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Hubei Institute of Fine Arts
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Cumulus Association

Narratives of Love

爱的阐释

Narratives of Love
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Narratives of Love

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ECO-VISUALIZATION STRATEGIES. Towards new narrative values for nature-inspired communication

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Abstract

The implications of Climate Change's increasingly visible effects pose an unprecedented threat to the planet. The depth of the global issue cannot be handled solely by technology solutions and top-down institutional initiatives. To inspire collaborative and participatory procedures that can impact decision-making authority from below, a deep transformation in people' thought patterns and lifestyles is required. According to this viewpoint, design performs a critical and highly responsible role in raising awareness of the environmental crisis. Understanding complex processes related to the current crisis necessitates a multidisciplinary approach to translating scientific findings into communication artifacts capable of informing, educating, and influencing society.

As Donna Haraway (2016) states, it is necessary to consider Nature as a dynamic and continuously evolving entity of human and non-human actors, social, cultural and technological factors. The survival of humankind depends on the awareness of the Planet as a unique and resilient entity, in which cooperation between living and non-living organisms is the key to guaranteeing the balance of the entire Ecosystem. Recognizing the multiple ways in which Nature responds and reacts to the crisis of our time can lead us to develop design strategies that are not only more effective but also more inclusive and sustainable, reducing the impact of our actions and the entropy generated by the processes that characterize the anthropocene era.

Through some personal research experiences, the contribution aims to describe how ongoing research aims to identify new eco-strategies applicable to the discipline of Data Visualization, with Nature-inspired approaches. It is in nature, and with nature, that important answers can be found to the gaps not only of the discipline of Data Visualization but, as its most recent evolutions demonstrate, of design in general.

Author keywords

data visualization; bioinspired; nature; eco-strategies; climate change; sustainability

Design and Nature

There are various global movements that are attempting to reshape the relationship between man, natural and artificial, with a post-anthropocentric vision. Not only have we gone beyond the concept of man at the center, but we are moving from a centric to a relational vision and this in Design is transformed, as Goodwin says, into a relationship between "the life of form" and the "form of life" (Goodwin 1994, 2007). The world of product design and material design has been working in this direction for some time now, where Biomimicry and Bio-inspired generate new products and new materials. As stated by the biologist and researcher Janine Benyus (1997), to



Figure 1. Quipu (Incas, 2000 B.C)

whom we owe the birth of the concept of biomimicry, it is precisely the figure of the designer who must take on the responsibility of tracing new trajectories for the project. Taking inspiration from Nature, not only from a formal point of view, but as a conceptual, structural and organizational model, can be the most effective strategy for creating new types of more sustainable products and services.

The question is whether also in the digital, and specifically in the Data Visualization are applicable Bioinspired processes that can evolve the discipline towards new and strong spaces of relationship with nature, for nature. [1]

Historically, there have been some case studies that demonstrate the systemic connection between artifacts, whether digital or not, with humans and nature.

Like the Quipu (Figure 1), a system of ropes and knots that the Incas used in 2000 B.C. to record events and information of all kinds related to the life, history and culture of the people and the territory. These artifacts appeared as real analog data visualizations defined by a series of codes described by node type, measure and distance. (Harley et al., 1987) Also Tegan Bristow (2020, 2021) with Vernacular Algorithms demonstrates how binary code and algorithmic thinking existed well before the advent of technology and how it was a tool able to contain and describe several dimensions simultaneously related to the human histories of peoples and places where they developed. The researcher finds how the geometric distribution of the beads of the African isizulu beadwork contained the recording of various systematized information such as community norms, values, reflections on the environment, tribal stories, personal experiences of love, loss, life, relationships, births and deaths. These are powerful examples of objects that showcase the relational dimensions between man, artifact and nature, with communication processes that can inspire us to better understand how we can move towards new models of eco-systemic and eco-ethical communication. It is indeed with nature that design can redefine its ethical sense.

[1] This contribution is part of a ongoing research within a PNRR MUR - MICS project “Circular and Sustainable Made in Italy” (CUP B83C22004890007)

Bio-inspired Data Visualization Processes

Nature offers an infinite variety of solutions and strategies whose application can be fundamental in design practice. The renewed interest in the observation of natural models demonstrates the need for a change of direction in the approach to design, with particular attention to the sustainability of processes and the reduction of impacts.

Considering that some living organisms have been spreading and thriving on earth for much longer than humans, we have the opportunity to learn from these new ways of creating in a way that is not only more harmonious, but also regenerative and in balance with what surrounds us. As Stefano Mancuso (2013) argues, the strength of the plant world lies precisely in its ability to store information and make decisions. The dense network that crosses the subsoil generates a complex communication apparatus within the plant system that allows the entire ecosystem to collaborate for common survival. The processing and transmission of information within the natural world and the elaborate adaptive system of some living organisms represents one of the most effective strategies to guarantee their survival even in particularly adverse environmental conditions.

The research argues that the key to imagining new information processing and visualization processes may lie precisely in this sophisticated communication system of the natural world.

The DIKW (Data-Information-Knowledge-Wisdom) model describes how Data (D) once aggregated turns into Information (I) which then leads to Knowledge (K) of a given phenomenon and consequent Wisdom (W). According to Nathan Shedroff (2000) and Lankow et al. (2012), it is defined as the most suitable model for describing the Data Visualisation process. In this section, we will show how and which bio-inspired solutions can be included in the Data Visualisation process by defining new data-eco-strategies orienting the discipline towards an eco-ethical dimension.

1. *From Data to Information-Data Walking:* Atlantic Wonder, the Summer School organized by the Art & Design Department - University of Madeira, explores the concept of learning-by-walking as an immersive methodology to learn within a natural environment. The Summer identifies walking not only as a tool that humans have always used to learn and explore, but also as a way to develop local literacy. The experience shows how this has been an effective tool for the activation of fruitful dialogues between people from different disciplines such as designers, biologists, historians, artists, and researchers, enabling new skills to deal with the issues of complexity with which design is currently struggling. During the workshop, several walks were organized with multidisciplinary groups and different tools (also from different disciplines) were used for observation and data collection. (Bertolotti & Vezzani, 2021)

In “Data Meditation, A Meditation for the Environment”[2] we investigate the relational dimension between individuals and the habitats and ecosystems in which, and with which, we coexist. In this artistic act, meditation and computational science come together to trigger reflections on issues such as the emergence of climate change. The workshop, with the final exhibition of a collective work at the Maxxi Museum in November 2021, involved 50 people who for seven days, in autobiographical form, described their perception of and relationship with the environment, as a self-reflection and self-representation becoming more aware of their relationship with their surroundings.

Atlantic Wonder and Data Meditation show how immersion in the real/natural environment makes it possible to identify in walking - or more generally in physical immersion - a nature-inspired data collection tool capable of generating new values in the way we can do data collection in a more sustainable, collaborative, ecosystemic, bottom-up, inclusive way. The environment and nature become a physical space of investigation and data collection to be experienced with the body, with walking. The nature-inspired data collection phase becomes a collaborative practice between humans and the environment where, regardless of one’s discipline, the act of

[2] https://www.maxxi.art/wp-content/uploads/2021/09/MOREINFO_OpenCall_DataMeditation.pdf

walking "facilitating immanent, often unexpected experiences" (Edensor, 2010).
There are several studies that show how walking can be a powerful design tool (Careri, 2006; Edensor, 2010; Pierce & Lawhon, 2015; Kagge, 2019) considering it useful for the reading of complexity for it is capable of containing, in a single act, space, time, scientific knowledge, community, culture, economy, and more.

2. *From Information to Knowledge-Sensing Chromatism:* color perception allows us to create a highly stratified substrate of symbolic levels in nature, just as it does in visual communication: attract attention or raise an alarm (aposematism[3]) (figure 1), re-establish balance with the surrounding environment, clarify a message, and much more (Eisner and Grant, 1981).
Even humans constantly use color's polyphonic feature to communicate with other members of their species, for this reason they have assigned symbolic values that vary as the different semantic meanings vary and are strictly conditioned by the social and cultural context (Schneider and Nocke, 2017). In the context of communicating the environmental crisis, color is one of the essential elements for representing complex data regarding the climate in an intuitive and accessible way, especially when the reference target is the general public. Over time, even people who are not experts in climate science have learned to read heat maps, to associate specific colors with numerical data and understand that if a geographical area takes on dark red or purple tones, the temperatures reached are thus extreme enough to represent a potential danger to life itself. As has also emerged with the Covid-19 pandemic, data visualization is a very powerful tool, not only to inform political decisions, but also to help people respond to risks that threaten their way of life (Hawkins, 2020).
Visualizing the climate crisis is even more complex because the data does not always express conditions that have immediate effects in the present, as in the case of the pandemic, but greater effort is needed to imagine future repercussions. According to some recent studies published in Nature journal, color is one of the main indicators of a changing planet. In the era of "global boiling" (Guterres, 2023), the oceans will become greener (Cael et al, 2023), the coral reef will lose its bright colors and many other living organisms will change their colors to adapt to a climate increasingly hostile (Koneru and Caro, 2023). Also for this reason, the flow of emotions generated by "semantic association" makes the choice of color a fundamental step in the systematization of data and one of the main elements in the translation of complex information into a communicative artifact.
In recent years NASA has been sharing fascinating scientific visualizations on social media that illustrate complex phenomena in an engaging and intuitive way. The problem of how to make the reading of complex scientific phenomena accessible through data visualization has always been a constant in the world of science, which is why we are always looking for effective visual solutions to reach a wider audience. Recent studies on scientific visualizations promote the use of color palettes inspired by nature to improve the effectiveness of the representation of complex phenomena. In the hard sciences, some researchers are already proposing the replacement of standard data-independent maps (such as the traditional rainbow, viridis, cold-hot divergent, Jet and Turbo) with new scientific color maps (Crameri, 2020), whose goal is to more accurately translate complex datasets while reflecting the palette of the natural world. Through the principles of "semantic association" it is possible to experiment with the use of new colors with the aim of searching for visual analogies that better describe the topics displayed. (Samsel et al., 2018).

[3] Aposematism is an animal's way of telling potential predators that it is not worth attacking or devouring. This unprofitability can be attributed to any protections that make the prey difficult to kill and consume, such as toxicity, venom, unpleasant taste or odor, sharp spines, or aggressive disposition. These advertising cues might be visible color, sounds, odors, or other perceptible features. Aposematic signals benefit both predator and prey by avoiding possible injury.



Figure 2. Granulated poison arrow frog via WikiCommons.

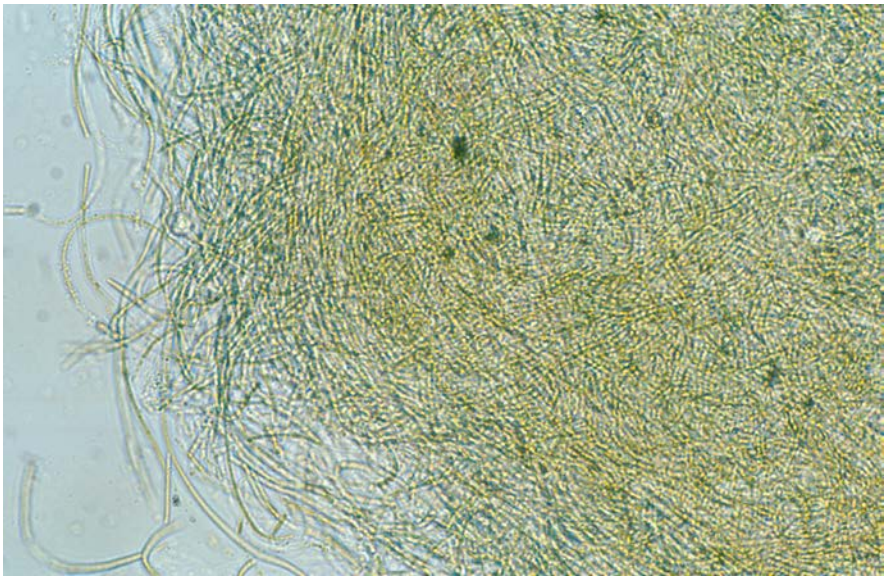

Figure 3. Blue-green algae species via WikiCommons

3. *From Knowledge to Wisdom-BioViz:* the Material Experience Lab[4] has been experimenting for some time within the emerging field defined as Biological-Human Computer Interaction, also known as bio-HCI, i.e. using micro-organisms as Living Media Interfaces (LMI) and Living Bits towards a design that connects living organisms (Figure 3), such as algae, bacteria and fungi, and the digital world. The use of living organisms in interactive design elements, offers unique reactive behaviors for new functions and interaction possibilities.

Specifically, the team of researchers has developed FlavoMetrics, a tool that aims to support bioprojectists in the exploration and rapid iteration of projects with Flavobacteria. The tool is based on computer graphics

[4] https://materialsexperiencelab.com

and simulations, providing a representation of the living aesthetics of Flavobacteria, including iridescence and reactive behavior. Users can manipulate parameters such as growth, humidity and lighting conditions to see how these changes affect the appearance and behavior of the organism. (Risseeuw et al., 2023)
Using living organisms as new digital interface systems is a cutting-edge issue, especially applied to the field of Data Visualisation, where we could start talking about BioViz. Replacing the digital experience completely with a natural one is innovative in several respects: (i) lowering or drastically reducing the energy consumption for Data Visualisation; (ii) providing a far more empathic and immersive experience, bridging some of the gaps still present in this field; (iii) establishing new natural projects.

Towards new narratives values for nature-oriented communication

The ongoing research currently allowed, through some experiences, to explore this relationship between design, man and nature outlining possible future innovative directions applicable to new design processes. Specifically, the issues explored concern: (i) the role and responsibility of communication - such as exhibition routes and Data Visualisation - as activators of behavioral change; (ii) nature as a spontaneous source of data and information for the design project.

1. *Sustainability narratives; science as a bridge*: the *BLIND UNTIL FINAL ACCEPTANCE* exhibition project created as part of the *BLIND UNTIL FINAL ACCEPTANCE* festival is dedicated to the imagination of new sustainability scenarios. The objective is to highlight the urgency of rethinking our way of being human as an integral part of Nature itself, thus abandoning the idea of moral superiority over everything that is not human. According to environmental historian Marco Armiero (2021), it is vital to merge social and environmental justice. Not only should man and nature be regarded as a unified organism, but environmental conservation is also a necessary prerequisite for protecting our very means of survival. The exhibition itinerary, divided into five sections, brings together a collection of works by national and international designers who present a variety of new ecological, social, technical, and cultural paradigms
through both a practical and philosophical approach. The exhibition's goal is to enlighten and alter viewers through the presentation of science-driven artifacts that highlight ethical-social and environmental challenges and show new methods of sharing and connection between humans and non-humans. It is precisely in the relationship between scientific fact and art that an important innovative value is recognized in this exhibition on which to explore future developments in order to fill those gaps relating to the communication of values such as sustainability or raising awareness on the issue of emergency, such as the climatic one (figure 4).
The necessity of having a path that is primarily based on scientific evidence of the environmental and societal crises helps to increase the viewer's feeling of confidence, helping him in comprehending complicated topics through the designers' creative vision.
This exhibition prioritizes sustainability in its conception and realization. It minimizes the CO2 impact by physically exhibiting local artworks, while using digital storytelling for distant works. The design of the exhibition is essential and incorporates existing local solutions. Materials were chosen for their longevity and potential for reuse, while the local stand design company is responsible for repairs. CO2 emissions were reduced by more than 20% compared to a similar exhibition through careful planning and the use of online tools such as Gallery Climate Coalition.
The positive reviews from the audience of *BLIND UNTIL FINAL ACCEPTANCE* confirms that through the combination of science and art it is possible to increase the involvement and interest of the public and raise awareness about human-to-nature relations and the impact these dynamics have on the surrounding environment and society. In fact, through a sample survey carried out at the end of the exhibition, 80% of visitors



Figure 4. MB > CO2 by Thijs Biersteker, one of the displayed artworks.

said they felt emotionally involved by the works on display and had understood in a clear and comprehensive way complex issues thanks to the evocative and narrative power of the artifacts present in the exhibition.

2. *Sound-datafication. Environments and nature as a spontaneous data source:* in the *BLIND UNTIL FINAL ACCEPTANCE* and *BLIND UNTIL FINAL ACCEPTANCE* projects, the relationship between humans, disruptive technologies and the environment (whatever it may be) is explored, trying to understand how to find new design strategies in order to create a balance in this complex relationship.
Specifically, both projects open up possible processes of using sound as a spontaneous source of data and as a tool for reading and describing complexity, but above all for the design process. Furthermore, both recognise the tool of walking - as described previously - as an important design tool capable of connecting the designer to the community and place towards a post-colonial approach to design.
Specifically, *BLIND UNTIL FINAL ACCEPTANCE*-an international project involving artisans and students from Italy, Colombia and Brazil - aims to explore, through a multidisciplinary and multicultural process, new processes that link the material world from the immaterial one, in relation to traditional craft. Materiality is recognisable both in the range of physical-environmental scales in which the craftsman acts - work space, urban space/neighborhood, territory/region - and in the materiality of the objects he daily creates. Immateriality is recognisable in the values of tradition and in the spectrum of emotions he pours into the object. The power of disruptive technologies in this project is in the bridging of these poles, leading to new scenarios and new skills and knowledge.
The project involves collecting data describing the relational dimension between the various environments in which the craftsman operates, trying to understand in how many and what possible ways the material and immaterial dimensions can be read and recorded. The data turned the immaterial layers visible, transforming them into input for the craftsman's project, with the possibility to modify its form, becoming DNA of it.
BLIND UNTIL FINAL ACCEPTANCE- an ongoing thesis project that mixes art and culture of Italy and Madagascar - explores even more deeply this relationship between sound, environments and traditional craft. Specifically, the project combines soundscape studies and data visualization transforming the different scales of the sound

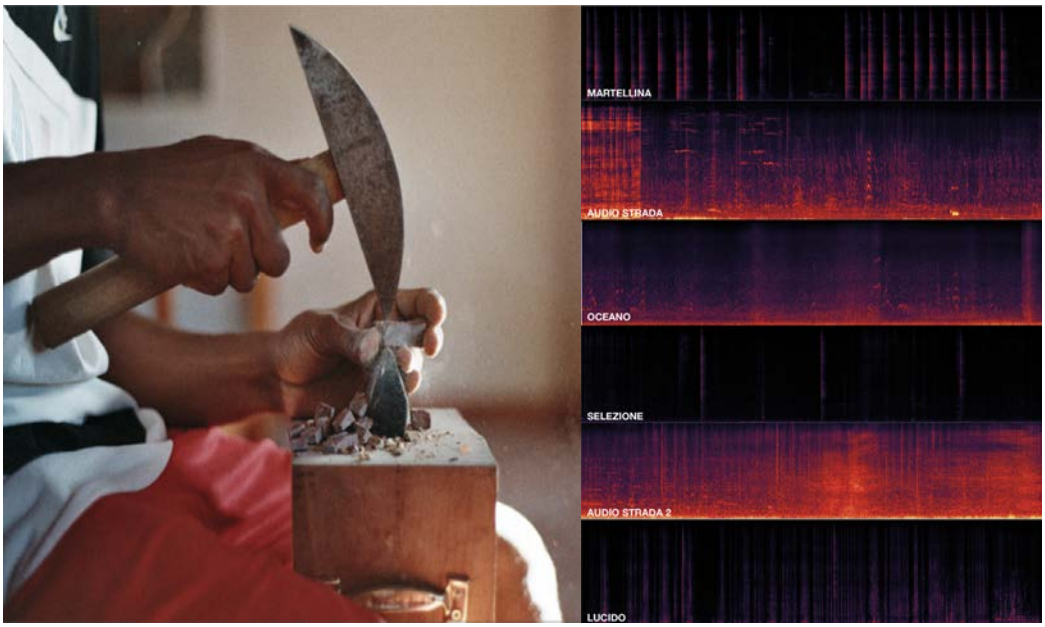

Figure 5,6. Mosaic work-space environment in Madagascar and the sonorogram of recorded sound.

landscape - territorial, urban, domestic - into a source of data: a process that we can define *sound-datafication*[5]. The acoustic ecology defines the soundscape as the description of the relationships between living organisms and their environment, showing acoustic identity of a place and the relationship between the community and its places. (Truax, 2001) The ongoing project aims to create physical data visualization in the form of mosaics built with local stones involving people from the local community.

Through the recording of the sounds in some places of Madagascar, in the three different scales, datasets have been obtained that describe different sound levels such as: the sounds typical of the gestures of mosaic art - hammer, brush, etc.; the sounds of the production environment - people's voices, set of the sounds of gestures, noises from outside; and the sounds of the urban and territorial scale - neighborhood, market, street, forest, sea. (Figure 5,6)

At the end of the process it is expected the prototyping of an object that represents the data visualization of the sound stories collected and that also become, as in *BLIND UNTIL FINAL ACCEPTANCE* DNA of the object. These objects will be material containers of intangible information that narrate the complexities of the relationships between man, artifact and nature, as Quipu were and as are still today the African isizulu beadwork.

Conclusions

The research shows developments in what we call Eco-Visualisation strategies that can lead to new narrative values for nature-inspired communication. Biomimicry and bio-inspired processes are identified as fundamentals for the creation of innovative design processes, especially in this age of climate change emergence. The research aims not only to redefine the relationship between humans, technology, and the environment in a sustainable and empathetic way, but also to lower the impact of consumption in design processes, especially digital ones.

[5] The relationship between data and sound is not new and can be found in various disciplines, from art to science, but generally we speak of data-sonification where the data is transformed into a sound signal. In this research, the process is reversed and we speak of sound-datafication where sound becomes data, ready to be integrated into the Design process and project.

Approaches such as data-walking, sensing-communication and BioViz are only first attempts at a possible radical transformation in the field of Data Visualisation.
Future research developments will in fact proceed with a series of quantitative and qualitative tests on the topics of Data Visualisation representation and perception through bio-metric UX tests to explore and validate new design languages of bio-inspired communication.

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Narratives in Biodesign – History (part 1)

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Abstract
This is the first part of a study that endeavors to enhance the depth of theoretical comprehension concerning the discipline of Biodesign. Such work efforts are imperative for establishing a robust background encompassing this developing field's thematic, conceptual, critical, and methodological aspects. An exhaustive literature review centering on the "Design and Nature" theme has been undertaken. This review extends from historical contextualization that intertwines Design and Ecology narratives to encompass contemporary design strategies, such as Biomimetics, Cradle-to-cradle, and Biodesign.

Author keywords
Biodesign; Design and Ecology; Narrative; Literature Review; Design History

Introduction

It is essential to acknowledge that Biodesign is an emerging field, formally delineated slightly over a decade ago, as discussed in subsequent sections. Within the scope of this text, our research endeavors to delve into the intricacies of the relationship between Biodesign and Ecology. Our primary objective lies in the historical contextualization of Biodesign, achieved through a meticulous examination of ecological approaches and an exploration of the contemporary design strategies that interface with the natural world.

Methods

An exhaustive literature review was conducted to accomplish our goal, comprising the analysis of 85 articles, deliberation upon 33 books, evaluation of 8 exhibitions, and 10 videos on the realm of Biodesign and its associated subjects.
Noteworthy contributions to the discourse, particularly those entwined with the theme of "Design and Nature," merit mention. These seminal works encompass articles from Blanco-Wells (2021), Camere and Karana (2018), Ciuffi (2013), Collet (2017, 2020), de Pauw et al. (2014), Ertürkan et al.(2022), Esat and Ahmed-Kristensen (2018), Ginsberg and Chieza (2018), Karana et al. (2020; 2010, 2018, 2017),E. B. Kennedy (2017), Myers (2018a, 2018b), and Rognoli et al. (2015).
Additionally, we have also consulted texts rooted in the domain of Design and Sustainability, which include the contributions of Brink et al. (2009), Ceschin and Gaziulusoy (2016, 2020), Doordan (2013), Escobar (2018), Fuller (1998), Hinte (2016), Oropallo (2017), Papanek (1984), and Van Helvert (2016).

Nature in Design: a brief historical overview

For this historical analysis, we establish the genesis of the Design discipline by starting with the advent of the Industrial Revolution in the 18th century, situated within the backdrop of England. This epoch was distinguished by the transformation of manufacturing processes, catalyzed by exploring novel energy resources and groundbreaking technological advancements. These innovations facilitated the heightened utilization of machinery and exerted a degree of control over industrial processes and the natural environment.

Cunca (2006) explained that the resultant economic paradigm shift, characterized by escalated production rates and concomitant cost reductions, was pivotal in reshaping societal dynamics. Among the myriad changes that transpired, one of the most notable was the segregation of functions essential for optimizing manufacturing processes.

19th Century

Within the historical purview of the English context in the 19th century, several prominent figures emerged within the realm of design. Foremost among them is William Morris, a luminary who spearheaded the Arts and Crafts movement. Morris fiercely criticized rationalism and the consequences of mass industrialization. His creative work, rooted in the decorative arts, celebrated nature and craftsmanship, and his ideological perspective manifests in rejecting industrial methodologies and the societal structures underpinning them. Morris even alluded to pollution as a pernicious byproduct of industrialization. However, it remains a matter of debate whether Morris's vision of harmonizing with nature reflects a nostalgic longing for a bygone era or a pioneering articulation of sustainable design principles, as elucidated by Oropallo (2017).

A prominent English design theorist, Owen Jones, left an indelible mark on the field. He authored the seminal work "The Grammar of Ornament" and formulated essential criteria for the artifact's design akin to Henry Cole, a prominent English designer. Jones advocated that the most superlative design principles should draw inspiration from the organic forms inherent in nature (Victoria and Albert Museum, n.d.). Like Cole, Jones also served as an educator, disseminating his ideas at the Government School of Design, now known as the Royal College of Art.

One of Jones's distinguished students within this institution was Christopher Dresser, a botanist of eminent academic stature who transitioned into a celebrated designer. Dresser, a proponent of industrial production, earned notoriety for his remarkable versatility in crafting objects from diverse materials and for his collaborations with numerous enterprises. As elucidated by Hugerth (2019), Dresser's seminal work, "The Art of Decorative Design", 1862, along with other publications, delved into design principles underpinned by the abstraction of botanical forms. This approach underscored Dresser's botanical background and persistent belief that a designer should not merely mimic natural forms but apply the underlying principles of nature to Design.

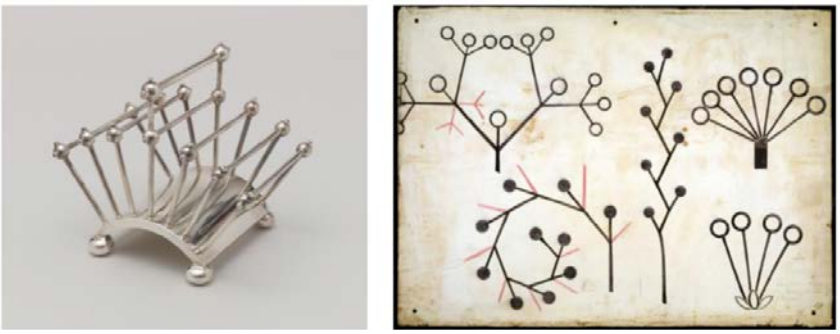

Figure 1. Design and nature in the work of Christopher Dresser, metal toast holder, on the left (Cooper Hewitt Museum website, 2023) and diagram to illustrate design classes, 1854-56, on the right (Victoria and Albert website Museum, 2023)

The interplay between Design and the natural world during the 19th and early 20th centuries extended far beyond the boundaries of England, resonating throughout Europe. Notable figures in this context include Antoni Gaudí in Spain, Raphael Bordallo Pinheiro in Portugal, Victor Horta in Belgium, and Otto Wagner in Vienna, among many others, all associated with the Art Nouveau movement and its multifaceted elements.

20th Century

Subsequently, as we transitioned into the early 20th century, many architects and designers continued to draw inspiration from nature as either a model or a guiding principle for their creative endeavors. Notable examples include Alvar Aalto, Frank Lloyd Wright, and the Metabolist architectural movement that emerged in Japan (Myers, 2018a).

By the 1930s, "Biomorphism" began gaining prominence (Tate, n.d.). This term denotes using abstract forms that evoke the contours of living entities, such as plants and anatomical features (MoMA, n.d.). Biomorphism is occasionally employed to characterize design objects, exemplified by Isamu Noguchi's 1944 coffee table (Official Vitra Website, n.d.).

During the latter half of the 20th century, a notable shift towards incorporating organic and fluid forms became evident. In the 1960s, Luigi Colani emerged as a prominent figure in product design, characterizing his work as "Biodynamic" Design. Colani's creative approach bore a profound affinity with Biomimicry, encapsulated in his assertion that "we should look to the superiority of nature for the solutions. If we want to tackle a new task in the studio, then it's best to go outside first and look at what millenia-old answers there may already be to the problem". (Design Museum, 2015).

Colani was a reference for several designers and architects at the turn of the millennium, known for using digital tools and organic forms, such as Ross Lovegrove, Karim Hashid and Zaha Hadid (Pownall, 2019). Unfortunately, even with this evolution, the domain of Industrial Design in the 20th century ultimately positioned it as one of the most environmentally detrimental professions, as expounded by Victor Papanek (1984).

First ecology approaches in Design: Fuller and Papanek

The emergence of ecological perspectives within the realm of Design finds its roots in the mid-20th century, a period marked by a significant industrial transformation following the upheaval of the early 20th-century wars. This industrial growth had a visible and unsettling impact on the delicate ecological equilibrium (Oropallo, 2017), and the environmental movement gained strength in the 60s and 70s. In 1969, Buckminster Fuller authored the seminal work "Instruction Manual for the Spaceship Earth." Although Fuller was not a pioneer in harboring environmental concerns, he distinguished himself as the first to integrate these concerns into the domains of Engineering and Design (Ceschin & Gaziulusoy, 2020).



Figure 2. "Coffee Table", Isamu Noguchi, 1944, on the left (Official Vitra Website, 2023). "Pegasus Piano", Luigi Colani, 1997, on the right (Website Noise Addicts, 2023)

Fuller's book espoused a visionary perspective for its era, emphasizing the significance of interdisciplinary collaboration, critiquing specialization, and highlighting interconnectedness. His writings also critiqued the wasteful depletion of natural resources. However, it is worth noting a pronounced anthropocentric viewpoint permeating his work, evident in passages such as: "All other living creatures were designed for highly specialized tasks. Man seems to be unique as a coordinator and global understander of events" (Fuller, 1998, p. 6). This perspective aligns with Fuller's overarching analogy, comparing planet Earth to a machine, a "mechanical vehicle, exactly like a car" (p. 30), implying the capacity for human mastery and control. Fuller's concept of the "spaceship earth" must be contextualized, as he symbolizes his reference to the planet's finite resources and the boundaries of human agency - a pioneering notion for his time.

Nevertheless, two pivotal figures in Ecological Design during the 1970s were Meadows, who wrote "The Limits to Growth" in 1972, and the renowned designer Victor Papanek, author of the seminal work "Design for the Real World". This leading-edge treatise, written between 1963 and 1970, was initially published in Sweden in 1970 and subsequently in the United States in 1971. The book is renowned for its incisive critique of the design profession, exposing its complicity in fostering rampant consumerism and exacerbating ecological and social degradation (Ceschin & Gaziulusoy, 2020).

Papanek, in the latter section of his book, authored the chapter titled "The Tree of Knowledge: Biological Prototypes in Design," where he explored the concept of Bionics (also referred to as Biomimetics, as we shall later discuss). He defined Bionics as "the study of the fundamental principles of nature and the application of these principles and processes to human needs" (p. 186). While Papanek's perspective was inherently anthropocentric, his primary objective was to underscore the imperative for designers to delve into the study of Biological paradigms. He lamented that the "manifestations of nature" surrounding us remained underexplored and underutilized by designers (p. 194). Papanek substantiated his argument by presenting numerous examples of how designers can draw analogies from the natural world, or Biological prototypes, to generate creative insights. These examples spanned various domains, including Ethology, Anthropology, and Morphology.

> *Design, if it is to be ecologically responsible and socially responsive, must be revolutionary and radical in the truest sense. It must dedicate itself to nature's principle of least effort, in other words, maximum diversity with minimum inventory ⋯ or doing the most with the least. This means consuming less, using things longer, and being frugal about recycling materials. ⋯ In many areas, designers must learn how to redesign. In this way we may yet have survival through design. (Papanek, 1984, pp.346–347)*

Design and Nature: Strategies

As a result of profound reflection within the Design community concerning their role amidst the environmental crisis, the late 20th and early 21st centuries witnessed the emergence of several publications. Brundtland (1987) reinforced the problems of environment and development in "Our Common Future", and the relationship of Biology and Materials was the main topic of Alper (1992). The list continues with important texts as "Strategic Design for Sustainability: Towards a New Mix of Products and Services" by Manzini (1999); "The Perception of the Environment: Essays on Livelihood, Dwelling and Skill" by Ingold (2000); "Bio Design Products: Co-Design with Nature" by Koivumen (2005); "Bioprinting: a beginning" by Mironov, et al. (2006 e 2009); "Design for Environmental Sustainability - Life Cycle Design of Products" by Vezzoli (2008); among others.

Within the confines of this narrative, however, our attention will be directed toward strategies that establish a nexus between Product Design and the natural world. Prominent among these are Green Design (Maldonado, 1970/72; Ceschin & Gaziulusoy, 2020), Ecodesign (Ceschin & Gaziulusoy, 2020; de Pauw et al., 2014), Natural Capitalism (Karana et al., 2010), the Repair Movement (Oropallo, 2017), Industrial Ecology (Myers, 2018a), and

Biophilia (Wilson, 1984), among many others (Brink et al., 2009). In this study, we analyze three nature-inspired design strategies: Biomimetics, Cradle- to- Cradle and Biodesign, which provide theoretical and practical support for an updated reflection on Design and Ecology.

Biomimicry

Termed interchangeably as Bioinspiration, Bionics, or Biomimicry (Kennedy, 2017), this strategy constitutes the emulation of natural processes and forms to devise innovative solutions (Ceschin & Gaziulusoy, 2020; de Pauw et al., 2014). Nature is perceived as an exemplar, a source of inspiration, a measure for estimating viability, and an educator rather than a mere reservoir of resources to be extracted. As elucidated by Benyus (1997), "Nature manufactures its materials under conditions favorable to life, in water, at room temperature, without aggressive chemicals or high pressures" (p. 97).

Janine Benyus is widely credited with coining the term in her seminal 1997 book "Biomimicry." In this work, she provides practical illustrations of how natural principles can be applied across diverse contexts. She posits that nature serves as an exemplar and an instructive evaluator guide, emphasizing the intrinsic sustainability of a project or approach. However, it is imperative to acknowledge that Biomimetics is not inherently sustainable, as solutions inspired by nature may not always confer environmental benefits (Ceschin & Gaziulusoy, 2020).

Biomimicry is possibly the most popular design strategy that bridges Design and Nature in contemporary times. Its prominence is manifest through various avenues, such as the release of the film "Biocentrics" (2022, Brazil) and the widely recognized platform "Ask Nature" (asknature.org). The latter provides a forum where individuals from diverse backgrounds can pose inquiries and explore existing natural solutions. Biomimicry has also witnessed extensive integration into educational curricula, covering a spectrum from Design courses (de Pauw et al., 2014) to interdisciplinary higher-level programs (Kennedy et al., 2015), and even extending to students of school age, including children.

Cradle-to-Cradle

In 2002, Michael Braungart and William McDonough unveiled their seminal work, "Cradle to Cradle: Remaking the Way We Make Things," which delineated and expounded upon a pioneering design strategy. Distinct from the conventional paradigm of designing for recycling, which, in the authors' perspective, merely strives to render products "less detrimental," their approach advocates the pursuit of "eco-efficiency."

They accentuate several fundamental principles derived from nature to inform design principles, encompassing the notion that waste is nonexistent, replaced by an abundance of nutrients, a reverence for harnessing solar energy, and a celebration of diversity.

The central idea of the Cradle-to-cradle framework is "borrowing" materials from nature. Within this paradigm, all products are envisioned to be integral components of cyclical systems, whether biological or technological (McDonough and Braungart, 2002). In the technological cycle, materials are regarded as serviceable entities. Alternatively, in the biological cycle, product materials are directly returned to the biosphere through compost or other nutritive elements, from which fresh materials can be regenerated.

Biodesign

> *Biodesign harnesses living materials, whether they are cultured tissues or plants, and embodies the dream of organic design: watching objects grow and, after the first impulse, letting nature, the best among all engineers and architects, run its course. (Antonelli, 2018, p.7)*

The majority of scholars define Biodesign as a strategic approach that incorporates living entities within its

processes to generate alternative sustainable materials or products (Camere & Karana, 2018; Collet, 2017; Ertürkan et al., 2022; Karana et al., 2020; Myers, 2018a). Myers elucidates that biodesign transcends mere imitation, aiming for seamless integration, erasing the boundaries that traditionally separate natural and constructed environments, and forging hybrid typologies (Myers, 2018a, p. 8). Moreover, he declares that by harnessing biological processes, Biodesign experiments possess the potential to supplant industrial processes while requiring fewer resources in terms of materials and energy.

In consonance with Myers' perspective, numerous authors contend that Biodesign heralds a new frontier or represents a paradigmatic shift in the field of Design (Esat and Ahmed-Kristensen, 2018; Karana, 2020; Mironov et al., 2009).

Ginsberg and Chieza adopt a more expansive perspective, defining it as the practice of Design that operates concerning Biology, encompassing three fundamental modes: "of" Biology, "with" Biology, and "from" Biology. In this multifaceted approach, Biodesign emerges as a conduit for offering novel perspectives for humankind and other living entities (Ginsberg & Chieza, 2018). These authors underscore that Biodesign, while perceived as a contemporary phenomenon, is rooted in historical practices such as the refinement of organisms through selective processes, an age-old practice notably exemplified in agriculture and animal husbandry. Ginsberg and Chieza (2018) articulated that their perspective carries a more societal than technological dimension, rendering it inclusive of both traditional and contemporary practices. It embraces diverse methods, processes, spaces, and agents as constituents of Biodesign. The authors also caution that, despite Biodesign´s intent to challenge the prevailing industrial paradigm, this strategy risks merely substituting usual products, thereby reinforcing existing systems, markets, and their ecological footprints, rather than manifesting the transformative potential it promises.

Some researchers extend the boundaries of Biodesign to encompass properties of formerly living organic elements (Esat & Ahmed-Kristensen, 2018; Mironov et al., 2009). This inclusive stance allows for considering Biodesign processes that do not directly involve living organisms in manufacturing, such as materials crafted from dehydrated algae sub-components (Karana & Camere, 2017). Consequently, the expansive domain of Biomaterials becomes an integral Biodesign facet. Whether involving living organisms or not, Biodesign invariably relies on organic materials and remains commited to principles of ecology and regeneration.

The significance of interdisciplinarity within the realm of Biodesign is noteworthy. Biodesigners frequently seek information and collaborate with diverse disciplines outside the Design domain, often drawing from fields closely associated with Sciences. Nonetheless, it is imperative to acknowledge that scientists bring distinct perspectives and problem-solving approaches. This exchange between design and science engenders opportunities but also presents challenges. In this context, Biodesign professionals cultivate learning strategies across diverse areas even without specialized training. This adaptability empowers them to spearhead projects rooted in their concepts and ideas (Bandoni et al., 2022).

Conclusion

A comprehensive literature review was conducted to delve into the historical context of Biodesign while also examining the commonalities between Design and Nature articulated by various authors. Three nature-inspired design strategies were thoroughly expounded upon, emphasizing Biodesign.

Biodesign has experienced significant growth in recent years, encompassing interdisciplinary advancements in material and product development. The emerging Biofabrication technologies, an inherent part of Biotechnology, are progressively recognized as environmentally friendly and therefore promising approaches toward achieving cleaner production methods.

In this research, a noticeable predominance of authors hailing from or situated in the global north became apparent. This inclination can be attributed to Biodesign being rooted in Europe and the Industrial Revolution. Nevertheless, numerous communities in the global south maintain close ties with Nature and the principles underlying what we now identify as Biodesign. It could be discerned in many other practices, particularly those rooted in Traditional Crafts or Indigenous Knowledge Systems. Similar to some of the authors presented in this study, there is a belief in expanding the term to ensure that this approach is not confined to a specific technology or era. Instead, it should be associated with the extensive awareness that we continuously engage in a reciprocal relationship with nature. Moreover, we could envisage a form of Design thoughtfully orchestrated to nurture life on our planet.

Acknowledgments

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Narratives in Biodesign–Terms and Frameworks (part 2)

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Abstract
This paper is the second part of a study aimed at increasing the depth of theoretical reflections on the emergent discipline of Biodesign. In pursuing a comprehensive understanding of the terminologies pertinent to the domain of Biodesign, we have ventured beyond the confines of this discipline, drawing upon narratives from diverse fields of knowledge, such as Medicine and Engineering. We have scrutinized schematic representations from various authoritative authors, elucidating the foundational components of Biodesign. As a culminating effort, we proposed frameworks and a timeline to facilitate a more accessible and coherent comprehension of this multifaceted field.

Author keywords
Biodesign; Design and Ecology; Narrative; Terminology; Frameworks

Introduction

> *Biodesign goes further than other biology-inspired approaches to design and fabrication. Unlike biomimicry, cradle to cradle, and the popular but frustratingly vague 'green design design', biodesign refers specifically to the incorporation of living organisms as essential components, enhancing the function of the finished work. It goes beyond mimicry to integration, dissolving boundaries and synthesizing new hybrid typologies. The label is also used to highlight experiments that replace industrial or mechanical systems with biological processes." (Myers, 2018, p.8-9)*

When reading relevant Biodesign authors, such as Myers (2018a, 2018b), Collet (2017, 2020) or Karana (Camere and Karana, 2018; Karana et al., 2010, 2019, 2020), just to name a few, it is noticeable that their definitions and frameworks have significant differences. It calls attention to how they describe similar Biodesign techniques but refer to them with different names.
This study clarifies the terminology utilized in Biodesign inside the Design field, acknowledging that its terms might have originated in other knowledge areas but differ from those in concept. The study also compares existing Biodesign frameworks published by different authors.
To enable the comprehension of Biodesign, we propose two frameworks to ease the understanding of Biodesign projects. We also propose a timeline with Bioedesign themes and authors, facilitating access to knowledge on nature-inspired design.

Methods

Besides the exhaustive literature review mentioned in the article 'Narratives in Biodesign – History (part 1)', we have drawn upon texts from diverse disciplinary domains to elucidate the terminological nuances inherent to the field of Biodesign. These encompass the works of Benyus (1997), Mironov et al. (2009), Pavlovich et al. (2016a, 2016b), and Trifonov (2011).

We must note that our research draws strength from diverse sources and experiences. In 2022, site visits were conducted by Bandoni to prominent Biolaboratories, including Mediamatic and Open Wetlab in Amsterdam, Blue City Lab Rotterdam, Delft University, and Biolab Lisbon. Furthermore, interviews were undertaken with biodesign practitioners across Europe and Latin America, with comprehensive details documented in Bandoni et al. (2022). Additionally, practical experiments were executed as part of the Cuia Colab project in the Amazon Forest region, in 2022.

Paoliello's involvement in the Cocoon Project, an Erasmus initiative related to Biodesign and Biofabrication, further enriched the research. This collaborative endeavor involved partnerships with esteemed institutions: COFAC and BIOPOLIS from Portugal, AALTO from Finland, IAAC from Spain, FB from Iceland, PUC-Rio in Brazil, and HBBE in the United Kingdom.

The amalgamation of insights derived from this multifaceted array of primary and secondary sources has enabled us to articulate a comprehensive and contextually nuanced narrative of Biodesign.

Biodesign Terminology

The widespread use of the prefix 'bio,' denoting life, sometimes conveys the impression of a trend similar to the proliferation of 'eco' or 'green.' While it is true that Myers (2018a) promoted the term, the concept of collaboratively producing or creating from living elements had already found expression in Biofabrication. So Biofabrication, a long-standing history in Biomedical sciences and Engineering, is a foundational underpinning for Biodesign (Karana, 2020).

Biofabrication, as initially conceived within the medical sphere, represents an interdisciplinary domain intersecting Biology, Material Sciences, and Mechanical Engineering (Mironov et al., 2009). In more contemporary terms, it has been reconceptualized as a transformative approach to healthcare, employing manufacturing processes to generate a spectrum of products, encompassing Biomaterials, devices, cells, tissues, and even organs (Pavlovich et al., 2016a). However, it is pertinent to differentiate Biofabrication from Biomanufacturing, the latter entailing the manipulation of drugs and molecules utilizing living cells (pharmaceutical area).

Diverging from the medical sphere, Biofabrication inside Biodesign refers to one of the techniques for engaging with living organisms (Collet, 2017, 2020). To clear potential confusion, some scholars characterize it as "Growing design" (Karana & Camere, 2017). This technique positions nature as an active collaborator in the Design process. Here, the designer transitions into a cultivator, nurturing and orchestrating the morphological development of materials through collaboration and cooperation with natural organisms, such as bacteria, fungi, or algae (Collet, 2020a, p. 1334). Camere and Karana (2018) and Moisy and Pschetz (2017) elucidate that, as materials are "alive" and "unpredictable", this technique fundamentally alters the conception of materials, the trajectory of the process, and the approach adopted by designers.

Likewise, Synthetic Biology, which resides within Biology, may be regarded as a Biodesign technique involving manipulating organisms to generate specific products. In this technique, nature is a "hackable system" (Collet, 2020), allowing designers to conceive and execute speculative projects, thereby providing an arena for exploring and pushing technological boundaries to their limits.

Analysis of Biodesign Diagrams

In order to enhance comprehension of Biodesign, Collet introduced a conceptual framework in 2013, which illustrates three distinct ways in which Nature interfaces with Design: as a model, as a collaborator, and as a hackable system. Subsequently, in 2020, Collet refined this framework, now termed the "Biodesign Framework," encompassing four distinct processes (figure 1): Biomimetics, Synthetic Biology, Biological-Based Materials, and Biofabrication (Biointegration).

Collet's point of departure hinges on the various perspectives through which nature can be perceived within the realm of design - namely, as a model, collaborator, resource, or system. While the author provides illustrative examples of these perspectives, the specific techniques and resource types (living or non-living) remain open-ended, leaving certain aspects unspecified.

In parallel, Camere and Karana (2017, 2018) proffer a framework elucidating biological approaches to Design, encapsulating four distinct possibilities: 'Growing design,' 'Augmented Biology,' 'Digital Biofabrication,' and 'Biodesign Fiction' (figure 2). The authors support their framework with many Biodesign project-cases, elucidating the instances that cross the intersections of two or more of these approaches.

It can be deduced that Camere and Karana´s approaches indeed allude to specific techniques, and noteworthy parallels can be drawn between this framework (figure 2) and Collet's (figure 1), for instance "Growing Design" aligns with "Biofabrication" and "Nature as a partner".

In a distinct disposition, Esat and Ahmed-Kristensen (2018) present a taxonomy of Biodesign applications, with the point of departure being the material and the final products themselves. Initially, they categorize products into two primary groups: those crafted from living organisms and those derived from 'lifeless' biomass. They also acknowledge that these categories can be further subdivided, considering factors such as the presence of genetically modified organisms (GMOs) in the production process (figure 3).

These authors define Biodesign as "a novel frontier in design research which incorporates the lifelike properties of living or once living organisms and their processes and their reappropriation to human-facing contexts and industries." (Esat & Ahmed-Kristensen, 2018, p.1031). Consequently, the authors deliberately choose to encompass non-living organic elements within the scope of Biodesign.

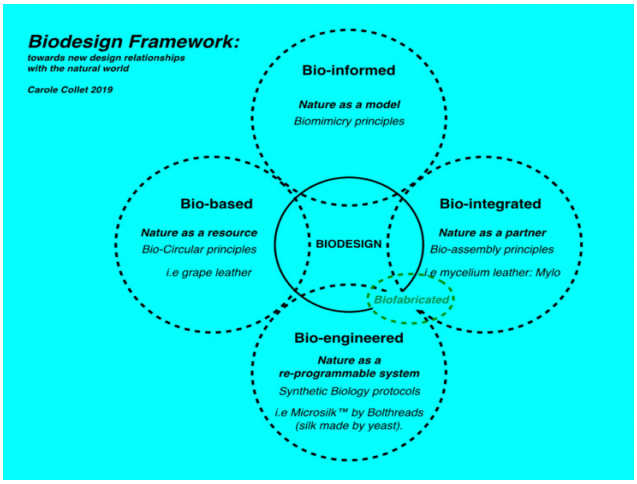

Figure 1. Design diagram with living systems, by Carole Collet, 2020. (Maat Museum website, 2021)

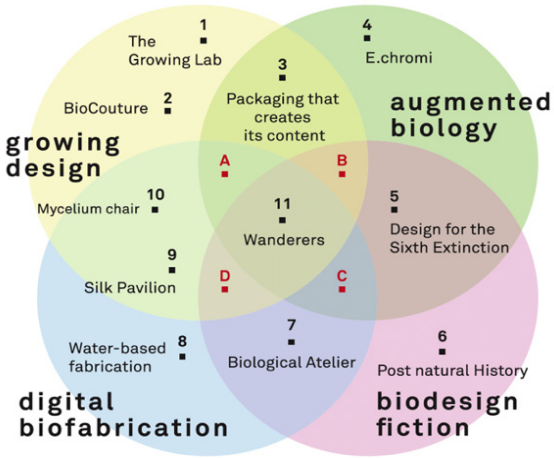

Figure 2. Diagram listing different existing Biology + Design projects by Karana & Camere, 2017.

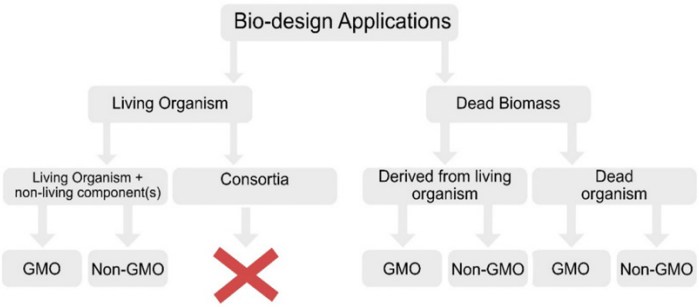

Figure 3. Biodesign applications diagram by Esat e Ahmed-Kristensen, 2018.

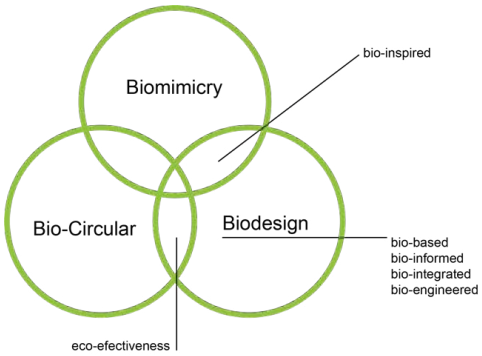

Figure 4. Diagram of contemporary Design approaches to Nature, by Paoliello, 2023.

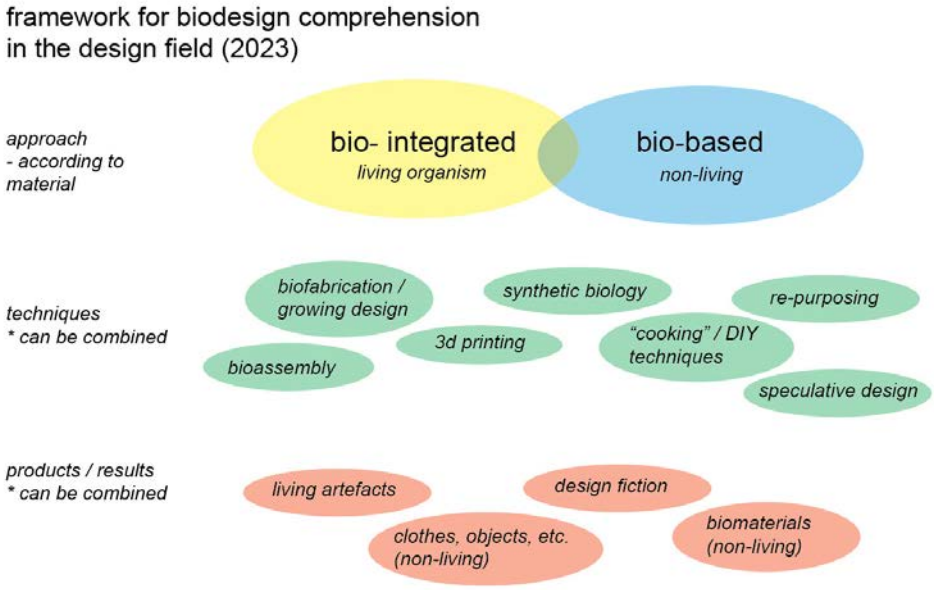

Figure 5. Diagram for understanding Biodesign within the field of Design by Bandoni, 2023.

Biodesign Diagram Proposals

The initial diagram presented below (figure 4) delineates the principal contemporary strategies that converge nature-inspired design strategies within contemporary Product Design, considering Biodesign and correlated Bio- terms.

As a result of their association with living organisms and their respective processes, Biomimicry, Cradle-to-Cradle, and Biodesign predominantly generate projects deeply rooted in ecological and regenerative concepts. These strategies are interconnected in this diagram, given that a substantial proportion of projects employing them reside within their intersecting domains, utilizing multiple strategies jointly. Nevertheless, these three strategies encompass distinct principles, which can lead to instances that do not always align, hence, the proposition to maintain their separate delineations.

We also present below a proposed schematic representation specific to Biodesign, derived from an examination of prior diagrams (figure 5).

Like Esat and Ahmed-Kristensen (2018), this proposed diagram consistently engages with organic elements, whether living or non-living. It encompasses not only minerals but also household or agricultural residues in the case of non-living elements. This fundamental material aspect is the departing point that delineates two primary categories of approaches: for living elements, it involves Bio-integration (collaboration/partnership); while for non-living elements, it revolves around Bio-based elements (ingredients). Collet's "nature as a model" approach (2013, 2020) has been omitted, as it pertains to Biomimicry, and "nature as a hackable system" approach, referring to synthetic Biology, has been redefined: in this context it is understood as a technique.
It is crucial to acknowledge numerous overlapping possibilities within the presented diagram: combinations of techniques, or of living and non-living elements, are possible. Furthermore, the outcomes of Biodesign, its final products, can encompass living entities (living artifacts), non-living materials (Biomaterials), speculative concepts (Biodesign fiction), or its combinations.

Biodesign Timeline Proposal

The proposed timeline has terms and authors that helped us frame our understanding of Biodesign and its themes. The paper 'Evolution of Design for Sustainability: From Product Design to Design for System Innovations and Transitions' by Ceschin and Gaziulusoy (2016), provided an overview of the evolution of the field of Design for Sustainability (DfS). Their exploration followed "a quasi-chronological pattern" (p.120), and they showed a "DfS Evolutionary Framework" (p.144) that helped to build the one shown here. The distinction lies in their emphasis on an approach encompassing environmental, socio-ethical, and economic dimensions. In contrast, this timeline focused on nature-inspired design approaches and Biodesign (term not mentioned by Ceschin and Gaziulusoy) showcases the significant publications of each Bio-term examined (figure 6).

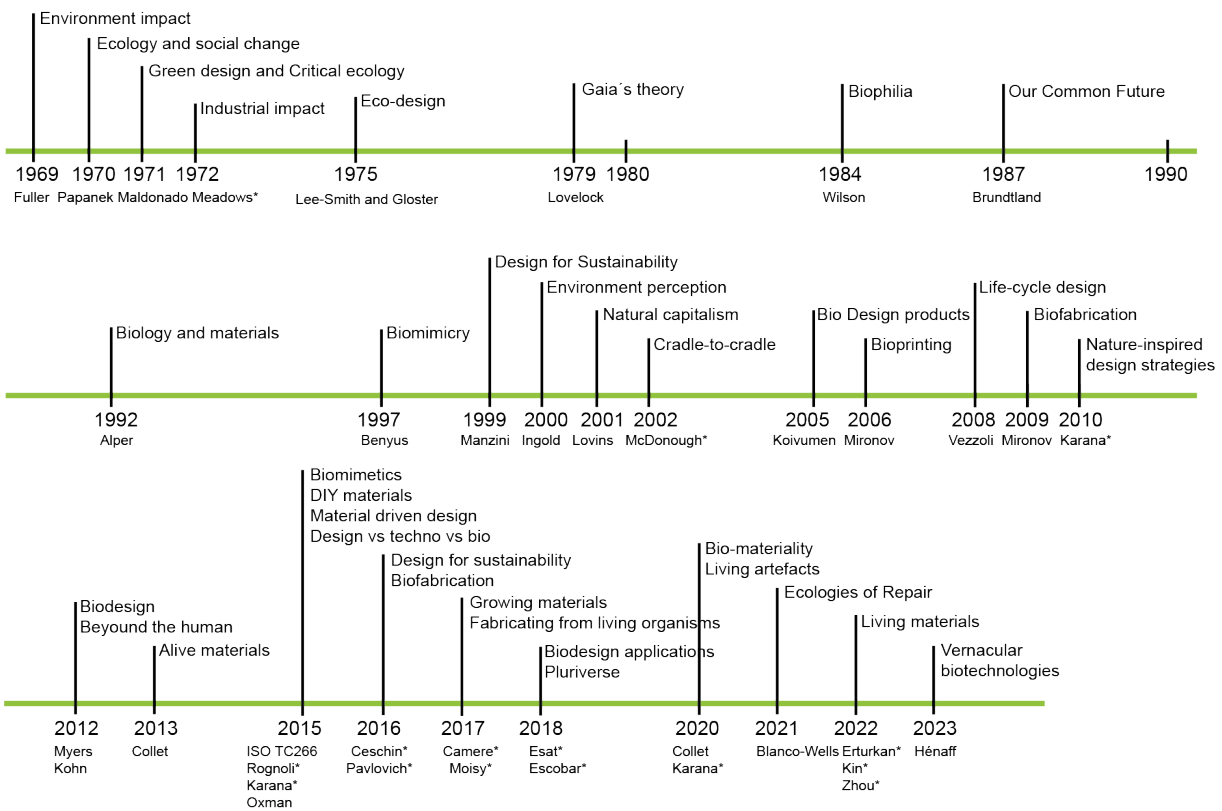

Figure 6. A chronological timeline reflecting the critical publications on each bio-term, by Paoliello, 2023.

Our timeline starts with Fuller's work, as he was the first to be concerned about resource limits and material production's environmental impact (1969). After him, in chronological order, the different authors appear.
It is also essential to present "How Forests Think: Toward an Anthropology Beyond the Human" by Kohn (2012) and the exhibition "This is Alive" by Collet, C. (2013). We also mention the ISO/TC266 "Biomimetics - Terminology, concepts and methodology" and the works "DIY materials" by Rognoli, V. (2015).; "Material driven design (MDD): A method to design for material experiences" by Karana, E., et al. (2015) and "Design at the intersection of technology and biology" a TED Talk by Oxman (2015). The latest reflections are Escobar's (2018) "Designs for the Pluriverse: Radical Interdependence Autonomy and the Making of Worlds"; "Ecologies of Repair: A Post-human Approach to Other-Than Human Natures" by Blanco-Wells (2021), and "Vernacular biotechnologies" by Hénaff (2023).

Conclusion

In this article, terminology research was undertaken to clarify some of the nomenclature employed within the domain of Biodesign. The diagram representations created by specific authors were also analyzed to enhance the comprehension of this emerging area. Subsequently, we have created two diagrams and a timeline encapsulating this field's essence.
Concerning the proposed framework for Biodesign (figure 4) it is relevant to highlight the inclusion of all biomaterials (or bio-based materials) inside the domain of Biodesign. Most authors only relate biomaterials to Biodesign when living organisms are part of the design process. However, in our proposal the integration is total: we deliberately included non-living organic matter (e.g. fruit peels, agriculture residues) and its techniques in the scope of Biodesign.
In this way, our proposal indicates that the narrative of Biodesign should be headed toward an ecological approach that favors life, not mattering if its process includes living or non-living organic matter. More than "designing with living organisms", Biodesign can be "design for life".

Acknowledgments

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Tangible Visualization Design Based on Bivalve Data

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Abstract

This endeavor seeks to delve into the production of wearable data sculptures, intertwining the realms of art and data depiction. By translating elusive data into concrete physical entities, these sculptures offer a sensory and visual exploration. Concentrating on the realm of bivalve species, the project underscores their biological attributes and ecological importance. Leveraging techniques like data manipulation, visualization mapping, and 3D printing, the data is crafted into wearable ornaments. This innovative approach not only accentuates the intricate bond between humans and bivalves but also presents an immersive method to engage with intricate data sets.

Author keywords

data visualization, tangible data, Bivalve, 3D printing

Introduction

Over the past few decades, a strand of data visualizations has emerged that engage with ecological and sustainability topics and issues, such as concerns for the health of biological organisms and their habitats, particularly in relation to human activities. Margaret and Christine's Crochet Coral Reef Project integrates art, science, and mathematics to represent coral reefs' inherent hyperbolic geometric structures through crochet. They posit that crochet can uniquely depict these natural forms. Similarly, the Tempestry Project translates temperature data into visual tapestries, allowing knitters to perceive climatic variations and global warming

trends. Niittyvirta and Aho's Lines installation uses LED neon-ropes to reflect potential tide levels, based on tide data, offering a vivid insight into climate change implications. Together, these endeavors underscore the fusion of ecological awareness and tangible data visualization, highlighting the significance of artistic mediums in conveying crucial environmental narratives.

The phylum Mollusca, known for its remarkable diversity and ecological significance, encompasses a wide array of species within its six major classes. Bivalves play a crucial role both ecologically and socially, exhibiting substantial impacts on biodiversity and acting as key contributors to biological habitats. From a societal perspective, bivalves have long been intertwined with human economic activities and have enjoyed high cultural value. Due to this strong association between bivalves and humans, there is a growing interest in understanding and appreciating this diverse group.

Nevertheless, current knowledge about bivalves primarily centers around their significance as a food source. However, it is apparent that numerous individuals lack awareness regarding the ecological aspects of bivalves, such as their classification, despite their significant impacts on both humans and the environment. To restore an understanding of bivalves from a different perspective, one that highlights their vital role as part of ecosystems and their status as a diverse and essential group, we aim to visualize bivalves themselves.



Figure 1. Wearable data sculptures.

This project explores the feasibility of creating tangible data visualizations, which transcend traditional geometric shapes and instead function as containers of data. Through the mapping of data in three-dimensional space and the incorporation of color, these jewellers are generated using three-dimensional printing technology and subsequently undergo hand-painting and processing techniques (see Figure 1).

Methodology

Data

In this project, we utilized the Bivalvia database available on the Ocean Biodiversity Information System (obis.org) website. This database compiles monitoring datasets from various countries, encompassing a time span of approximately 60 years and containing essential parameters such as location, temperature, salinity, among others.

To comprehend bivalve from an ecological standpoint, an understanding of biological taxonomy, a branch of biology that examines the principles and methods of biological classification, is crucial. The current biological classification of bivalve is based on the approach pioneered by Swedish biologist Linnaeus. In this project, the author initially conducted preliminary data processing on the species information, employing biological

classification methods to generate the biological tree. Based on the tree, it was determined that visualizing the data at the order level, which comprised 19 orders, was more suitable for the design of the visualization. Additionally, the author visualized the number and proportion of families associated with each order. The number of populations per order varied from 17 to 1, which facilitated the visualization design process. Consequently, the order was selected as the largest unit for physical visualization, while the family was chosen as the smallest unit.

Ecology encompasses not only the study of organisms themselves but also the examination of interactions between organisms and their environment. The depth data of bivalve represents their distributional environment. This depth varies among bivalve species and is typically determined by their feeding habits. Analyzing the depth data allows for a better understanding of the relationship between bivalve and their environment, thereby highlighting their ecological adaptations. We included data on the bivalve's growth depth in our visualizations, leading to a depiction of the average ocean depth for each family within the 19 bivalve orders. This displayed the differing ocean habitat preferences among families within an order.

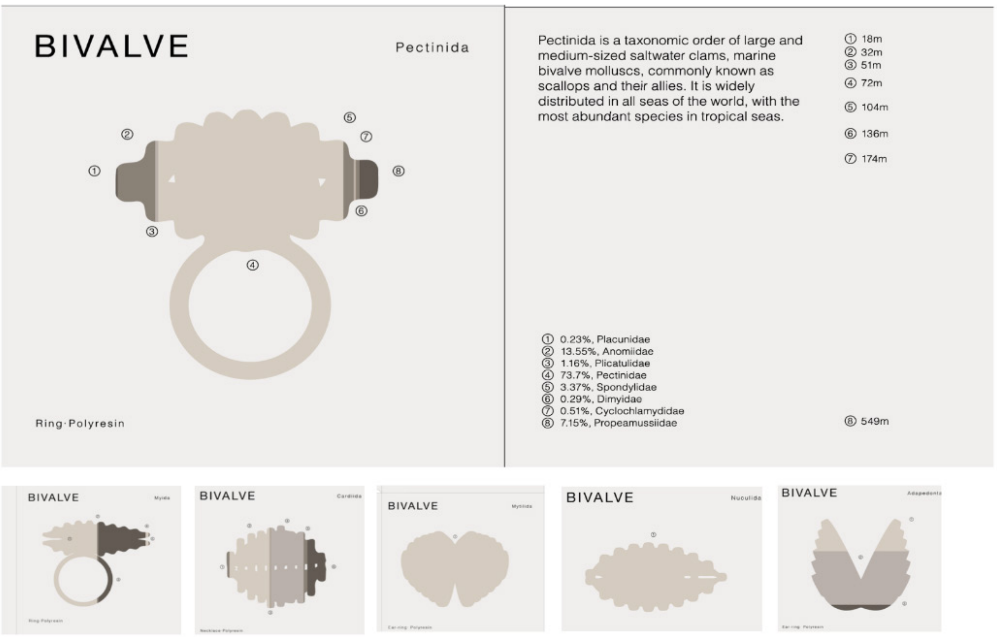

Figure 2. Pectinida data map.

Data mapping

Notably, there exist substantial variations in color and shape among different bivalve shells. Consequently, shell characteristics have been employed as valuable tools in species identification. This insight has inspired the author to employ shell traits as a means of representing distinct bivalve species.

Prior to the data mapping stage, our approach involved the selection of representative orders, namely myida, cardiida, galeommatide, nuculida, adapedonta, venerida, pectinida, and mytilida, rather than striving for exhaustive descriptions of all orders. This is because these types of orders have a higher recognizability and are more well-known among people.

Based on the available data, visual mappings were created for each of the 19 orders, with Pectinida serving as an example (see Figure 2). The figure depicted in the mapping showcases eight color blocks of varying shades, each representing one of the eight families within this order. The proportion of each color block in the entire figure corresponds to the relative number of families within the order. The ordering of the families, ranging from 1 to 8,

is determined based on the depth of the respective family's growth environment, which ranges from ten meters to several hundred meters. This mapping served as the foundation for generating 3D models, with shell textures divided into ten lamellar structures to enhance the legibility of the data.

3D model creation and printing

After mapping, we used it as a base to create a 3D data model (see Figure 3). The original shell morphology was simplified into ten lamellar structures based on texture, preserving the unique bivalve shape and improving data clarity in the 3D model. We used Blender software for this transformation, selecting ten layers to balance original shape preservation with processing simplicity. The model's wall thickness was set at 0.8cm for optimal printing. To protect the environment and promote sustainable marine development, the material for 3D printing the artwork was sourced from plastics collected from the seashore. After sorting and cleaning, the plastics were ground into granules for use.



Figure 3. Model coloring, visualize the data.

Conclusions

The design process involved data processing, mapping and visualization, 3D model creation and printing, and model refinement. At each stage, outcomes were assessed against the design objectives, ensuring a harmonious blend of data legibility and aesthetic appeal.

By visualizing their diversity, this project illuminates bivalves' significance and fosters a deeper understanding of their ecological footprint. The utilization of sustainable materials, like recycled beach plastics, for 3D printing not only champions environmental conservation but also symbolizes the intersection of art, ecology, and technology. Through innovative methodologies like data mapping and 3D modeling, the study emphasizes the potential of artistic mediums in conveying crucial environmental narratives, thereby encouraging an informed appreciation of bivalves and their ecological importance.

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Good design:
the triple ecological view in the rural space production

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Abstract
The ecological construction of rural areas has become a worldwide proposition. The China government has emphasized the goal of ecological revitalization on many occasions, and has launched an active exploration of ecological construction. This paper introduces the transformation and transcendence of rural areas in China in recent years, mainly using the research methods of case study and model construction, and studies the rural space production from three perspectives: micro, meso and macro. Based on the analysis of different rural ecological construction models,This paper is pointed out that rural construction should cover material space, social space and spiritual space. The result and viewpoint of the study is that the space production of contemporary rural areas should be different from the alienation and slavery brought by the industrialized landscape society, and its core lies in activating the goodwill orientation of design, creating the value of love and healing in the new rural space, and at the same time making efficient use of rural local resources, pointing out the action path for the ecological development of rural areas and promoting the realization of ecological goals.

Author keywords
Public space; Space production; Rural ecology; Design goodwill; Heritage resources

Introduction

American scholar Victor Papanek in his book Design for the Real World: Human Ecology and Social Change said: “in such a visual, physical and chemical pollution mess,..., design can and must become such a way, namely young people involved in the design activities is equivalent to participate in the change society”(Victor Papanek,2013). His criticism of this society is sharp and sincere. The emergence of new technologies and materials has gradually enriched the ways to shape the world, and the world has also diversified.The semantic meaning of this change just responds to Henry Lefebvre’s direction of space production: space is not established, but generated, and constructive forces change space, just as Panack mentioned that visual elements affect society.At present, as a marginal place in society, design has become a constructive force, guiding the multi-dimensional exploration of the countryside.

Microscopic ecology: physical space, from heritage to resources

Different from the unconscious existence of animals, human beings have creative thinking and ability, actively transform the natural world with the help of tools, and leave rich remains. the close with nature and left the

field, shows the human and nature, and thus shaped a physical space.The field left by this close exploration with nature shows the micro-communication between human beings and nature, and thus shapes a physical space. Judging from the form of settlement, rural space is obviously more dependent on the power of nature, and the ecological attribute of symbiosis with nature is stronger. American biologist Edward Wilson thinks that human beings have the natural ability to be friendly with other animals, which is named as “pro-nature attribute”(Edward Wilson,2018). In such a natural ecological community, mountains, water, forests, fields, lakes and grasses constitute the ecological foundation of space, and thus form the dual physical properties of natural heritage and cultural heritage.

When the design is involved in the closed rural space production, it must try to get rid of the influence of excessive external factors and create with the local remains as the material, so as to maintain the weak dominant position and realize the reproduction of dual physical properties, that is, the process from heritage to resources.Therefore, the first ecological view of rural space production is the cooperation between landscape and industry, which can be manifested in the optimization of rural environment, the organization of industrial form and the dispatch of cultural symbols. The original physical resources of the field are reorganized mainly through design, and the environment, culture and their production have formed a symbiotic relationship, and the ecological structure is further stable.

In rural areas of China, there has been an active attempt to construct field ecology based on physical resources. Qingshan Village in Yuhang, Zhejiang, China is rich in natural resources, but the ecological imbalance caused by the increase of chemical materials has made the villagers reflect on the direction of development. In 2014, the villagers in Qingshan Village launched the collective management of ecology, and attracted a group of artists and craftsmen to settle in, especially the team of “goods logistics” led by designer Zhang lei, which promoted the integration of natural heritage and cultural heritage, and established a number of representative and unique rural public spaces. The reconstruction of villagers’ space has led to the turn of daily life, and formed a physical development model of “rural handicraft-knowledge research-aesthetic shaping of life”, which has led to the



Figure 1. The Artistic Practice of Qingshan Village（Photographed by LuFeng）



Figure 2. Designer introduced the work.（Photographed by LuFeng）

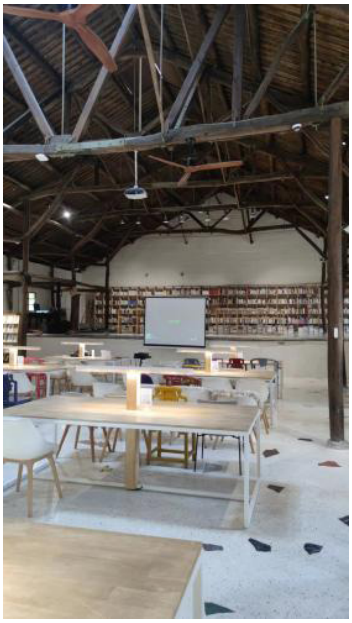

Figure 3. Rong·design library（Photographed by LuFeng）



Figure 4. Sanbao porcelain valley Creative bazaar（Photographed by LuFeng）

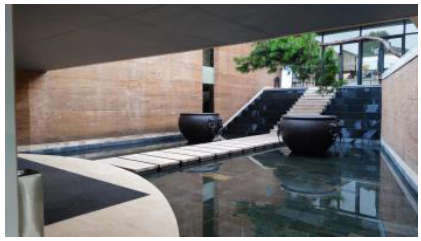

Figure 5. Sanbaopeng landscape space（Photographed by LuFeng）

further construction of ecological field（Figure 1,2,3）.In Jingdezhen, Jiangxi Province, the development of Sanbao Porcelain Valley is similar, and the exhaustion of clay resources has led to the decline of the countryside. However, with the entry of artists and the guidance of the government, the format space of Sanbao Porcelain Valley has gradually improved, capital, power and culture have reconstructed the countryside, and the functional practice of production, learning, research and exhibition has promoted the organization and integration of physical resources, and the spatial ecology has become more abundant and benign（Figure 4,5）.

Meso-ecology: reinterpretation of social space and media

Humans are always good at summarizing from details, but theory and experience are two ends of a gap. Plato criticized "borrowing experience" in Tyated, and he thought: "One can't make a better judgment on other people's experience."(Plato, 2015)Robert, on the other hand, puts forward a method to solve the problem of the separation between theory and experience-the middle-level theory, which is characterized by building a bridge for theoretical experience and having the superior ability to deal with social action and social structure(Robert merton,2006).When using this sociological theory to deconstruct rural social space, we will seek the media power between grand imagination and micro-physical property, which can be a theory, an object, a path or a method. The core role in rural areas is to implement the goal of rural reform in concrete and verifiable rural space production, which is not only public life, festival events, but also rural environment and settlement places. Therefore, the spatial production of rural society is no longer passive.

As the constructor of space production theory, Henry Lefebvre pointed out in his article Social Products and Use Value: "Space is filled with social relations. It is not only supported by social relations, but also produced by social relations(Henry Lefebvre,2003)."The ecological point of meso-view is to pursue the "harmony of relations" in the rural social space. To construct this kind of harmony, we need to gradually deepen along the path of space perception. Communication scholar Lippmann thinks that "the adjustment of the environment is of course carried out through various fictions as the media", and this kind of fictions in Lippmann's view is a kind of "environment described by people themselves" or "mimetic environment(Walter Lippmann,1989)". With this concept and logic, the further production of rural space follows the principle of "material space-production medium-mimetic environment-space".Among them, the mimicry environment, as the connector of social relations, is a temporary, changing and flowing space scene, which is manifested as staged functional places such as public space, commercial space or religious space. It maintains people's recognition and application of field relations, and then forms a kind of harmony. The stressed media also goes beyond its ontology concept and transforms into the contact node of social space.

In recent years, in rural areas of China, art has played a role as a production medium to reshape the countryside, and rural construction activities with universities as the main participants are taking place widely.In September, 2023, in Xikou Village, Mingshuihe Town, Aershan City, Inner Mongolia Autonomous Region, China, with the participation of more than 10 colleges, institutions and more than 20 art teams represented by Tsinghua University, taking the natural features, folk customs and production traditions of Xikou Village as physical resources, through the empowerment of art production, various forms of event-based "mimetic environment" such as artistic works, family space, public space, village environment and logo system were formed, and a new society was formed（Figure 6,7）. At the same time, in Youyang, Chongqing, China, "Up and Down the Yangtze River-the Third China Youyang Rural Art Season" was held in Hewan Village. This art season brought together ten creative teams from seven art colleges, including sichuan fine arts institute and Tongji University, to think about the development opportunities of ethnic minority villages and the communities within the villages by perceiving the lifestyle, belief customs and geographical features of local ethnic minority Tujia people and shaping them in



Figure 6. Wang Zhigang and Yue Song's Works "Warm" (The picture comes from WeChat official account "Academy of Arts and Design, Tsinghua University")



Figure 7. Kong Fandi's work "Layers of Woods and Waves" (The picture comes from WeChat official account "Academy of Arts and Design, Tsinghua University")



Figure 8. Resident inspection of Youyang artists (The picture comes from WeChat official account "Youyang Country Art Season")

the public environment, community culture and life scene.In this way, the meso-ecology of industrial support, aesthetic co-construction and environmental symbiosis can be formed (Figure 8).

Macroecology: Imaginary Space, a Spiritual Community

From the macro-ecological perspective, space production focuses on the formation of a common value guidance and a kind of cultural identity recognition. Its essence is a kind of system ecology, and the core is that individuals in the system can slow down the opposition formed by contradictory interest production, and eliminating this opposition is the core of community construction.Lin Kangyi and others mentioned in the preface to the translation of General System Theory: "To understand a thing, we should not only know its elements but also know the relationship between them", and the author of this book von Bertalanfi also pointed out in it: "It is impossible to understand the" systems "at all levels by examining their isolated parts(von Bertalanfi,1987)". Therefore, beyond the meso-ecology centered on the construction of staged social relations, macro-ecology is to coordinate the co-construction, co-creation and symbiosis of fields with a common knowledge, rules and values.

The concept of "imaginary community" originated from the book "Imaginary Community: Reflections on the Origin and Spread of Nationalism" by American scholar Benedict Anderson. In this book, it explains the imaginary community of the nation, which is connected by intention, bounded in space, sovereign based on imagination, and the nation is always supposed to be equal and friendly(Benedict Anderson,2016). As a concept to describe the national form, the imaginary community has similar attributes in similar villages with cultural isolation and communication obstacles. As a representative figure in the early study of rural areas in China, Mr. Fei Xiaotong has a profound understanding of the construction of rural society in China. He believes that "rural society relies on close and long-term common life to cooperate with each other's behavior, and social ties are grown up(Fei Xiaotong,1998)."Here, we can see that the rural society, as an existing community, can grow and be nurtured, which is reflected in the construction of contemporary rural communities. Several steps can be clarified. First, we must determine the common value base, mainly the local knowledge system, second, we must establish common values (relationships), mainly the inheritance of rural ethics, and third, we must produce common value spaces, mainly the setting of rural public spaces. On this basis, design, as a coordinated force, began to participate in the production of rural public space, and in this process, it activated the main value of villagers, so that artists can become new villagers, and villagers can also become artists, depicting the growth dimension of villages in their common imagination.

The concept of "imaginary community" was first put forward by Vice President Jiao Xingtao of sichuan fine arts institute. In 2012, he led the team into the rural area of Yangdeng Town, Tongzi, Guizhou Province, and launched

the comprehensive art project of “Yangdeng Art Cooperative”, which was named “an imaginary art community”. Here, artists widely joined the villagers to participate in artistic expression and practice, and the power of art penetrated into the daily life of Yangdeng, from the 12 scenic spots of Yangdeng to Feng Douhua Art Museum. The imaginative community of art began to drive the rural imaginative community to grow together, and the reproduction of this space enabled the villagers to have the capital to confront the new art that came here later, making it a realistic social group（Figure 9,10,11）.In Jiajiang, the boundary of the community is more obvious. As a traditional handmade paper-making village, Shiyan Village in Jiajiang naturally has a common value base. With the participation of design, the greater value lies not in creation, but in activation. The construction team integrates resources by “taking paper as the medium”, activates the historical context by building the village history museum, activates the paper-making culture by building the traditional craft workstation, activates the lifestyle by building the homestay community, and guides “Wenjiale” to activate the style of calligraphy and painting, so that the villagers can receive visitors from all directions as hosts, become practitioners and creators of rural imagination space, and empower the common growth of the countryside（Figure 12,13,14）.

Conclusion

In February, 2020, rem koolhass planned the exhibition “Future Village” in Guggenheim Museum. He thought: “In the information age, rural areas may be undergoing more drastic changes than cities”, and it is the technological innovation of observation methods that brings about this change. This leads to a proposition thinking about what design can bring to the countryside in the era of space becoming more public and digital. Looking back on the development of industrial technology, the great production power makes the city accommodate more life and culture according to the standardized module, but at the cost of self-loss and behavior alienation. We



Figure 9. Vegetables as exhibits（Photographed by Yang Jian）



Figure 10. Carpenter Hu Xiankun and His Works（The picture comes from WeChat official account “Tongzi released”）



Figure 11. Group photo of art countryside activities（Photographed by Yangjian）



Figure 12. A homestay with local painting and calligraphy characteristics（Photographed by LuFeng）



Figure 13. Rural residential space under construction（Photographed by LuFeng）



Figure 14. Shiyan village history museum（Photographed by LuFeng）

can't evaluate the quality of this trade-off, but when new technologies once again participate in broader social changes, what design can do is to use the coordination and organization ability of resources to construct a new mode of production, so that the countryside can avoid the loss of natural and cultural heritage and maintain the most vivid existence carrier for the world's multiculturalism, which is not only the self-innovation of space production, but also the greatest goodwill of design for the future rural ecology.

Acknowledgments

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Retrieve the initial 500 meters: Reflections and inspirations from two multi-species coexistence design cases in southwestern China

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Abstract

In most research, design often centers on humans, focusing on how design can promote social development to meet people's growing material needs and desires. However, the pandemic outbreak has made us realize that observing, understanding and empathizing with a world beyond humans often makes it difficult to achieve a sense of wholeness through the perspective of modernization and human-centrism. Based on this dilemma, this paper takes two administrative area studies in southwestern China as cases. It examines the sustainable resources that may exist in transitioning from a "human-centered perspective" to a "multi-species coexistence perspective" based on a multi-species viewpoint. By exploring various boundaries such as urban and rural areas, Han and minority ethnic groups, humans and non-humans, the research found that incorporating the interests of "non-human beings" into design is a common public demand for people from different cultural backgrounds. The subject of the community proposed in this paper includes not just humans but also the "non-human" living existence entangled with humans, including animals, plants, ancestors and deities. At the same time, giving new academic attention to "failed" design and "non-place" or "ruins space", especially to the pre-historical stage of "non-place" and propose that "no place" is also a place for people, non-human beings and gods to inhabit together. Multi-species coexistence design presented in this paper integrates a comprehensive framework of technology, capital, environment, humans and non-humans and excavates the folds and blanks that have long been concealed by capital, power and planning design under the background of the pandemic. Capturing the sustainable power of "sharing hardships" in this anti-structure helps people retrieve the initial 500 meters and reshape their connections with themselves, communities, surrounding society and the non-human world. The salvaging of "human" and "non-human" emotions by multi-species coexistence design is for "all things to live in harmony and thrive, each receiving its nourishment". From a research perspective, multi-species coexistence design can provide a research dimension centered on "objects" for service and spatial design. In addition, it could rebuild "symbiotic" communities and help us solve the thorny problems in society, finally, improve the quality of people's lives step by step.

Keywords

Space and service; Multi-species design; The initial 500 meters; Public engagement; China.

Introduction

In 2005, the American disaster anthropologist Susannam Hoffman wrote a paper titled Katrina and Rita: A Disaster Theorist's Thoughts points, in which the paper pointed out that disaster is a monitor which reveals the contradiction between man and nature. This concept could help us re-understand how small human life is and how greedy and narrow human nature is (Hoffman, 2005). At the end of the year of 2019, a sudden COVID-19 pandemic quickly swept all over the world. China is no exception. The pandemic has significantly impacted the global public health system, the lives and health of people and consequently, even the socio-economic development of countries. At the same time, it also has changed people's way of working, learning, living and socializing. Faced with the raging pandemic, many people have blocked social activities regarding government measures of home isolation and city lockdowns, which resulted in a high level of anxiety and stress gradually about their uncertainty of the future. Moreover, restrictions on social activities trigger the fear of the epidemic and stigmatization of infected people and their locations, which further declines trust in epidemic think tanks and public health institutions. By-products from the pandemic constitute people's collective memory and social suffering.

A garden community, Shapingba District in Chongqing, also experienced the pandemic outbreak, containment and uncontained. Whenever residents take the elevator in my neighborhood, there is still an unconscious somatization of mental and physical aspects. In elevators, residents always hold their breath or take out masks and put them on to protect themselves from the potential dangers of infecting with the epidemic. Even though they know that the epidemic is under control, the somatization will be more evident once someone coughs in an elevator or other public places. In addition, the community's residents will deliberately avoid people around them. The daily communication before the epidemic, as well as the collective social activities of dancing and watching movies, are gradually disappearing in the community. Unlike the pre-pandemic period, after the pandemic, people have increasingly become dependent on the Internet at an unprecedented speed. In this context, real social communication is gradually scarce. Xiang Biao, the Max Planck Institute for Social Anthropology in Germany, regarded this social scarcity as the "vanishing neighborhood(xiang Biao 2022)". To rebuild the relationships between neighborhoods and humans, which disappeared long ago during the pandemic, he advocates that each person can connect with the larger world and strangers by communicating with others from the 500 meters around themselves.

However, the main subjects of the city are not only composed of humans, the same situation in rural areas, but "non-human" creatures such as animals, plants, ancestors and others that are intertwined with humans. These creatures coexist with humans in the same diverse ecosystem, and their existence should also be a concern for us. However, looking at current designs, most focus on the city, and the design objects are mainly centered around humans, neglecting the perspective of designing for "non-human" creatures. Therefore, the outbreak of this pandemic reminds us once again that if we destroy the earth and the environment without considering the existence of non-human creatures, the relationship between man and nature will deteriorate further. Finally, humans will take no good consequences.

To restore and maintain a harmonious symbiotic relationship between man and nature, it is necessary not only to revise traditional design thinking and concepts, but also to reconsider the kinship relationship between humans and non-human creatures. Furthermore, we must redesign and critically examine our daily world within a 500-meter radius. The long-term influence of utilitarianism on modern design thinking has conditioned people to habitually seek solutions to the "self" dilemma from distant and non-verbal "other" worlds. The "other" is perceived as a harsh purification of the "self" (Sontag, 1994).

In the face of our state of recovery, the location of dilemma, and the disappearing surroundings, this pater

focuses on the following questions: Given the constantly evolving urban development and ubiquitous human-centered planning and design, 1) how could art and design change their theoretical structures, then shifting their thinking paradigms and respond to the "total presentation" of social sustainability? And 2) how can art and design rescue sustainable "non-human" forces that have been deeply fragmented by capital, temporarily obscured and forgotten by planning and design, but are worthy of timely "salvation"? 3) What does the existence of "non-human" entities mean for design, our identity and human existence?

To address the current dilemma in research, this paper offers a new perspective and methodology by selecting two area cases of multi-species symbiotic design. One case is the remote ethnic minority villages in Guizhou, and the other is a modern urban community in Chongqing, where one of the researchers lived. Taking the epidemic event as a "state of exception" (Agamben, 2008), this paper uses participatory anthropological observation research methods and interactive design theory to study and analyze the two cases of urban-rural and ethnic minority-Han together. Furthermore, we explore the cultural commonalities between the two regions and two different groups. This paper proposes a method of listening and collaborating with community members to expand the focus from "human-centered" to the field of multi-species symbiosis between "human and non-human", bringing back the interests of "non-human" into the field and category of design. Based on the research perspective of multi-species symbiotic design, it repairs the community relationship and social communication methods of "neighbors are better than distant relatives". This paper also hopes to improve people's material and spiritual lives, providing academia with another design of one or more paths and perspectives centered on "objects".

The ethnographic data on a particular village of Qiandongnan in Guizhou Province discussed in this paper were mainly collected during two field investigations conducted from July to August 2019 and from January to February 2021. As one of the researchers lives in a garden community in Shapingba District of Chongqing, ethnographic data on the multi-species changes inside and outside the community were already familiar to us. The specific research period began in April 2018 and finished in April 2023. During this time, we launched the urban multi-species symbiosis design research plan. This study lasted five years, including three years of the worldwide pandemic. In the process of the study, we used video, photography, and text to document the status of multi-species symbiosis in the two communities, as well as the energy, shelter, and environment animals required. Moreover, we collaborated with local residents in new ways to unlock the sustainable energy generated by multi-species interaction, which had been overlooked by capital and urban planning and enriched the field of research on "non-human" design.

Relevant research on multi-species design

Numerous scientific studies have shown that the earth has entered the "Anthropocene" era, which signifies that human activity has become the dominant force affecting and changing the Earth (Zalasiewicz et al., 2010). However, at the same time, systemic disasters, earthquakes, droughts, wildfires, epidemics, and other "exceptional" risks also threaten human survival and development, and are changing the public spaces where people live (Honey-Rosés et al., 2021). In this crisis context, researchers have analyzed the design of the Anthropocene era from different perspectives at the level of knowledge sociology. Neville Stanton and Christopher Baber (2002) attribute the outbreak of the epidemic to incorrect transportation and urban design, as well as the lack of evaluation of the cost caused by design errors. They use Human Error Identification (HEI) techniques to comprehensively evaluate the process and content of design to change the harm caused by incorrect design to humans and the environment. In addition to technical evaluation, some researchers believe that by transforming the physical environment and space of buildings (Megahed & Ghoneim, 2020), improving

the interface of urban green space design can reduce environmental pollution and alleviate the appearance of epidemics (Honey-Rosés et al., 2021). On the other hand, other researchers point out that the crisis faced by real space can be solved by the service design of virtual space, which eliminates the risk of infection that face-to-face interaction may bring (Shamim et al., 2023). However, numerous studies have shown that using the Internet and technology to solve thorny problems has also led to people's high dependence on the Internet (Sun et al., 2020).

In the face of failures in service design projects, Italian scholar Ezio Manzini proposed the SLOC model, which suggests that establishing a production unit system that is "small, local, open, and connected" can bridge the gap between society and technology, and promote better design to serve people and society (Manzini, 2011). Similarly, American scholar James C. Scott (2020) also proposed combining various practical knowledge, consensus, experience, and "metis" (local skills and folk wisdom) in action, emphasizing incremental steps and encouraging reversibility and elasticity in design, leaving enough room for future development.

The flexibility, sustainability, and uncertainty of flexible design make the "DesignX" of the future society increasingly diverse and complex (Lou, 2018), requiring innovative design thinking and methods. Lou Yongqi points out that cultural factors must be incorporated into the design, he proposes a new culture of environmental innovation that advocates the dynamic integration of "people and environment" thinking (from the perspective of human experience) and "environment and people" thinking (from the perspective of sustainable development) to create (Lou, 2019) and realize sustainable living ecosystems with a holistic, human-centered and interdisciplinary approach (Lou, 2022) that fundamentally optimizes the content of service design and enhances people's social well-being.

The ontological turn (Descola, 2013) advocated by anthropologists and the influence of multi-ethnic ethnography (Kirksey & Helmreich, 2010) has led other researchers to expand their perspectives into the realm of 'non-human' living subjects (Kohn, 2015) and reassess their presence's impact on human society and culture (Scott, 2006). For example, Beate Apfelbeck, Robbert Snep and others (Apfelbeck, 2020) have developed the "wildlife-inclusive urban design" concept, which seeks to integrate animals into urban planning and design to enhance cities' biodiversity and sustainability of civilizations. The "wildlife-inclusive urban design" concept focuses on individual species by creating a habitat in the built environment by analyzing their life cycle and providing all the necessary resources. These habitats are hybrid habitats where the resources are a mixture of natural and artificial (Handayani & Mardikaningsih, 2022). Gionata Gatto and John R McCardle (Gatto & McCardle, 2019) avoid the limitations of spatial design to serve only people and propose a plant-centered design perspective that takes sustainability as a critical component of the urban design process. They explore sustainability as a concept that transcends anthropocentrism, arguing that sustainability should not only be seen as the result of a design process, but also as a behavioral attitude and design as the realization of this attitude. Prudence Gibson and Catriona Sandilands (Gibson & Sandilands, 2021) have further researched that plants are versatile performers, drawing humans into them through their performance. They attract humans into their world through their performance, providing diverse emotional experiences.

In general, the current academic perspective that centers on "non-humans" research have softened or blurred the binary opposition between man and nature, people and plants, etc. However, most analysis is still based on a structural-functionalism standpoint. These studies ignore the degree of influence of the existence of "non-humans" on shaping and changing the way of interaction between "humans" and "non-humans". At the same time, there is a lack of discussion about the intervention and presence of capital and power. In addition, most studies of pandemics embrace subjective experience analysis of depression and hopelessness caused by pandemics, as well as responses to pandemic spread and prevention, but there is a lack of research for emotional and sustainable regenerative forces that can be seen as a response to this "dark" turn. Meanwhile, the design of "failure" and the

research of “non-place” or “ruins space” are relatively negative, ignoring the pre-historical stage of “no place”. However, this stage is where people, non-human beings, ancestors and gods live together. The above statements are also one of the critical concerns of this paper.

However, according to Chinese philosophy, “non-human” includes animals, plants, ancestors, gods and ghosts intertwined with humans. They all belong to the category of “Wu” (things), forming a “Qiwu” (the equality of things) life view between “human” and “non-human”. Therefore, corresponding creative design and practice should also be based on this multi-species coexistence life view concept. For multi-species design, “dark” and “good” emotions should be given attention and respect.

Results and analysis of multi-species coexistence design research

In the context of modernization and human-centeredness, it is often difficult to obtain a sense of wholeness when attempting to observe, understand and empathize with a world beyond humans. The relationship between man and nature includes the overlap of natural and human history and the close connection between different species. Therefore, we propose a multi-species coexistence design perspective, which provides flexible time and space for designers and community members to optimize the design (or redesign) of the material and spiritual home shared by “non-human” beings. Multi-species coexistence design differs from previous research methods in paying more attention to the interaction between humans and non-human beings. It explores non-human communication activities, such as gods, ancestors, animals and plants, that have long been forgotten or ignored by capital, power, planning and design. The following will combine two area cases in southwest China to explore a design paradigm beyond human-centeredness.

Exploring sustainability from “failed” designs: the concept of “community” of the Dong People in Guizhou Province. Disaster is a form of anti-structure. Sharifi and Khavarian-Garmsir (2020) pointed out that the pandemic outbreak provides planners and decision-makers an excellent opportunity to rethink the design and planning of cities. Planners can redesign and build more just, resilient, and sustainable cities. The community public activity center project in a village, Liping, Qiandongnan, Guizhou, was temporarily suspended due to the pandemic. The pandemic forced people’s lives to press the “pause button”, but the folding of time and space generated by the pause has precisely allowed us and the Dong people to find the power of sustainable design from “failed” designs and the natural world, shifting our research perspective from a human-centered approach to the realm of multi-species symbiotic design. Especially with the lifting of pandemic prevention and control measures, we have discovered that the “space” temporarily stopped or abandoned by the pandemic has burst into vigorous vitality under the push of nature’s invisible motivation. Plants have reclaimed and occupied the space and land previously designed in new ways. Wild grasses and flowers have gradually taken over the once-cultivated land. Animals and birds have also reappeared in the “idle” or “abandoned” space previously planned and designed. The exchange of energy and labor between humans and the earth, once humans retreat, nature will recover human traces in its way, restoring its original appearance.

Although the Dong people (farmers) do not understand modern design in a contemporary sense, they understand how to respect the living environment of animals and plants, know how to live with them, and have formed an ancient “kinship” with them. This kinship is deeply embedded in the Dong people’s belief in “everything has a spirit” and “ancestor worship”, and their emphasis on and practice animal and plant diversity. In Dong communities, the habitat of animals and plants extends almost from each Dong people home to the front and back of houses and even to cultivated land and forests. The Dong people ont only respect nature, but also selectively plant and cultivate some edible plants, providing food for insects (like bees) and habitats for birds.

Through respecting and reconstructing nature, the Dong people maintain cooperation and communication with "non-human beings" on both material and non-material levels.

In addition to forming a kinship with animals and plants, the Dong people's concept of "non-human" also includes "ghosts", "ancestors", and "deities". "Ghosts" usually parasitize in the "ruins" and "idle" space of the community, which were often residential areas but were reclaimed by disasters (fires), making them change from "good space" to "bad space" (see Figure 1). The Dong people believe that "bad space" is "unclean". Unclean space is both a "scar" on the community and a "scar" on people's psychological and emotional State. However, these "unclean spaces" are often ignored by external traditional village protectors and planners, who transform them into fire pools and fire isolation belts, thus triggering cultural conflicts and community residents' dissatisfaction (Ji, 2011).



Figure 1. The fire instantly reclaimed the whole village

Italian Ezio Manzini (2015), from Milan Polytechnic University, pointed out in his book Design, when everybody designs pointed that "when confronted with new problems, human beings tend to use their innate creativity and design capacity to invent and realize something new" to deal with all kinds of uncertainties and social crises.

Faced with the fire risk, the Dong people did not change their original "densification" living pattern or switch building materials. They still live in wooden houses. The Dong people's transformation and design of community spaces follow the guidance of "feng shui". Every aspect of the building must consider the relationship between humans and the gods, as well as the spatial interactions between "humans" and "non-humans". Special building materials have formed a set of village rules and regulations for preventing fires and handling them afterward. Among them, the custom of "washing the village", which punishes the "fire god", effectively regulates people's use of fire.

The Dong people's concept of "empty space" and coexistence with multiple species makes us deeply feel that a human-centered design is not enough to help us address the issues of minority community construction, but it does provide an opportunity for us to cooperate with the Dong people. Our methods about listening and collaboration, mobilizing local people to participate in project design and planning activities, and focusing on

the interaction between “soil” and “water” according to the local people’s concept of “community”. Community construction uses local resources, adapts to local conditions, experiments with villagers, and promotes equal participation of community residents in design and creation. The characteristic of sustainable renovation is to deal with the living space and interaction environment of both humans and non-human beings. We have also designed reserved and forgotten spaces for “empty space”. Forgetting is not to completely sever the historical connection between the community’s past, present, and future, but through the “mourning” of space, to further continue the folk customs of Dong society and the collective memory of fires.

In our research on a village in Guizhou, our focus is not on creating a space for the Dong people’s social interaction through the construction of community space, but rather on analyzing the epidemic as an exceptional state. It provides us with a paradigm for stopping and thinking about design, as well as the “threshold” power and the inversion of “structure” that spills over from the reverse structure, allowing us to find sustainable emotions and the power of “sharing joys and sorrows” from social relationships in the stage of folds and blanks. With the help of this exceptional state, we have worked with local people to rebuild our relationships with the community, the surrounding society, and the “non-human” world, walking out of our own initial 500 meters.

Recalling the disappearing neighborhood: ecological fiction and redesign of “Non-Place” in Chongqing’s garden community

Multi-species symbiotic design is a design approach that includes people and multiple living subjects such as technologies, objects and media. Research conducted in the Dong region of Guizhou and by researchers such as Behera AK and Kumar PR during the New Crown epidemic closure has shown that as human activity decreases, animals move out of the forest and into the city, and the heterogeneity of plant and animal species in the habitat consequently increases (Latour, 2011). However, at the Plot field site, the heterogeneous relationship between species showed the opposite trend. As people reduced their social activities due to the epidemic, stray cats and tits living in the community would gradually decrease due to the lack of humans to provide them with food supplies (Behera et al., 2022). Even after the blockade was lifted, it was difficult to see the animals return. Flora and fauna in the community were followed up on before and after the blockade. It was observed that before the epidemic, animals such as snakes, squirrels, dogs and cats could be seen going back and forth to and from the community at any time. Many stray cats could also be found peacefully lying on the stone stairs by the roadside, basking in the sun. Various birds are also frolic among the flowers in the forest. Although there was a pet ban in the community, residents do not hate sharing the same ecological space with animals; some even provided food for them for years.

The garden community maintains many indigenous plants and flowers from the region before its development and a few non-profit urban vegetable gardens. This space encompasses both the community’s present and its historical past. Residents practice farming by cultivating vegetables and preserving the legacy of agricultural production, keeping it alive. The community gardens act as a countermeasure to prevent rural and suburban spaces from being swallowed up by uncontrolled urban construction projects. However, the lack of human activity and presence has led to the decay and loss of green plants and flowers inside and outside the community and weed regeneration (see Figure 2 Figure 3).

Although the pandemic prevention and control measures implemented in the garden community have disrupted communication and interaction among people, animals, and plants, the design of the nucleic acid testing booth has provided a way to bring residents together while maintaining social distancing. The booth, purchased by the government and carefully designed for flow analysis and convenience, had become a symbol and memory of the time. However, as the pandemic improved and policies changed, it’s completely diminished (see Figure 4). We



Figure 2. Comparison of vegetable fields (During the Pandemic).



Figure 3. Comparison of vegetable fields (Before and after the Pandemic).

collaborated with the community to repurpose the booth using design to restore community relationships.

The nucleic acid testing booth redesign presented an opportunity to reclaim the initial 500 meters. Working with community residents, we actively created a map. Through the conceptual design of space service, we try to establish: a mobile free library, convenient service center, animal park, etc. On the one hand, it can inspire community residents to get out of their homes, get together and participate together. On the other hand, community residents can enjoy convenient services in the space by scanning the QR code. At the same time, we will transform the nucleic acid testing hut into a small wildlife park based on the areas where animals and birds frequently gather. By designing around the remnants of the epidemic, we not only attempt to address the absence of interpersonal interactions and increased animal habitats. Although the reach of the nucleic acid testing booth is limited, its existence and services represent a shared historical memory of the pandemic to some extent.



Figure 4. Inactive coronavirus nucleic acid testing hut

In addition to redesigning spaces for people-animal and people-people interactions, designing for people-ancestor interactions also requires consideration of multi-species coexistence. Unfortunately, the community's historical heritage has been lost due to the past planning and design of the nearby elevated bridge. While the bridge serves as a functional transportation feature, it also obscures the presence of non-human entities behind the original space. Therefore, the elevated bridge transforms non-places into functional areas, unintentionally erasing the natural environment and its inhabitants.

The "residual space" or "ruins" created by the viaduct in the neighborhood was once farmland that was later reclaimed by the construction of the neighborhood, and turned into a recreational meeting place for its residents. Such "residual space" is often seen as a static "non-place", but the occasional ritual practice (see Figure 5) makes it possible for the "presence" and "translation" of this space to take on a narrative and historical character, giving it an aura and effect akin to that of a monument. This "non-place" in the monument is narrative and historical, acquiring an almost monumental aura and effect. At the same time, it also shows us that urban people who the metropolis has not alienated are still reclaiming the unbreakable space of modern construction in the form of rituals, stalls, parking, and entertainment, preserving the memory of the viaduct's past and their desire to recall the neighborhood.

How can design aid in recollecting the memories and interactions with non-human entities in the same neglected space? Following the community's demands, we collaborated with the residents to revamp the remnant area below the viaduct through sketching. The design method aimed to reintroduce particular content and emotions of a place into the "nowhere" space to uncover or reclaim their existence. Given that the viaduct lanes are linear and travel directionally without the possibility of reversal, partial reversibility is achieved via the painting design,



Figure 5. Residents offer sacrifices under a viaduct

thus restoring the district's history and retrieving the highly materialistic and impersonal elements of the traffic path. Infusing the unused corner area of the viaduct with historical significance exponentially expands the "non-human" communication between the community's inhabitants and their forefathers and deities. As a result, striving to restore mournful or ceremonial spaces.

By utilizing a multi-species design approach to incorporate surplus space into the design process, the boundaries between human and non-human entities are transcended. While redesigning existing space may appear straightforward, the involvement of community residents and the recognition of the presence of trees, flowers, animals, and other multi-species elements in the community revive the fading historical significance of the neighborhood, existing social norms, and neighborly trust.

Conclusion and Expectation

Through the study of two research cases in two administrative areas of Southwest China, it is pointed out that the human world cannot be separated entirely from the non-human world of plants, animals, ancestors, deities, and other entities of the "non-human" world. The cultural identity concepts of two different regions and groups tend to emphasize the wholeness of the environment as a shared ecosystem for humans and multiple species of life, in which they coexist and jointly explore and shape the material and spiritual worlds necessary for their survival. This relationship between humans and other species is more diverse and dynamic than the commonly emphasized relationship between humans and animals or plants.

This paper also employs a multi-species design approach to reflect on the concepts of "space" and "artifact" that emerged during the pandemic, demonstrating that animals and plants can help humans design sustainable

habitats while creating and developing their habitats. By using this approach, designers could avoid the individualistic and functionalist tendencies that may arise from a design philosophy that focuses solely on "making the most of resources". Additionally, this paper adjusts the research perspective from the habit of studying "others" to incorporating the "self" as a research method, continuously and over time discovering moments of resonance and intersection between humans and non-humans.

Multi-species design provides a research perspective on spatial design, service design, and ecological design from a non-human action subject, emphasizing not only the relationship between humans and nature, but also the ancestors and deities who are intertwined with humans. This perspective should be considered in service and spatial design. The research in this paper is innovative in methods and perspectives: in terms of research methods, this paper employs anthropological participant observation, listening and collaboration methods to enhance the interdisciplinary fusion of design and anthropology. From the research perspective, based on the design perspective of multi-species symbiosis, it is proposed that the main body of the community is not only human, but also contains the "non-human" life existence entangled with human beings. In terms of research topics, it gives new academic concern to "failed" design and "non-place" or "ruins space". It pays particular attention to the pre-historical "no place" stage and proposes that "no place" is where human, non-human begins, ancestors and gods live together. The visual space of "no place" seems to disappear, but people's memory and mourning of "place" are everywhere, which shows us the problem of the current design, and requires us to make adjustments. Such as the three aspects of the research content, for service design, space design, and community continuous design research, to provide two realistic "China experience" for two areas, for the pandemic in the context of how to change the design of people's lives, and put forward methodological thinking. Because of urban complexity and the high mobility of the population, research on multi-species design in Chongqing's neighborhoods is ongoing. The research team looks forward to future collaborations with relevant research teams on human-machine interaction to promote interdisciplinary research on multi-species coexistence design.

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Study on the Revitalization and Utilization of Rammed Earth Architectural Heritage in the Perspective of Ecological Civilization —A Case Study of Wujiahezui Watchtower,Chongqing

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Abstract

Building industry is one of important industries of carbon emission.In the context of ecological civilization. Ecological architecture has become a hot topic of current architectural development. Chongqing Wujiahezui Watchtower is in urgent need of revitalization and utilization,which is an important traditional Chinese rammed earth architectural heritage and ecological material representative. This paper starts from the perspective of ecological civilization and explains the realistic problems and connotations of contemporary ecological architectural design from five dimensions. Then, the ecological value of vernacular architectural heritage is described about proposing energy conservation, renewable, durability and culture. Eventually, the green design path of rural rammed earth architectural heritage is proposed from several major aspects: Heritage activation model, Energy, material, Landscape and culture. This paper provides a reference for the development of contemporary ecological architectural diversity and the development of vernacular cultural heritage.

Author keywords

Ecological Architecture; Heritage Activation; Rammed earth architecture; watchtower

Introduction

With the rapid development of economy and society, human activities have brought severe challenges to the current natural environment. In this context, how to achieve harmonious coexistence between human and nature and establish ecological values has become an important issue in the construction industry. In 2020, China pledged to achieve carbon neutrality by 2060. The Chinese government insists on modernization in harmony with nature The building trades, as a key industry, emitted about 1 billion tons of CO2 in 2019, accounting for 28% of the world's total energy-related emissions.

At the same time, the most arduous and onerous task of building a modern socialist country in an all-round way still lies in the countryside. The 20th National Congress of the Communist Party of China pointed out that we should accelerate the construction of an agricultural power, solidly promote the revitalization of rural industry, culture and ecology, and build a livable countryside. Rural areas will develop characteristic industries and broaden the channels for farmers to increase their income and get rich.

Therefore, we need to pay attention to the ecological activation and utilization of rural residential heritage in order to promote Chinese-style modernization.

Overview of ecological building development

Architecture as one of the basic life activities of human beings. No matter in the East or the West, architecture is built on the basis of the natural environment and the needs of human development. Confucianism and Taoism, two major philosophical schools in ancient China, both advocate the idea of " the harmony between the heaven and human". As one of the traditional practice categories, architecture also pursues the coordination between architecture and nature under the guidance of traditional philosophy. For example, residential cave dwellings in northern China generally located at the foot of the mountain or halfway up the mountain, which uses the thermal insulation function of the mountain to save energy consumption. Simultaneously, simple construction method of residential cave dwellings contribute to reducing the carbon footprint of the construction process.

In addition, focusing on the development of green buildings in the modern world, in the 1960s, Victor J.Papanek published <Design for the Real World> and proposed the concept of green design. In 1969, <Design with Nature> came out, marking the birth of green urban design. In the 1970s, the energy crisis broke out, and limited resource thought made people pay attention to green buildings. Subsequently, More green building books were published,such as <Earthscape:a manual of environmental planning>,<The Limits of Growth>,<Silent Spring>and so on,which continues to develop the concept of green architecture.

Practical problems and connotation of contemporary ecological architectural design

Ecological architecture is not only emphasizes the creation of functional space under technical means, but also emphasizes the adaptation of architecture to the natural environment, existing resources and formal characteristics.

1. Value dimension: the narrow value of anthropocentrism — New natural ecological values

Urbanization accompanied with industrialization focuses on development and function.In the past, human interests are more important than nature. And the environment has deteriorated due to frantic resource exploitation. It is now universally recognized that Only by respecting nature can we achieve sustainable development.Consequently,ecological value is the important connotation of ecological green building design.

2. Process dimension: Phased ecological design — Full life cycle eco-design

With the development of society, the concept of green building continues to develop.And it has also changed from the green ecology of a certain link such as the use of materials to the green life cycle including materials, production, transportation, use and recycling.

3. Technical dimension: passive building — Active Building

In the past, green building design mainly considered the installation of ventilation corridors, changing the orientation of the building, and using rammed earth materials.The overall design is static.However,with the progress of technology, Green buildings are smarter.Green buildings constantly adjust building facilities and Spaces according to usage and natural environment to improve energy collection and use efficiency.

4. Application dimension: living function — living health

In addition to the relationship between architecture and environment, people also play an important role in the green architecture.The design pays more attention to the comfort and health of human beings in the building,such as the introduction of natural light, the maintenance of appropriate temperature, the introduction of indoor natural landscape and so on.

5. Cultural dimension: functional experience — cultural experience

From the perspective of ecological civilization, people's attention to ecological civilization is not only reflected in the development of ecological technology, but also reflected in the yearning for ecological experience and ecological culture. Citizens relax and enjoy themselves in the landscape and countryside.Many activities related to nature, such as native farming, nature studies, etc., are of great interest.

Ecological value of vernacular architectural heritage

1. Overview of Wujia Hezui Rammed Earth Watchtower

Wujia Hezui Rammed Earth Watchtower is located in the 5th community of Shifo Village, Caijia Town, Jiangjin District, Chongqing. It was built in Qing Dynasty and sits north to south. The watchtower is an earth-tile structure with four floors and another ground floor. There are two wooden Windows on the south and one wooden window on the west, and the stone wall on the ground floor. The watchtower is largely intact.But because it has been abandoned, The roof tiles have been damaged.



Figure 1. Aerial view of the rammed earth watchtower in Wujia Hezui

2. Cultural value

The watchtower is the main building in the Villa complex. Villa style is free.The watchtower manor is Chinese and Western unique style. The decoration of the surviving carved beams and paintings of watchtower is of great artistic value. Below each window is a round emblem carved column.the west and south are supported by right-angled triangular wooden frames.And triangular wooden frames have different shapes of emblem carved patterns. The triangular diagonal struts set above the third floor are decorated with exquisite shapes and carefully sketched images, and the surrounding fence ,which expresses the special leisurely and exquisite life style of the owner living in the mountains. This building is an important physical material for the study of Qing Dynasty architecture and has important historical and artistic value.

3. Value of energy conservation

Buildings have a large carbon footprint in the process of material production and transportation, construction and post-operation. However, from the perspective of the whole process, rammed earth buildings have

considerable advantages in energy conservation and emission reduction.

On the one hand, rammed earth buildings have thermal stability, which can make resident feel warm in winter and feel cool in summer. Relevant scholars have done experimental research in this respect and found that the heat storage coefficient of rammed earth material is larger, and the temperature conductivity coefficient is smaller. Due to the heat storage and delay effect of the rammed earth material, this kind of wall has a good adaptability to the climate. Therefore, it can reduce the energy consumption.On the other hand, rammed earth construction materials are more locally sourced, which reduces the carbon footprint during excavation and transportation. It can also contribute to energy conservation and emission reduction.

4. Regeneration value

Rammed earth, considered a green alternative to concrete and often used to build eco-houses, is increasingly becoming a choice for contemporary architecture. Rammed earth construction mainly uses clean clay, rubble, wood, bamboo, gravel, strip stone, reed, straw and other materials. However, after the old rammed earth walls used for many years were removed, the Rammed earth construction waste can also be used as a good fertilizer. Therefore, rammed earth building materials have good ecological recycling value.

5. Durability value

The rammed earth material itself has no harm from insects and ants.But wind and rain erosion is the main source of harm. Due to the rainy weather in Chongqing in southwest China, raindrops have been washed diagonally through the earth wall and peeled off the wall under the action of wind. Therefore, we should also pay attention to its development, we can add different sizes of sand and stone particles, slag, mechanical waterproof agent and other materials according to the soil quality to improve durability and robustness, so as to extended service life.

Green design path of rural rammed earth building heritage

1. Heritage activation: Homestay experience model

In rural areas, compared with traditional rural processing industry and agricultural production , homestay is a sharing economy and experience economy. It has no significant carbon footprint outside of everyday life. Therefore, homestay economy can be used as the development direction of vernacular architectural heritage. Design can integrate regional environment, ecology, industrial resources and homestay development. This approach can not only show the original rural image and local characteristics, but also enrich tourists' emotional experience,which is becoming an important direction to innovate the homestay business model and build the core competitiveness of homestay.

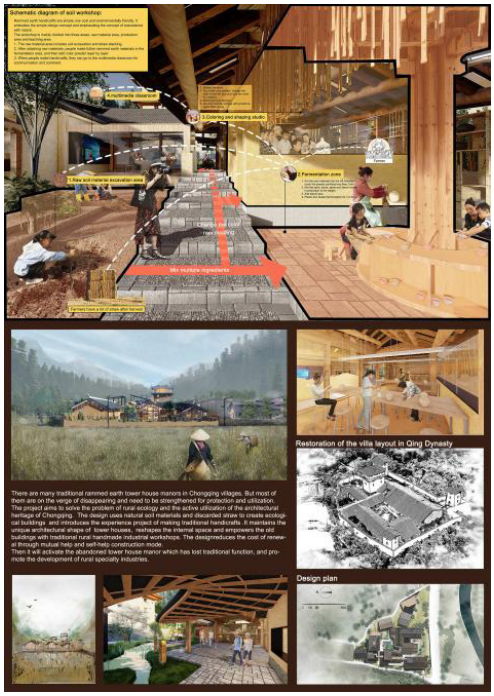

Figure 2. soil craft workshop design

2. Energy and material: decreases in carbon emissions

China is promoting the clean, low-carbon and efficient use of energy, and promoting the clean and low-carbon transformation of building field. The design can use photovoltaic power generation panels to generate electricity and use biogas for cooking and generating electricity. The



Figure 3. Activated utilization of rammed earth watchtower

ecological building is designed using natural materials and waste straw.In addition, the project reduces the renewal cost through the mutual construction mode.

3. Landscape design: Increases in carbon sinks

The Fuzhou Declaration upholds the idea of the organic integration of human destiny and nature and culture, and promotes the formation of a new relationship between man and nature to protect cultural and natural heritage. Because the climate of Chongqing is subtropical monsoon humid climate, Chongqing is hot in summer. Meanwhile, Chongqing has humid air and abundant rainfall.The design can place pools in the manor to reduce the site air temperature through evaporation and enrich the landscape experience. In the meantime,the site can introduce local plants to increase carbon sink and shade space.

4. Culture: traditional soil craft workshop experience

The design introduces handicraft experience project and ecological aesthetics, which not only enhances the spatial attraction but also promotes the rural endogenous development.

Conclusion

Rural rammed earth architectural heritage has ecological properties, natural environment endowments and traditional cultural genes. In the context of ecological civilization, we must pay attention to the development of traditional ecological architecture skills to improve their durability, bearing capacity and artistry. The active utilization of rural rammed earth building heritage in the direction of residential accommodation is conducive to promoting citizens' recovery perception in the post-epidemic era, and is conducive to improving villagers' income and promoting rural revitalization.

Acknowledgments

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Constructing Strategies for Green Lifestyle Based on China's "Dual-Carbon" Goals

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Abstract

With the deepening of the concept of sustainable development, terms like carbon peak and carbon neutrality have become popular and frequently appear in the public's view. However, the "dual-carbon" goals are merely technical terminology and may seem distant from the daily lives, thus making it challenging to establish a societal foundation and impeding the achievement of these goals. This article analyzes the current challenges of the "dual-carbon" goals, outlines the significant role of promoting energy conservation and carbon reduction through the construction of a green lifestyle, and proposes that green product design serves as an effective approach to foster the development of a green lifestyle.

Author keywords

Carbon neutrality; green design; green lifestyle; green consumption

Introduction

Carbon dioxide, as a major component responsible for triggering the Earth's greenhouse effect, has led to the term "carbon emissions," which collectively refers to greenhouse gas emissions. However, production and daily activities consistently contribute to carbon emissions. As a result, carbon reduction has emerged as a pivotal endeavor in realizing worldwide green sustainable development.

At the United Nations Climate Conference held in September 2020, Chinese President Xi Jinping pledged that China would strive to achieve carbon peak before 2030 and carbon neutrality before 2060. China has explicitly incorporated "carbon peak" and "carbon neutrality" into the overall layout of ecological civilization construction in its 14th Five-Year Plan (2021-2025). This signifies that China has advanced a more distinct set of tasks, goals, and timeframes for systematic implementation of green development concepts and reinforcement of green development practices within the framework of promoting green development strategies. The implementation timelines of major countries and regions' "dual-carbon" goals vary. The United States achieved carbon peak in 2007 and is aiming for carbon neutrality by 2050. Similarly, the European Union reached carbon peak in 1990 and has set the target of achieving carbon neutrality by 2050. Canada reached carbon peak in 2007 and is also working towards carbon neutrality by 2050. South Korea accomplished carbon peak in 2013 and has set its sights on achieving carbon neutrality by 2050. Japan achieved carbon peak in 2013 and has committed to reaching carbon neutrality by 2050. Meanwhile, Australia achieved carbon peak in 2006 and has established the goal of attaining carbon neutrality by 2040.

As of February 2021, 124 countries worldwide have declared their intention to become carbon neutral and achieve net-zero carbon emissions by 2050 or 2060. The 26th United Nations Climate Change Conference held

in November 2021 further implemented the Paris Climate Agreement, with member countries agreeing on the shared responsibility of working towards a net-zero economy through national efforts (Chen et al., 2022).
In terms of timelines, China's commitment to achieving carbon peak to carbon neutrality spans only 30 years, far shorter than the planned timelines of developed countries. For China, with its substantial population, this journey is undoubtedly a challenging one.

Implementation Significance and Real-world Challenges of Dual-Carbon Goals

1. Significance of Implementation

IPCC's Special Report on Global Warming of 1.5 ° C emphasizes that stabilizing global warming at a given level entails reducing global "net" greenhouse gas emissions to nearly zero. This equilibrium between greenhouse gas emissions entering the atmosphere and being absorbed is referred to as neutrality or net-zero emissions (European Parliament, 2019). Carbon peak represents the pivotal turning point in achieving net-zero carbon emissions and serves as an interim milestone.
The primary and most direct benefit of achieving carbon neutrality is to mitigate negative environmental impacts and slow the rising rate of global temperature. As a result, achieving carbon neutrality is a critical objective for a variety of countries today and one of the possible solutions to the problem of climate change (Deng et al., 2021).

2. Real-world Challenges

While the "dual-carbon" goals have gained international consensus and are being promoted and implemented through macro-level policies and industry practices domestically, effective strategies for implementation at the micro-level of societal life and consumption lack cohesiveness. Factors such as regional disparities in social development contribute to the real-world challenges faced in the broad adoption of carbon neutrality.
Upon analysis, the challenge lies in the fact that carbon peak and carbon neutrality are rooted in specific technical aspects of sustainable development that are largely detached from everyday life, making it challenging to capture public attention and resonance. The implementation of dual-carbon goals necessitates the collective engagement of the entire society and its citizens. The lack of support from a substantial consumer base impedes the establishment of a societal foundation. Without the formation of societal consensus, the momentum can be lost, leading to mere slogans or industry jargon.
Furthermore, despite policy impetus and corresponding industry standards, carbon's intangible nature within specific products creates a perception gap. In the absence of market demand, sustainable production becomes unsustainable. Top-down policy constraints merely address short-term issues. Transforming production into a consumer-driven imperative requires strategies that establish a profound sense of public endorsement for a "low-carbon green lifestyle," turning the production imperative from "what I must do" into "what I want to do," and fostering consumer-driven transformation that compels producers to shift towards greener options.
Taking into account the current state of consumption and production, the critical task ahead involves mobilizing society as a whole, identifying pathways for widespread public engagement in dual-carbon goals, and establishing a resilient and enduring foundation for a society that embraces both environmentally friendly practices and reduced carbon emissions.

Strategies for Advancing Green Lifestyle

1. Composition of Green Lifestyle

The introduction of carbon neutrality serves as a specific technical benchmark for China's pursuit of green development. It demands the concerted efforts of all sectors and strata to achieve carbon neutrality goals. This

effort involves governmental guidance, corporate implementation, and societal participation, forming a societal foundation encompassing guiding factors (policies, standards), supply factors (production, sales), consumption factors (use, disposal), and assurance factors (certification, assessment). This foundation collaboratively advances dual-carbon goals, fostering a green production and consumption pattern across society and establishing a green lifestyle.

Guiding Factors: At the national level, relevant policies are enacted, while industries formulate entry standards, guiding the top-down transition of production and consumption towards green practices.

Supply Factors: Enterprises recognize the potential to redefine mission and vision, reposition brand strategies, and redesign processes. The maintenance of a healthy environment and ecosystems becomes an opportunity for transformative upgrades, rather than a mere obligation.

Consumption Factors: Consumers are actively directed towards cultivating new consumption values, shaping novel lifestyles, and fostering new habits. Environmental consciousness encompasses purchasing green-certified products, maximizing resource utilization, practicing waste separation and recycling, and conscientiously adhering to environmental protection obligations. Individuals should proactively learn and cultivate low-carbon, frugal lifestyles, appreciating the enhanced quality and essence brought by embracing green living.

Assurance Factors: Through the establishment of green product certification and usage evaluation systems, the transition to low-carbon and high-quality everyday products is safeguarded.

High-quality development is more than a slogan or vision; it tangibly enriches people's lives. By synergizing efforts from policy (guidance, assurance), business (production), and society (consumption), a comprehensive understanding of the dual-carbon goals is crystallized across industries, society, and individuals. This multi-faceted approach promotes high-quality societal development. The shift evolves from top-down governmental-enforced supply-side low-carbon transformation to a bottom-up, consumer-driven impetus for supply-side low-carbon reform. By initiating high-quality living, consumers recognize that purchasing green products and embracing green lifestyles not only serve as carbon reduction measures but also embody a fashion trend, compelling transformative shifts in production and supply.

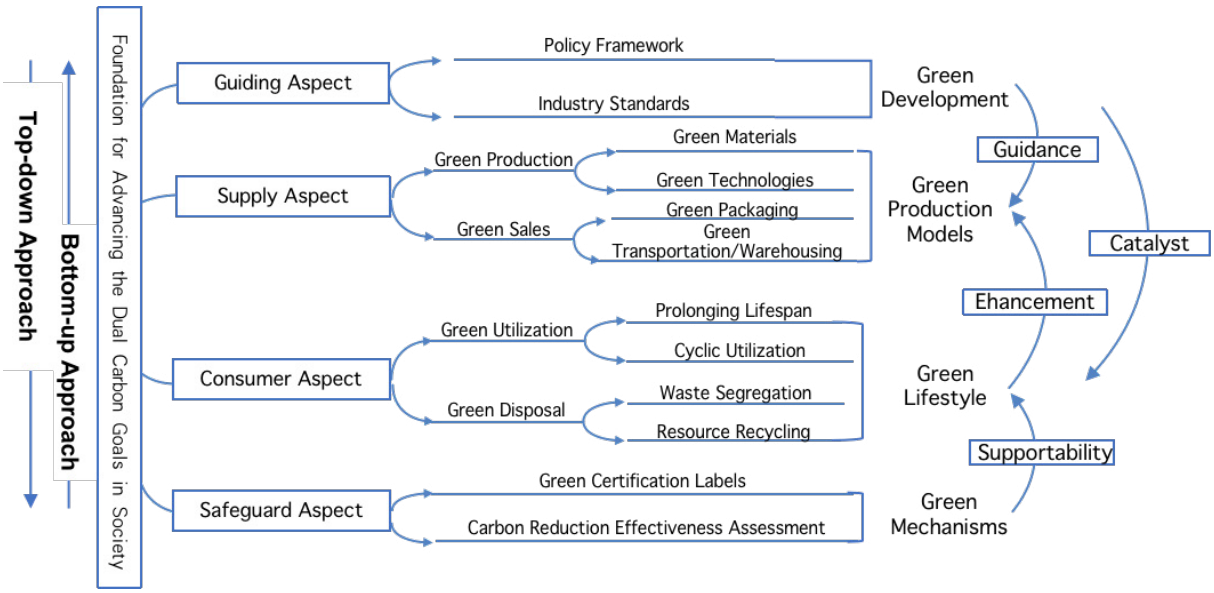

Figure 1. Logical relationship diagram for building a green lifestyle (Author drawing)

2. Construction Based on Green Design

In the context of lifestyle development, both constructors and practitioners engage with the impacts of various products across different scenarios on the quality of life. While we have previously explored multidimensional strategies for establishing green lifestyles, revisiting practical implementation involves focusing on the core participant in life experiences—the individual, or the consumer—and their potential for mindset transformation. Achieving this shift requires concrete product designs that instill confidence and support for environmentally friendly products and industries.

2.1 Policy Level: Significance of Green Design

As mandated by China's "Guiding Opinions of the State Council on Accelerating the Establishment of a Sound Green, Low-Carbon, and Circular Development Economic System" (State Council Document〔2021〕No. 4), green planning, design, investment, construction, production, distribution, lifestyle, and consumption are to be comprehensively promoted throughout the entire process. By coordinating high-quality development and high-level protection, this holistic approach seeks to establish a sound green, low-carbon, and circular economic system, ensuring the achievement of carbon peak and carbon neutrality goals, propelling China's green development to new heights. In the current landscape of carbon reduction measures, widely adopted solutions include Carbon Capture and Storage (CCS) and Carbon Capture, Utilization and Storage (CCUS). Both methods involve physically and chemically collecting and sequestering carbon dioxide emitted into the atmosphere or finding avenues for reuse, aiming to reduce atmospheric carbon content. This is often referred to as "end-of-pipe treatment."

Design is the forefront of all production and life processes. If carbon emissions throughout a product's lifecycle can be controlled during the initial design phase, it complements end-of-pipe treatment, achieving an effect greater than the sum of its parts.

In the battle to achieve "dual-carbon goals," design should be seen as a form of coordination and planning, directly influencing the quality of products across production, marketing, use, recycling, and reuse, which in turn influences consumer tendencies. Design thus becomes a pivotal phase for promoting harmonious coexistence among individuals, nature, and society. Currently, green design has permeated various aspects of social development, acting as a catalyst for constructing green lifestyles and paving the way for the pursuit of dual-carbon goals.

2.2 Industry Level: Leveraging the Value of Life Cycle Assessment (LCA)

"Life Cycle Assessment" is a highly effective design evaluation method in the realm of green design. It evaluates processes from raw material extraction to material processing, manufacturing, transportation, use, maintenance, repair, disposal, or recycling. Design interventions throughout a product's lifecycle play a role in comprehensive carbon management (Wang et al., 2020). Conversely, as a comprehensive assessment method for the product lifecycle, it engages people in full-cycle product management.

The cornerstone of constructing a lifestyle is consumer behavior, and designers serve as intermediaries between producers and consumers. Guiding and evaluating consumer behavior through design enables them to clearly understand the role of each lifecycle phase in carbon reduction. This awareness encourages green consumption and facilitates the development of systemic thinking about products, maximizing the practical value of LCA.

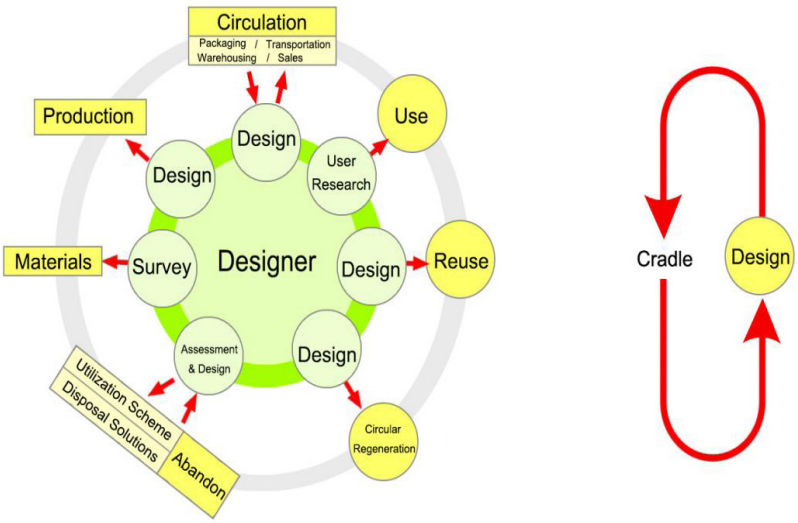

Figure 2. Diagram illustrating the design-integrated LCA (Author drawing)

2.3 Action Level: Guiding Low-carbon Consumption Scenarios

The purpose of design is to fulfill people's life needs, and the aspiration for a better life is its ultimate goal. Design is a creative activity that users can perceive from various aspects of daily life. Since its inception, design has possessed commercial attributes; as a result, many designers overlook their social responsibility. In his book "Design for the Real World," American design educator Victor Papanek delves into "design ethics." He emphasizes that design should serve human "needs" rather than "wants," and should cater to the needs of the majority while serving humanity's and the environment's future development (Papanek, 2020). "Design for the Real World" offers profound reflections on traditional design pursuits solely driven by technology and commercial interests.

From this perspective, to achieve society-wide carbon reduction goals, design needs to wield significant influence across all aspects of life.

Examine diverse life scenarios and explore the guiding role of design within each context.

Clothing: According to the United Nations Environment Programme data, the fashion industry contributes to nearly 10% of global carbon emissions, surpassing the combined emissions from international flights and shipping. Due to the rapid pace of fashion consumption, the clothing sector has become a major emitter of carbon. To curb this trend, green fabrics are a crucial aspect of design. Additionally, extending the lifespan of clothing and establishing recycling systems contribute to the green and low-carbon aspects of fashion products.

Food: As the saying goes, "food is essential to the people." Food constitutes a fundamental necessity for human survival, yet the choices we make regarding what and how we consume exert a substantial influence on carbon emissions. Crafting rational dining procedures, managing the carbon footprint associated with food processing, curbing waste, employing environmentally conscious tableware, and minimizing the use of disposable utensils all serve as effective approaches to reducing carbon emissions.

Housing: Energy-efficient architectural design plays a pivotal role in diminishing energy consumption. Consequently, the concept of net-zero carbon buildings has surfaced as a pragmatic approach to energy-efficient design. The incorporation of environmentally conscious design principles in both indoor and outdoor spaces enriches living experiences, fostering the efficient flow of resources and energy.

Transportation: Vehicle emissions are a major source of greenhouse gases. New energy transportation options improve the current situation. However, electric vehicles aren't the ultimate solution due to environmental

pollution and carbon footprint issues associated with recycling their batteries, which require substantial attention. Seeking greener alternative energy sources is a new direction for breakthroughs in transportation.

2.4 Spiritual Level: Fostering Identity with Green Consumption Demands

Maslow's hierarchy of needs theory is crucial when analyzing consumer psychology, encompassing physiological, safety, belongingness and love, esteem, cognitive, aesthetic, self-actualization, and transcendence needs.

Traditionally, when people buy a product, its functionality and appearance are primary considerations that fulfill both physiological and psychological needs. However, consumers rarely considered a product's environmental impact in the past. Japanese materials scientist Ryoichi Yamamoto pointed out in his book "Strategic Environmental Management - Eco Design" that industrial products, unlike craft art, are developed and produced based on mass production and supply, significantly affecting the global environment. Therefore, environmental compatibility is a necessity for industrial products, a fundamental precondition... In other words, products not aligned with green design should not be called industrial products anymore (Yamamoto and Wang, 2003).

Starting from consumers' psychological needs, green product certification gradually builds their sense of identification with environmentally friendly, green, and low-carbon products, igniting the desire to purchase green products. If paying for green becomes a new trend, it can leverage psychological conformity to influence more people, making them realize responsible consumption meets spiritual needs. Consequently, this prompts companies to adopt green design, green technology, and green materials for carbon reduction in production.

In summary, both top-down and bottom-up approaches are effective in achieving a green lifestyle. Methods that establish a green lifestyle as a natural habit in areas like policy guidance, product lifecycle management, shaping consumer behavior, and addressing spiritual needs can drive the transition towards green consumption on the demand side. This, in turn, prompts supply-side reforms, propels dual-carbon goals, and establishes a high-level dynamic equilibrium between demand-driven supply and supply-induced demand.

Conclusion

Sustainable development, as a principle rooted in first principles, guides macro-level planning for human development and serves as a guideline for individual actions. The "dual-carbon" target is an important step towards achieving sustainable development. Production and life are fundamental activities for human survival and development, representing interactions between humans and nature, as well as two principal activities mutually linked with and influenced by nature. The nature of production and life directly determines the nature of human-nature relations (Wang, 2016).

Lifestyle is a comprehensive concept. On one hand, it constitutes patterns of behavior in daily life gradually formed through practice. All human activities serve the purpose of human life, with different activities in economics, politics, culture, etc., playing diverse roles as the foundation of life. The transformation of lifestyles requires the transformation of these factors. On the other hand, lifestyles possess a complex hierarchical structure. While ultimately manifesting as behavioral patterns and life experiences, they encapsulate values, cultural attributes, and regulations and norms related to production methods and policy systems. Therefore, establishing a new lifestyle necessitates systematic and gradual advancement rather than instantaneous results.

Professor Wang Liduan in his book "Creating a Green Life" stated that people are the core subjects of society and the drivers of historical development (Wang, 2016). Only through changes in individuals' lifestyles can civilization shift, fostering genuine harmony between humans and nature, protecting the natural environment, the Earth as a home, and ensuring human sustainable existence.

The realization of dual-carbon targets concerns every member of society. Beginning with the establishment of a

societal foundation for dual-carbon targets and offering robust support and assurances for green transformation on the consumption side, individuals' green lifestyle behaviors can be rooted in both theoretical foundations and practical realities. This approach genuinely transforms people's lives into a primary arena for advancing dual-carbon targets, aligning the green lifestyle with carbon neutrality, and achieving mutual carbon neutrality in both production and daily life.

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Dynamic Classification Framework Based on Bio-Vitality

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Abstract

As an interdisciplinary field, Biodesign achieves cutting-edge innovation by studying and applying the structure, function, and production process of biological entities. However, in practical applications, do we truly respect the value of biology or merely view it as a manipulable tool? Based on the study of 25 representative Biodesign cases, we have constructed a visual thinking framework to reveal the evolving process of biological vitality in design. The framework not only displays the dynamic changes of biological vitality in design practices but also offers new insights for designers to deeply ponder the concept of " Decentering Human-Centricity" in design, promoting the development of sustainable and eco-friendly designs.

Author keywords

Biodesign; Biology; Bio-vitality; Dynamics; Design Framework.

Introduction

The concept of "Biodesign" was first introduced by William Myers in his 2011 book "Biodesign." It is not just about learning from and imitating nature, but it goes beyond biomimetic design. By intensely studying the morphology, structure, and function of biological entities, it harnesses their production characteristics to drive design innovation. Biodesign differs from ecological or green design because it relies on organisms in specific ways during the design conception or practice. It is an interdisciplinary field applied in areas such as art, design, architecture, and human-computer interaction (HCI). Currently, the application of Biodesign principles ranges from conceptual creative practices to practical design practices, showcasing its broad and diverse applicability. Even though in some biotechnological fields, scientists and engineers might use the term "design" to describe their work, their focus often lies in areas of natural sciences like agricultural engineering and human therapeutics, such as the research of pharmaceuticals and health and beauty products. This study focuses on the field of artistic design, including but not limited to architecture, interior, products, fashion, and graphic design.

As an emerging discipline, Biodesign continually sees experts proposing new concepts and frameworks, aiming to interpret the significance of the interdisciplinary fusion of biological entities and design from various perspectives. For instance, “Growing Design” seeks to produce materials with specific functionalities and properties by guiding the growth of organisms, offering a novel approach towards sustainable material design (Camere & Karana, 2017; Ciuffi, 2013; Montalti, 2010). Material Driven Design, beginning from the four material experience dimensions: sensorial, interpretative (meanings), affective (emotions), and performative, aims to assist designers in devising strategies for meaningful material experiences, enhancing their understanding and application of new materials (Karana et al., 2015).On the other hand, “Living Artefacts” introduce the idea of preserving the vitality of organisms during the design process, emphasising the dynamism and vitality of the designed items. This means that the end products are no longer static but are living artificial creations. This concept introduces a novel relationship between humans and designed objects. In such projects, designers must consider three essential elements closely related to organisms: Living Aesthetics, Mutualistic Care, and Habitabilities. (Karana et al., 2020); Moreover, there is a taxonomy of digital tools for Biodesign. This taxonomy highlights the three pivotal roles that digital tools play in the Biodesign process: understanding, embodying, and perpetuating the habitat. It emphasises the critical function of digital tools in Biodesign. It stresses considering the entire Biodesign process from the initial design phase. (Zhou J et al., 2022).

While the studies mentioned above have offered insights from different perspectives into understanding the life value of biological entities in design practice, current research on the vitality of life in design practice remains limited. The dynamism of biological entities is a crucial determinant of their value in design, and overlooking it can lead to the overexploitation of living entities or even a regression in the design field to a human-centric era. Taking mycelium furniture as an example, designers utilise the growth characteristics of fungi to shape its structure and form; however, to ensure product stability, the vitality of the mycelium may be reduced in the final product (Karana et al., 2018). The introduction of Biodesign is an innovative adherence to the “decentralising human” concept in design. While continuously meeting human needs in design practice, the natural ecosystem is undoubtedly the primary concern for designers. Therefore, constructing a framework for the vitality of life helps designers delve deeper into understanding the role and value of biological entities in the design process. Designers should not only cater to human needs but also respect and uphold the life value of biological entities throughout the design process. This is not just a technical and methodological consideration but also poses significant ethical and value-based challenges for designers.

Research Questions and Objectives

The main question of this study is :

- RQ1: How can we establish a framework to illustrate the evolution of biological vitality from the onset of design to the final result?
- RQ2: How can we evaluate whether current Biodesign practices truly stimulate the potential of biological entities or merely treat them as a tool or material? This framework seeks to help designers gain a deeper understanding of the changes in the vitality of biological entities within design practices.

Research Methodology

This study primarily employs content analysis as its research method, elaborating on the following two aspects:

- Extensively collect and study literature to obtain representative Biodesign cases.
- Based on the gathered cases, we analyse the changing characteristics of biological vitality as a basis for classification, constructing its dynamic framework.

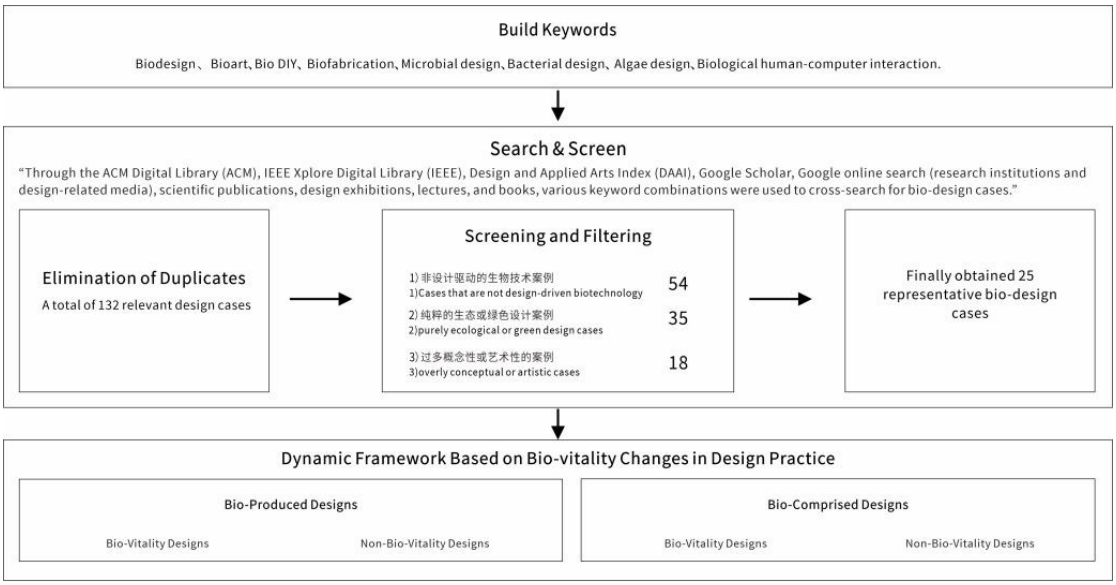

Figure 1. Research flow chart

- Furthermore, we clarify the definitions within the framework and explain its practical application in design practices. (Figure 1)

Case Retrieval: To delve deeper into representative cases related to Biodesign, we conducted cross-referenced searches on online platforms such as the ACM Digital Library, IEEE Explore Digital Library, Design and Applied Arts Index (DAAI), and Google using the following Biodesign-related keywords: “Biodesign”, “Bioart”, “Bio-DIY”, “Bio-manufacturing”, “Biotechnology”, “Microbial Design”, and “Bio-human Interaction”. These databases extensively cover Biodesign cases within design studies, ensuring a comprehensive investigation of relevant cases.

Selection and Filtering: In the search results, we first removed duplicate content. Subsequently, based on the relevance and representativeness of cases, we filtered out similar ones. Meanwhile, some cases were marked as irrelevant, which are:

- Non-design-driven biotechnology cases: These focus on biotech innovations, emphasising the realisation and functions of technology, oriented towards solving technological or medical issues but lacking explicit design methods or processes. For instance, biotech cases centred on drug development.
- Pure ecological or green design cases: These primarily focus on environmental sustainability but do not involve collaboration with living entities.
- Cases leaning heavily on conceptual or artistic aspects: These overly emphasise concepts and artistic nature, lacking practical feasibility or clear application objectives.

After the selection process, we identified 25 representative Biodesign cases. To gain a deeper understanding of the changes in biological vitality within the cases, this study detailedly classifies and analyses the transformation of biological vitality from the initial design to the outcome. Based on this, we introduce a new concept: “Dynamic Framework of Biological Vitality”.

Construction of the Dynamic Framework of Biological Vitality

Based on these 25 design cases, a new framework (Figure 2) was constructed to demonstrate how to apply it in actual design practices. The names of the works and the designer information from the 25 cases are located on both sides of the framework, and specific images of the works can be seen in Table 1. The framework emphasises

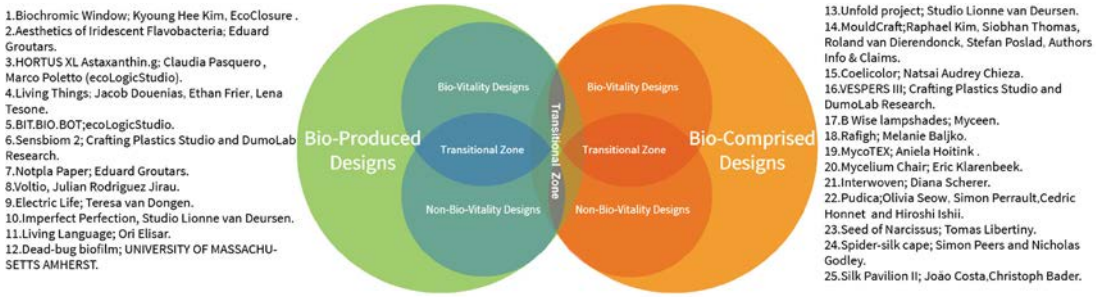

Figure 2. Dynamic Framework of Biological Vitality

that the vitality of life in biological entities is an ongoing process rather than a static state, providing designers with a new tool to evaluate changes in biological vitality.

The study categorises the design cases into two types: Designs constituted by biological entities and designs created by biological entities. Within these two categories, they are further differentiated into designs with vitality and designs without vitality. We will elucidate this framework in detail through actual cases.

Bio-Comprised Designs

Emphasis is on directly integrating biological entities into the design, making them an integral part of the design item.

Bio-vitality Designs

This sub-category involves biological entities not only as a part of the design but also requires the vitality of the biological entities to manifest their functionalities and characteristics. The case study “On the Living Aesthetics of Iridescent Flavobacteria” epitomises this concept. In this case, Flavobacteria serve as the centrepiece of the design, and the resulting design’s characteristics and aesthetic features are contingent upon the vitality of the Flavobacteria. Designers not only explore the visual changes in the bacteria but also harness its life characteristics to create unique optical effects, showcasing the bacteria’s vibrant life processes and emphasising its aesthetic of life. Throughout this process, the existence and function of the design work rely entirely on the vitality of the Flavobacteria.

Non-Bio-vitality Designs

This sub-category involves biological entities not only as a part of the design but also requires the vitality of the biological entities to manifest their functionalities and characteristics. The case study “On the Living Aesthetics of Iridescent Flavobacteria” epitomises this concept. In this case, Flavobacteria serve as the centrepiece of the design, and the resulting design’s characteristics and aesthetic features are contingent upon the vitality of the Flavobacteria. Designers not only explore the visual changes in the bacteria but also harness its life characteristics to create unique optical effects, showcasing the bacteria’s vibrant life processes and emphasising its aesthetic of life. Throughout this process, the existence and function of the design work rely entirely on the vitality of the Flavobacteria.

Bio-Produced Designs

This category describes substances or structures produced or generated by biological entities. In most cases, the biological entities are not part of the design work.

Bio-vitality Designs

This sub-category emphasises the offspring, organism A-1, which embodies living characteristics generated during the growth and development of organism A. Taking the “Myceen” case as an example, designers cultivate

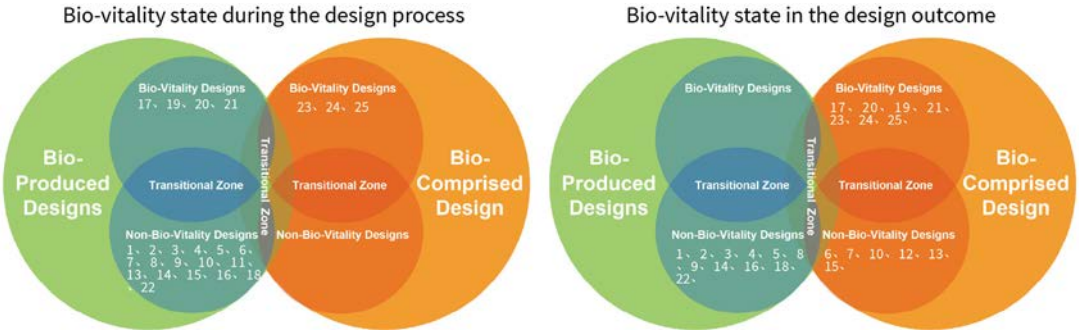

Figure . 3. Phased Changes in Bio-vitality

fungus (A) to produce mycelium (A-1). We can understand this as organism A (fungus) giving rise to a life-featured organism A-1 (mycelium). However, it is crucial to note that organisms A and A-1 might coexist during the design process, and separating them could be challenging. This procedure endows the design object with life characteristics related to organism A-1 while retaining the presence of organism A.

Non-Bio-vitality Designs

This sub-category focuses on materials produced by biological entities that do not possess life characteristics. For instance, a designer set up a framework to guide bees in nest construction to achieve a hive design with specific intentions (Tomas Libertiny, 2011). Similarly, a case describes a cloak made from spider silk harvested from wild spiders (Simon et al., 2012). Even though the spider's silk was used here, it does not directly become a part of the design piece but merely serves as a material provider.

This framework is not static but evolves with different stages of the design. As shown in Figure 3, our study organises 25 design cases within this framework. Some design schemes may be classified differently at various stages of the design. (Cases 11 and 12 were not mapped into this dynamic framework due to the lack of precise data on the biological life state.) For instance, we can observe design cases utilising fungi to create products similar to leather, paper, or plastics (Aniela, 2016; Myceen, 2022; Mycel, 2023; Nir Meiri, 2019). In the early stages of these designs, designers cultivate fungi, allowing them to grow into mycelium, categorised as "Bio-Produced Designs——Bio-vitality Designs." In subsequent design stages, designers guide the mycelium to achieve the desired form, taking measures like raising the temperature to weaken or eliminate its vitality. During this process, the mycelium gradually loses its vitality, thus being categorised as "Bio-Produced Designs—— Non-Bio-vitality Designs". Similarly, design cases use bacteria to produce products (Polybion, 2023; Studio et al., 2020; Elena, 2019; Emma, 2018). In the early stages of these designs, bacteria are cultured and multiplied through mediums like yeast, which are categorised as "Bio-Comprised Designs——Bio-vitality Designs." However, once the bacteria reach the desired volume and produce new substances, they are treated and lose their vitality, thus being reclassified as "Bio-Comprised Designs ——Non-Bio-vitality Designs."

Results and Discussion

This research framework offers a fresh interpretation of biological design principles, emphasising the central role of biological vitality in design. Whether considering living organisms as components of the design practice or as the primary producers of the design, designers should more thoroughly contemplate the role and value of biological entities in the design process and the relationship between the design and the living entities. In the mentioned framework, both the designs with vitality and those without underscore the life characteristics and

material properties of biological entities, propelling us to comprehend better and exploit the design potential of biological entities. Furthermore, the dynamic nature of the framework caters to different design stages, pinpointing the position of biological entities throughout their lifecycle. This accentuates the flexibility and diversity of biological design, also offering designers various paths for collaborative design with biological entities.

This framework shows that current research on biological design is primarily focused on “Bio-Comprised Designs”. Microbiological entities such as bacteria and algae, owing to their ease of control, production scalability, and inherent diversity and complexity, possess vast potential for applications in design. However, exploration of “designs created by biological entities” remains limited, with existing studies primarily centring around design cases involving fungal mycelium.

“Bio-Produced Designs” lead us to deeper contemplation of “decentralising humans”. Within this framework, biological entities are not just participants but play a pivotal role in design and manufacturing. The mycelium of fungi, the beeswax of bees, and the silk threads of spiders all showcase their irreplaceable biological manufacturing skills. The enormous potential of this domain remains to be explored, with predictions of more innovative and eco-friendly design solutions emerging in the future. This will advance design innovation and foster a more harmonious integration between humans and nature, contributing to sustainable and eco-friendly designs.

Table 1. Characteristic Biodesign cases (characteristic biological design cases selected after this study)

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	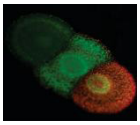			
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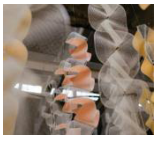		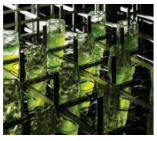	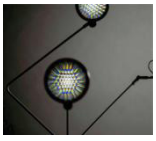	
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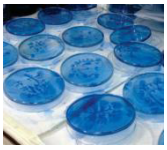			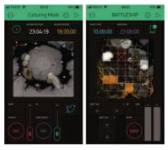	
NO.16	NO.17	NO.18	NO.19	NO.20
				
NO.21	NO.22	NO.23	NO.24	NO.25
				

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The Everydayness and Routine of Rural Artifact Design and Its Value Reshaping

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Abstract

As a carrier of culture, rural artifact design define the value of the countryside and reflect the daily life in the rural area. This paper attempts to explore the objects, contents, goals and design principles of rural artifact design in the context of daily life, and analyze the elements of rural artifact design oriented to daily life. It is proposed that everydayness and the quality of being routine is the basic attribute of rural artifacts, and meeting the needs of rural daily life is the primary task of rural artifact design. This paper believes that the essence of rural artifact design should be based on the countryside, taking the interests of rural living groups and the ecological environment as the fundamental starting point, and taking into account the overall interests of the rural social network. Through rural artifact design, we can reconstruct the rules, regulations and etiquette of rural daily life, rebuild the identity and cultural confidence of rural residents, realize a self-consistent lifestyle, and develop the characteristics of rural daily life.

Author keywords

Rural artifacts, daily life, design value.

Introduction

Daily life space is the cultural context and spatial field where rural creations exist. As cultural carriers, rural artifacts reflect the everyday life of the countryside, the traditional beliefs and social customs of rural residents, map out the multiple and complex rural relationship networks, and also define the value of the countryside. Traditional rural artifacts did not have sufficient conditions to develop their own modernity in pre-modern society, so it was often difficult to integrate into modern society. In contemporary society, rural revitalization is vigorously carried out, and artifact design has become a medium and tool to improve rural life and enhance rural value. However, in the actual practice of rural artifact design, there have always been problems such as blurring the design subject and object, confusing the service objects of artifact design, and failing to form clear design goals. This makes it difficult to claim the true value of rural artifacts. On the one hand, we acknowledge that the rural artifact has a long history and profound culture; on the other hand, we turn a blind eye to this and discard the wisdom of rural artifacts. In the face of the impact of modernity, defining the rationality and validity of rural artifact design, understanding its value, and determining the appropriate method have become complex questions. In practice, conflicting behaviors and contradictory views have emerged. As a medium and tool, how design can be combined with the original wisdom of rural artifact to produce a system of objects that adapts to the current social situation is an issue that needs to be discussed urgently. We need to think about how the constantly updated system of rural objects can be combined with the traditional rural material culture, spiritual

culture and lifestyle accumulated through history, and how to integrate into the process of urban-rural integration and promote the construction of rural material civilization and spiritual civilization.

The context of daily life in rural China

Chinese countryside and its modernity

The countryside has , as a carrier of agricultural production, focuses on life as its objective, capitalizes on nature and local culture, and strives to fulfill human survival needs. It is a unique mode of production distinct from industry(Wen Tiejun & Zhang Xiaode, 2018). The countryside in contemporary society emphasizes the development of diversified rural industries on the basis of agriculture. It is a civilization that combines life and production, society and culture, history and politics, and carries the genes of Chinese culture and civilization. The countryside is the geospatial and cultural spatial context for the rural artifact design. Lefebvre(2018) believes that the countryside cannot be defined by the mode of production, but by more complex changing relationships. In contemporary China, rural areas and cities are breaking away from the binary opposition and forming a closer linkage. Rural problems constitute an inherent part of the overall urban issues(Lefebvre, 2018). In the process of modernization, there is an imbalance between urban and rural development; in contemporary society, everyday life in the countryside is inevitably affected by capital and the value propositions of consumerism. Many valuable traditional creations in rural areas struggle to adapt to the needs of modern society and face challenges in establishing viable industries. They are often perceived as outdated and undervalued objects. The ecological essence of rural artifacts remains poorly understood and underutilized. A large number of remarkable traditional rural creations lack a sustainable development pathway. Transforming these rural traditional artifacts into modern designs lacks effective innovative mechanisms. As a result, accurately assessing the true value of rural creations is a complex task. Countryside faces significant challenges, including erosion of rural values, decline of rural culture, and identity collapse of rural residents. China's rural areas are experiencing a decline in the labor force, with a substantial amount of land lying idle. Simultaneously, the absence of labor and innovative practices in rural areas hinders their progress towards modernization and limits their potential for enhanced value. As traditional rural values and cultural identity undergo transformation in the face of modernity, the countryside is confronted with the imperative of reconstructing its regional cultural identity. Consequently, rural artifact design must navigate this intricate situation with adaptability and sensitivity.

The characteristics of daily life in contemporary Chinese rural areas

In contemporary China, rural daily life is influenced by global capital and emerges within the dynamics of urban-rural interactions. However, local culture and close-knit communities remain enduring features. The qualities of ordinariness, repetition, microcosmic nature, spontaneity, universality, ambiguity, complexity and intricacy are all manifested in rural daily life in China. Rural life should possess its distinctive characteristics, and rural development is not necessarily bound by the path of urban modernization. Within rural daily life, a substantial abundance of local resources can be found. The 19th National Congress of the Communist Party of China report explicitly stated the potential for organic connection between small-scale farmers and the development of modern agriculture. In present-day China, the coexistence and diversification of rural small-scale peasant economy and modern agriculture give rise to a variety of industries. The direction of rural revitalization lies in the development of small yet exquisite, outstanding, and diversified rural industries.

The structural elements that define rural lifestyles

The structural elements in the space of rural daily life include: the system of rural objects, the venues where

rural practices and events take place, the environmental space, and the diachronic behavioral interactions can collectively be considered as the four structural elements in the space of rural daily life. In the countryside, the everyday objects system is showcased in specific locations, where daily object-making and interactive behaviors present. These creative acts, daily practices, and social interactions are diachronic in nature, reflecting their unique and diverse manifestations within the contemporary landscape of daily life. Simultaneously, they embody a sense of inheritance and stability across the long arc of historical time and space. The four structural elements serve as a gateway for design to seamlessly integrate into rural existence.(Chen Anying, 2023)

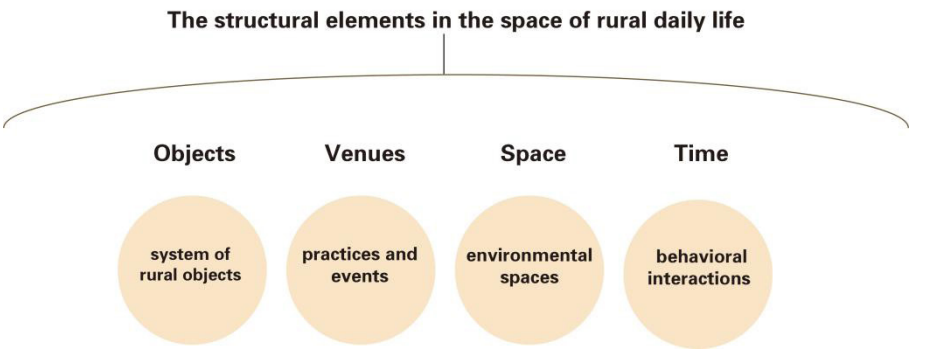

Figure 1. Four structural elements of rural daily life.（Drawn by the author）

Nature of Rural Artifact Design

Rural artifact design refers to the process and behavior of materializing daily rural needs, thereby forming behavioral interaction patterns and community relationships. Rural artifact design has two fundamental properties: firstly, it generates a system of objects based on rural cultural traditions, characterized by historical continuity, collective design, and spontaneous generation.

Furthermore, there is the system of “objects” that arises from the combination of modern design with rural resources and conditions, adapting to the times. This is the result of modern design methods intervening as an external force, and compared to tradition, it is more variable. Understanding the rural cultural context faced by rural artifact design through social anthropology methods; Exploring the ways and means of embedding art design into the rural creation system, so that “the retained traditional artifacts and forms can be continuously revitalized and applied to new areas”(John Heskett, 2013: 7). The artifact design in the contemporary rural social context, based on the existing rural object-making model, supplements the new requirements proposed by the current social environment for rural creation, thereby producing new functions and forming new relationships.

Everydayness: From basic attributes of rural creations to design goals

Everydayness and routine: fundamental attributes of rural artifact design

Everydayness is an experiential nature, and everyday life is an experience common to all social groups (wikipedia). Everydayness is characterized by a certain regularity that distinguishes it from moments of great significance. It constitutes the fundamental attribute of rural artifact design, which involves the materialization process of commonly occurring, routine, and repetitive activities in rural daily life. Rural creations of daily life present suitable opportunities for modern design intervention. The more life-oriented and frequently used the items are, the greater the scope for design intervention. Conversely, objects used during special moments, such as religious ritual artifacts, often adhere to traditional conventions. They are intended to preserve history and tradition, and

are less influenced by modern factors. Consequently, the opportunities for modern design intervention in these cases are relatively limited. Rural artifact design entails the creation of commonplace objects that foster daily interpersonal and social connections within the "object" framework. The everydayness of rural artifact design is characterized by repetitive practices in daily life, spontaneous bottom-up design actions, the collective design that integrates the contributions of both villagers and experts, micro-level manifestations that address local issues with potential scalability, and a certain regional similarity in object attributes (figure 2). Pierre Bourdieu's sociological practice theory argues that the exact form of cultural practice in a given situation is not an arbitrary choice. (Pierre Bourdieu, 2019) . Rural creations are the expressions of culture in the distinct environment of everyday life in the countryside. Rather than being accidental, they embody a habitus.

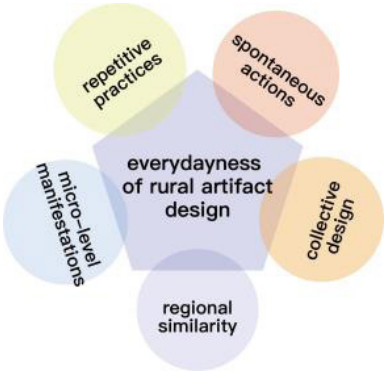

Figure 2. The Characteristics of everydayness of rural artifact design (Drawn by the author)

Designing for "everyday": goals and basic value judgments of rural artifact design

The goal and fundamental value judgment of current rural artifact design should lie in designing for the everyday needs of people within the context of rural daily life, rather than prioritizing performative and sporty behaviors. The goal of rural artifact design is to enhance the quality of rural life by creating and utilizing well-crafted objects. It aims to provide a sense of satisfaction for rural inhabitants within their daily living spaces, to restore cultural self-confidence among residents, foster a sense of identity, and enable compatibility with their way of life. Additionally, rural artifact design serves as a medium to construct harmonious and balanced networks of social relations within rural communities. The objects of contemporary rural artifact design are the result of an interaction between the designer's intent and the rural environment and culture. They are also the outcome of an interplay between the needs and perceptions of the users and the intentions of the designer. The discussion on rural artifact design should focus more on the practice and acceptance process of "design" in the creation of rural objects, as well as the methods employed. When modern design is utilized as a tool and method in rural artifact design, any resultant changes will be limited by the boundaries of rural vernacular culture. When modern design intervenes in the rural object system, it should gradually bring about spontaneous growth and iteration of the artifact design through small changes in daily life. Eventually, modern design should become seamlessly integrated into the rural tradition.

The structural elements of rural artifact design

The contemporary rural artifact design model does not completely overturn the previous design model, but rather builds upon the traditional creation model. Each new stage in the history of design does not invalidate all the previous stages, but rather layers itself upon the existing achievements. This is the cyclical pattern that runs through the history of design. (John Heskett, 2013: 21). The structural elements of rural artifact design include material foundation, environment, behavioral patterns and meaning production. These structural elements are the "invariants" of rural artifact design, that is, the "abstracted structural elements" as mentioned by Baudrillard(Jean Baudrillard, 2019). In addition to these fundamental structural elements, there are various factors that influence the outcomes of creation design activities. These "variable" factors include technology, market conditions, conceptual considerations, industry trends, management practices, cultural influences, and more.(figure 3)

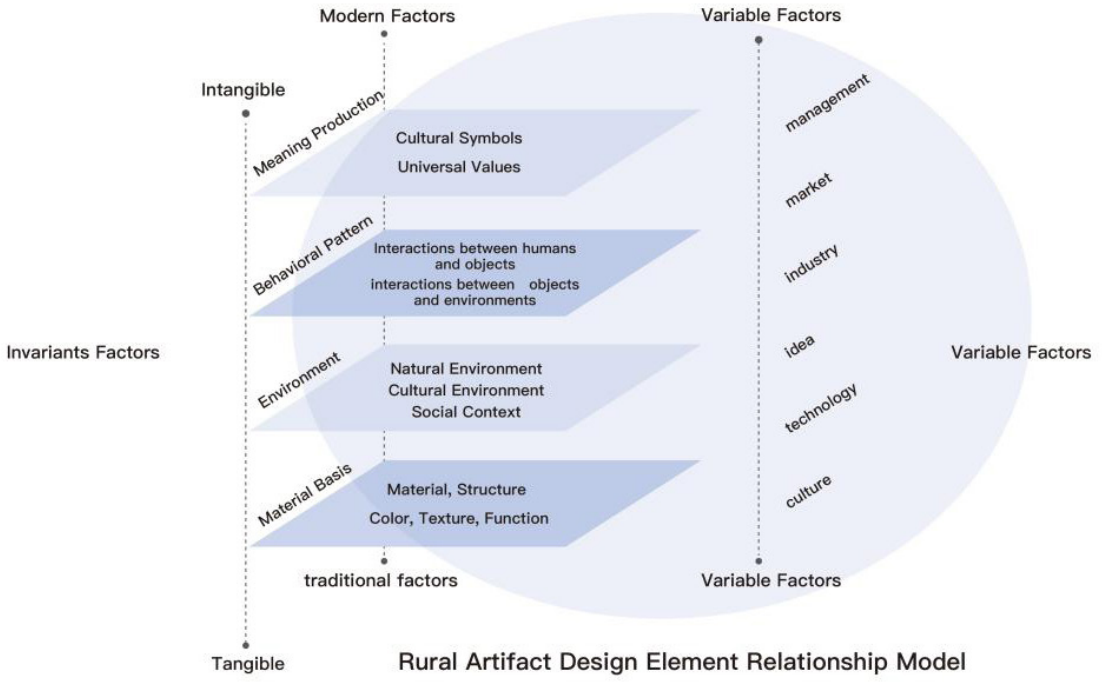

Figure 3. A model of the relationship between the elements of Rural Object Creation Design（Drawn by the author）

The objects and contents of rural artifact design in daily life space

Compared with traditional society, the daily life environment in contemporary rural areas has undergone tremendous changes.New technologies, new markets, and new forms of business organizations are all fundamentally changing our world. The new daily life environment requires new design concepts and practices(John Heskett, 2013: 22). As the demand for design in today's society has gone beyond the traditional scope of "objects", what should be designed in "rural artifact design" for everyday life? An "object" is usually understood as a physical object, and is the result of industrial design or handicraft design. As the understanding of design deepens and the scope of design expands, the meaning of products also changes. "Products are not solely limited to physical objects; they encompass experiences, activities, and services, all of which contribute to a broader perception of what a product is or can be."(Richard Buchanan, 2001) Rural artifact design not only involves the creation of physical objects, but also includes the creation of mediums for rural life experiences, activities, and services. It aims to design behavioral patterns and interaction modes through these objects, constructing the cultural context and logic of daily rural life, including rules, regulations, manners, and the relationships among residents within villages and communities. Additionally, it also focuses on designing rural industries and developing the rural service system.

The contemporary rural artifact design leverages design tools to harmonize the interests of multiple stakeholders. Essentially, a product acts as a mediator between complex interests, and the process of developing new products involves negotiating these interests. Evidently, strategic planning, collaborative design, participatory design, and, crucially, human-centered design have risen to a new level, requiring new knowledge to achieve successful solutions(John Heskett, 2013: 7). Rural artifact design involves balancing the interests of various stakeholders, including villagers, government, capital, ecology, and outsiders, etc. As each party has different interests, rural artifact design needs to consider these interests and coordinate a balance among them.

Conclusion

In the face of rapidly changing modern society, rural artifact has encountered a series of problems that are difficult to adapt to the social environment.The value of rural artifacts is often underestimated. It is important to recognize the significance of everyday creations, which reflect the spiritual outlook and social relationships of rural residents. Therefore, besides their economic and aesthetic values, rural artifacts should be recognized as cultural carriers in daily life, shaping rural cultural identity and embodying rural lifestyles. It is essential to acknowledge their role in constructing rural social relationships and behavior patterns, thus influencing rural daily life.

The modern design intervention in rural artifact has led to many issues such as subjective design and false design detached from actual needs. When modern design techniques are applied to address issues in rural creation, it is necessary to determine to what extent the cultural attributes and characteristics of rural artifacts are fixed within the context of rural daily life, how deeply design can intervene, and within what scope adjustments can be made to the existing content of rural artifact. With the aid of modern design, rural artifacts can achieve social and cultural adaptability. When modern design is applied to rural contexts, it's crucial to clarify and evaluate its objectives, targets, principles, and methods. Mistakes could lead to cultural regression or wasted resources without achieving the desired outcomes. Rural artifact design must adapt to modern challenges and establish its own unique creation methods and industries in the context of daily life in contemporary society.

The design of rural artifacts should be socially adaptable, sustainable, self-operating, and meet collective demands. It should integrate into the contemporary way of life, reshape the role of "objects" in rural contexts, and establish the value of creations, generate an object system compatible with modern rural life, and form rural social relations mediated by objects.

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Images of the Native Land: Exploring the Utilization of Livelihood Landscapes Chongqing Traditional Agricultural Settlements

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Abstract

The beauty of rural settlements is a mirror of ecological utilization, a portrayal of rural livelihood, and a demonstration of ecological consciousness and livelihood wisdom. Chongqing rural settlement is a special southwestern mountain settlement system, not only do the architectural houses have profound research value, but the mountain rural settlement landscape is a unique ecological beauty as well. By revealing the inner principle of the rural settlement beauty, the author aims to explore the possibility of how to continue and develop the rural settlement landscape in Chongqing. Combining the research methods of landscape ecology, iconography, and typology, the study focuses on the practice of Chongqing's rural landscape based on the concept of "ecological mapping", and using visual images to reveal the potential ecological relationships of the rural landscape. Through the analytical tools and identification methods of "ecological mapping", the study is looking for a research direction suitable for rural settlement landscapes, which can be used as a reference element in the classification standard of traditional settlements in Chongqing.

Author Keywords

traditional agricultural settlements, livelihood landscapes, landscape mapping

Introduction

Traditional settlement landscapes should not only play the aesthetic function of settlement landscapes but also utilize rich agricultural resources to design livelihood systems by the requirements of ecological regulations and give full play to their social production capacity, to enable traditional settlement landscapes with greater social function, hence ensuring the sustainability and the development. Studying the livelihood landscape of traditional settlements from the perspectives of ecology, human geography, and landscape mapping, clarifying the relationship between traditional settlements and farmland[1][2], and discovering the landscape language conveyed by the land phenomenon from the perspective of landscape "visibility" helps to observe and understand the regular characteristics of Chongqing's traditional settlements, the influence of agricultural livelihood patterns on the evolution and development of the settlements from both the two-dimensional and three-dimensional perspectives, as well as to explore the modern conservation and transformation of their values.

The landscape is a visual phenomenon in the complex of human-land relations, and the landscape of a settlement is viewed as the manifestation of a natural or humanistic process rather than a single aesthetic "fact" or "scientific

process"[1]. The natural landscape of traditional villages is the visual phenomenon of geographical and ecological processes; the humanistic landscape is the visual manifestation of the process of people's utilization of nature and their own culture. The wisdom of land use and the form of livelihood of the village landscape are different from that of the township landscape, conveyed through "recognizable" and "readable" graphic images, making the definition of place, spatial perception, and spiritual experience vary. Identifying the results of land use can be used to analyze and interpret the settlement landscape, helping us to analyze the structure of the traditional settlement landscape and to systematically understand the reasons for the fundamental differences between traditional villages and townships.

Main Causes of the Evolution of Traditional Settlements Landscape

Historical Factors Influencing the Composition of Chongqing's Settlement Livelihood Landscape

Chongqing's geographical location and natural environment are rather remote and closed. With the increase in population and the improvement of agricultural equipment, and agricultural and hydraulic technology, the level of three-dimensional vertical agricultural distribution improved, affecting the agricultural livelihoods and landscapes of Chongqing traditional settlements. First, the improvement of agricultural technology. With the improvement of technology, traditional settlements have gradually broken through the limitations of cultivation in the hills and mountains, resulting in the possibility of a three-dimensional agricultural layout. The second is the iteration of the crop[3]. The transition to new cash crops and economic forests with higher returns has led to the finalization of the mountainous settlements landscape with agricultural cultivation as the core. Third, the development of commercialization of agricultural products. The rapid development of the commercialization of agricultural products led to the emergence of commercial towns in the early Qing Dynasty[4]. At the end of feudal society, landlords and squires purchased vast land to collect rents and built fine mansions surrounded by fertile land and beautiful valleys, such as the Zhao Clan Ancestral Hall in Fengming Township, Yunyang. Fourthly, the shift in land utilization created different settlement landscapes. In the Qin and Han Dynasties, self-sufficient, large-scale manor landscapes were formed. In the Tang and Song Dynasties, the situation of heterogeneous living and the prosperity of countryside markets were formed. In the Ming and Qing Dynasties, the group-type land use form showed the settlement landscape of "mass settlements and small separations". With the massive immigration wave from Hunan, Hubei, Guangzhou, and other surrounding regions to Sichuan, Eastern Sichuan gradually formed the settlement landscape featuring forest-based, scattered farmlands, and flourishing markets and townships. Multiple technological upgrades, crop iterations, and the development of commerce promoted the expansion and extension of agriculture in traditional rural settlements, resulting in a wider range of livelihoods over time.

Agro-geographical Zoning Factors Influencing Settlements Livelihood Landscape

Chongqing has vast hilly areas and stream valleys that have a strong influence on agriculture. Complex topographic differences add to the diversity of resource types in different settlements. It belongs to the intersection area of central and southern subtropics. The cropping system is mainly two-maturing and three-maturing in paddy fields and two-maturing in drylands, with distinctive three-dimensional characteristics in agriculture. The natural zones constrain the types of agricultural cultivation. As the watershed of the Yellow River, Yangtze River, and Huaihe River Basin, it is an important agricultural ego-boundary line in the region, with the climate affecting the distribution of agriculture.

The living environment of a settlement includes climate, land, and water systems. As a unified natural environment, there are many common features. The elements of such natural factors are interrelated and restricted. First, changes in natural factors may cause livelihood landscape differences in different basins,





Figure 1. Hejiayan Settlement

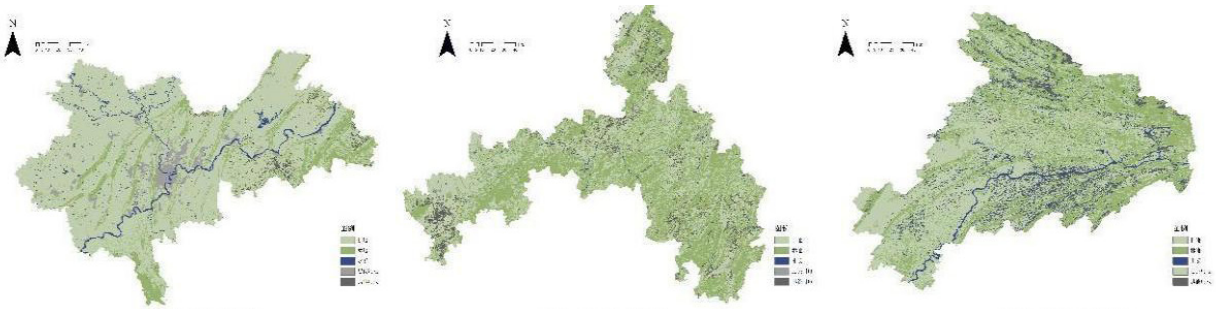
resulting in the succession of one factor to another. Second, the uneven distribution of resource combinations, and the distribution of natural factors is territorial. Regional differences in natural conditions for agriculture are important constraints affecting the regional distribution of agriculture in traditional settlements[5].

Natural Factors Influencing the Composition of Settlement Livelihood Landscape

The DEM analysis of the Chongqing area yielded differences in elevation geographic patterns and landscape structural features, which were divided into the Parallel Ridge and Valley Area, the Xiajiang River Valley Area, and the Wuling Mountain Area. The traditional settlements in the Parallel Ridge and Valley area are limited by the geomorphological constraints of the parallel arrangement of one mountain and one ridge and one mountain and one valley, and the arable land is concentrated between the two mountains. The traditional settlement farmland in the Wuling Mountain Area is mostly cultivated in the middle slopes of the mountain ranges, such as Wuling, Jinfo, Qiyao, Shihao, and other high-altitude planation surfaces. There are many high mountains on both sides of the river, and most of the arable land is reclaimed from the mountains. Traditional settlements farmland in Xiajiang Valley areas are mostly located at altitudes 1000-2600 meters with Daba Mountain, Wushan Mountain, and other mountains as the main body. The height change from north to south shows a downward trend. The place has a wide and flat area. Among them, there are fewer Sichuan plains and more moraines. And in the middle, there are some flat fields. The “V” shaped valley in the middle of the mountainous terrain does not have sufficient land for livelihood.

Agricultural livelihoods in Chongqing are highly dependent on watershed waterways and land use conditions. The Basin water system is mainly shrub type. The natural water patterns and shorelines created good farming conditions, and the construction of hydraulic facilities after the late Song Dynasty increased the efficiency of agricultural development around the river.[6]

The Parallel Ridge and Valley area is characterized by a dendritic water system that is distributed expansively along the main watercourse to the branches. The density of the water system is closely and proportionally related to the pattern of farmland. Traditional settlements extensively utilize the terraces of secondary branches to expand in depth. In the Wuling Mountain area, the branch-like water system is distributed along the main waterway on both sides. The water system is evenly distributed, and the farmland ecology and woodland layout are mixed. The Xiajiang Valley area is characterized by a dendritic water system distributed along both sides of the main watercourse. The traditional settlement farming land is mostly shifted to high mountains, and large areas of arable land are far away from the main water system[7].



Ecological Mapping of Parallel Ridge and Valley Area

Ecological Mapping of Wuling Mountain Areas

Ecological Mapping of Xiajiang valley Area

Figure 2. Ecological Mapping of 3 MainTerrains

Characteristics and Atlas of Three Major Sectors of Chongqing Rural Settlement Landscape Ecological Mapping

"Mapping" is derived from the concept of genetics. By exploring the "genetic" composition of the beauty of rural settlements: the four major ecological factors, including settlement, arable land, water system, and forest, and exploring the ecological relationship of rural settlements: the "genealogical relationship" in which each ecological factor constraints and connects each other[8] has been proposed as a practical method and strategy for creating rural ecological revitalization by utilizing the law of "mapping". The first step is to identify the "genealogical relationship" of the rural landscape to obtain clues for the continuation and cultivation of rural beauty.

Mapping of the three major terrain areas at the broad level

According to the 2018 national land use distribution map, the grid resolution is 30m×30m (Figure). Extracting the geographic information of Chongqing regional level classification of arable land, forest, water system, residential land, and unused land (including grassland), the original Chongqing land use map of 31 types through the integration of 5 major ecological types: arable land, forest, water system, residential land, and unused land. Using ArcGIS10.5 for visualization and analysis, with Fragstats landscape index software to describe the landscape pattern, to effectively understand the ecological relationship.

Overall, in the Wuling Mountains region, vertical zonation is the determining factor of landscape pattern. Due to the abundant precipitation and lush vegetation growth in the mountainous regions, the landscape pattern is reflected in the higher degree of complexity of plot shapes and connectivity. Hence, from the perspective of plot and landscape level analysis, the shape complexity of the plot is much higher than the parallel ridge and

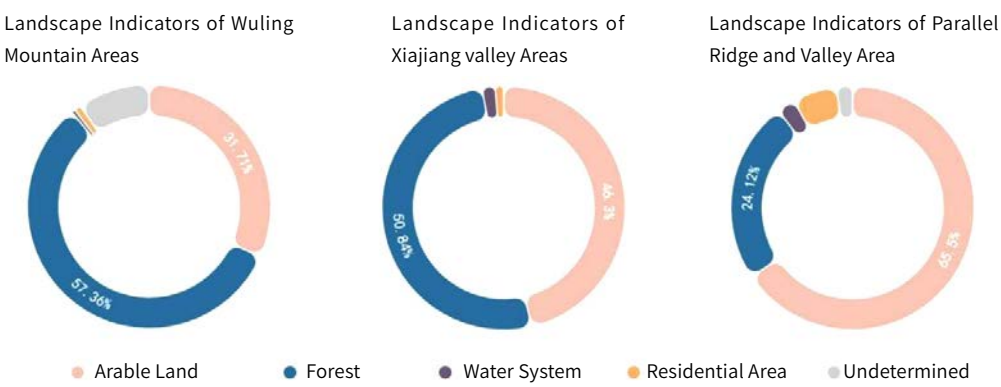
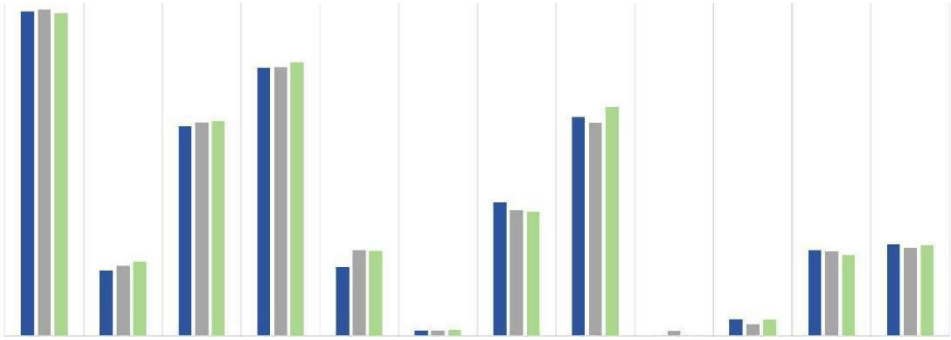


Figure 3. Landscape Indicator Analysis of 3 Main Terrains

valley area. In the Xiajiang Valley area, the dispersion and juxtaposition index of residential land is the highest, influenced by the distribution of the water system, and adjacent to the water system, the plots are clustered and strongly dependent on the water resource, reflecting the distinctive characteristics of “human-water symbiosis”. The landscape is the most fragmented and the ecological environment is fragile. In the parallel ridge and valley area, the arable land plots are the landscape model, and they are in a dominant position. The degree of spread is the highest, and the rest of the plots are surrounded by arable land plots, which are relatively small and heterogeneous mosaics (Figure).

Table 1. Fragstats landscape index of 3 Major Terrains



3 Major T										:I	IJI	CONTAG
Parallel Ridge and Valley Area	2768558.04	19.87	14303	210800.68	23.80	1.28	450.74	21895.19	0.96	0.59	50.77	64.97
Xiajiang Valley Areas	2943919.71	24.95	17619	212458.28	51.12	1.30	313.42	17158.77	1.13	0.70	46.58	56.35
Wuling Mountain Areas	2510024.40	30.16	18314	265715.68	49.34	1.31	288.35	34842.11	0.97	0.61	40.75	61.99

Ecological mapping of twelve watersheds at the intermediate level

Chongqing has a river pattern of “one river, two main branches, and seven sub-branches”. The intermediate level of ecological mapping was sampled from 12 watersheds in three major terrains, with a sampling area of 25km×25km (Figure). The land livelihoods of traditional settlements in Chongqing included two systems: paddy agriculture and dryland agriculture. The size of the arable land, water system, settlements, and forests is of significant importance to the livelihood system of the settlements. For traditional settlements acquiring resources for livelihood and production, due to the differences in the ecological landscape of main watersheds, the land use of the settlement relies on this spatial carrier of the watershed, resulting in multiple differences.

Table 2. Spatial Distribution of 12 Watersheds in Chongqing

			
3 Major Terrains at Broad Level	Parallel Ridge and Valley Area	Xiajiang Valley Areas	Wuling Mountain Areas
12 Watershed at Intermediate Level	Two Rivers Four Banks Region Jialing River Basin Fujiang River Basin Laixihe River Basin Qujiang River Basin	Longhe River Basin Meixihe River Basin	Apengjiang River Basin Youshui River Basin Qijiang River Basin

Parallel Ridge and Valley District Watersheds

In general, it forms a settlement landscape pattern with a river valley and alluvial plain landscape as the base, finger-like distributed paddy field as the main body, plot settlements developing in clusters, and a dendritic water system as the lead.

The regional landscape pattern along the two rivers and four banks region is distributed unevenly. Judging by the different types of land use, it is of high landscape diversity and homogeneity. The Qijiang River Basin presents a landscape matrix dominated by farmland and characterized by a pattern of agricultural and forestry intermingling. The farmland in the Laixi River Basin and the Fujiang River Basin, as a landscape matrix, presents a pattern of high completeness, connected edges, and a low degree of fragmentation. The relationship between buildings and farmland is close, the water system is evenly distributed, and the dependent relationship between farmland and settlements is prominent in the terrain of high-altitude plains and shallow hills.

The area dominated by the Jialing River and its two major branches has a widely and evenly distributed watershed. The landscape pattern is led by the main water system, with dense architectural plots, reflecting the fact that the location of the settlement is close to the watersheds with a certain degree of separation between the settlements and the arable land, due to the development of land transportation. the farmland is mostly dispersed in the scale distribution clusters around the traditional settlements.

The parallel ridge valley area is close to the Sichuan Basin, where the level of production agriculture is well developed, and the landscape matrix of farmland is large and also appears in a regularized pattern. The dependence between farmland and settlement is strong. For example, in Shuangjiang Ancient Town in the Fujiang River Basin, the river floodplain formed by lateral erosion and accumulation of the river is surrounded by large-scale farmland, with regular and connected land plots. A regular strip field landscape is formed around the settlement.

Xiajiang Valley Area Watersheds

Generally speaking, it presents the traditional settlement landscape pattern with folded uplifted medium altitude mountains, karst hills, and eroded stripped mountains as the base, dry land planting in medium altitude mountains distributed like strips and dots as the main feature, point-like settlements developing alongside, and shrub-like water system as the lead.

The Xiajiang Valley area is dominated by the middle mountains, and the steep topographic conditions constrain

the utilization of land. The Tangxi River Basin and Meixi River Basin both show a pattern of intermingling of farmland and forest, lacking of large-scale farmland. The settlements are mostly uniformly distributed along the runoff in the mountains. Farmland boundaries are clear and connected, but highly fragmented.

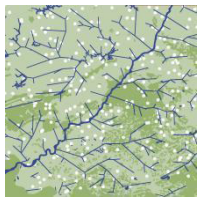
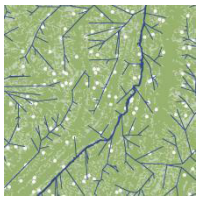
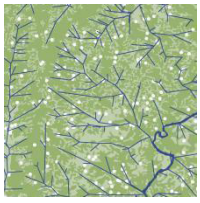
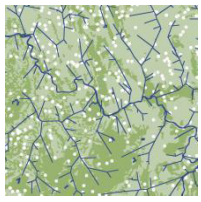
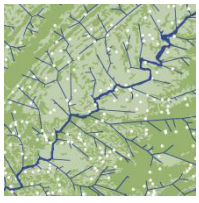
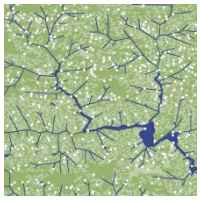
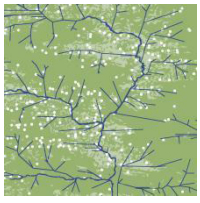
Agricultural land in the Daning River Basin forms a highly fragmented and continuous livelihood pattern along the river channel, with fewer settlement points distributed in the deep river valley. The deep cuts in the terrain constrain agricultural arable land, therefore it also relies on a small number of flat areas in mountains and multi-level terraces for cultivation, which affects the scale of the settlements. Therefore, in terms of the overall farm landscape pattern, it is difficult for the basin to form a large-scale farmland landscape (Fig.)

Watersheds in the Wuling Mountains

Generally speaking, it presents the traditional settlement landscape pattern with folded and uplifted mesas and karstic hills as the landscape base, group distribution of dryland planting as the main feature, point-like settlements developing into groups alongside, and branch-type shrub-like water system as the lead.

Wujiang, Youshui, and Apengjiang river basins control the energy flow and logistics of the entire region. Farmland is distributed like fish bones into the sides of the river. In the longitudinal region, the farmland is distributed evenly on a small scale in the mid-mountains between the mid-levels and the edge of the mountain. The open areas on the sides of the Long River Basin provide fine land resources for agricultural production and utilization. The agricultural landscape matrix is formed with Long River as the core. The forest distribution in regions with high altitudes forms a connected corridor. The landscape matrix and the corridor often generate forest plots. A large number of water-dependent villages form on both sides of the river (Fig.)

Table 3. Ecological Mapping of 12 Rivers at Intermediate Level

Parallel Ridge and Valley Area	 Two Rivers Four Banks Region	 Jialing River Basin	 Fujiang River Basin	 Laixihe River Basin	 Qujiang River Basin
Wuling Mountain Areas	 Apengjiang River Basin	 Apengjiang River Basin	 Youshui River Basin	 Qijiang River Basin	 Qijiang River Basin
Xiajiang Valley Areas	 Longhe River Basin	 Meixihe River Basin	 DaningRiver Basin	 Tangxi River Basin	 Tangxi River Basin

Water System Villages Farmland Others

Types of settlement ecological mapping at the micro

Settlement ecological mapping at the micro level takes a sampling area of 2km × 2km, through the extraction of arable land, water system, and settlement, using ArcGIS10.5 to simulate the hydrological network, and compared with the actual hydrological structure, simulating surface runoff mode, summarizing the settlement boundaries to generate settlement analysis mapping. The spatial distribution of landscape elements is presented from west to east, the land use scale from large to small, and land use intensity from strong to weak. From the perspective of the spatial distribution relationship of landscape elements, Chongqing's traditional village landscape ecological mapping has four distinctive types. (Figure).

The first is settlement ecological mapping featuring even plains. The distance between farmlands is kept relatively



Settlement Ecological Mapping Featuring Even Plains——
Wanling Ancient Town



Settlement Ecological Mapping Featuring Cluster at Middle Mountain——
Hejiayan Village



Settlement Ecological Mapping Featuring Karst Hilly Alongside——
Xinjian Village, Xiaonanhai County



Settlement Ecological Mapping Featuring Lifted Plain Areas in Middle Mountain——
Wenmiao Village

Figure 4. Types of settlement ecological mapping at micro level

the same, presenting a settlement landscape that expands uniformly towards river valleys, alluvial plains, and hilly plains. For example, in the traditional settlements in the Laixi River Basin, due to the relatively even amount of land occupied by people, the distribution of area between farmlands is also more evenly, and the distance between villages is also kept relatively the same, which is a typical uniform settlement ecological mapping with people interacting with nature.

The second is settlement ecological mapping featuring clusters in the middle mountain. Land plots are clustered together to form a large distribution area. Typical settlement clusters include the Hejiayan Ancient Village in Huatian Township, and the Huangjiazhai Village in Santanggai, which is in the valleys and basins of the mountains. The settlements are built on the mountains, and there are also traditional settlements living in groups in the valleys and basins of the mountains. The farming land is widely distributed in the surrounding mid-mountains and half mountains, and the high-altitude plains and slopes are utilized to form large-scale farming and planting belts along the terrain. Vegetation is planted along the belt on the edge of the mid-mountains, and the vegetation in the settlement is planted into groups and belts around the settlement, forming forests in the belt along the valleys. The settlement and the land are embedded in each other with strong dependence. Therefore, the settlement shows the scene of a piece of farmland surrounding the settlement, and the vegetation is planted into the forest as a distant view.

The third is settlement ecological mapping featuring karst hilly alongside. The plots of land are linearly distributed. Such as the situation where the settlements are distributed sporadically along the valleys of karst hills or the farmland is distributed along the rivers. Farmland is distributed along the high-altitude plains at river valleys and low mountains, presenting a landscape of settlements situated against the mountains and water, and small groups of valley settlements. Daba Mountain-Wushan area is located at the northern end of the Xiajiang Valley area. Typical settlement groups include the Wuling Mountain Abong River basin of the Tujia settlement. The field town settlements are spread out and laid out in front of the river, because the terrain is alpine, steep, thin soil layer, unsuitable for cultivation, so the dry land is the main type of arable land. Farming is distributed in the lowlands of certain deep river valleys, and traditional settlements have limited utilization of land, so the farming areas of the settlements are used as the lowlands of mountain margins and alluvial fan areas where streams and runoffs pass through. Forest land and pasture resources are mostly concentrated in the middle and upper mountain edges. Settlement groups are banded settlements, mostly backed by mountains and facing water. Settlements are separated from the land yet with close dependence, and the utilization of land tends to show three-dimensional features prominently.

The fourth is settlement ecological mapping featuring lifted plain areas in the middle mountain. Farmlands are distributed in parallel due to the plots being at different levels, such as the Wenmiao Village at Longhe River Basin, where the settlement is sited in the high altitude plain at a low mountain between the water corridor and the upper vegetation corridor, and the graded parallel terraces unfolding with special geomorphology have created the formation of large-scale agrarian land substrate. Wenmiao Village is an independent cluster settlement in the Longhe River Basin, which satisfies the subsistence life of self-sufficiency. It has evolved into an ecological and cultural landscape of the Long River with the Longhe River ecological and cultural landscape scattered along the terraces in the form of a stretching and rhythmically distributed fan area and high altitude plain at low mountain, which is very different from that of the shallow hill area in the parallel valley area.

Thoughts on the conservation of Chongqing's traditional agricultural settlement livelihood landscape pattern

In the effective protection of the regional settlement landscape, it should be able to combine the natural environment, humanistic landscape, etc., to continue and develop the settlement landscape by reasonable means. Certain regional characteristics are demonstrated as a special settlement pattern produced by the interaction of the natural environment, traditional culture, and economic development. This aims to pave the way for the development of regional traditional settlement landscape protection and development strategy, to obtain the entry point for the development strategy, and to carry out the traditional settlement landscape protection and development work in a more orderly and efficient way.

Conservation of ecological landscape types

The identification of the ecological landscape pattern is beneficial to the formation of different types of settlement spatial structures, combining different ecological spots, corridors, and substrates, presenting diversified traditional settlement landscapes, and deriving unique traditional settlement landscapes. To protect the landscape characteristics of traditional settlements, it is important to recognize the unique livelihood form and appearance of the settlements in natural ecological conditions. Chongqing's traditional ecological livelihood has the typical characteristics of the agricultural society settlement, in the protection and utilization, which can be combined with the successive formation of the settlement landscape in each historical period to form an innovative protection method, to protect its unique livelihood landscape characteristics.

First, the low mountain farming landscape in the parallel ridge and valley area, the typical landscape of fan-face flat dam farmland, reflecting the landscape level of hill-forest-field-lake (river), reflecting the unique topography of the parallel ridge and valley and the organization of the water network, and taking advantage of the water for the traditional towns and villages as a group, highlighting the characteristics of the distribution of multiple flat dam farmland. Secondly, the scale farming landscape of shallow hills and flat dams in the parallel ridge and valley area reflects the landscape level of dam-field-forest-river. The livelihood landscape that utilizes the fan of the river and the waterfront area to carry out farming operations expresses the characteristics of large settlements and small scattered settlements in the Parallel Ridge and Valley Area that utilize the fan of the river and the settlements that rely on the fields to live. Third, the farming landscape in the Parallel Ridge and Valley area, which is interwoven with the perimeter of the hills along the river's shoreline, reflects the landscape hierarchy of river-forest-field-forest-field-mound. Farmland is difficult to form large-scale subsistence landscapes, and settlements and subsistence farmlands are not close and need to be combined with ecological corridors in series to enhance the ecological quality and shape the subsistence landscapes. Fourth, the karst landscape farming landscape planted in the mid-mountain and mid-mountain of Wuling Mountain area reflects the landscape level of plain (slope)-field-forest. The livelihood landscape that utilizes the mid-mountain and mid-mountain zones and uses flat dams and slopes to carry out farming operations along the terrain expresses the typical characteristics of the Wuling Mountain Area region's settlement landscape where agriculture is the main livelihood and the settlement is embedded in the farmland. Fifthly, the lowland dryland farming landscape from the deep river valley to the edge of the middle hills in the Xiajiang River Valley Zone reflects the landscape level of river-slope-land. It reflects the farming livelihood landscape of three-dimensional agriculture in the Xiajiang Valley area.

Local people make full use of the mountainous living conditions, obtain survival resources from nature, and form a complete set of traditional techniques and natural outlook in the long-term development to maintain the landscape qualities and livelihood of traditional settlements in Chongqing, which must be fully respected under the premise of the regional way of life, and through appropriate planning and management means, to maintain its unique successive processes.

Integrate the space around typical settlement landscapes at the watershed scale to form a new eco-cultural

tourism model with cultural and tourism characteristics of settlement livelihood landscape experiencing, traditional farming activity experiencing, and livelihood experiencing, to experience the life and characteristic culture of living with the water, and at the same time promote the economic and trade exchanges between the settlements and the cities. With the visualization of ecological processes, the ways to experience livelihood landscapes are created. The reproduction of traditional settlement livelihood wisdom includes the spatial design of the resources of the branches, the settlement livelihood process, living scenes, and production technology visualization and experience. For example, the organization of the water system and the shaping of the wetland landscape are strengthened to form the unique shoreline landscape of different branch sections and the beauty of the river valley-type settlements. Traditional villages living by the water fully embody the mutual influence of natural geography and human history and shape an open humanities and ecological “museum” of living with the water.

Conclusion

Improve and enhance the systematic design of the landscape pattern. Identify the distribution of major landscape elements in the settlement landscape system, clarify the structure of the original settlement landscape, and reduce the intervention of species in the original livelihood system. Improve and optimize the inappropriate landscape structure of the traditional settlement landscape by the scientific configuration of ecological pattern planning and design. Taking the agriculture-dependent settlement as an example, the first thing is to protect the main factors affecting the ecological nature of the landscape. Ecological agriculture is an important component of the traditional settlement landscape, using the characteristics of crops combined with the reasonable setting of landscape space to achieve the overall balance of the settlement landscape. Second, other systems in the settlement, such as wetland ecosystems, aquatic ecosystems, forest and frutex ecosystems, and settlement life systems are also set scientifically to achieve a reasonable setting of several internal systems and to realize the coordinated development of farming and natural water protection. In the protection of settlements, scientific means should be used to identify the original ecosystems and related configurations in the settlements, and artificial intervention and construction should follow the spatial clues and construct spatial levels around the systems, to form an ecological environment realizing the coexistence of agricultural production and the traditional landscape of the settlements.

In the process of effective protection of the regional settlement landscape, it should be able to combine the natural environment, humanistic landscape, etc., to continue and develop the landscape of the settlement by reasonable means. Certain regional characteristics are demonstrated as a special settlement pattern produced by the interaction of the natural environment, traditional culture, and economic development. This aims to pave the way for the development of regional traditional settlement landscape protection and development strategy, to obtain the entry point for the development strategy, and to carry out the traditional settlement landscape protection and development work in a more orderly and efficient way.

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Research on innovative design study of modular garments in unitary form

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Abstract

The fashion industry is a significant contributor to China's economy. However, it raises the issue of environmental pollution resulting from resource wastage, impacting the lives of the public. The industry must undergo reform and innovation promptly to mitigate its harmful effects. The concept of personalized consumption has played a crucial role in shaping the public's diverse demand for clothing. However, to attain commercial gain, the fashion industry has excessively pursued short-term trends, resulting in uniformity in design and disregard for the significance of clothing's emotional connection to the general public. Furthermore, the clothing's durability is inadequate, and thus, the public's demands are not fully met. Additionally, the language of fashion created by the global fashion industry relies heavily on Western design principles and aesthetics, which do not wholly capture the essence of Eastern design ideas and aesthetics conveyed through traditional East Asian tailoring. With its removable and recognizable structure, "zero-waste" material cutting, and versatile expressions, modular garments in unitary form presents an opportunity to explore innovative design perspectives and comprehensive methods for tackling contemporary challenges in the fashion industry.

Author keywords

Sustainability; Modular design; Unitary modular garments

Research background

The fashion industry has brought great economic benefits, however, its serious environmental pollution and resource wastage cannot be ignored. According to the United Nations data, the fashion industry emits 1.2 billion tonnes of greenhouse gases annually, with total carbon emissions exceeding the sum of emissions from all international flights and maritime transport, occupying 10% of global carbon emissions, and it is the world's second largest polluting industry after the petroleum industry.

The rapid development of fast fashion is an important factor that causes environmental pollution and resource waste in the fashion industry. The improvement of living standards has made the public's demand for fashion more diversified, but the development of fast fashion has resulted in the convergence of design, which is contrary to the development of fast fashion.Under the influence of economic efficiency and consumerism, the fast fashion industry has continued to create a variety of short-term trends, stimulating consumer purchases with a variety of new products and marketing methods, and shortening the fashion cycle. However, the popularity of short-term trends has resulted in the convergence of designs, and the diversified needs of consumers for fashion have

not been truly satisfied. When the trend passes and the new trend begins, the outdated products are discarded in large quantities, resulting in a waste of resources and a vicious circle. In addition, in order to save costs and ensure that the products are inexpensive to attract purchases and can be produced quickly in a short period of time, the durability of fast-fashion garments decreases, and the protection of the environment during the production process is not fully guaranteed. With the promotion of the concept of sustainable development and green consumerism, the public continues to clarify the real needs of fashion, pay attention to the environmental pollution and resource waste in the fashion industry, and reduce blind consumer behaviour; this has prompted the fashion industry to carry out industry transformation, and the sustainable development of fashion has gradually become an industry consensus. In this regard, modular design can provide the current fashion industry with a sustainable design perspective and design method for reference, and seek a breakthrough in the difficult situation of the fashion industry.

Overview of modular garments in unitary form

Modular design is a design theory and methodology that aims to subdivide a system into many small units, called modules or blocks, which can be independently built and used in different systems to form a variety of products to meet the different needs of the market. Modular design is the inheritance and development of the traditional concept of “making the best use of things”. The traditional concept of “making the best use of everything” is about using all materials and maximizing the use of materials.It is the embodiment of the concept of sustainability in the traditional concept of making things.

Modular garments is the application of modular design theory in the field of clothing design, which breaks down the clothing into different parts, with each part as a module to achieve the combination and disassembly of clothing. Modular garments can be divided into component modular garments, modular garments in unitary form , and composite modular garments with the combined application of both. Component modular garments to clothing piece as a module, modular garments in unitary form to unit as a module, to unit inter-module connection combination of clothing. The unit refers to the independent components of the sample that are self-contained or self-contained systems . Through the design of the connection method and the shape of the unit, the unit type modular garments can form the changing structure of the clothing silhouette, rich colour texture effect, and can achieve the maximum use of a variety of materials, which is in line with the concept of “making the best use of things”.

The innovative application of unitary modular design in clothing can effectively solve the problems faced by the fashion industry nowadays. In the following, I will explain the characteristics and advantages of unit-based modular design in the sustainable development of fashion by combining specific design practices.

Design practice of unitized modular garments

The “MIAO” series is a sustainable fashion garment designed using the traditional Hmong dress pattern,the cloud and thunder pattern and cross pattern, as the main design element, combined with “zero-waste” and “one-piece” techniques, and using the unit modular design method. Firstly, the traditional pattern is transformed into a series of shapes, and then combined with a variety of materials for the design (Figure 1); on the one hand, it provides a new design idea for the inheritance of the traditional pattern and the innovation of the design. On the other hand, the “detachable and reconfigurable” form of the modular garment is a reflection of the concept of sustainable design. Combined with the design method of “zero-waste”, reflecting the simple concept of the Hmong people’s reverence for nature in the modular garment can express the importance of nature to human beings throughout the ages, and better convey the message of sustainable design. It can better express the importance of nature to

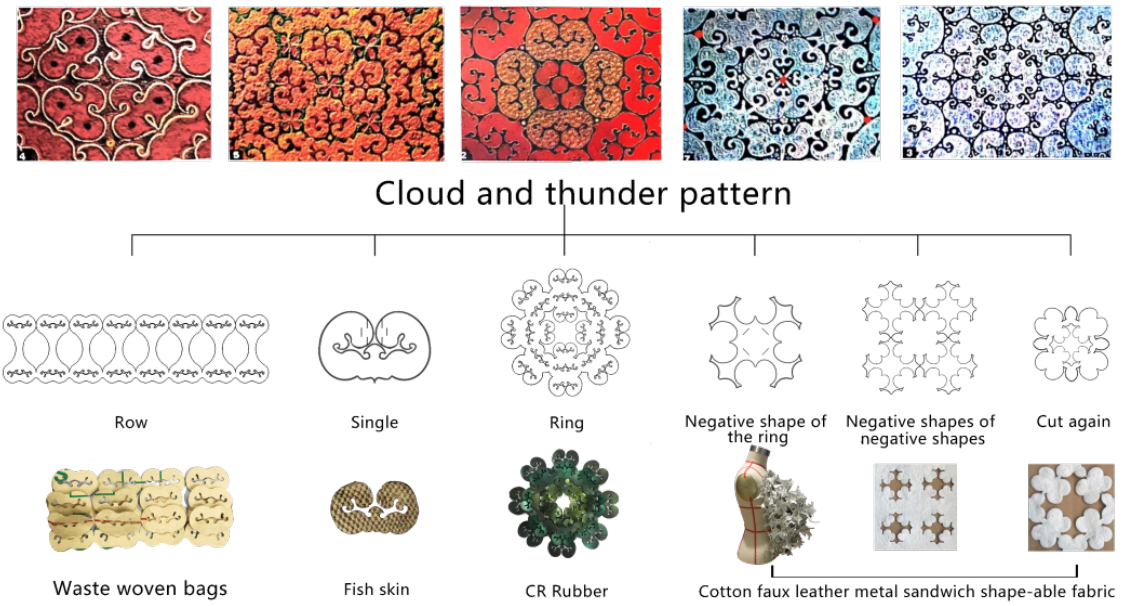

Figure 1. Conversion process

human beings throughout the ages, and better convey the concept of sustainable design.

The modular design method and the ever-changing modern material processing technology enable the application of many materials that are difficult to be used in clothing and apparel design, thus expanding the scope of material use. The diversified application of materials and processes also allows modular garments to present a variety of visual effects and structural silhouettes. For example, the fish skin material (Figure 2), which was originally difficult to be applied to a large area in apparel due to its material characteristics and size, can be used as the main material of apparel to present a distinctive texture and texture through laser cutting and unit modular design.Another example is used woven bags, which can become garments with a unique texture texture through unitized modular design. (Figure 3)



Figure 2. Fish skin



Figure 3. Used woven bags



Figure 4. Shapeable fabrics and negative shaped units



Figure 5. Ring-shaped cloud and thunder pattern units

Unit type modular design can bring multiple changes in garment structure and modelling. The unit modular organization has a highly flexible structure, which can be disassembled and reassembled, bringing more diversified changes to the spatial relationship between the human body and the garment structure, as well as to the overall silhouette of the garment. For example, the garment designed by combining shapeable fabrics and negative shaped units (Figure 4), through the design of the connection method and unit shape, it can make the flat unit convert into a three-dimensional unit organization structure, enriching the modelling language of the garment: even if it's the same unit group, changing the way of connecting it can make the garment structure and modelling produce different visual effects, such as Hemispherical and cylindrical structures; on the contrary, the same way of connecting On the other hand, the same way of connection, the shape of the unit connected, the use of different materials, and for the clothing to bring different structural changes and silhouette changes. For example, in the same way of interlocking connections, by changing the shape and size of the ring-shaped cloud and thunder pattern units, it can form a unique garment effect that spreads from the inside to the outside. (Figure 5)

Removable and reconfigurable modular garments reduces waste and is an important part of sustainable fashion. The combination of modular design with a 'one piece', 'zero-waste' design approach is a continuation of the concept of sustainability in clothing. The design of unit shapes maximises the use of materials and surplus materials, reflecting the green design thinking of "making the best use of what you have". For example, in the case of the garment combining a shapable fabric with a negatively shaped unit (Figure 6), and the garment combining sbr rubber (a rubber sandwich fabric with a customisable coloured fabric surface on both sides) with a cross-hatch unit, the shape and arrangement of the units is designed in such a way that the remaining fabric remains intact and can be used for subsequent designs, thus achieving "zero-waste" of the material. Zero-waste" is achieved. (Figure 7)

The design process of modular garments has interactivity, and designers have a deeper understanding of sustainable fashion design methods and green design concepts in the process of innovative design of modular garments; users integrate their own aesthetics and interests into the interactive process of disassembling and assembling modular garments, and create an emotional connection to the self-designed clothing to reduce waste. The interaction between people and garments satisfies the diversified needs of people, the personalised expression of garments and the promotion of sustainable concepts.



Figure 6. Garments made from surplus Shapeable fabrics





Figure 7. sbr rubber and crosshatch garments and remaining full fabrics

Conclusion

This essay offers conclusions drawn from research on the innovative design of modular garments in unitary form. The design of modular garments in unitary form can reduce material waste through connection and unit shape design. Diversified clothing structures and effects can meet diverse needs through the removable and recognizable structure. The range of material applications can be broadened through modularization of material experiments, enriching clothing material choices. Through the participatory production process of modular garments, it is possible to meet the demand for personalized clothing and deepen the public's awareness of fashion sustainability.

In terms of artistic value, through the experimental research and summary of the connection method, unit shape and material application of the modular garment, and the combination of "one-piece" and "zero-waste" design methods, we have carried out the creation and practice of modular garments. We have explored various innovative design paths for modular garments and formed diversified design expressions, which provide reference data and cases for the future design of modular garments and innovative design solutions for the public's diversified and personalised demand for garments.

In terms of social value, through the innovative design of unit-type modular garments, the scope of use of various materials in the field of clothing has been broadened, and new recycling paths have been provided for discarded materials, which continues the development of the concept of sustainability in the field of clothing, and reduces the wastage of clothing materials through the combination and innovative application of a variety of "best use of materials" design methods, which promotes the concept of sustainability through design. Through the combination and innovative use of a variety of "make the best use of what you have" design methods, it reduces the waste of clothing materials, reduces the waste of clothing, and promotes the concept of sustainability through design.

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Sharing and sustainability: A case study from literature on "eco" and "traditional" villages in Türkiye

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Abstract

This scoping review compares the impact of sharing practices influenced by the design of places and communities on sustainability between ecovillages and traditional villages in Türkiye. It examines the ecological, economic, cultural, and social aspects of sustainability in both models, considering their role in community development and participation. Ecovillages, with intentional community structures, foster social connectedness and promote a culture of sharing that extends beyond resource-sharing, contributing to their overall sustainability. In contrast, sharing practices in traditional villages primarily stem from community participation rather than a conscious effort to promote sustainability, occurring naturally within existing relationships and designated areas. These findings underscore the importance of incorporating social sustainability into community-based initiatives and highlight the potential of community-based sustainability efforts.

Keywords

Ecovillages; Sustainability awareness; Sharing practices; Traditional villages; Turkish villages.

Ecovillages and sustainability

Sharing behaviors within ecovillages and traditional villages play a crucial role in shaping their respective sustainability practices. While both communities exhibit sharing practices, ecovillages approach sharing as an intentional aspect of their communal life (Van Schyndel Kasper, 2008; Kara, 2016; Kirby, 2003), while traditional villages engage in sharing practices without explicit intentionality (Özdemir et al., 2019; Taylan, 2009). This distinction emphasizes the influence of conscious community-building in fostering sustainable practices (Belk, 2007). To shed light on sharing and sustainability practices in Turkish "traditional" and "eco" villages, we conducted a scoping review. The objective was to reinterpret the collected data within the context of Turkish "eco" and "traditional" villages. Notably, the reviewed literature did not explicitly emphasize sharing practices, particularly in traditional villages.

Design is fundamental in both ecovillages and traditional villages, encompassing elements such as spatial layout, agricultural organization, tool and system utilization, social role definition, and interpersonal relationship establishment (Akkaya & Usman, 2010; Sahin, 2022). Our analysis demonstrates that ecovillages excel in social sustainability through intentional community structures and a culture of sharing (Van Schyndel Kasper, 2008;

Kirby, 2003). In contrast, traditional villages distinguish themselves with cultural sharing and sustainability practices, supported by their deliberate design to foster sharing (Akkaya & Usman, 2010; Sahin, 2022).

Subsequent sections will examine the literature through the perspective of sustainability and sharing both in "eco" and "traditional" villages. This study aims to contribute perspectives and understanding of sharing and sustainability practices in Turkish "eco" and "traditional" villages.

Ecovillages, defined by the Global Ecovillage Network (GEN, 2022), are intentional communities designed for sustainability in all dimensions, regenerating social and natural environments in traditional and urban settings through participatory processes. Ecovillages strive to integrate ecological principles, social cohesion, cultural preservation, and spirituality, aiming for a balanced and sustainable way of life in harmony with nature ("Dogayla Uyumlu Yasam Formu: 'Ekoköy' (Ecovillage)," 2020). Dawson (2006) outlines the following principles of ecovillages based on Gilman's definition: (1) grassroots, private citizens' initiatives, (2) valuing community living, (3) reducing dependence on centralized sources for necessities, (4) a strong sense of shared values often with spiritual overtones, and (5) serving as research and demonstration sites and offering educational experiences for others.

Ecovillages exemplify resource management through practices such as minimizing energy use, employing alternative energy sources, adopting sustainable construction methods, prioritizing waste management, and integrating permaculture design principles (Van Schyndel Kasper, 2008; "Dogayla Uyumlu," 2020). Ecovillages demonstrate social sustainability through shared values, connections, knowledge exchange, and a collaborative approach, fostering happiness and well-being (Van Schyndel Kasper, 2008; Kara, 2016; Kirby, 2003). They also embody the cultural dimension through practices like spiritual connection with nature, integrating social and agricultural activities, and promoting intergenerational sustainability, enhancing overall sustainability and individual well-being (Kirby, 2003; Yildiz et al., 2020; Aytac et al., 2020).

Sharing practices in ecovillages

Sharing, as a fundamental aspect of ecovillages, is driven by the desire to belong to like-minded communities, emphasizing shared resource use and fostering a sense of community among members, making it crucial for their sustainability practices (Belk, 2007).

Sharing for environmental/economic/social/cultural sustainability in ecovillages

Sharing practices promote environmental sustainability within ecovillages. Examples include sharing spaces such as communal living areas in Fethiye and Pastoral Vadi, stone houses in Knidia Ecovillage, and multi-functional rooms in Dutlar Collective House. Product sharing involves common use of kitchen tools, appliances, and vehicles, while energy sources are shared through solar panels and wind turbines. These practices contribute to an eco-friendlier lifestyle, reduced energy consumption, and stronger community bonds (Aytaç et al., 2020; Güleryüz, 2013; Kuruoglu et al., 2021; "Dogayla Uyumlu," 2020). Ecovillages prioritize economic sustainability through sharing practices that support co-production, trade, and income distribution. Examples include Imece Evi's and Bayramiç Ecovillage's focus on organic farming and agricultural products, and Pastoral Valley's participation in eco-tourism activities. Sharing duties and responsibilities contribute to economic sustainability within these ecovillages (Güleryüz, 2013; Öglek, 2021). Ecovillages prioritize social sustainability by emphasizing sharing practices that support their core values and objectives. Günesköy, the first GEN-approved ecological settlement in Türkiye, exemplifies this through its establishment purpose, ecological concerns, and activities (Öglek, 2021). Similarly, Bayramiç Yeniköy focuses on self-sufficiency, permaculture, and sharing knowledge (Öglek, 2021). Ecovillages often welcome volunteers, offering them the opportunity to gain ecological life experience and contribute to shared expenses and routine work (Dogru, 2022). Shared spaces, including

gathering areas, classrooms, and multi-functional spaces, support socialization and sharing (Güleryüz, 2013; Kuruoglu et al., 2021; Van Schyndel Kasper, 2008). Ecovillages promote cultural sustainability and maintain their core values. Günesköy ecovillage engages in educational initiatives (Kara, 2014). Dedetepe Ecological Life Farm applies the Montessori Education Model in its school, while the Çamtepe Ecological Life Center hosts events on yoga and organic farming (Güleryüz, 2013). Ecovillages challenge the status quo through their collectivistic nature and unique values, which may vary from spiritualism to utopian ideals (Boyer, 2015; Hong & Handan, 2016).

Traditional villages and sharing

Traditional villages in Türkiye, governed by the Village Law of 1924, exhibit unique characteristics and dynamics that emphasize community and cooperation for social and economic stability. These villages possess shared resources, community values, and emotional bonds, forming distinct social entities (Kara, 2019). The self-sufficient mode of production, mutual aid, and the concept of "imece" (collective labor) exemplify the strong sense of community and solidarity within traditional village life (Kara, 2016; Özdemir et al., 2019; Taylan, 2009). "Imece" culture, deeply rooted in Turkish society, reflects the interdependence and collective work necessary for social sustainability (TDK, 2022).

Sharing for environmental/economic/social sustainability in traditional villages

Traditional villages in Türkiye prioritize environmental sustainability through protecting water resources, planting trees, equitably sharing agricultural lands, respecting natural balance, and utilizing local natural products (Village Law, 1924). Examples from Sirince, Mustafapasa and Ayvalik demonstrate these sustainable approaches (⊠Sahin, 2022; Arinç, 2018; Tarhan et al., 2019). Traditional village societies achieve environmental protection, economic development, and rural livelihood improvement (Sahin, 2022; Roy & Chan, 2012; Velten et al., 2015). Livestock and cultural tourism are emerging as alternative income-generating activities (Sahin, 2022). Successful examples include lavender production in Kuyucak village and Gruyere cheese production in Bogatepe village (Tarhan et al., 2019). The cultural values of traditional Turkish villages prioritize community solidarity, sharing, and self-sufficiency, which are reflected in daily practices such as communal labor, mutual aid, and sharing of food and resources (Kara, 2016; Özdemir et al., 2019; Sahin, 2022). These practices promote social cohesion, equality, and cultural sustainability within the village community. The Village Law of 1924 further reinforces these values by imposing penalties for non-compliance with communal duties and encouraging cooperation in building infrastructure and undertaking community projects (Sahin, 2022; Abdurrezzak, 2015). Generosity and sharing are highly esteemed, fostering social unity and moral integrity while preserving traditional cultural values (Kara, 2016; Özdemir et al., 2019). Friday prayers in traditional village communities provide an opportunity for social interaction among men (Sahin, 2022). The Village Law of 1924 establishes village chambers as key social and cultural sharing environments, promoting collective thinking, unity, legal solutions, and entertainment, while also serving as communication centers for transferring knowledge, manners, and traditions between generations (Abdurrezzak, 2015).

Results

A scoping review was conducted, (Table 1) categorizing the data into four sustainability aspects. The comparison highlights significant disparities in sustainability and community building between ecovillages and traditional villages. Ecovillages, as intentional communities, demonstrate a collective commitment to harmonious coexistence with the environment. In contrast, traditional villages lack a conscious, collective decision towards sustainability. While traditional villages may exhibit certain aspects of social solidarity and sharing, the sharing practices in ecovillages are more advanced and purposeful.

Table 1: Comparison of Turkish ecovillages and traditional villages in terms of sharing practices and sustainability.

	Ecovillages	Traditional villages
Environmental Sustainability		
Sharing space	Living/gathering area, kitchen, bathroom	**
Sharing products	Washing machine, kitchen appliances, tools, vehicles	**
Sharing energy sources	Common use of all energy sources	*
Sharing natural sources	Water, trees, agricultural land	Water, trees, agricultural land
Sharing transportation	Shared vehicles for long distances	*
Economic Sustainability		
Production	Agriculture, handicrafts, cosmetic products, services	Agriculture, handicrafts, regional food
Trading	Agriculture, handicrafts, cosmetic products, services	Local products boost economy and tourism
Swapping	Agriculture, handicrafts, cosmetic products	Products are swapped within the community- there is no market
Sharing workload	Co-production	"İmece"
Social Sustainability		
Motivations	Living in harmony with nature; integrating all dimensions in a whole systems approach to sustainability; restoring and regenerating their social and natural environments	Acting together, being a part of the community, being accepted, next time it will be their turn, showing off their wealth
Roles	Each person has a role in production and maintenance, organization, leadership	Each person has a role matching their age, strength, and skills to keep the system going
Responsibilities	Production, maintenance, organization	Construction, repair, or cleaning
Sharing space	Living area, gathering spaces	Different groups come together for collective works
Sharing tools	*	Tandoors, ovens etc.
Sharing products	**	Households share surplus with those in need - welfare
Cultural Sustainability		
Values	Varies	Respect for diversity, equality & equity, social justice
Sense of belonging	Being a part of an intentional community	"İmece" activities and meetings afterwards, talks
Sharing space	Classrooms, spiritual spaces	Village chamber, wedding, oven, mosque, laundry, coffee houses

* No literature is found on the subject ** Not with intention of sustainability

Conclusion

This scoping review compares sharing practices and their impact on sustainability in ecovillages and traditional villages. Unlike previous research that has not focused on sharing practices and sustainability in these structures, we specifically examined the role of intentional communities and core values in driving sustainable behaviors.

By gathering data about Türkiye on both “traditional” and “eco” villages, we provide insights into sharing and sustainability within a specific context. The findings of our analysis reveal significant disparities in sharing practices between ecovillages and traditional villages. Traditional villages rely on “imece,” while ecovillages are driven by core values and intentional community, leading to variations in sustainability awareness. Additionally, our study underscores the role of design in creating idealized conditions for sharing activities. The physical design of places and tools influences the social dynamics within these communities. By examining the interplay between physical design and societal sharing activities, our research offers a unique perspective on the subject. Further investigation into the personal experiences of residents in ecovillages and traditional villages is essential.

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Eco-design Pedagogical Model and Academic Practices Based on the Krebs Cycle of Creativity

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Abstract

Throughout history, the discipline of design has redefined the relationship between people and environment repeatedly. The concept of eco-design goes far beyond functionality or speculativity in this era. With the emergence of new type of ecology design, the models and prototypes of eco-design have been gradually emphasized. This paper focuses on the "*Krebs Cycle of Creativity*" proposed by Prof. Neri Oxman at MIT Media Lab, as a way to understand eco-design in this age. Using the *Krebs Cycle of Creativity* as a framework, the author iterates a new model for eco-design pedagogy, as well as explores the experimental path of implementation in specific courses in the Design for Crisis and Ecology program at the School of Design at the China Central Academy of Fine Arts (CAFA).

Author keywords

Design Model; Design Methods; Eco-design Pedagogy; Cross discipline.

Introduction

The world is increasingly moving towards complexity and systematicness. Since the term "*ecology design*" (eco-design)was officially coined in 1996, from Fuller's systematic management of the earth to Papanek's green design; from McHale's diagnosis of the earth's resources to the circular design in "From Cradle to Cradle"; and from the Whole Earth Catalog's advocacy of self-sufficient lifestyles to the ecological cybernetic theory of cross-species futures, all of them are attempting to redefine over and over again the complex relationship between human beings and the environment. In the past 10 years, the emerging eco-designhas been characterized by the following features: (1) interdisciplinary and cross-scale (2) complexity and (3) resilience facing change. Eco-design, like "more and more design and biology, focuses on the flow of information, on network participants at different levels and exchanges information to balance the stability of the whole system". Eco-design's "process of scaling up and scaling down" of issues at different scales often goes beyond the realm of functional or discursive design. New forms of eco-design research are already emerging at universities and institutions of many kinds around the world, including the *Mediated Matter* at the MIT Media Lab, the Biodesign and Material Futures Program at the University of the Arts London, GeoDesign at the Design Academy in Eindhoven, and Risk and Resilience at the Harvard University Graduate School of Design. The Material Ecology, developed by Prof. Neri Oxman, director of "Mediated Matter", investigates the intersection of computational design, biomaterials and architectural engineering; "GeoDesign", which develops innovative develops innovative tools to investigate industrial resources and address issues of environmental responsibility and inequality through interventionist materials, technologies and discourses.

Does the new eco-design have clear design prototypes and principles to make the design approach more traceable? Looking back at history, a large number of design diagrams have emerged since the second half of the 20th century to visualize the thinking process and improve collaboration. Examples include Bela H. Banathy's "*Double Diamond Model*", L.J March's "*Cyclic Model*", and Richard Buchanan's "*Four Orders of Design*", which are widely used in many design senarios. In 2009, speculative designers Anthony Dunne and Fiona Raby proposed the "A/B Manifesto", which shifts design from a problem-solving paradigm to a critical and inquisitive one, emphasizing the differences between the past, present, and future of design in the post-industrial, pan-digital era, using 21 juxtaposed positions. This paper examines the *Krebs Cycle of Creativity* explain the process of complementary change between disciplines from a metabolic perspective. The author of the model, Prof. Neri Oxman previously teaching at MIT Media Lab, refers to her ecological practice as "*material ecology*": "It is an emerging field of design that refers to the relationship between products, buildings, systems, and their environments. "Using the Krebs Cycle of Creativity as a framework, this paper iterates the design principles of the "new" ecology design, and explores the experimental paths for operationalizing the design principles using specific courses as case studies.

Krebs Cycle of Creativity

Neri Oxman, a designer with a background in architecture, medicine, and engineering, serving as professor at the MIT Media Lab, first proposed the "*Krebs Cycle of Creativity*" (KCC) in 2016 in the Journal of Design and Science (JoDS), founded by the MIT Media Lab. KCC is a framework that views the fields of art, science, engineering, and design as synergistic forms of thinking and creating, where the inputs of one field become the outputs of the other. Oxman thus posits an anti-disciplinary hypothesis: knowledge is no longer attributed to or produced within disciplinary boundaries, but is fully entangled, with one field triggering (re)evolution in another; a person or project can reside in more than one field.

KCC is derived from the Krebs Cycle (tricarboxylic acid cycle), which was proposed by the British biochemist Krebs in 1937 later won the Nobel Prize in Medicine in 1953. The Krebs Cycle describes the metabolism and chemical reactions of organisms inhabiting an oxygenated environment. In this analogy, the four modes of human creativity - science, engineering, design, and art - replace the carbon compounds of the Krebs Cycle. On the other hand, the KCC is an extension of the design thinking diagram proposed by Gropius and John Maeda. Walter Gropius' 1922 schematic of the Bauhaus curriculum, which represented the different trajectories as a loop, thus hinting at the school's mission to bring together students from different disciplines to transform art, design, and

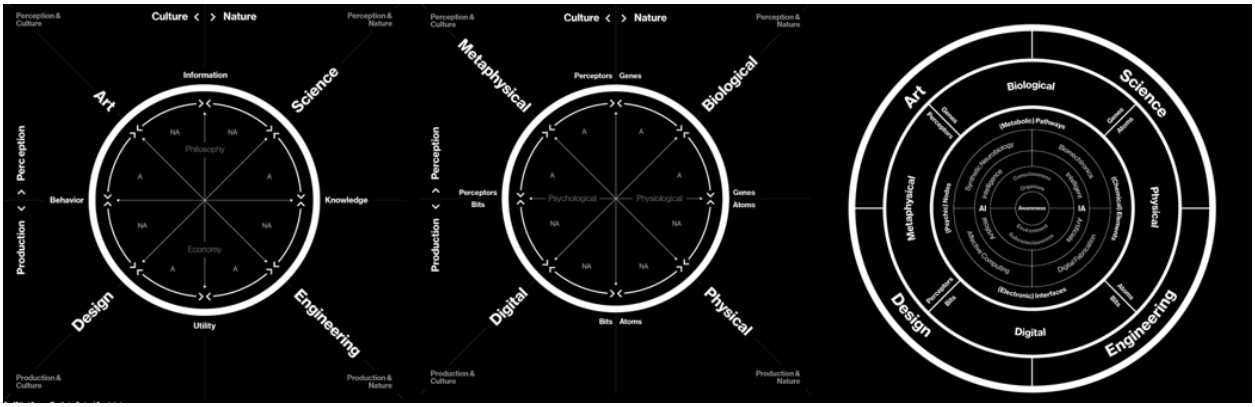

Figure 1. Krebs Cycle of Creativity. KCC I, KCC II, and KCC III.

society. In 2007, John Maeda, former director of the MIT media lab, created an diagram based on the *Rich Gold Matrix*, which divides the graph into four quadrants, each of which interprets and acts on the world from a unique perspective: science, engineering, design, and art.

KCC generates intellectual energy in the transition from one domain to another. Science explains and predicts the world around us, turning information into knowledge; engineering applies scientific knowledge to the development of solutions to empirical problems, turning knowledge into utility; and design produces solutions that maximize functionality and maximize utility. solutions that maximize functionality and add to the human experience, translating utility into behavior; and art questions human behavior to create awareness of the world around us, translating behavior into new perceptions of information, re-presenting the data that started the scientific cycle. The vertical axis of the first generation of the Krebs Cycle of Creativity (KCC I) runs from the sky to the earth, from theory (or philosophy) to application (or economics). KCC II explains, predicts, changes, and perceives the domains of the world, each of which is defined by a unit associated with it. In order for design objects, structures, and interventions to inform and influence the natural ecology, designers must be able to see and create the world in the ways it is seen and in the units that construct them. KCC III combines the first two iterations into an ideal map of interdisciplinary design practice, with an unobstructed transition between the domains articulated by KCC I and KCC II.

Oxman argues that since the emergence of the concept of “anti-disciplinarity,” we have stepped into a new “age of entanglement.” “Knowledge can no longer be attributed to or produced within disciplinary boundaries, but is completely entangled.” Oxman gives four different interpretations to the KCC: clock, microscope, compass or gyroscope. First, the KCC can be thought of as a two-way clock, where time can stand still, bend, or jump. Second, the four fields in the KCC can be seen as the four objective lenses of a microscope through which the world is viewed and acted upon. Third, the KCC can be used as a compass to travel from north to south or east to west. From “information” generated by science and art in the “perception” hemisphere to “utility” generated by design and engineering in the “production” hemisphere. “. Finally, the KCC acts as a gyroscope to measure or maintain creative direction.

“One of the great strengths of the KCC is that it can be extended to the entire MIT community, embarked at different stations by scientists and artists already working in the four fields.” Oxman called it “a holistic approach to design that views all environments, built, natural, and biological, as a whole and assumes that the physical construction of any design is an integral part of our ecology. A practicing materials ecologist will therefore engage multiple disciplines such as computational design, digital fabrication, synthetic biology, the environment, and the materials themselves as inseparable and harmonized design dimensions. “

Pedagogical Model of Eco-design based on the Krebs Cycle of Creativity

Based on the interdisciplinarity and flexibility of KCC, the author have evolved a more specific model of Eco-design for the academic scenarios of the School of Design (D-school) at CAFA. The model was validated in the five-year academic systems of the program Design for Crisis and Ecology at D-school. The model is used in cross-disciplinary design education, centered on eco-design. It could be interpreted from multiple perspectives, splited and combined.

The eco-design pedagogical model can be divided into three parts. The first part is the four quadrants of southeast, northwest, and north, each quadrant is “a shift” of design. The second part is the α-axis and the β-axis, which are the criteria for designing from process to values and for designing a project-based system, respectively. The third part is a three-layered circle from the outside to the inside, called “cell membrane”, “cytoplasm”, and “nucleus”, with the interdisciplinary fields involved in the cell membrane, the seven criteria for design evaluation in the cytoplasm, and different mediums and scales of expression of the design in the nucleus.

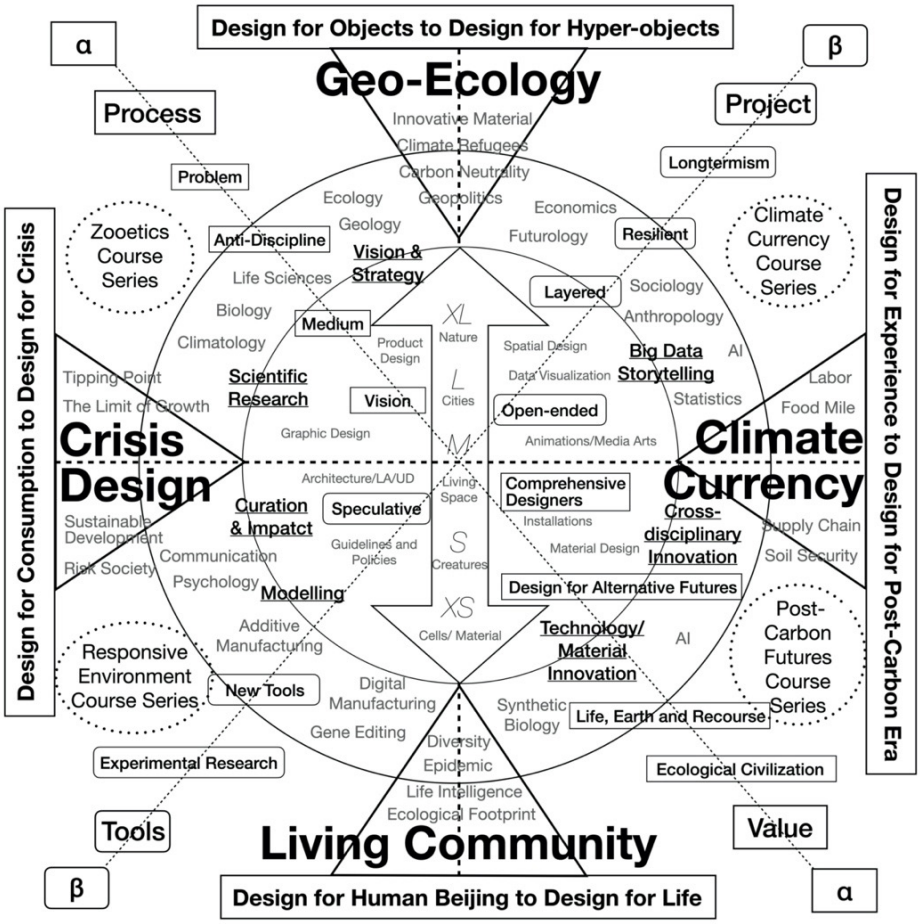

Figure 2. Pedagogical model of Eco-design based on the Krebs Cycle of Creativity.

The Four Shifts of Eco-design

From Design for Objects to Design for Hyper-objects

"*Hyper-objects*" refers to the complexity of things becoming a mesh, where all living and non-living things are bound together. Single objects are no longer exists. This section explores topics such as geopolitics, resource innovation, carbon neutrality, climate refugees and other "geo-ecological" topics.

From Design for Human Beijing to Design for Life

It refers to a focus on a wider range of life forms as one of the ways to ensure sustainable development for future human well-being, emphasizing "interspecies" responsibilities, including animals, plants, microorganisms, bacteria, and other life forms other than human beings. Topics explored include life intelligence, pandemics, species diversity, ecological footprints and other "community of life" issues.

From Design for Consumption to Design for Crisis

It refers to a greater focus on "crisis awareness" rather than "consumption awareness", and how to deal with crises such as extreme weather, pollution, the spread of pandemics, food security, inequality, etc. becomes the underlying design issue. Crisis design issues such as tipping points, limits to growth, sustainable development, and risk societies are explored.

From Design for Experience to Design for Post-Carbon Era

It refers to the carbon emissions in the agricultural, industrial and service industry as the primary object of concern, rather than the human-centered experience. Low-carbon and green consumption habits will force the reform of the whole industrial chain. Explore the use of ecology as a "climate currency" in the supply chain, labor force, soil arrangement, food miles, and so on.

From Process to Value

In the α-axis, the design process is not about giving an answer from a discipline, nor is it a process of asking a question to solving a problem, but rather a process of identifying a problem and throwing out a vision. In the first half of the α-axis, multiple disciplines are combined and different media are chosen to express them. In the "cytoplasmic" section, the design process resulted in seven evaluation criteria: scientific research, strategy and vision, big data narrative, cross-discipline innovations, technological and material innovations, physical production, planning and impact. Each criterion involves the ability to utilize cross-disciplinary skills, which are reflected in the "Cell Membrane" section. For example, scientific research requires the integration of knowledge in climatology, biology, life sciences, geography, ecology, etc.; cross-discipline and techno-materials innovation involves knowledge of materials science, artificial intelligence, synthetic biology, etc.; curation and influence involve knowledge of communication, psychology, and other fields. In the second half of the α-axis, designers need to find an "alternative future" using the capabilities of the "comprehensive designer" to design for life, the planet and resources in an era of transition from an industrial civilization to an ecological civilization.

Table 1. Table caption should be placed above the table.

Nine Commandments for a Materials Ecology	A/B Manifesto	Criteria of Design for Crisis and Ecology
Nature as Client; Growth over Assembly; Integration over Segregation; Non-Human-Centered Design; Difference over Repetition; Decay over Disposal; Activist Design; System over Object; Technology over Typology;	affirmative vs. critical; Problem solving vs. problem finding ; Design as process vs. design as medium; Provides answers vs. asks questions; in the service of shareholders vs. in the service of society; for how the world is vs. for how the world could be; science fiction vs. social fiction; futures vs. alternative worlds ; fictional functions vs. functional fictions; change the world to suit us vs. change the us to suit the world; narratives of production anti-art vs. narratives of consumption applied art ; research for design applications vs. research through design implications; design for production vs. design for debate; fun vs. satire; concept design vs. conceptual design ; consumer vs. citizen ; makes us buy vs. makes us think ; innovation vs. provocation ; ergonomics vs. rhetoric;	Longtermism over short-term interest; Resilient over settled; Layered over single dimension; Open over answered; Speculative over proven; New tool development over available tool employment; Experimental research over Information-gathering research;

Project-based design criteria

The β-axis explores the criteria for project-based ecodesign, juxtaposing with Oxman's "*Nine Commandments for a Materials Ecology*" and Dunn and Raby's "*A/B Manifesto*". Nevertheless the contexts in which these three standards emerged are not the same. "*Nine Commandments*" are centered on "material ecology", with application scenarios for new design practices, namely Nature as Client; System over Object; Growth over Assembly; Integration over Segregation; Technology over Typology. They are all expansions of the nature-centered principle. *The Nine Commandments* have been developed and revised in contrasting design contexts before and after the advent of digital computing and the biological century. This is similar to the context in which the *A/B Manifesto* was brought up in 2009. Anthony Dunne and Fiona Raby, the authors of Speculative Design, reflect on the differences between the past, present, and future of design in the post-industrial, pan-digital era, with defining design as a paradigm shift from problem-solving to criticality and inquiry. The criteria for eco-design, on the other hand, proposes a series of principles for project-based eco-design that echo both of the previous two, specifically: Longtermism over short-term interest; Experimental research over Information-gathering research; New tool development over available tool employment; Resilient over settled; Speculative over proven; Layered over single dimension; Open over answered.

Academic Case Studies of Eco-Design

This section will present case studies of different types of courses based on pedagogical models. Since 2019, the Crisis and Ecological Design Direction of D-school CAFA has launched a series of interdisciplinary and innovative courses, including the following features: (1) taken by students from different professional backgrounds; (2) inviting interdisciplinary faculty teams; (3) requiring students to learn the technical skills on their own; and (4) completing work in a short period of time.

The series of courses fall into different quadrants of the model, with topics entangled. Since the teaching reform of the D-school CAFA, the sophomore and junior years have implemented a small open-loop system, that is the courses of this two years can be chosen by each other. Offered in the second year is an 8-week, 96-hour integrated design course. Offered in the third year is a 4-week, 48-hour professional and technical methods course. The number of students enrolled in each course is less than 20, with most of them have taken courses in graphic design, digital media, social design, art and technology, fashion design, and jewelry design. So the students' mindsets and design skills are quite diverse. The course Responsive Environment is offered in the second year in the hope that when design students are first introduced to design projects, they will gain a more "holistic" understanding of design and methodology, rather than getting bogged down in the details of technology and application. The couses Zooetic and Climate Currency is offered in the third year to introduce more interdisciplinary technical methods and open up the possibility of interdisciplinary collaboration and innovation. At the same time, in response to anti-disciplinary barriers in D-school, each course can be taken independently, so that even students who have never taken courses in the field of Crisis and Ecological Design can gain the ability to utilize "eco-design model".

Course Case 1: Climate Currency Project

The Climate Currency Program was open in 2021 and 2022, with the two-year theme of "The Vision of Food" and "Sustainable Food Innovation in Xinjiang Province", both of which are centered on food design. In response to national food security issues and food system transformation strategies, this course uses food as a thread to guide students through research to understand how food connects human activities and ecosystems, individual experiences and collective cultures, economic systems and climate crises. Works presented include, but are

not limited to, research papers, community co-construction, tool design innovations, packaging innovations, branding innovations, interactive installations, performances and videos, and immersion experiences. As an example, Sustainable Xinjiang Food Design course, offered in 2022, ran as a joint course between the CAFA and the Xinjiang Arts University. The research targeted local food specialties of Xinjiang as the main research line. The subject is divided into four units: Food and Everything; Ecology and Crisis; Community and City; Vision and Empowerment.

Climate Currency, like other course, has set up task books at different stages, in order to ensure that student work can be completed in a clear and specific way. For example, Task 1 of the project involved having a favorite dish chosen and made into a recipe, including a short descriptive essay, the food's ingredients, preparation, and nutritional content; Task 2 was a map of the food's spatial and temporal spectrum, an ecological trajectory, and a map of the food's carbon and water footprints; Task 3 was to ask questions about the food they had chosen. Students asked over sixty questions, such as how will sea level rise threaten our three meals a day? How can food be used to engineer interspecies relationships? How can we address food safety and nutrition? There are several interesting aspects of the project. First, the teacher brings the ingredients for the "future" food to the classroom, and the students work together to make it. Secondly, in the second half of the lesson, the teacher led the students to print out the previous knowledge points, cases and literature, and constructed a knowledge map of food design through collage, which triggered the students' active summarization and thinking.

The difficulty of this course is, on the one hand, how to concretize the national macro policies related to food and propose design solutions that are cutting-edge, experimental and practical; on the other hand, how to reconcile the locality of the topic with the universality of the solution. Therefore, many policy-oriented reports are interspersed in the project. Secondly, a seminar was organized, with the participation of guests from diverse backgrounds, such as the Chief Agronomist of Xinjiang Department of Agriculture and Rural Affairs, the President of the E-Commerce Association of Urumqi Economic Card Development Zone, and the Research Institute of Agricultural Product Processing of Xinjiang Academy of Agricultural Reclamation. Scholars and experts from other areas were also invited to discuss the process, including Harvard University scholars, WWF food program directors, food designers, the Food Foundation, and food waste disposal companies.

Course Case 2: Zooetics

The Zooetics Course has been offered several times. Zooetics - MicroLab in 2021, for an example, focuses on innovations at the intersection of design and synthetic biology. Through interdisciplinary creation and research in design and life sciences, students will consider the microcosm, which is usually overlooked, as a starting point for thinking about how human beings perceive life, ecology, and ethics in the post-genetic era. The course is divided into four parts: Wet Lab, Dry Lab, Ethics Lab and Generation Lab, which lead students to cultivate microorganisms, understand the latest trends in synthetic biology, as well as collect natural data as a basis for creating computer-generated art, encouraging students to utilize a blend of different materials and media for their creations.

The mission statement in the project is challenging for the students. One type of task was to complete an biology experiment. For example, Task 1 was to complete a research paper on a microorganism of interest of their own and to be creative in your experiment; Task 2 was to complete a research paper on environmental microorganisms, i.e., to collect microorganisms from the living environment using culture media. These are called "wet labs". In dry labs, students were required to complete "experiments" using computers. For example, Task 3 is to conduct a "generative code design" using the genetic sequences of organisms; Task 4 is to research and propose a direction for research in a genetic database of organisms. Of course, students do not need to fully master each part of the project, and they need to choose the most interesting method and medium to express

their final work.

The difficulty of this topic is how to understand and familiarize themselves with synthetic biology techniques, life science knowledge, metacellular automata, and other high-threshold scientific knowledge and principles in a short period of time. Therefore, in the first half of the course, a PhD in synthetic biology from Peking University was invited to teach the working methods in the "wet lab", and lectures and tutorials were also invited from art and mechanical engineering programs from MIT, as well as professor from Harvard, MIT and Upenn to give critics to their projects.

Course Case 3: Responsive Environment

The Responsive Environments course was open several times between 2020 and 2023, with topics such as oceans, respiration, and climate, etc. In this paper, we take the *Responsive Environments – Marine Augmentation* course opened in 2020 as an example. The course focuses on the ocean crisis, training students to narrow down research topics on a broad ecological theme, to propose unique ideas, and to propose a comprehensive project.

The teaching objectives of this course are: firstly, to cultivate students' crisis awareness and experimental research ability; secondly, to respond to the crisis of China as a great marine country by decelerating the recurring ocean crisis and repairing the earth's environment through cross-disciplinary innovation, and to cultivate students' ability of comprehensive; thirdly, to analyze and magnify the natural crisis through the medium of design and to propose practical eco-design and restorative design solutions, so as to cultivate students' social influence and sense of ecological responsibility.

The four parts of the course are: Ecological Landscape, Crisis Design, Parametric Nature, and Ecological Curation. In the first part of Ecological Landscape, two tasks are set up, namely "Marine Ecology Report" and "White Dolphin Survival Report". Students need to transform the report into a perceptible problem, as well as convert the abstract big data and research report into "perceptible data". In the Parametric Nature section, for another example, students simulated the effects of environmental changes on white dolphins with the help of Google Earth, grasshopper, processing, Arduino.

The difficulty of the course is how to visualize abstract and grand ecological problems and translate scientific research into visual solutions. Since it is offered in the second year, the course is accompanied by a technical teacher to address the use of design tools. The course also invited nearly 10 experts from various fields, including environmental experts from WWF, UCL Biodesign researchers, scholars from MIT, experts in AI, curators, scientists in biosynthetics, etc. The project also made use of the platform of the Shenzhen-Hong Kong Biennale to exhibit the research results in a series and invited experts such as marine biologist and engineers from Institute of Ecology and Environment to have an in-depth discussion.

Conclusion

The Krebs Cycle of Creativity provides designers with a flexible coordinate system for dealing with entangled issues and helps to construct interdisciplinary cognitive systems. The Eco-design Pedagogical Model is designed to help students to position, research and innovate in a broader context during the learning process. The model and the courses have received a lot of feedback: some universities and social organizations think that the courses are cutting-edge, with advanced medium, and provocative angles. However, there are also the question of the lack of practicality. At the same time, the design of the courses is a huge challenge for both students and instructors. For students, they need to invest a lot of energy to digest the design methodology and technical knowledge in a short period of time, which requires high quality of students themselves. For the instructors, they are required to have interdisciplinary knowledge system, strong resource allocation ability and a large amount of

knowledge reserves. Due to the limited number of times the courses has been open and the diversity of topics, these eco-design course needs to study the effective path to be copied and promoted. In addition, the courses are still short-term results, and it may be more effective if they can form a cyclical and continuous research. Both the Krebs Cycle of Creativity and the Eco-design Pedagogical Model are still in the early stages of validation, and need to be constructed by scholars and experts from diverse backgrounds. This article hopes to intrigue more prototypes of new eco-design methods as well as pedagogical pratices.

Table 2. The structure of the three course in Design for Crisis and Ecology program D-school CAFA

	Climate Currency Course	Responsive Environment Course	Zooetics Course
Course Unit	Food and Everything; Ecology and Crisis; Community and City; Vision and Empowerment;	Ecology Landscape; Crisis Design; Parametric Nauture; Ecology Curation;	Wet Lab; Dry Lab; Ethics Lab; Generation Lab;
Cross-discipline	Food systems, ecology, global history, anthropology, nutrition, economics, data visualization;	Ecology, Biology, Synthetic Biomaterials, Geography, Geology, Life Sciences, Pathology;	Microbiology, synthetics, climatology, ecology, computer science, futurology;
Course objective	-Responding to national issues; -Research on locality and landedness; -Impact on local/consumer issues;	-Focusing on issues from macro to micro; -Comprehensive design capabilities;	-Interdisciplinary experiments; -Microcosmic view of problems.
Difficulties	Concretizing intangible national policies, cutting-edge, experimental and practical; reconciling the cutting-edge with the local;	How to visualize abstract and grand ecological issues and translate scientific research into visual and pictorial perceptible solutions	Understand and familiarize yourself in a short period of time with synthetic biology techniques, life science knowledge, metacellular automata, and other high-threshold scientific knowledge and principles
Teaching Form	-Methodology and Theory Lectures -Reading and speaking One-on-one tutoring -Community and local co-creation	-Methodology and Theory Lectures -Technical workshops -One-on-one counseling	-Methods and Theory Lecture; -Experimental Workshops -Readings and presentations -One-on-one tutoring
Work Media	Product Design, New Material Design, Artificial Intelligence Design, System Design, Landscape Design, Industry Chain Design, Game Design, Installation, Instruction Manual, Experimental Performance	New material design, installation, sculpture, discursive design, games,	Biomaterials, Clothing, Jewelry, Data Visualization, Installation, Documentary, Book, Discursive Design, Video
Course Extension	-Exhibition “Planet Planet at the Table” -Exhibition “Third Nature at the Table” -Exhibition “Food Testing Ground” -Exhibition “Xinjiang Biennale”-”New Food”. -Teaching material “Sustainable Food Design	-2050 Ocean Conference -Shenzhen-Hong Kong Biennale-Youth Panel	-Translation of Biodesign -Translation of the book “Bioart”. -Translation of Material Ecology

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Materials design for a positive ecological impact: A case study in the fashion field

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Abstract

The overproduction of goods and its implications, such as excessive energy consumption and use of natural resources, is leading the world's population into an era of unpredictability and global crises at different levels. In this context, interest in developing sustainable design solutions has increased considerably. However, it is still necessary that designers adopt practices that enable them to drive design for the healing and regeneration of the ecosystem. This article argues that incorporating a materials design perspective into the design process expands creativity and the possibilities of responsible design for the improvement of the environment. Through a case study from the field of fashion design, this paper illustrates and discusses the benefits of including the materials design viewpoint and how it can be implemented. This work highlights and demonstrates how recognised approaches in this field, such as DIY materials and tinkering, can be considered a source of inspiration for circular production and regenerative design.

Author keywords

materials design; fashion design; DIY materials; tinkering; circularity; design for sustainability

Introduction

in general, in the way we live. The prospect of sustainability necessarily\nplaces the very model of development under discussion. In future decades we must be\nable to move from a society in which well-being and affluence are measured by the production and consumption of goods to one in which people live better, consuming (muchIn an era where human impact is determinant, the world's population is forced to cope with unpredictable global events and environmental problems such as climate change, biodiversity loss, and depletion of natural resources (Irwin et al., 2015). These issues are strongly tied to how we produce, consume and live (Manzini, 2008)in general, in the way we live. The prospect of sustainability necessarily\nplaces the very model of development under discussion. In future decades we must be\nable to move from a society in which well-being and affluence are measured by the production and consumption of goods to one in which people live better, consuming (much.

This phenomenon is evident in multiple design disciplines, with particular emphasis on the fashion sector, acknowledged as one of the most polluting industries second only to oil (United Nations, 2018). Due to the proliferation of fast fashion and the unsustainable habits it encourages among consumers, this problem is increasingly evident. Researchers and design professionals are called to search for and apply alternative tools, methods and approaches to sustainable fashion design (Bui & Cappellieri, 2020)researchers and designers have

focused on answering the question of how fashion can be more sustainable; however, the fact is that fashion has become one of the most polluting industries in the world. The purpose of this study is to investigate and develop a consolidated knowledge-base and know-how to support and equip fashion designers in the design process, with a focus on Accessory Design. To achieve this goal, three research phases have been conducted, including (1. One way to address these problems is to shift the current material paradigm to which the fashion system and its designers are accustomed. Thus, fashion designers may adopt a perspective in which materials are obtained from renewable or abundant sources such as fast-growing natural stocks or waste and scrap from other industries. To do so, design approaches that guide and encourage designers to find a balance between design solutions and ecology are needed. On this basis, we argue that by adopting a contemporary materials design perspective in the design process it is possible to expand the creative possibilities and to visualise the design of materials and products for circularity and regeneration.

The paper is organized as follows: First, the theoretical background of materials design is presented. The subsequent section outlines the methodological approach implemented. The remaining sections provide a discussion of the results, and finally, it underlines the conclusions.

Theoretical background

Materials design has been acknowledged as a branch within the Industrial Design discipline (Rognoli & Levi, 2005). Research and development in this area gained recognition for guiding designers in generating new materials, material identities and experiences through deep materials understanding (Karana et al., 2014; Karana, Pedgley, et al., 2015). In 2015, scholars in the field (Rognoli et al., 2015) defined an approach identified as *DIY materials* that brought a new dimension to the relationship between designers, technologies and production processes. It has been developed by considering different sectors of knowledge and expertise (Lukens, 2013) and determined by the techniques and understanding of the Do-It-Yourself movement, combining crafts and self-production. As a consequence, this approach provides practitioners with tools to combine new creative techniques and innovative design approaches to develop authentic and meaningful material experiences (Rognoli & Ayala-Garcia, 2021).

The production of DIY materials has been conceived as a design practice characterised by a *tinkering* approach (Parisi et al., 2017; Rognoli & Parisi, 2021). The process of tinkering with and for materials involves a direct, creative, and iterative experimentation with materials that can drive innovation and uniqueness in design. Its objective is to acquire a holistic comprehension of materials, including their properties, limitations, potentials and applications (Parisi et al., 2017).

DIY materials and tinkering have become popular among designers because they share a strong connection. The former helps to gain an understanding of materials and develop procedural knowledge through experiential learning. Meanwhile, the latter encourages sensory awareness of the qualities of materials. Thus, these approaches can provide unique experiences with materials (Karana, 2009), a growing awareness of sustainable solutions, and an activist reaction to mass production (Ayala Garcia, 2019; Ayala-Garcia et al., 2017; Vuylsteke et al., 2021)

The scientific literature on the development of circular fashion design solutions through creative approaches is still underdeveloped. For this reason, we want to highlight in this area the potential of materials that promote ecological principles and generate a meaningful connection between the product and the user.

Method

The development of this contribution employed a case study research methodology (Yin, 2006). The selected case study, entitled *reGrowth*, was developed as a project of master's thesis in fashion design (Guarino, 2022). It was

selected because it clearly stands from a materials design perspective, envisioning the investigation and use of new materials, products, and processes to promote ecology in the fashion design field. It presents a focus on DIY materials and tinkering activities, enabling to highlight and confirm the potential of these practices in the realm of fashion design. Through a qualitative analysis of the project, data was examined and interpreted to generate empirical knowledge relevant to the practice of fashion and design in general. The following section offers an overview of the case study and proceeds with a discussion of the findings.

Case Study: reGrowth

ReGrowth constitutes an empirical exploration into novel materials at the intersection of the fields of circular economy and fashion design. Encouraged by the need for an ecological and regenerative transition in the fashion industry, reGrowth positions itself in the materials design perspective and draws inspiration from BioDesign (Myers, 2012)but only recently have they been able to alter and incorporate living organisms in their work. In a world with finite resources and a growing population, design that mimics or appropriates the sustainable template of nature is likely to prove as vital as it is novel. Bio Design examines some seventy projects (concepts, prototypes and completed designs and Growing Design (Camere & Karana, 2017) to create material solutions from biobased and renewable resources.

The project began with a thorough investigation of fashion issues and how new business models could be addressed to change the unsustainable status quo. Preliminary desk research highlighted the need to radically change the linear industrial model of production and consumption. This shift proposes moving towards a ‘closed’ and ‘iterative’ model that can consider discarded materials and products as valuable sources (Rinaldi, 2019). In this context, the circular economy (Ellen MacArthur Foundation, 2013), which works through ecological and biological loops, was identified as a solid pathway for the transition to a sustainable fashion system (‘Circular Business Models’, 2021; Coscieme et al., 2022)

Supporting the mantra ‘from Nature back to Nature’, *reGrowth* was motivated by the idea of developing a speculative collection of ‘plantable’ clothing. This envisioned to promote responsible disposal and give rise to new flora. Materials were tested that could combine organic and biodegradable fibres with bio-based and cultivable elements to produce a regenerative fashion garment, i.e., one that can contribute to ecological restoration at the end of the life cycle.

The analysis of previous work to foster circular and regenerative material design solutions (Duarte et al., 2022; Parisi & Rognoli, 2017) pointed to the Material-Driven Design (MDD) method (Karana, et al., 2015) as the appropriate methodological approach to inform the experimental journey of *reGrowth*. Through this method, designers should start with understanding the material by first-person exploration, thereby qualifying it not only for what it is but also for what it does, expresses, elicits, and makes people do (Giaccardi & Karana, 2015; Karana, Barati, et al., 2015). Therefore, the MDD approach fosters designers to the intuitive use of resources, ingredients, and the formulations of materials with a hands-on approach. The MDD enriched the design process of this project by enabling expressive-sensorial exploration of material samples (Rognoli, 2010) and providing tools and guidelines to support the creation of meaningful materials and applications.

The investigation was characterised by the increasing trend of DIY materials design and tinkering with and for materials in circular contexts (Clèries et al., 2020). Furthermore, open-access recipes, such as Bogers (2020), enlarged the material generation possibilities.

Organic textiles formed the basis for developing new materials incorporating sprouts and plants to create products in line with Living and Growing Design. The ‘living textiles’ were produced by combining eight substrates with the seeds of five different plant species and cultivated by embedding the seeds within the fabric.



Figure 1. reGrowth bioplastic samples and living textile prototype.

The samples were germinated and maintained through watering, exposure to light, and appropriate temperature conditions.

In addition, the experimentation process included tinkering with over 50 DIY material recipes to develop bioplastics which is a plastic produced from renewable biomass sources (Rognoli et al., 2011). The resulting material samples were used to encapsulate seeds and flowers, allowing for the growth of plants after disposal. By simple DIY procedures, mainly characterised by mixing ingredients such as glycerine, water and polymerisation agents (such as agar-agar, pork gelatine, starches or pectin) and later cooking them, the bases for bioplastic materials were produced. The composites prepared were placed on moulding surfaces and the materials were finished with seeds, natural dyes, leaves and flowers on the substrates.

During the whole design process of the materials, ingredients, utensils employed, and development steps were documented. Data collection during the process is a fundamental step to understand the results. The materials resulting from both experiments (living textiles and bioplastics) were analysed and those that demonstrated functionality and ease of production were selected to advance to the final step.

The journey finalised with the design of a fashion collection and prototypes through which the materials and their potentials could be demonstrated. As recommended by the MDD method, the exploration concluded with a concept design prototype. A speculative garment was created to concretely showcase the potential of DIY and tinkering with materials.

Results and discussion

The qualitative analysis of the case study confirmed several advantages of including a material-driven perspective in the design process. Among them, that experimentation with creating the materials that will constitute the product pushes the boundaries of creativity and innovation in fashion design for the improvement of the environment.

In analysing the ReGrowth project, we were able to reflect on how the inclusion of DIY materials and tinkering approaches provided a way to create materials and garments with the intention of generating ecosystem benefits. The possibility of designing materials in fashion design is not usual. In fact, we have found that the established methods of the design process do not encourage designers to generate materialities. In the current process of fashion design, making a holistic characterisation of materials and creating materials by hand using discarded material or culinary techniques are just an emerging issue.

The approaches used in the case study, helped to visualise a positive impact during the creation, and at the end of the product's life cycle. The use of bio-based materials and the growth of plants when disposing of biodegradable materials in the soil were taken into consideration. It was also highlighted that with an outcome such as regrowth, end-users would take special care of their textile garment, establishing a unique connection between them and

the product. This could also lead to new responsible consumer behaviour.
The materials involved in the project, characterised by bioplastics and cultivated seeds, offer alternatives to traditional options, as they are created from renewable resources and can be given a second life by planting them.
Another finding is based on the resulting materials experience, which reveals the potential to create sensory connections between people and design. Both speculative materials, with their unpredictable and imperfect nature (Rognoli & Parisi, 2021), and growing plants, undergo constant evolution and change, demanding acts of care and nurturing. This dynamic establishes an unconsciously ingrained empathy towards such materials (Pinto, et al., 2013). Accordingly, the interaction between humans and their garments created through DIY and tinkering practices can be considered the result of "design for emotional durability" (Chapman, 2005), a circular solution that has been shown to prolong the lifespan of products and postpone their disposal.
From the present analysis, it is possible to illustrate how material design allows to imagine new alternative resources for materials and to envisage new recycling processes. It also makes possible to envision and enhance processes for converting waste into new materials. These unexpected properties can arouse curiosity in the industry, especially today, and unveil new scenarios and applications with potential to contribute to environmentally sustainable development.

Conclusions

This article explores the opportunities for creativity and innovation that a materials design perspective can bring to the design process. In the first place, the material design field was briefly and theoretically contextualized to objectively give an understanding of its position and advantages. Through the description of a fashion design case study, reflection was made on the introduction of DIY materials and tinkering approaches and how these could contribute to envisioning materials and products to foster ecology in design. Finally, it presents the results and discussion of the case study, making reflections of introducing the material design perspective and how it can facilitate circular and regenerative awareness by encouraging the use of creative and responsible practices.

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Assessing design projects of human-nature reconnection following a scientific theory of Nature Connectedness

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Abstract

This paper discusses an approach to assess design projects in the human-nature reconnection domain. It utilises a psychological framework of five specific human engagement activities with nature that can psychometrically improve individuals' inclusion with nature, called the Five Pathways Framework of Nature Connectedness. Since current design theory lacks tools to assess whether a design project reconnects humans with nature, the authors investigate the psychological framework to assess design projects by identifying whether the engagement activities enabled by the projects fall within the five types of activities of the framework. The authors argue that the psychological framework can be an assessment tool and be helpful in the planning phase of future propositions and curricula as a scientific theoretical basis for those designing for human-nature reconnection.

Author keywords

human-nature reconnection; Five Pathways Framework of Nature Connectedness; design assessment; curriculum development.

Introduction

Along with industrialisation and urbanisation, more people dwell in cities, live indoors, and interact with other people or human-made artefacts. The ecopsychologists claimed thirty years ago that this physical separation from the natural world, an extinction of nature experiences, brought about a psychological disconnection. These disconnections from nature can lead to ecologically destructive behaviour of humans and a crisis of nature (Scull, 1999). Over the past decades, with a growing recognition of the environmental problem, humans' disconnection from nature has been proposed as a root cause of unsustainability (Pyle, 1993; Folke et al., 2011; Dorninger et al., 2017). Calls for society to "reconnect with nature" have grown louder (Zylstra et al., 2014), with new research emerging in sustainability science, conservation biology, environmental education, and environmental psychology (Nisbet et al., 2009; Folke et al., 2011; Fischer et al., 2012; Frantz et al., 2014; Richardson et al., 2020). In the design field, besides prevailing approaches such as "green", "sustainable", and "circular" design for sustainable consumption, reflections and practices are answering the challenge of human-nature reconnection. For example, the "design of transition" proposed by Arturo Escobar is a design able to react creatively to the crisis of the environment, society, and cultural meanings. In his words, "to nourish design's potential for the

transitions, however, requires a significant re-orientation of design from the functionalist, rationalistic, and industrial traditions from which it emerged, and within which it is still functioning with ease, towards a type of rationality and set of practices attuned to the relational dimension of life" (Escobar, 2018, prologue). Professor John Thackara, on the stage of a conference about the intersection of design and AI, suggested that design could help AI (and all the technology at large) to focus on "things that matter", to look at technology in light of the benefits and the good that it may bring in the perspective of the Pluriverse: "Once we understand we are part of a living system, the reconnection with nature is not only possible, it becomes obvious. And once this reconnection is done, our creative priorities and understanding of where to focus our energy and cultural energy can only change" (Thackara, 2019).

As a research team in a design college, the authors of this paper host design studio courses whose brief is also to reflect and act for human-nature reconnection. We use Nature as a subject of study in the studios and scheme the course structure upon the traditional design thinking but reframed and inspired by deep ecology, and students are guided to design artefacts to enable citizens' engagement activities with nature (Francesca & Saverio, 2021). We assessed the design projects by their ecology concept, design concept, usability, and fabrication completeness. Through these, we can tell whether a design project has a clear and interesting ecology concept, whether it has a design concept to embody its ecology concept, whether citizens can use it, and whether it has enough care for details. With these existing design tools, we can assess whether a design project creates ecological awareness among citizens to reach a psychological reconnection with nature. However, ecological awareness is only one dimension of human-nature reconnection, and humans connect with nature psychologically, physically, cognitively, and behaviourally. To improve our design assessment, we found a plausible tool from environmental psychology. It identifies five specific engagement activities with nature that can effectively improve humans' inclusion with nature, called the Five Pathways Framework of Nature Connectedness.

Nature Connectedness (NC) is a term to describe an individual's emotional attachment and cognitive beliefs about his/her inclusion within nature (Lumber et al., 2017). It is manifested in our feelings and understandings of being connected to a larger community of nature (Pyle, 1993). Although NC is a subjective and multidimensional construct, psychologists have developed several scales to evaluate individuals' NC level, including the Nature Connectedness Index (NCI), the Inclusion of Nature in Self (INS), the Connectedness to Nature Scale (CNS) and the Nature Relatedness Scale (NRS-6). With the scales, it is found that higher NC level is positively related to higher levels of hedonic and eudemonic happiness (Pritchard et al., 2020), more vitality (Capaldi et al., 2014), more pro-environmental behaviour (Mackay & Schmitt, 2019, p. 7), and buffering the effect of low social connectedness (Cartwright et al., 2018).

Psychologists also developed the Five Pathways Framework of NC to identify and guide more efficient ways to increase individuals' NC levels. It describes five specific types of human engagement activities with nature that can increase individuals' NC level psychometrically (Lumber et al., 2017), including:

- Contact activity (engage with nature through the senses).
- Beauty activity (perceive aesthetic qualities of nature including shape, colour and form that please the senses).
- Meaning activity (use nature or natural symbolism to communicate a concept).
- Emotion activity (perceive an affective state or sensation that occurs as a result of engaging with nature).
- Compassion activity (concern and help other natural entities).

While all five activities can increase NC level, the quasi-experimental test of their effectiveness (Lumber et al., 2017) shows that the most effective increase happens when both the Contact/Beauty pathway and the Meaning/Emotion/Compassion pathway are activated. Another due observation is that whilst knowledge about nature is commonly thought to be able to improve NC (Liefländer et al., 2013), activities focussed on knowledge,

identification, and figures do not increase NC level but rather are suggested to provide information able to activate the five pathways (Lumber et al., 2017).

As shown above, Nature Connectedness is a more comprehensive dimension of human-nature reconnection than ecological awareness. The Five Pathways Framework of NC studies specific human engagement activities with nature that can increase individuals' NC levels. Our studios' design projects also enable citizen engagement activities with nature, sharing the same subject category with the framework. Therefore, it is worth investigating that the Five Pathways Framework of NC could be a new tool to assess whether a design project increases citizens' NC level, in other words, reconnects humans with nature.

Methodology

To investigate the Five Pathways Framework of NC being a design assessment tool, we identify whether the engagement activities enabled by a studio's design project could be classified as one of the five types of activities of the framework. Forty heterogenous design projects compose the outcomes of the studios sharing a brief of "reconnect citizens with nature". They are in the forms of devices, installations, products, and jewellery, and with diverse topics varying from properties of ecology, metabolism and functions of flora and fauna to abstract concepts such as balance in the ecosystem, systems of organisms, and the multiplicity of the life cycle.

From one studio, design projects are artefacts communicating to citizens new understandings of human-nature relationships or things that humans generally overlook or ignore, which are built up by students from their explorative research and mapping of urban nature (Francesca & Saverio, 2021). The engagement activities enabled by the design projects are compared with and classified as the framework's Contact/Beauty/Meaning/Emotion/Compassion activity. For example, "Nature Sidekick" is a set of modular lenses of different colours, mirrors, and magnifiers. Various combinations create different ways to see, through which users are encouraged to observe natural entities in new views. This engagement activity can be classified as Contact activity, which is engaging with nature through the senses. "Skin of Nature" is a material library utilising 15 different plant-based bodies and transforming them into wearable concepts: Flipper gloves made of palm bark's midsection for its naturally hydrophobic fibres; facial jewellery of thick pineapple bark protecting the cheekbones while keeping them moist and breathable through tiny holes on the inside; and gloves of cucumber's skin keeping insects and bacteria at bay. All the wearables and more-than-human skin samples are presented in fashion fabrics, encouraging citizens to perceive the aesthetic qualities, including shape, colour, and form, which matches the Beauty activity. "Relationships between Nature and Urban" is a board with left and right ends representing extremes of reality and fantasy. Users can use stickers of elements, like animals, plants, humans, and artefacts, to put on the board to construct their imagined urban nature. This engagement activity encourages citizens to use natural symbolism to communicate concepts, the same as the Meaning activity. "Natural Ritual" is a set of metal structures with spaces for embedding natural elements. Users are encouraged to gather natural materials they find beautiful to fulfil the temporary jewellery with their aesthetic preferences until bringing them back to nature, where the cycle can start over again. Through this engagement experience, users engage with nature through their senses and perceive the aesthetic qualities of nature, which matches both Contact and Beauty activities. "Nature Connector" is a pair of hemispherical earmuffs amplifying environmental sounds. Users are encouraged to wear them to receive the sounds of nature and perceive the affective sensation occurring, which matches both Contact and Emotion activities. "Touch" is a collection of pictures illustrating relationships, unexpected entities and the beauty of urban nature hidden in the bottom of cups. Users use magnifying glasses to look at pictures and coloured stickers to express feelings. These engagement activities are the same as both Beauty and Emotion activities.

In the other studio, design projects are devices amplifying human senses or introducing new senses borrowed from living organisms to enable interactive activities between humans and aspects of the natural environment (Francesca & Saverio, 2021). The engagement activities enabled by the design projects are compared with and classified as the five framework activities. For example, “Percuino” is a headband that allows the wearer to experience the peculiar way Snakes, Frogs, and Turtles perceive the environment. The printed circuit board inside the headband features three detachable and interchangeable modules, each enabling an innovative way of sensing the environment: the “snake module” utilises an infrared temperature sensor to detect the presence of living beings, the “frog module” has a laser motion sensor to detect their motion and the “turtle module” mounts a compass sensor to detect one’s position relative to the magnetic south; lastly, the actuator is a vibration motor that can stimulate the back of the wearer’s head at increasing intensity (Saverio & Francesca, 2023). These enabled engagement activities can be classified as Contact activity. “Lily Turf” is a device with a magnifying lens showing details of lilyturf in different seasons. Users can rotate a knob to change the images and observe the beautiful details of a small lilyturf in the cities, which matches the Beauty activity.

We assessed all forty projects by identifying the engagement activities enabled by the design projects with one of the five types of activities of the framework. We understood whether and how each project increases citizens’ NC level, in other words, reconnects citizens with nature. Since the most effective increase happens when both the Contact/Beauty pathway and the Meaning/Emotion/Compassion pathway are activated, we arranged the assessment results in sequential categories: “Enable none of the five activities”, “Enable Contact/Beauty or Meaning/Emotion/Compassion activity”, “Enable Contact/Beauty and Meaning/Emotion/Compassion activity”. Then, we arranged the results of the projects that enable at least one type of activity by the five types separately.

Results

When arranging the assessment results of the forty design projects by the three categories of progressive effectiveness of NC increase (See Figure 1), we found that 17 projects enable none of the five activities, which is 42.5%, all focusing on communicating scientific facts and knowledge, which do not increase individuals’ NC level (Lumber et al., 2017). 21 design projects enable Contact/Beauty or Meaning/Emotion/Compassion activity, which is 52.5%. Among the 21 projects, eleven enable only the Contact activity, five enable only the Beauty activity, four enable only the Meaning activity, and one enables both the Contact and Beauty activities. 2 projects enable both Contact/Beauty and Meaning/Emotion/Compassion activities, which is 5%. Among the 2 projects, one enables both the Contact and Emotion activities, and one enables both the Beauty and Emotion activities.

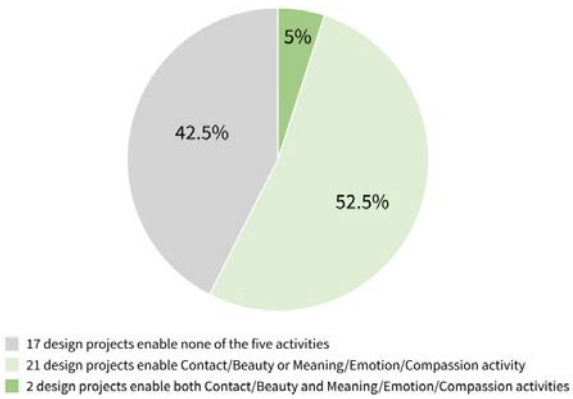

Figure 1. 40 Design Projects Assessment Results by Categories of Progressive Effectiveness of NC increase.

When arranging the 23 design projects that enable at least one type of activity by the five types of activities separately, we found that 13 projects enable Contact activity, consisting of eleven enabling only the Contact activity, one enabling both the Contact and Beauty activities and one enabling both the Contact and Emotion activities; 7 enable Beauty activity, consisting of five enabling only the Beauty activity, one enabling both the Contact and Beauty activities and one enabling both the Beauty and Emotion activities; 4 projects enable Meaning activity; 2 projects enable Emotion activity, and 0 project enable Compassion activity.

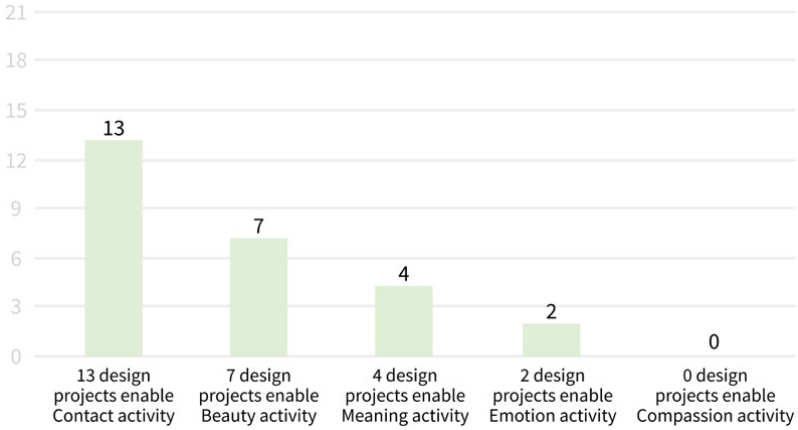

Figure 2. 23 Design Projects Assessment Results by Categories of the Five Types of Activities

Conclusion

From the results, many considerations are opened for our future teaching practice and how to re-orient the studios' brief. Over 40% of the design projects failed to enable any NC-increasing activities, so we may consider introducing the framework as an evaluation metric in the brief requirements, helping the students work more focused on the five activities. Only 5% of design projects enable both Contact/Beauty and Meaning/Emotion/Compassion activities, which is the most effective way to increase individuals' NC, so we may consider encouraging more types of activities to be enabled. Besides, more design projects enable Contact activity, and fewer design projects enable Beauty, Meaning, Emotion, or Compassion. It could be explained by the studios' teaching environment and curriculum requirements, prompting students to pay attention to the sensory aspects of the interaction with nature. We may consider an extra emphasis on Beauty, Meaning, Emotion and Compassion activities while encouraging more types of activities.

A limitation of this study is that the assessment is composed of qualitative identifications telling whether and how a design project increases individuals' NC levels. In future research, quantitative measuring scales of individuals' NC levels should be implemented before and after people use the design projects to determine how much of individuals' NC levels are increased by the engagement activities a design project enables. The scales can include the Nature Connectedness Index (NCI), the Inclusion of Nature in Self (INS), the Connectedness to Nature Scale (CNS) and the Nature Relatedness Scale (NRS-6), which comprises several psychological questions and can be implemented easily.

In summary, we believe that the Five Pathways Framework of NC can be a new tool to assess whether a design project increases citizens' NC level, in other words, reconnects humans with nature. Besides, the framework is also helpful in planning future propositions and curricula as a scientific theoretical basis for those designing for human-nature reconnection. This indeed expands the practices of the psychological study of the human relationship with the natural world and offers a fresh route for design research and practice responding to the global sustainability challenges and the interest in more-than-human ecologies.

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The Study of How Chongqing Achieves Green Urban Ecological Design - Hidden in the Woods

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Abstract

In the new era, Chongqing is actively implementing the guidance from the State Council to build a modern city that is international, environmentally friendly, intelligent, and humanistic, promoting the harmonious development of people and nature. Chongqing aims to become a city with a healthy ecology, and when we talk about ecology, it naturally leads us to think about green development. Modern urban development necessitates a responsibility towards the ecological environment. Internationally, there have been innovative concepts for urban development such as “Ecopolis,” which reflects a sustainable value system. The green city development concept in modern Chongqing aligns well with this perspective.

Therefore, I would like to revisit the spiritual realm cherished by ancient literati—living within nature. During the Northern Song Dynasty, literati began to aspire to live amidst mountains and rivers, which was essentially establishing an emotional connection with the natural environment. Hence, an important objective of Chongqing’s current urban ecological design is to establish an emotional connection between modern urban residents and the ecological environment.This emphasis on ecology is also an interpretation of love for the environment.

Author keywords

city; ecology;design; sustainable; environment.

Introduction

The ultimate outcome of a green city requires the establishment of a benign and sustainable relationship between humans and ecology, which necessitates comprehensive consideration of disciplines such as anthropology, economics, ecology, sociology, and more. Designers need to contemplate how to incorporate more green spaces into the rapid urban development process while maintaining the city’s necessary functions and responsibilities. The ideal state is when the city’s modernization process aligns with its natural processes, achieving harmony between humans and nature, sustainable development of society, economy, and the environment. Urban planning and construction should be guided by this value system.

The Chongqing municipal government is aligning with the times and implementing concepts like “green city” and “landscape city.” The idea of a “landscape city” was initially proposed by Mr. Qian Xuesen, which, in essence, continues the ancient Chinese literati’s desire to find solace in landscapes. Therefore, for Chongqing’s future urban development goals and planning, it is crucial to rigorously contemplate how to achieve the spiritual realm of “hidden in the woods” in the process of urban modernization and establish an ecological city.

How Green Urban Ecological Design Became the Mainstream in Today's Urban Development

Background and Reasons

Firstly, the concept of green urban design aligns with the global consensus on "sustainable development" today, making it a more future-oriented design approach in the field of urban planning and design. Secondly, the ecological environment of urban construction worldwide is deteriorating due to the processes of modernization, and cities are reaching a saturation point in terms of their capacity.

In this new era, exploring the relationship between human society and nature has become a hot topic. How can people balance the relationship between humans and nature in the rapid urbanization of the modern age? There is a paradigm shift in urban design concepts, aiming to make cities more than mere concrete boxes.

Therefore, contemporary green urban design represents a novel way to integrate city life with nature. Modern urban design has numerous examples, including the creation of landscape cities and the recent "Park City" concept proposed during the Chengdu 2021 Summer Universiade. The "Park City" idea aims to attract tourists, generate cultural tourism revenue, and establish cultural tourism special train services in collaboration with Chongqing, successfully promoting the city's image during the Universiade.

Creating a unique city "IP" (intellectual property) in modern cities is a challenge that tests the creativity of designers.The development of key sites within the larger landscape can highlight ecological functions and bring them to the attention of the public(Lovel et al.,2009). It involves developing distinctive characteristics based on the city's foundation, differentiating it from other cities, and aligning with the prevailing urban development direction and policies. This requires on-site investigations and data analysis.

Policies and Development Planning

During the "Ninth Five-Year Plan" period, there was significant development in environmental protection. This was evident in several aspects: the high-level attention paid by the Party and the state to environmental protection, the widespread increase in environmental awareness among the entire population, intensified environmental protection measures, a substantial increase in environmental investment, and some improvement in environmental quality.Sustaining human society requires engineering design practices that protect and enhance the ability of ecosystems to perpetuate themselves while continuing to support humanity(Bergen et al.,2001). However, environmental pollution remained severe, and the trend of ecological degradation was not effectively curbed. China initiated explorations in ecological and environmental construction in the 1980s, and these efforts have been ongoing.landscape ecologists have an important contribution for urban planning and design that requires new modes of collaboration to be realized(Ahern, 2012).

On September 16, 2022, in the morning, Chongqing held a press conference to interpret the "Implementation Opinions on Promoting Green Development in Urban and Rural Construction." The conference decoded the future "green content" of "Green Chongqing." At the conference, Dong Yong, member of the Party Group and Deputy Director of the Municipal Housing and Urban-Rural Development Commission, and spokesperson, mentioned that "Green Chongqing" had set two-stage overall goals: by 2025, the green development system and policy framework for urban and rural construction would be basically established, and by 2035, comprehensive green development would be fully realized in urban and rural construction. In the short term, by 2025, various aspects would be enhanced and improved, outlining the "data model" of "Green Chongqing."

On June 25, 2023, the Municipal People's Government and the National Forestry and Grassland Administration issued the "Implementation Plan for the Scientific Greening Pilot Demonstration City Construction in Chongqing," proposing to comprehensively enhance the level of scientific greening in the city and enhance the diversity, stability, and sustainability of the forest ecosystem. By 2025, the forest coverage rate across the city would be

stabilized at over 55%, with a forest stock volume of 280 million cubic meters.The implementation of these policies has promoted the overall construction of a “green city” and achieved significant results. It has led to an improvement in the living environment for residents and has greatly aided in the rethinking and re-planning of the city’s overall functionality and layout.

How to Implement the Ecological Development Perspective of “Hidden in the Woods” in the Current Urban Development Context

What is the Ecological Development Perspective of “Hidden in the Woods”?

“Hidden in the Woods” is a Chinese idiom that originates from ancient Chinese literature. This idiom first appeared in a poem by the Northern Song Dynasty literary figure Su Shi (Su Dongpo). In this idiom, “Hidden in the City” refers to the idea of blending within the city while “Woods” symbolizes natural landscapes. This phrase vividly expresses the desire to find hidden, tranquil beauty in the midst of urban life and the pursuit of inner peace and relaxation amid the hustle and bustle of city living. The idiom “Hidden in the Woods” is commonly used to depict a state of peaceful and content living, immersed in natural surroundings, away from the noise and chaos of urban existence.

Applying this concept to contemporary urban design, this philosophy remains relevant. Although physically located within a city, the heart and soul can connect with the natural environment. In modern urban planning, the goal is to create an urban environment that fosters this connection with nature, allowing residents to resonate with the natural ecology through design. This aims to achieve the spiritual realm of “Hidden in the Woods” through urban design techniques.The emergence of the modern concept of “ecological cities” is driven by a transformation in human environmental values and a reconsideration of the ideal life for future generations. The core idea behind ecological cities is “sustainable development,” where urban planning and the natural environment must dynamically evolve over time in harmony.

How Ecological Principles are Applied in Urban Design

Ecological design has been applied to an increasingly diverse range of technologies and innovative solutions for the management of resources(Todd et al.,2003),Firstly, viewing the city as a holistic entity with social, political, economic, and other functions, designers should take ecological principles as their guide when considering design solutions for the overall urban functionality. A successful design should not only meet functional requirements but also align with contemporary ecological demands, ultimately achieving harmony and coexistence between humans and nature.Secondly, in specific design tasks, designers need to strike a balance between urban human landscapes and natural landscapes. For different cities, it is essential to conduct research on the specific ecological environment of the locality, understand the overall environmental conditions and climate of the city, which will serve as the foundation for subsequent design. It is crucial to adopt a forward-looking perspective on the city’s development process, considering whether the design outcomes will have irreversible impacts on the environment and more importantly, how to protect the local ecology while harnessing the city’s full potential.The Chongqing municipal government has taken concrete measures at the infrastructure level to protect the overall ecology and energy resources. For instance, they have strengthened the construction of the overall transportation network, creating a grid-like structure for urban rail transit and enhancing the “rail + traffic + pedestrian” green transportation system. Additionally, they have introduced requirements for “green buildings” and formulated new energy-saving standards for high-tech buildings, along with the implementation of a unified emblem system for green buildings. Tailored approaches for the promotion of renewable energy in construction, policy support for green building materials, and widespread dissemination have also been implemented.Furthermore, improvements have been

made in public facilities and the redevelopment of older neighborhoods, aiming to enhance public environments and promote green living from the grassroots level. Initiatives such as eco-friendly government offices, green hospitals, green schools, and green markets have been launched.

The promotion of new energy vehicles, encouragement of households to use green lighting equipment, and reduction in the use of disposable consumables and packaging materials have also been emphasized.Urban ecological networks are defined differently in ecology, urban planning and landscape ecology, but they all have linearity and linkage in common(Ignatieva et al.,2010). Strengthening the overall regulatory framework, reinforcing the design of systemic regulations, enhancing the city's green ecology, improving grassroots governance systems, and establishing a smart green city governance system are among the key strategies. Moreover, there is a strong emphasis on encouraging the development of green environmental protection industries. Efforts are being made to nurture these industries, promote ecological industrialization, create advantageous green and low-carbon industry clusters, and expand the scale of the green environmental protection industry.Lastly, there is a focus on intensifying the promotion and education of green environmental protection concepts. This involves spreading awareness of green environmental protection ideologies at universities, research institutions, public organizations, and associations, with the goal of fostering a collective understanding of the importance of environmental protection at the ideological level.

How Designers Should Balance Urban Modernization and Ecological Environment

Contemporary urban designers face the challenging task of being responsible for accelerating urban modernization while also ensuring ecological preservation. This requires not only a mastery of urban planning knowledge but also a proficiency in the latest standards related to green architecture. It involves improving the city's comprehensive governance capabilities and establishing a governance system for smart and green cities.

From an ideological perspective, designers need to consider how to achieve the goal of sustainable development in their designs. They must assess whether their urban design will impact the current natural ecology and assume responsibility for the city's public spaces for an extended period. Designers need to cultivate a sense of responsibility for the city spaces they design, not only for the people who reside in and use those spaces but also for the local ecological environment.

In the design process, the use of more environmentally friendly materials and the reduction of carbon emissions are essential considerations. Throughout urban planning, the ideal realm pursued by Chongqing is the "mountain-water city." Additionally, Chongqing is a key city in the development of smart cities. Designers must carefully balance the level of greenery, the circulation of water supply systems, and river systems within the urban construction process. While achieving a city equipped with smart systems, it is essential to ensure the rational utilization and coexistence of the natural ecology.

The Significance of Ecological Design in Current Urban Development

An ecological city is a concept that emerged during the research process of the United Nations Educational, Scientific and Cultural Organization's "Man and the Biosphere (MAB)" program. It represents the result of ecologically sustainable urban development, characterized by social harmony, economic efficiency, and a virtuous ecological cycle. It embodies the symbiotic relationship formed when nature, the city, and people merge into an organic whole.

Ecological cities are not only about examining the relationship between humans and nature but also about considering the relationships between individuals. They enhance the efficiency of material resource utilization,

leading to more rational resource allocation, and can contribute to resolving conflicts among people to some extent. Traditional methodologies for systems development and deployment are often based on a set of rationalistic or "mechanistic" ideas about artifacts and infrastructure(Star et al.,1994). The construction of ecological cities symbolizes the progress of human civilization and represents the inevitable direction of urban development. It encompasses not only the ecological construction and restoration of urban physical environments but also values, lifestyles, policies, and regulations. China, as a developing country, faces significant disparities in comprehensive national strength, technological capabilities, population quality, and consciousness compared to developed countries.

Guided by urban ecology and environmental economics theories and centered around the theme of sustainable development, ecological city construction is based on urban planning, prioritizing environmental protection and leveraging urban management. It aims to establish a new mechanism with government leadership, market promotion, law enforcement supervision, and public participation, fostering a city where the economy, society, and ecology maintain a high degree of harmony. The goal of ecological city construction is to create a clean, beautiful, and peaceful city that fully realizes sustainable development. It aims to establish a harmonious ecological landscape that integrates high-efficiency ecological industries with the fulfillment of people's needs and desires, ultimately achieving the organic integration of nature, agriculture, and human habitats.

In summary, the path toward ecological urban development sets clear goals for urban development by promoting the construction of ecological cities. Ecological city construction signifies progress in human civilization and points the way for urban development. For Chongqing, achieving the spiritual realm of "hidden amidst the forest" is still a long journey, but the positive aspect is that under the leadership of the Communist Party and the Chinese government, we have embarked on the path of green and sustainable development.Given the current national conditions, green and ecological urban design is the new trend in urban planning. Designers in this new era have more aspects to consider. Urban development has shifted from solely pursuing economic efficiency to a focus on efficient integration of economic and ecological considerations. This shift in thinking represents significant progress and is indicative of China's overall development. In the modern process of urban development, with increasing complexity and ecological issues becoming global hot topics, urban design considerations have also expanded. Chongqing's green and ecological urban design is steadily progressing, and its design philosophy is moving closer to the spiritual realm of "hidden amidst the forest."

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Facilitating Consensus and Co-learning between Stakeholders for Geothermal Utilization in Japan: Leveraging ANT and Service Design with Co-Creation Sketch Method as a Boundary Object

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Abstract

The use of renewable energy is critical to achieving the Sustainable Development Goals (SDGs), and geothermal power generation is a promising solution due to its minimal CO2 emissions and reliability. Despite having significant geothermal potential, Japan lags behind in geothermal power generation due to challenges such as high development costs and environmental concerns. To address these issues and promote consensus building among stakeholders (SHs), this study adopts a service design approach and uses Actor-Network Theory (ANT) together with Boundary Objects (BO). The study identifies key factors hindering geothermal development through stakeholder interviews and proposes the co-creation sketch method as a BO to enhance communication and knowledge sharing. Workshops were conducted to test the effectiveness of this method, which showed significant improvements in participants' geothermal knowledge and understanding of real SHs.

This study provides a holistic perspective of service design and ANT to facilitate consensus building in the early stages of geothermal development. It provides theoretical insights and practical tools for understanding and interacting with SHs to promote sustainable renewable energy projects. Although the theory and tools of this research proposal need to be validated by further research, the combined theory and co-creation sketch as BO already brings new research perspectives and more research possibilities to the early stages of renewable energy development.

Author keywords

Actor-Network Theory; Boundary Objects; Service Design; Geothermal Utilization; Co-Creation Sketch Method; SDGs

Introduction

The utilization of renewable energy is essential for SDGs. Geothermal power generation, which produces clean energy without emitting CO2, can be obtained anywhere on Earth and is essential for a sustainable future. Unlike renewable energy sources like solar and wind, geothermal power generation has several advantages, including minimal CO2 emissions, immunity to weather conditions, seasons, and time of day, no resource depletion concerns, and the ability to provide a stable electricity supply. However, despite possessing the world's third-largest geothermal resource potential, Japan's geothermal power generation ranks low, falling beyond the top 10 globally. This can be attributed to a combination of disadvantages associated with geothermal power generation, such as high development costs, potential disruption of natural landscapes, and limited site conditions.

A systemic perspective and reform from the ground up are required to ensure the success of the "Geothermal

Development Acceleration Plan" set by the Japanese government. Conventional approaches have struggled to effectively analyze and resolve the inherent conflict between economic development and environmental conservation. Therefore, a method is needed to comprehensively analyze both the state and process of alignment between initiatives for economic development and environmental conservation. This study adopts a comprehensive perspective of service design and utilizes ANT to analyze the relationships among SHs engaged in environment-oriented initiatives. Moreover, considering the compatibility between BO and ANT, the Co-Creation Sketch Method is considered a BO, facilitating coordination among SHs. This approach allows for the establishment and maintenance of relationships among SHs.

As a result, to address the hindrance in geothermal development characterized by the challenge of achieving sustained consensus-building among SHs, this study leveraged the principles of 'service design' to co-create something 'comprehensive' among SHs, thereby generating new value. During the initial stages of platform construction for consensus formation, involving mutual learning of 'professional knowledge' and 'local knowledge,' and enabling the co-creation of future visions and scenarios, the study obtained preliminary results through theoretical analysis and experimental verification. These findings are believed to have relevance in Japan and promoting geothermal development worldwide, while considering the preservation of natural environments and fostering community integration.

Research Methods and Aims

This study conducted a literature review focusing on 'consensus building in geothermal utilization', 'ANT' and 'BO', leading to insights into their interconnectedness.

Subsequently, semi-structured interviews were conducted with relevant SHs in Japanese geothermal utilization based on the theoretical analysis results, revealing several key factors contributing to the lagging development in geothermal utilization.

The 'co-creation sketch method' was considered a BO facilitating communication and co-learning to address the challenge of facilitating exchanges comprehensively and sustainably between 'professional knowledge' and 'local knowledge' in SHs consensus building. It was integrated into the actor network, following the principles of service design, to construct a prototype platform to promote sustained consensus building and co-learning. The effectiveness of the co-creation sketch within this framework was qualitatively and quantitatively examined through workshops conducted in a laboratory environment.

Literature Review

From the 'Outsider' Theory to ANT

The concept of 'outsider' theory has influenced environmental sociology research, particularly in studies focusing on 'local,' 'on-site,' and 'stakeholder' contexts. It emerges from situations where the conservation and utilization of nature are in opposition. In light of these considerations, there is a need to organize frameworks and methods. Specifically, entities with an 'outsider' perspective, in the sense of being universal, emphasize the process of understanding locality.

In Kito's discourse (Kito,1998), the focus is on 'outsiders' in situations where nature conservation and development projects are in opposition. While the effectiveness of 'outsider' theory as a framework for analyzing the dynamism in local communities can be confirmed, there are methodological challenges. For instance, an evaluation based on analytical perspectives such as mutual recognition, information sharing, value sharing, and interest sharing among different entities would be feasible. One of the simplest methods would be to apply a network analysis approach.

Actor-Network Theory and Boundary Object

ANT, a theory that views interconnected elements, living and non-living, without distinguishing between humans and non-humans, is used in this study. It allows analyzing individual actors' behavior as processes and considering the relationship among various actors in an actor world, focusing on 'translation' functions. Focusing on a specific actor becomes a means for one actor to enroll others (Callon, 1986). Attention is directed towards 'translation' scenarios, actors involved, and underlying values. For instance, an economically driven scenario leading to environmental harm may face critical evaluation.

BO enables cooperation among groups with differing understandings of an object (Star & Grisemer, 1989). This study utilizes ANT and the Co-creation sketch method as BO for geothermal development analysis.

In this study, we conducted an analysis of the key SHs based on real cases, categorized them into two distinct actor worlds, namely local and external stakeholders, and subsequently conducted interviews and experiments targeting these actor worlds (see Figure 1).

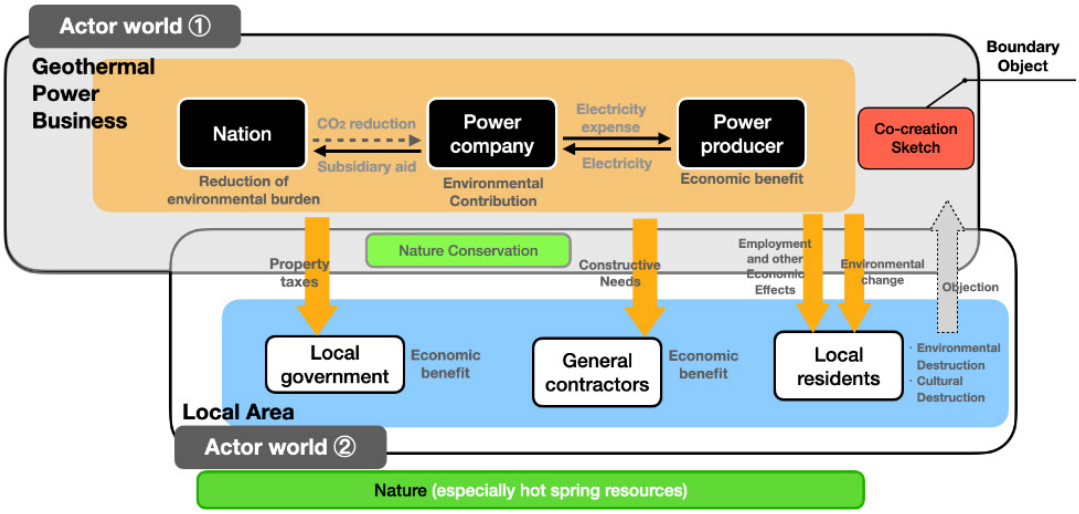

Figure1. Two actor worlds generated by geothermal utilization projects.

Service Design in This Study

From a practical standpoint, service design approaches interdisciplinary work comprehensively and across academic domains. Service design tools are used within the framework of the overall perspective of service design to visualize relationships among various SHs, often referred to as stakeholder mapping. This approach aims to develop visual communication tools among SHs and serves as the first step in facilitating ongoing consensus-building by enabling the exchange of "local knowledge" and "professional knowledge." In this study, a preliminary validation of such a tool was conducted to prepare for future talent acquisition.

Investigation and Experiment

Interviews with Actual Stakeholders

Before embarking on the design of the experimental workshop, the author conducted semi-structured interviews with various key SHs involved in geothermal development. The interviews primarily aimed to inquire about the reasons, based on their experiential knowledge or local circumstances, for the slow progress of geothermal development. Through qualitative analysis, two main common factors were identified:

SHs	Names	Affiliation	Title	SHs	Name	Affiliation	Office (title)
Academic Experts	ohnuma	Hokkaido University	Professor	Public Officials	Yamanaka	Hokkaido Prefectural Government	Environment and Energy Division
	Suzuki	Tohoku University	Associate professor		Shiratsuchi	Akita Prefecture Yuzawa City Hall	Community Vitality Promotion Group
	Baba	Tokyo City University	Professor		Kikuchi	Iwate Prefectural Government	Environmental Life Planning Office,
	Shirai	Musashino University	Professor		Nakamura	Shizukuishi Town Hall, Iwate	Environmental Affairs Office
	Hondo	Yokohama National University	Professor		Hori	Beppu City Public Welfare Department	Living Environment Division
	Sugiura	Keio University	Professor	Hot spring operators	Iwaoka	Ryukyoso Hot Spring	(Representative Director)
	Igarashi	The University of Tokyo	Research Staff		Tsujita	Geothermal Tourism Lab Enma	–
	Fukuda	Sapporo City University	Lecturer	Geothermal Developer	Kajiwara	Geothermal Engineering Co.	General Manager of Business Headquarters

Figure 2. List of interviewed individuals with real geothermal development SH experience

- There is a chronic shortage of human resources, and a lack of a platform or mechanism for the continuous updating of the exchange of knowledge between residents and specialists.
- In the early stages of geothermal development, there was a lack of effective communication between SHs, which made it difficult to reach a consensus. In particular, there was opposition from pro-environment organizations and hot spring practitioners.

Workshop design and its objectives

The author aims to enhance knowledge exchange among SHs and facilitate effective dialogue, contributing to SH consensus. The experiment involved 50 participants, undergraduates, graduates, and professionals in Tokyo, split into 10-member groups and conducted five times.

Initially, participants received geothermal knowledge and underwent sketch-based knowledge assessments (see Figure 3a). A persuasive role-play game named Persuasion Game developed by Prof. Sugiura (Sugiura,2003) was played (see Figure 3b), using sketches and co-creation sketch method developed by Fukuda for facilitating communication and creativity (Fukuda, 2020). The game-winner is the one who had the highest persuasion rate, but the goal was understanding SH behaviors and motivations, and promoting professional and local knowledge for future talent development. The experimental workshop in the study served as an early lab experiment for communication enhancement between simulated SHs.

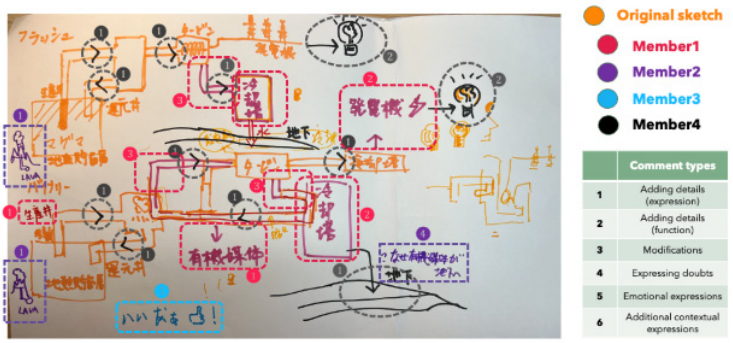



Figure 3.

(a) Geothermal power principal test diagram. (b) Participants preparing to sketch for the persuasion game.

A comparative test of the co-creation sketch method as a BO revealed a significant increase in participants' grasp of geothermal-related knowledge. The success rate of persuasion was also significantly improved when it was used as a medium of explanation to persuade others in the persuasion game.

Conclusion and Discussion

This study focuses on geothermal energy as a use context, highlighting the representative issues that require careful attention and handling during the early stages of exploration and utilization of renewable energy while ensuring environmental protection. (1) Facilitating mutual understanding and creating a co-learning environment. (2) Enhancing effective communication between SHs by using co-creation sketches as tools to facilitate communication and persuasion among SHs with different backgrounds. (3) At the methodological level, introducing co-creation sketches as boundary objects (BO) into Actor Networks composed of various SHs, enables the analysis of system states and processes.

Based on the above, the author introduces a holistic perspective of Service Design (even its tools) into the negotiation processes of early-stage SHs. This enriches the theoretical framework that promotes value network analysis. Therefore, this study provides theoretical improvements and effective tools for understanding and engaging with SHs during the early stages, potentially addressing issues related to uneven distribution of interests or conflicting ideologies that can lead to later project difficulties or failures. However, this research offers only a preliminary framework, and further extensive work is required for theoretical enrichment and long-term experimental validation.

Furthermore, this research aligns with the overarching goal of achieving the Sustainable Development Goals (SDGs) and emphasizes the consideration of ecological aspects in designing renewable energy projects, fostering themes of mutual development.

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Gamification and Serious Games: Technological and Social Transformation through Video Game Interactions

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Abstract

The relevance of video game’ s industry both for its market scale, social impact and cultural role is testified by industry reports, scientific research works, strategic government fundings and policies supporting the use of video games as drivers for cultural and social innovation. However, it emerges the need for a more profound connection between game design research and practices, cultural critique, and reflective design research. Observing video games as an expression of the contemporary commodity form, this contribution aims to discuss designers’ contribution in shaping the changing technocultural sphere enforcing the cybernetic idea of mutual influence between social and technological systems. This contribution is part of an ongoing research on how video games represent a space for designer’ s intervention and a tool for speculative enquiry in design-driven innovation processes.

Author keywords

Interaction Design; Gamification; Serious Games; Technological Determinism; Social Construction of Technology

Introduction

The relevance of video game’ s industry both for its market scale, social impact and cultural role is testified not only by industry reports, but also by the growing number of dedicated scientific research, strategic government fundings and national policies supporting the use of video games as drivers for cultural and social innovation. Reports published by national associations and research studies describe the economic impact and the diffusion of the industry around the globe describing a cartography dominated by established clusters in North America (Pilon & Tremblay, 2013), in the United Kingdom and Asia. Smaller regional clusters, or even sparse companies, are emerging even far from the main production hubs (Wolf, 2015) testifying the growth and the evolution of this productive sector. Institutions and national governments are both directly supporting the industry, for example with financial aids and tax breaks, and promoting the adoption of game-based practices to address issues outside of the entertainment sector (Ruffino, 2018a).

The “material turn” of game studies (Apperley & Jayemane, 2017) testifies the branching of the research on video games into a wider network of knowledge and disciplines with specific reference in the area of social sciences. In design literature, however, not much attention is dedicated to video games as a future space for designer’ s intervention in the changing production-consumption context triggered and shaped by digital technology innovations. It emerges the need for a more profound connection between game design research and practices, cultural critique, and reflective design research (Malazita & O’ Donnell, 2023) to bridge the existing gap.

This contribution is part of an ongoing research on how video games have come to represent a space of intervention for designers and an instrument for speculative enquiry and anticipation in design-driven innovation processes. Video games represent a cultural form in which the characteristics of the transformative economy converge (Celaschi & Casoni, 2020; Pine II & Gilmore, 2013). Moreover, they represent the product of a complex industrial systems that merges physical and digital spaces. Here, two specific forms of game materialization - gamification and serious games - are discussed in relation to their role in the changing contemporary socio-economic context. The outcome serves as a preliminary framing for the development of the ongoing research.

Cybernetic interactions through Gamification and Serious Games

The increase of interest in the video game industry and its technologies must be contextualized within the economic scale of the video game market. It is estimated that in 2022 over 3 billion people play video games in a market which size is estimated to worth almost $200 billion (Newzoo, 2022). When considering gaming platforms, over half of the total revenues are estimated to be coming from mobile games. This market segmentation appears to be of particular interest since the mobile market, specifically that of games played on smartphones, has a significant shorter history compared to that of computer and console games. The development of the mobile game market, together with the evolution of new economic model of distribution and consumption had a significant boost in late 2007 with the launch of the iPhone and the opening of the App Store. Several studies have analyzed the evolution of business models in the video game industry (Lantano et al., 2022) and the evolving dynamics of virtual economies (Lehdonvirta & Castronova, 2014).

Observing such transformations in the video game industry from a design point of view allow to understand how the models and means of value production, consumption and exchange are transforming in contemporary technocultural society. The game market is a dynamic exchange field which materialize the experimental economy in which non-specialists are active actors of a "mainstream method for maximizing innovation" (Jagoda, 2020, p. 97) that has been made possible by technological transformation. Digital interfaces and networked digital systems have redefined the way users experience, navigate and interact with physical and digital spaces. In this context, video games open what has been defined as a "possibility space" (Squire, 2008) that enable the exploration of alternative ideas and behaviors. Game technologies, however, is often used to define experimental situation of which users are not always aware (Jagoda, 2020, p. 15). In the experimental economy, the production and consumption paradigms are no longer the ones that characterize the traditional industrial and post-industrial economy. In fact, in the experimental economy, commodities emerge from an iterative experimental process of production and re-production (Thomke, 2003; Thrift, 2008) rather than being a direct output of a linear process of problem solution. In designer' sterms, the definition of the commodity form is a process of continuous innovation determined by socio-cultural, economic, environmental and technological variables (Celaschi, 2000, 2008). If the commodity form is an expression of the context, on the other way around, designer should consider how the commodity form can influence users' agency inside the experimental economy.

In the opening chapter of "Game Cultures. Computer Games as New Media" (Dovey & Kennedy, 2006), Jon Dovey and Hele W. Kennedy explore two opposite positions: the first one supports the idea that society shapes technological development (Williams, 1974/2003), the second one is that technology influence society (McLuhan, 1964/2015). As Dovey and Kennedy point out, new-media studies address this issue through the idea that the social and the technological systems, rather than being one dependent on the other, are actually intertwined through feedback loops like in cybernetic systems. The concept of a cybernetic loop of influences

between technology and society invites to reflect on the designers' contribution in the changing domain of human-computer interaction and at the same time, to analyze how designers' practice adapts and evolves under the influence of the technological environment.

In the next two sections, the perspective of technology determinism and social construction of technology (SCOT) will be explored through the analysis of gamification and serious games as game forms that materialize instances of the two positions through game mechanics and technologies. The intent is not to argue on a philosophical level the conceptual adherence of the two practices to one vision or the other. As it will be discussed, within gamification and serious games it's possible to draw examples that can be interpreted either as expression of technological determinism or as SCOT. At the same time, no general positive or negative connotation are associated to the two perspectives, although ethical implication will emerge as part of the discussion. The scope of this argument is to provide examples that highlight designers' contribution in shaping the changing interaction happening in human-computer-interaction (HCI) through video games enforcing the cybernetic idea of mutual influence between the social and technological sphere.

Gamification

The use of the term Gamification in the field of technology and human-machine interaction started spreading in 2008. One of the most referenced definition is that gamification is "the use of game design elements in non-game context" (Deterding et al., 2011). The game design elements are those used in most analogue and digital games and articulates along a growing scale of abstraction: from interfaces elements (badge and leaderboard) to game mechanics and dynamics. These components are applied in non-ludic context in order to achieve affective and motivational outcomes, behavioral outcomes, and (cognitive) learning outcomes (Krath et al., 2021). Specifically, as reported by Krath et al. (2021) studies on behavioral outcomes highlight the positive impact that gamification has when adopted for increasing engagement and improving performances. Gamification has become a popular term across many industries, and it has been proposed as a possible solution for solving even complex problems (McGonigal, 2011). However, criticisms have been made to gamification as it suggest a methodology that proposes easy to apply solution to complex issues (Bogost, 2014). Moreover, gamification has been criticized since its applications can leverage on human's cognitive and responsive mechanism not only to persuade and nudge towards positive or health attitudes, but also to exploit and influence users to corporation's profit or social control (Hon, 2022). It has been argued that, more than a design approach, gamification describes the form that contemporary economic and social technoculture is taking. Jagoda (2020) observes how Debord described spectacle as "a social relationship between people that is mediated by images" (Debord, 1967/2008) that broadcasted cultural and social expression of the late 1960s. Seemingly, gamification materializes contemporary economic and socio-cultural dynamics (Jagoda, 2020, p. 31). Compared to spectacle, gamification does so with the structural difference of game and network technologies. In this sense, Jagoda interprets gamification, not only as a design strategy, but as the manifestation of the contemporary economic, social and cultural environment that constitute a "formal and cultural counterpart to neoliberalism" (Jagoda, 2020, p. 63). By translating neoliberal values in mechanics of play, gamification emerges as a form of social determinism of technology, but, in the same time, it acts as mean of technological determinism of society, by leveraging on forms of nonconscious manipulation.

One of the most common applications of gamification is in sports and physical activity tracking. Not only specialized equipment for advanced sports practitioner, but also consumer gadget with tracking features saw a growing diffusion in the electronic market. The ease of use of tracking application facilitates the collection of personal data relatively to general or specific activity. Such practice is generally defined as "lifelogging"

and consists in tracking information relevant for the user in a digital diary. Active and passive data collection generate “lively data” which are big quantities of information describing a wide variety of aspects of human life (Lupton, 2016). With multiple sensors in our devices continuously tracking our physiological data, every aspect of our life can be measured and “as long as it ca be measured, it can be gamified and improved” (Hon, 2022, p.12). In the constant chase for personal improvement, of maximized performances, of the “best version of oneself”, the quantification through personal analytics enables progress tracking, and gamification acts as a motivational nudge to keep pursuing goals. When motivation and commitment are not enough, a solution proposed by a product is generally available for purchase. In this sense, it could be argued that the quantified self is a product of technological determinism that uses gamification to encourage behavioral change. At the same time, users’ data are collected and used to suggest custom products and services presented as something that can boost the charts and the leaderboards of personal analytics. Over time, gathered personal data accumulate and stratify. Users will eventually stop using tracking device - it has been estimated that abandonment rate for fitness tracker is 30% (Gartner, 2016). Gamification (or the lack of it) fails to transform the initial engagement with the technology in something different. The distance between the user and the technology does not change as the two parts do not influence each other (Ruffino, 2018b). One of the causes of tracking device abandonment is that they lack the capability to adapt to unforeseen changes and circumstances in users’ lives (Clawsonet al., 2015). The growing implementation of Artificial Intelligence technologies that are capable to predict, anticipate and adapt to users’ needs and behaviors, could be considered a design strategy to activate a cybernetic connection between human and non-human agents. In context, the contribution of designers is to build meaningful interaction through user’s data and to develop frameworks for technology adoption capable to adapt and interpret changes in users’ lives and in the environment they live in. Together with self-tracking technologies improvement, the development of feedback loop across different physiological and psychological component is an area in which user experience design can significantly contribute (Chianellaetal., 2021). The social dimension of data is a component on which gamification can leverage to build strong social relationships among users and between humans and machines.

Serious and Applied Games

Serious games are games designed with non-entertainment purposes. The original definition is attributed to Clark C. Abt (Abt, 1970) and has been widely adopted, reformulated and extended in literature (Laamarti et al., 2014; Michael & Chen, 2006; Susi et al., 2007). Related definition can be found in literature (games with a purpose, education games, game-based learning) that stress specific connotation and use context. Ian Bogost’s definition of Persuasive games (2007) is built upon the representation system based on rules and interactions typical of video games for conveying a form of nonverbal persuasion that he calls "procedural rhetoric" (Bogost, 2007). Applied games is a term that has been proposed as a comprehensive definition for facilitating cross-disciplinary research and design innovation (Schmidtet al., 2015). In this contribution, the terms serious games and applied games will be used interchangeably since the discussion revolves around general approaches and it is geared to design applications.

Serious games have been developed for application in multiple areas with a particular focus on training and education. In the field of medical education and surgical training, for example, serious games are considered potentially valuable tools for their flexibility, operational cost and accessibility, even if more standardized assessment are generally required for full implementation (Graafland et al., 2012; Wang et al., 2016). With the development of game technology, a growing number of applications are exploring the field of cultural heritage

(Anderson et al., 2010; Mortara et al., 2014). Serious game have also been developed for training in other critical condition, such as fire service training (Williams-Bell et al., 2015) and aviation. Military and defense operations are, of course, among these critical scenarios. One video game that is frequently reported as an effective example (Laamarti et al., 2014) of serious game is America’s Army (U.S. Army, 2002). America’s Army is a free-to-play first-person shooter game developed and first published in 2002 by the U.S. Army to encourage recruitment among players. The support was discontinued in 2022. The “serious” aspect of the game, rather that referring to the actual dynamics of real military operations, that are carefully represented and simulated, is attributable to the enrolment scope of the games. Following this interpretation, America’s Army appears to be an expression of technological determinism (as it should push users to join the military forces) rather than a technological tool materializing a social interest. However, the latter is equally arguable since a society that builds its defense strategy on a strong and technologically advanced military capability needs to construct such digital infrastructure: a technology that leverages on strategies of persuasion and social influence. America’s Army represents the cybernetic loop between technological determinism and social construction of technology. It shows both a form of technology determinism in its capability to persuade individuals in joining the army, and an expression of socially constructed technology since it is the materialization of a technological tool giving answer to a social need.

The ethical implications of the designer’s role are deeply connected with technological innovations. The problem is not only related to military applications, but it also extends to the social impact of the digitalization. Serious games and video games provoke emotional responses in users not only recurring to narrative representation of the storytelling which are typical also of other media, such as movies, but especially through actions and choices deliberately made by the user. In fact, the peculiarity of video games is that they are an action-based media (Galloway, 2006/2022). The actions of the operator (the gamer) and those of the machine are what activate the material change, and therefore the evolution, of the system (Galloway, 2006/2022). Through design decisions and techniques, games can evoke both positive and negative emotions into players (Isbister, 2016). For example, in games like Paper, Please (Pope, 2013), players are confronted with ethical decision within an altered moral and social systems. The player is asked to allow or deny access to the fictional country of Astorzska to migrants on the bases of their documents and other available information. The player’s decisions will determine who will be allowed to enter the country or not with the risk of letting terrorists with falsified passports in and rejecting innocent people who don’t have the necessary documentation. As it has been pointed out, the possibility of exploring different moral behaviors through deliberate ethical choices invites to develop a critical reflection on social values (Sicart, 2019). This exploration space of possibility is determined by game designers who structure a system in which players action acquire meaning (Salen & Zimmerman, 2004). In the same way, interaction designers define a space of possibility when designing human-machine interactions that intertwine physical and digital spaces with real and virtual experiences. Also, in designing game interfaces and virtual artifacts in games, designer shape the limits of interaction and player’s agency inside the virtual world. The interface of Paper, Please defines the limits of the user’s ability to intervein in the system. In this case, it translates the complex moral dilemmas raised by the narrative into a straightforward basic game mechanic: allow or deny access. At the same time, it provides worldbuilding elements that materialize the frustration of an over-bureaucratized political system with the use of a basic interface that clutters with documents, notes and manuals. As the previous example, it is possible to observe the cybernetic loop between SOCT and technological determinism materialized by the designed interface of the game.

Conclusion

As new technologies are developed and introduced to the market and in design practice, video games are changing the designers role of "dialectically mediate between needs and objects, production and consumptions" (Maldonado, 1991/2008, p.14, Author's translation). The convergence of multidisciplinary skills and professionalism that characterizes the video game industry makes it an important bearer of innovation and change. Moreover, with the intersection of many languages and models of human-computer interaction and the integration of artificial intelligence-based technologies it emerges the need to develop common methodologies and practices between the video game industry and other productive sectors. This contribution used the concept of cybernetic systems to frame the role of gamification, serious games, and video games in general in the ever-changing contemporary society characterized by technoculture. Future development of this ongoing research will explore how video games are reframing the space of designer intervention in the redefinition of alternative models of value production and exchange and how they can be used as tools for speculative enquiry and design research.

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Co-Design Sessions at Revigrés: Workshop 1.0 as a Catalyst for Design-Led Innovation and Transformative Culture

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Abstract

This article presents the findings from Workshop 1.0 of the Co-Design Sessions at Revigrés, part of an ongoing Ph.D. investigation. The Co-Design Sessions explore the potential strategic role of a Chief Design Officer (CDO) in driving innovation and fostering a design-oriented culture at Revigrés, a leading Portuguese ceramic tiles manufacturer. This article focuses on the first workshop of a series of four, engaging stakeholders from industry, retail, and research fields.

The workshop, held in January 2023, aimed to test assumptions regarding the CDO's strategic responsibility for evolving the product range, educating stakeholders about design value, improving creativity through open communication with multidisciplinary participants, and leveraging design principles and methodologies in a corporate environment. Designed around "kinetic tiles" and "smart tiles" themes, Workshop 1.0 envisioned innovative multi and plural-function ceramic products and experiences to position Revigrés as an industry leader. Facilitation work showcased how CDOs foster a design-oriented culture and inspire participants through tailored methodologies.

The workshop's relation to the conference theme of "Narratives of Love" is evident through empathy, collaboration, and envisioning products that enhance lives, aligning with the conference's vision of love as a driving force for cultural and societal positive change and innovation.

This study highlights the significance of multidisciplinary collaboration in driving innovation, while the iterative nature of design thinking enabled continuous improvement. Facilitation effectively balanced open and closed briefing paradoxes, nurturing creative freedom while offering a sense of direction. Implications for Revigrés include fostering creativity, identifying diverse perspectives, and unleashing the power of design thinking. The practical results of this study yielded four project proposals to be developed in the forthcoming workshops.

Workshop 1.0 exemplifies design thinking's role in shaping a design-oriented culture, guided by a CDO, to drive innovation at Revigrés. The multidisciplinary collaboration and interactive nature of the workshop underscore the value of design thinking as a common practice employed by CDOs. Furthermore, the workshop showcased the potential strategic role of a CDO, mediating and bridging the gap between design and business objectives, and propelling Revigrés towards a design-led future. Moreover, the workshop's alignment with the conference's theme highlights the exploration of empathy, innovative solutions, and a transformative mindset as key elements in fostering a culture of love-driven innovation at Revigrés. As the company continues its co-design journey, Workshop 1.0 serves as a visionary stepping stone, offering insights that will propel Revigrés into a

future of boundless innovation and design excellence.

Author keywords
Co-Design Sessions; Chief Design Officer (CDO); Innovation; Design-Oriented Culture; Empathy.

Introduction

Building Design-Led Innovation at Revigrés: A Journey of Co-Creation

This article fits into the scope of ongoing Ph.D. research led by the research team, aiming to explore and affirm the role of a Chief Design Officer (CDO) in a corporate environment having Revigrés as a platform for strategic experimentation.

In the prototyping length of this Ph.D. research, a series of four co-creation design sessions were meticulously organized by the research team, engaging various stakeholders from industry, retail, and research fields. Under the format of workshops, they were designed with a focus on innovative product development, and leveraged design principles, techniques, and methodologies to explore two distinct themes within the context of Revigrés, a prominent Portuguese manufacturer of ceramic tiles. The overarching goal of these sessions was to experiment with how to drive design-led innovation and to show the potential strategic role of a CDO within the company. Held between January and May 2023, in three different locations, these workshops aimed to test key assumptions, foster a design-oriented culture, and develop groundbreaking concepts that could shape Revigrés' future product range.

Since these activities are part of a study in which the goal is to assert the CDO role in businesses, the research team approached the workshops with specific assumptions to validate. Previous studies and activities such as case studies and interviews have shown some practices applied in the design function of companies like Philips, 3M, PepsiCo, and J&J, led by CDOs. The inputs gathered in these studies and the literature review prompted several research questions and hypotheses that have since been tested by the research team.

The first assumption aimed to explore how the CDO's strategic responsibility for evolving the product range could lead to more creative solutions and broaden the company's offerings. The second assumption examined whether the CDO's role in educating stakeholders about the value of design would enhance their understanding of the design function and its activities. The third assumption sought to determine if open communication with multidisciplinary participants in the design process could improve creativity and lead to more innovative concept generation. Finally, a fourth assumption delved into the challenge of embedding and scaling up a design culture within the organizational context, making it a key goal for the CDO.

Furthermore, the Co-Design Sessions emphasized two central themes devised by the research team. The first theme focused on the development of kinetic energy ceramic tiles, exploring how this technology could enhance the product range and boost the company's innovative performance. The second theme, centered around "smart tiles," sought to envision new products, services, and experiences integrated into intelligent ceramic tiles that optimize spaces and fulfill multiple functions. These themes emerged from the research team's design vision to develop multi and plural-function products for Revigrés, as a catalyst of innovation aligned with the strategic guidelines defined to implement a design function within the business environment.

The overarching goals of this Co-Design Sessions initiative were threefold. Firstly, the research team aimed to build design-oriented innovation processes for Revigrés, ensuring that design played a central role in driving innovation within the company. Secondly, the team sought to explore the implementation of design culture within Revigrés, fostering a mindset of creativity, collaboration, and user-centered thinking. Thirdly, the initiative aimed to develop a range of concepts for innovative multi and plurifunctional products that would position

Revigrés as a leading player in the market.

Specifically, the set of workshops aimed to demonstrate the importance of collaboration and multidisciplinary approaches in the creative process. By bringing together stakeholders from various backgrounds, the research team intended to showcase the transformative impact of incorporating design thinking methodologies into project and corporate development. Through a co-creative design-driven process, the workshops were dedicated to developing the concept of “kinetic tiles” and "smart tiles." By involving stakeholders with diverse expertise, the sessions aimed to capitalize on a wide range of know-how and perspectives.

The research team anticipated gaining valuable insights into the impact of collaboration, multidisciplinary practices, and design thinking on product innovation at Revigrés. Observations and feedback gathered during the sessions were expected to provide significant contributions to the understanding of creative processes and design culture. Ultimately, the workshops were envisioned to yield two or more distinct product concepts, arising from collaborative processes with various stakeholders. These concepts were intended to form the foundation for potential final products, showcasing the CDO's contributions through both a contributory structure, guided by designers and specialists, and a collaborative structure, driven by all stakeholders.

The workshops aimed to extract insights on effective approaches to both restrictive and non-restrictive briefings by observing participants' difficulties, needs, and aspirations during the co-creation journey. The goal was that these workshops would serve as a relevant contribution, demonstrating how design dynamics integrated with collaborative and multidisciplinary methodologies could amplify the creative process for innovation. Additionally, the research team intended these sessions to be a vehicle for the application of new design-led innovation processes within the organizational culture at Revigrés, fostering a transformative design-thinking culture that permeates the entire company.

Exploring the Narratives of Love: Workshop 1.0

This article focuses only on the first workshop in the set of four Co-Design Sessions and represents a crucial early stage in the design process, where exploration and divergent thinking are at the forefront. Held at Revigrés on the 31st of January of 2023, this kick-off workshop aimed to inspire and provide a solid framework for investigating the challenges at hand. The primary goal was to define intentions, contexts, and the pertinence of proposed concepts through a collaborative and multidisciplinary approach.

With a diverse audience comprising individuals from different contexts, ages, and genders, the workshop embraced inclusivity and collective creativity. The methodology of the Co-Design Sessions was introduced, outlining the scope of development, objectives, and anticipated results. Participants were welcomed into a world of design-thinking methodologies, empowering them to explore innovative solutions for the two presented themes.

As a starting point for the Co-Design Sessions, this workshop stimulated participants to exponentiate creative confidence mindsets, sparking inspiration and igniting a passion for tackling challenges. Through collaborative discussions and a wealth of perspectives, four proposals emerged, two for each of the themes: “kinetic tiles” and "smart tiles." This dynamic and engaging workshop set the stage for the subsequent sessions, promising a transformative journey of creativity and innovation at Revigrés.

This workshop seamlessly aligns with the conference's focus on ideology and ideality, exploring the theme of "Love" as a driving force in human civilization. Just as love permeates every aspect of human existence, the initiative described in this article embraced the multifaceted concept of design thinking and user-centricity to delve into innovative product development for Revigrés.

Within the realm of ideology, the initiative described parallels the conference's goal of exploring loving multiple

dimensions. By gathering a multidisciplinary and diverse audience, the workshop fostered discussions on a symbiosis between humans and nature, the compatibility of heterogeneous perspectives, and the stability of social structures. These themes echo the design-oriented innovation processes pursued in the Co-Design Sessions. Through collaborative efforts, the participants sought to create concepts that reflect cross-cultural characteristics, bridging differences and integrating elements of different cultures.

The topics to be discussed at the conference, including ecological technology, sustainable design, material culture, social design, and civic education, intersect with the design principles and methodologies applied in this session. Workshop 1.0, with its exploration of “kinetic tiles” and "smart tiles", embodies the conference's quest for cross-cultural wisdom in shaping the future directions and methodologies of design. Furthermore, the exploration of empathy, an essential aspect of design thinking methodologies, directly relates to Workshop 1.0's collaborative and multidisciplinary approach. The research team, akin to the conference's goals, aimed to foster a design-oriented culture and nurture a transformative design-thinking mindset within Revigrés.

Research Methodology

This study explores the experimentation of a process of building design-led innovation at Revigrés through a journey of co-design and multidisciplinary workshops, according to the following research methodology.

Participant Selection Process and Workshop Promotion

The co-design sessions were promoted both within the university where the doctoral research undergoes and within Revigrés. The workshop promotion included a detailed description of the objectives of the co-design sessions, the specific objectives of each workshop, the agenda, duration, location, and facilitators' descriptions.

For the university participants, enrolment was open to students, teachers, and researchers from any course or degree. The workshop had a limited capacity of 15 seats and the selection process was based on a first-come-first-served basis. The aim was to encourage a diverse range of perspectives and expertise among the university participants.

For Revigrés’ employees and stakeholders, the remaining half of the workshop seats were reserved. The selection process for this group was based on nominations and recommendations from the company's management to ensure representation from different departments and roles within the organization.

Data Collection Methods

The research methodology adopted a mixed-methods approach, integrating qualitative and quantitative data collection methods to gather comprehensive data on the impact of design thinking and the role of CDOs in enhancing the innovation process within the company. The study involved four co-design sessions, each focusing on different phases of the design thinking process inspiration, ideation, prototyping, and validation. Data was collected through participant observation, feedback surveys, and interviews.

The research utilized a sequential exploratory strategy, which involved an initial qualitative phase (participant observation, document analyses, and interviews) followed by a quantitative phase (feedback surveys) to corroborate the qualitative findings. This approach allowed for a holistic understanding of the co-creation process and the participants' perspectives. The main data collection methods were:

— ☒ Participant Observation: participant observation was conducted during the co-design sessions to capture real-time interactions, collaboration, and problem-solving processes among the participants. This method allowed the researchers to immerse themselves in the co-creation environment,

facilitating and gaining deep insights into the dynamics of the workshops, and understanding the participants' experiences and interactions.

- Interviews: Semi-structured interviews were conducted with some participants, including Revigrés' employees, students, researchers, and staff, to gather in-depth insights into their perceptions, experiences, and learnings from the co-design sessions. These interviews explored participants' attitudes toward design thinking and the impact of the workshops on their creative thinking.
- Feedback surveys: post-workshop surveys were administered to assess participants' satisfaction with the co-design sessions, the effectiveness of the design thinking methodologies, and their perceptions of the value of design-led innovation at Revigrés. Questions like "What worked well?", "What could be improved", "Ideas?" and "Questions?" were set.
- Document Analysis: Documentation of the co-design sessions, including canvases, brainstorming results, and prototype designs, was analyzed to identify themes, patterns, and innovative concepts that emerged from the workshops. Document analysis provided valuable qualitative data that complemented the interview and survey findings.

Qualitative data from participant observations, interviews, and document analysis were analyzed. The data were transcribed, coded, and categorized into themes and patterns, capturing participants' experiences, challenges, and creative outputs during the co-design sessions. The quantitative data from feedback surveys were analyzed using descriptive statistics, providing insights into participants' overall satisfaction and perceptions of design thinking methodologies.

Triangulation was employed to ensure the validity and reliability of the research findings. Data triangulation involved cross-verifying information from multiple data sources, including participant observation, interviews, surveys, and document analysis. The convergence of findings from different data collection methods added credibility to the research outcomes and was converted into infographics to be communicated to the company and design community.

Ethical Considerations

Ethical considerations were given due importance throughout the research process. Informed consent was obtained from all participants before data collection. Anonymity and confidentiality were ensured to protect participants' privacy and identities. The study complied with the ethical guidelines outlined by the company ethics board.

Limitations

The research faced some limitations, including the relatively small sample size of participants, which may limit the generalizability of findings. Additionally, the four-hour duration of each co-design session may have constrained the depth of insights that could be obtained. Nevertheless, efforts were made to mitigate these limitations and draw meaningful conclusions from the available data. Nevertheless, each workshop data analysis helped to improve the next one, contributing to a continuous improvement in the facilitation procedure and the session structuring.

The mixed-methods approach allowed for a comprehensive understanding of the impact of design thinking on product innovation within the company. The findings shed light on the value of design-led practices through methodological experimentation, the role of CDOs experienced in the facilitation role, and the transformative potential of co-design workshops in the mindsets and ways of working of the participants. This research

contributes to the growing body of literature on design thinking in corporate environments and offers valuable implications for companies seeking to foster innovation and creativity in their product development processes.

The Value of Design Thinking for Companies: The CDO Perspective

Design thinking has become a common and transformative practice exploited by CDOs to drive innovation, foster creativity, and create user-centric solutions within companies. As strategic leaders responsible for the design function, CDOs employ design thinking methodologies to address complex challenges, enhance collaboration, and cultivate a culture of innovation (Pinheiro & Franqueira, 2021; Ignatius, 2015).

At the core of design thinking lies a human-centered approach, focusing on understanding the needs and desires of end-users. CDOs spur their design team to use methods such as empathy mapping and user interviews to gain deep insights into users' experiences and pain points (Porcini, 2023). By placing the user at the center of the design process, companies can develop products and services that address real-world challenges, enhancing customer satisfaction and loyalty. Moreover, Brown and Katz (2019) emphasize the importance of empathy in design thinking, which aligns with CDOs' efforts to place stakeholders at the center of decision-making. Research by Liedtka and Ogilvie (2011) supports the effectiveness of human-centered design in generating successful solutions that meet user needs, while Lafley and Martin (2013) reveal the importance of relating and communicating with stakeholders in design strategy.

CDOs embrace an iterative and experimental approach to problem-solving. They encourage teams to prototype and test solutions rapidly, seeking feedback to refine and improve designs. Different authors (Mootee, 2013; Lewrick et al., 2018) underline the significance of prototyping as a means of learning and exploration, while research by Cross (2011), Dorst (2015), and Martin (2009, 2022) support the iterative nature of design thinking in achieving effective solutions for businesses. CDOs understand that early prototypes help identify flaws and opportunities for enhancement, minimize risks and resource wastage, and support a mindset of experimentation (Quint et al., 2022).

Chief Design Officers cultivate a culture of creativity and innovation within their organizations, by inspiring and encouraging the design team and other functions to think creatively, explore new possibilities, and challenge the status quo. Kelley & Kelley (2014) concept of "creative confidence" is reflected in CDOs' efforts to unleash the creative potential of their teams. Research by Hennessey and Amabile (2010) further supports the positive impact of a creative work environment on employees' intrinsic motivation and innovative outputs.

On the other hand, CDOs need to embrace ambiguity and uncertainty, recognizing that design thinking is an iterative and non-linear process. They encourage teams to adopt a design thinking mindset, characterized by curiosity, openness to failure, and a bias towards action (Porcini, 2023). This approach is aligned with the advocacy for embracing uncertainty and viewing failures as learning opportunities. CDOs understand that a design thinking mindset fosters resilience and adaptability in the face of challenges (Brown & Katz, 2019).

Design thinking is a continuous learning process, and CDOs actively promote a culture of learning and adaptation. They encourage teams to gather feedback from users and stakeholders, using insights to refine and optimize solutions (Quint et al., 2022). CDOs implement post-project evaluations to capture lessons learned and apply them to future initiatives. Deserti and Rizzo (2014), on innovation culture, highlight the importance of continuous learning in driving organizational performance, supporting CDOs' commitment to learning and improvement.

To scale up design in companies, CDOs actively promote cross-functional collaboration to harness diverse perspectives and expertise. Cross's (1982, 2011) research highlights the value of multidisciplinary collaboration in design, which resonates with CDOs' aim to create holistic and innovative solutions. For this reason, this

article explores how design thinking workshops and co-creation sessions involving stakeholders from different functions may be a valuable initiative to foster a collaborative environment where individuals from background work together towards a shared goal.

Overall, CDOs leverage design thinking as a common practice to foster innovation, collaboration, and user-centricity within their organizations. By employing a human-centered approach, embracing cross-functional collaboration, and cultivating a culture of creativity, CDOs drive transformative solutions and position their companies at the forefront of innovation. The iterative and experimental nature of design thinking enables CDOs to navigate uncertainty and adapt to dynamic market demands. Through a design thinking mindset and continuous learning, CDOs promote a culture of innovation that empowers their organizations to thrive in the face of evolving challenges and opportunities. As research supports the effectiveness of design thinking in driving successful outcomes, CDOs' strategic adoption of these methodologies proves crucial in shaping a successful and innovative future for their companies.

Workshop 1.0: Inspiring Innovation at Revigrés

Workshop 1.0 of the Co-Design Sessions initiative aimed to set the stage for a transformative journey of innovation at Revigrés by achieving inspiration, defining intentions, relevance, and contexts. The overarching goal was to lay the foundation for subsequent sessions, promoting collaborative creativity, and driving design-led innovation. With a four-hour duration, the workshop engaged participants in a process of idea generation, concept development, and scenario definition.

Divided into four groups with five to seven people each, attendees were driven through a collaborative process, to foster a design-oriented culture, nurturing creativity, and promoting networking opportunities among students, researchers, and Revigrés employees. With an emphasis on empathy and inclusivity, Workshop 1.0 set out to validate some of the assumptions regarding the role of a CDO in driving innovative product development and cultivating a design mindset within the company.

The Attendees

Workshop 1.0 brought together a diverse group of 25 participants, including 14 students and researchers, and 11 Revigrés' employees. To foster multidisciplinary collaboration and embrace cross-cultural wisdom, individuals from different internal functions were invited, such as representatives from R&D, marketing, commercial, HR, environment, quality, production, logistics, top management, cleaning, and canteen staff.

Participants were distributed in pre-constructed groups, to ensure that for each group there was an equitable cross-section between Revigrés employees and members of the educational institution. Therefore, a wide range of knowledge and thinking was guaranteed amongst the 25 participants, from 14 different areas of knowledge, spread across the four groups that made up workshop 1.0. The two challenges were also distributed by the team, resulting in Team A and C with the Smart Solutions challenge and Team B and D with the Kinetic Tiles challenge. In this workshop, four different project proposals were achieved.

The research team identified the specific needs and aspirations of the participants during the session to ensure a fruitful and enriching experience. The clarity in communicating the workshop's objectives was crucial to fostering engagement and active participation. Moments that provided networking opportunities were sought, promoting interactions between attendees from different backgrounds. Energizing moments were incorporated to maintain enthusiasm and momentum throughout the session, while also providing relaxation and minimizing evaluation moments to create a safe and supportive environment for Revigrés employees.

Revigrés management saw the workshop as a platform for nurturing partnerships, networking, and potential

impacts on the company.

Program and methodologies

The workshop commenced with an engaging introduction, wherein facilitators (research team) set the stage for the Co-Design Sessions, providing participants with a clear understanding of the workshop's scope and objectives. A brief definition of design thinking methodologies and the design mindset laid the foundation for creative exploration. Additionally, the workshop's themes, fundamental rules, program, and expected results were outlined, setting the tone for an inspiring and collaborative experience.

A 15-minute ice-breaking activity followed, which served as an effective warm-up to familiarize participants with one another. Participants engaged in a creative and fun ice-breaker, where they passed around a roll of toilet paper and were asked to take out as much as needed. Then, in line with the number of sheets of paper withdrawn, they revealed truths about themselves, introducing their names and areas of training/professional activity. This activity facilitated networking and promoted a friendly and open atmosphere. After this action, the participants were organized into pre-constructed groups and directed to their respective worktables, each assigned a specific challenge related to the workshop's themes.

To enhance problem understanding and generate ideas, the participants engaged in “Reverse Brainstorming”. This technique encouraged teams to think about potential obstacles to success rather than diving into immediate solutions. By identifying and questioning challenges, teams initiated the idea-generation process. An energizer activity arose, in the form of dance to stimulate creativity, collaboration, and group dynamics. This activity served as a refreshing break, invigorating participants for further engagement.

Following idea generation, participants refined and stated two concepts. Brainstorming sessions were conducted to explore and develop structured ideas for the two selected hypotheses.

In the decision-making phase, participants engaged in a “Speed Dating” activity, where each group pitched their ideas in a 3-minute presentation. All participants voted for their favorite ideas, which were then selected for further development.

To gain inspiration and analyze the impact of current actions on the future, “Future Backcasting” was introduced. Participants envisioned future scenarios and explored how present actions could shape desired outcomes. After that, the participants synthesized their ideas and presented their concepts, showcasing the innovative concepts generated during the workshop.

The workshop concluded with a feedback exercise, providing an opportunity for participants to share their thoughts and reflections on the session. A goodbye drink was offered, allowing for informal networking and a chance to celebrate the successful completion of Workshop 1.0.

Space Organization, Ambiance, and Materials

The workshop's ambiance was carefully curated to promote a relaxed and creative environment. The spatial organization, combined with thoughtful materials and narratives constructed by facilitators, fostered a sense of collaboration and ideation.

Revigrés provided the venue for the workshop. The room was thoughtfully divided into five spaces: four areas designated for the work of the four teams and one space for facilitators and material disposal. Additionally, Revigrés' showroom space was made available for networking moments, such as the coffee break and goodbye drink, providing participants with an opportunity to immerse themselves in the context of the ceramic industry.

An assortment of materials, including markers, pencils, post-its, and cardboard, were thoughtfully provided to support the creative activities. For specific exercises like Reverse Brainstorming, Concept Generation, and Future

Backcasting, canvases with instructions were available, facilitating seamless and fluid activities.

W1.0 core activities: the power of inspiration and curiosity

Workshop 1.0 aimed to establish in essence an inspirational phase. In the design thinking process, framing a well-defined question is foundational to the success of ideation and problem-solving. As discussed by Brown and Katz (2019), starting with curiosity and a beginner's mindset is crucial for uncovering challenges and opportunities.

Since this was a limited four-hour workshop, users' interviews and observation weren't plausible methodological options, so the research team felt the need to boost creativity and enhance ideas, using the participant's unique and diverse perspectives to identify and frame a problem. It was by setting a compelling question, fostering curiosity, building idealistic scenarios, and encouraging analogous inspiration, the research team guided the participants toward creating innovative ideas. Reverse brainstorming and future backcasting were the two core activities chosen to build this inspirational framework, along with decision-making and generative exercises like "speed dating" and "concept generation", as previously described.

Reverse Brainstorming is a technique used in design thinking workshops to facilitate ideation about a specific problem by focusing on potential causes and negative aspects rather than traditional solutions. This approach builds on the cognitive ability of individuals to recognize problems more readily than envisioning solutions, making it an effective tool to uncover critical issues and gaps in a project (Evans, 2012). By examining potential failure points, teams gain valuable insights into the underlying challenges and can subsequently identify strategies to achieve the opposite effect.

Reverse Brainstorming normally falls under the ideation phase of the design thinking process, where teams aim to understand the problem deeply before generating solutions (Lewrick et al., 2020). However, the methodology was chosen because the audience was diversified and multidisciplinary, requiring greater alignment and a framework that encouraged problem-orientated rather than solution-orientated thinking. Since this was the first workshop, there was no pretense to find final solutions, but rather to introduce ideation techniques that would lead to diversity and divergent approaches. The primary objective of this technique is to foster critical thinking by exploring potential causes and negative consequences related to the challenge presented. By shifting the focus from solutions to potential issues, participants can gain a comprehensive understanding of the problem space and identify opportunities for innovative approaches.

Reverse Brainstorming is grounded in cognitive psychology and the understanding that individuals may find it easier to identify problems rather than propose solutions. Research by Paulus and Yang (2000) on group creativity highlights that brainstorming is often biased toward generating positive ideas, leading to the exclusion of critical evaluations. Reverse Brainstorming counteracts this bias by encouraging teams to examine potential failure points, thereby ensuring a more comprehensive exploration of the problem space.

The first step of this activity involved clearly defining the goal or problem that the team aims to address. This ensures that participants have a clear understanding of the scope and context of the challenge. After that, instead of directly brainstorming solutions, the team deliberately considered potential causes or negative aspects that could exacerbate the problem. This shift in perspective enables teams to explore different angles of the problem and uncover hidden complexities. In the next step, participants generated potential solutions to the problems identified in the previous step. The emphasis is on divergent thinking, encouraging the team to generate multiple ideas. In another step, the team engaged in a discussion to evaluate the feasibility and practicality of the ideas generated. By considering the reverse perspective, participants assessed the potential consequences of implementing each idea.

To conclude the activity, from the pool of ideas formulated in the previous step, the team collectively selected two ideas that stand out as feasible and promising. These selected ideas become the basis for further development and prototyping.

On the other hand, Future Backcasting is a forward-thinking methodology with a primary objective to envision and plan for an ideal future state that aligns with the concept statement formulated based on previous results (Bibri, 2018).

Given the perceived need to open mindsets and stimulate a collaborative exchange of ideas from participants with different backgrounds, it was relevant to test a methodology that would encourage futuristic thinking. It was hypothesized that this methodology could cause divergent thinking by considering ideal scenarios and not locking into current problems. By putting the lens of analysis from the future to the present, this approach fosters the ideation of innovative ideas by understanding how present actions can impact and shape the desired future (Bibri, 2018). By projecting into the future and then working backward to the present, participants were able to identify the necessary actions and steps required to bridge the gap between the present and the desired future.

Future Backcasting is rooted in the theory of strategic foresight, which is an established field of study focused on anticipating and preparing for future developments. According to Bishop et al. (2007), strategic foresight methodologies, including backcasting, provide a structured and systematic approach to envisioning possible futures and designing pathways to achieve them.

Research by Adegbile et al. (2017) further highlights the effectiveness of backcasting in innovation processes, enabling organizations to create long-term visions and plan for transformative changes.

The exercise steps included a concept statement, which involved formulating a concise and well-defined question that encapsulates the vision of the concept. This statement served as the guiding framework for envisioning the future, twenty years from now (2043). Participants were, also encouraged to imagine and describe various possibilities and scenarios in the future that relate to the defined concept statement. The emphasis is on creativity and envisioning ideal scenarios, regardless of current technological or financial limitations.

In the next step, the focus shifts from the future (2043) to the present (2023), and participants work backward to identify the necessary steps to connect the desirable future to the present, jumping every five years. For each future scenario, teams map out the specific actions required to bring that scenario into reality. Upon returning to the present (2023), participants reflected on the insights gained during the exercise and identify actionable steps that need to be taken today to move towards the ideal future. These steps form the basis for strategic planning and innovation initiatives.

Insights Gained from Workshop 1.0

Workshop 1.0, the initial phase of the Co-Design Sessions, provided valuable insights into the application of design thinking principles and methodologies in fostering innovative solutions for Revigrés. Through an iterative approach encompassing gathering inspiration, framing problems, questions, ideal scenarios, and ideation, significant findings emerged, aligning with established scientific research on design thinking and innovation.

Valuable insights into a multidisciplinary collaboration, the iterative nature of design, the facilitator's work, the paradox between an open and a more closed briefing, time constraints, and adaptability, were plain throughout the workshop. These aspects encouraged active engagement and idea generation to foster a culture of creativity and collaboration within Workshop 1.0 and helped formulate derivations to improve future workshops.

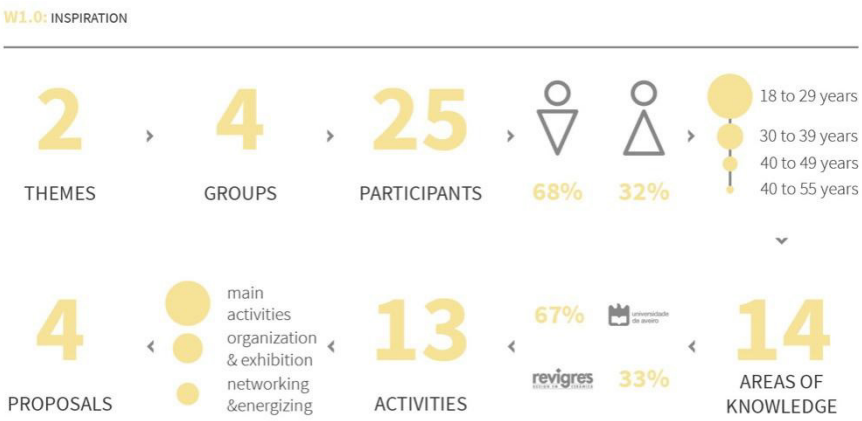

Figure 1. Workshop 1.0 in numbers.

Multidisciplinary Collaboration as a Driver of Innovation

A notable insight gained from Workshop 1.0 was the power of multidisciplinary collaboration as a driver of innovation. The multidisciplinary approach, which included a diversity of participants, including students, researchers, and Revigrés' employees from various departments, proved instrumental in broadening problem-solving horizons and exploring innovative solutions.

Figure 1 demonstrates the diversity and inclusivity of Workshop 1.0 through quantitative analysis. This visual representation emphasizes that among the 25 attendees representing 14 distinct areas of knowledge, 13 different activities were addressed. The observed diversity and multiplicity of thought led to positive feedback.

As mentioned by Cross (2011), design thinking thrives on diverse perspectives, and Workshop 1.0 showcased the importance of cross-functional cooperation in unlocking creative potential and enriching the ideation process. In fact, 72% of the participant's main feedback indicated that the sharing and different knowledge within groups was crucial during the workshop activities. Inputs such as: "The multidisciplinary of the design sciences made the emergence of ideas varied and differentiated" or "The group work, and the flow of the workshop, was very enriching and appealed to each one's more creative side and problem-solving skills" were obtained.

This favorable response can be attributed to the enriching tapestry of perspectives and expertise that fostered an open and collaborative atmosphere. These findings underscore the significance of sharing and diversity, particularly in cultural inception within design and cross-functional teams. Preserving these dynamics is vital for the success of future workshops.

The iterative nature of design as an asset to Innovation

Workshop 1.0 demonstrated a synergetic landscape of design by conducting participants to define their ideas throughout a process, characterized by its iterative nature, where the stages of inspiration, ideation, prototyping, and testing are often revisited.

The framing of well-defined questions was observed to be a critical catalyst for driving creative ideation. This aligns with existing research suggesting that well-crafted questions lay the foundation for problem-solving and inspire teams to explore unconventional paths toward innovative solutions. As supported by Brown and Katz (2019), the participants' curiosity and inquisitive mindset led to the identification of pertinent challenges and opportunities.

Reverse Brainstorming was an asset since it boosted problem-solving thinking and empowered the teams

to ideate and understand complex problems more comprehensively. By leveraging cognitive biases and encouraging a reverse perspective, this approach enhanced critical thinking, expanded the problem space, and provided a solid foundation to frame a question. Therefore, Future Backcasting galvanized the teams to envision and plan for a desirable and transformative future. By projecting into the future and working backward to the present, teams developed strategic pathways, actions, and innovative ideas that align with their concept statement. With this, the project proposals gained a competitive advantage by shaping a purposeful and forward-thinking approach to problem-solving and product development.

This iterative approach, as shown in Figure 2, consistent with the principles of design thinking, allowed for continuous improvement and the incorporation of feedback and insights to enhance the proposed concepts. Employing this comprehensive approach culminated in the development of four distinct project proposals, poised to be further refined and progressed in the forthcoming session.

Facilitation as an invisible guide to innovation

Workshop 1.0 offered valuable insights into the facilitation work as an invisible guide in navigating design methodologies and mindsets while enhancing collaborations among participants. Through the skillful guidance of the research team, design thinking principles were effectively applied, fostering a culture of curiosity and openness that sparked creativity among participants.

Understanding the participants' aspirations and motivations played a crucial role in tailoring the workshop's content and ensuring a meaningful experience. By acknowledging the participants' diverse needs, Workshop 1.0 fostered a sense of ownership and engagement, leading to the co-creation of innovative concepts. By providing moments for networking, recognition, and a sense of contribution, the research team instilled a feeling of commitment to the creative outcomes. This sense of ownership played a vital role in stimulating participants' engagement and dedication to the co-creation journey.

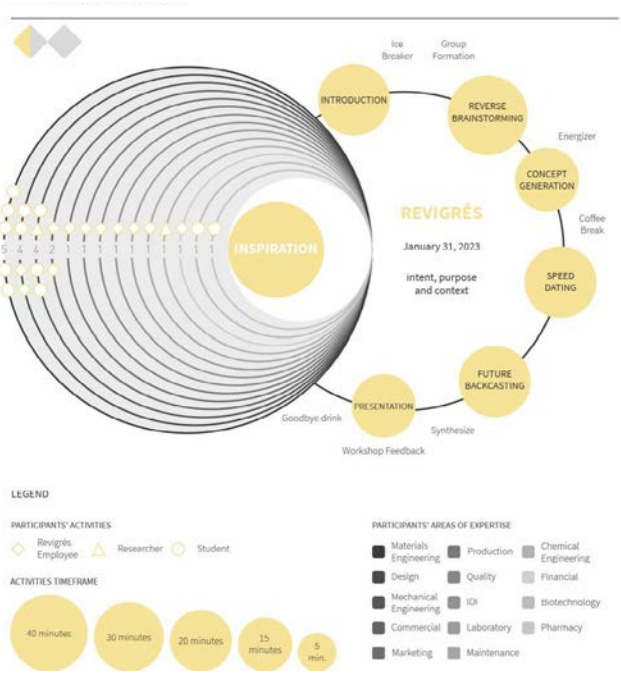

Figure 2. Workshop 1.0 framework and methodologies.

The research team's facilitation approach was instrumental in guiding participants to frame compelling questions. By drawing inspiration from design thinking methodologies advocated by design thought CDOs such as Eric Quint, Mauro Porcini, Sean Carney, and Stefano Marzano the facilitators encouraged a beginner's mindset and curiosity among the participants. This approach enabled the formulation of thought-provoking questions that acted as stepping stones for the subsequent ideation process. By encouraging analogous inspiration, problem analysis, question framing, and the visualization of future scenarios, the research team's facilitation approach propelled participants to seek inspiration from diverse domains outside their immediate context and urged them to critical and problem-orientated thinking.

The research team's efforts in promoting collaboration and cross-disciplinary exchange were pivotal in leveraging the participants' diverse expertise. As already mentioned, design thinking scholars suggest that multidisciplinary collaboration enriches the ideation process, leading to comprehensive and holistic solutions. The facilitators fostered an environment that nurtured open communication, encouraging participants to build upon each other's ideas and perspectives. Additionally, as participants progressed through Workshop 1.0, the research team ensured that mindsets such as curiosity, empathy, and open-mindedness were continuously applied and adapted based on the evolving needs of each group.

Intertwined with the interactive approach of design revealed in Figures 2 and 3, the facilitator's role emerged as essential in steering individuals through the design process, bridging their varying mindsets, skills, and methodologies. The ability to weave storytelling within the workshop proved pivotal. Storytelling, skillfully integrated by the facilitators, aided in maintaining a seamless flow and engaging participants throughout. As affirmed by participants in feedback surveys, the dynamics of activities and the spatial organization significantly contributed to the workshop's success. Participants expressed how the collaborative atmosphere, resembling a narrative journey, enriched their creative thinking and problem-solving abilities, through statements such as: "The group work, and the flow of the workshop, was very enriching and appealed to the more creative side of each one and to the ability to solve problems" and "organization and follow-up that interconnected with each other, it was almost like following a story”. Notably, 80% of attendees lauded the workshop's well-executed flow, organization, and dynamic activities. This response indicates that effective facilitation, coupled with storytelling and optimized logistics, can foster an environment where participants find themselves immersed in a cohesive and creatively stimulating experience.

Navigating the Open vs. Closed Briefing Paradox

The workshop's theme selection introduced a nuanced balancing act between open and closed briefings as illustrated in Figure 3. To foster diverse ideas yet provide direction, challenges were structured to be open-ended yet contextually relevant to Revigrés. This equilibrium entailed certain constraints to prevent stifling creativity.

However, this equilibrium encountered unique challenges. In particular, the encouragement of divergent thinking, vital for defining contexts and design intentions, proved intricate within groups facing the broader theme. Though both briefings embraced openness, the "smart tiles" theme leaned towards a wider range since it enabled participants to collaboratively outline trends, previews, and innovative ceramic tile products, services, or experiences. Conversely, the "kinetic tiles" theme delved into kinetic absorption technology's ceramic sector potential, taking a more specialized route.

This diversity yielded varying participant feedback. The “kinetic tiles” theme drew less direct reference in feedback surveys, while “smart tiles” group participants noted its expansiveness. Facilitators highlighted challenges within “smart tiles” groups, needing more guidance in the first exercises and facilitator intervention for task adaptability. When the initial spectrum is inherently wide, the process of converging toward a defined

intention gains heightened complexity. This was particularly evident since participants had such diverse backgrounds and grappled more intensely with the ambiguity. Unlike designers accustomed to navigating uncertainty, participants from various fields often found discomfort in ambiguity and lack of immediate clarity—especially present in the problem identification domain, a typical aspect of divergent thinking.

This highlights the challenge of managing openness and ambiguity, particularly for non-designers. Despite this, the iterative nature of the design process, including activities like future backcasting and decision-making exercises, aided in overcoming this complexity, helping participants transition from divergent to convergent thinking. This struggle underscores the delicate task of balancing openness and direction to harness the benefits of both approaches effectively.

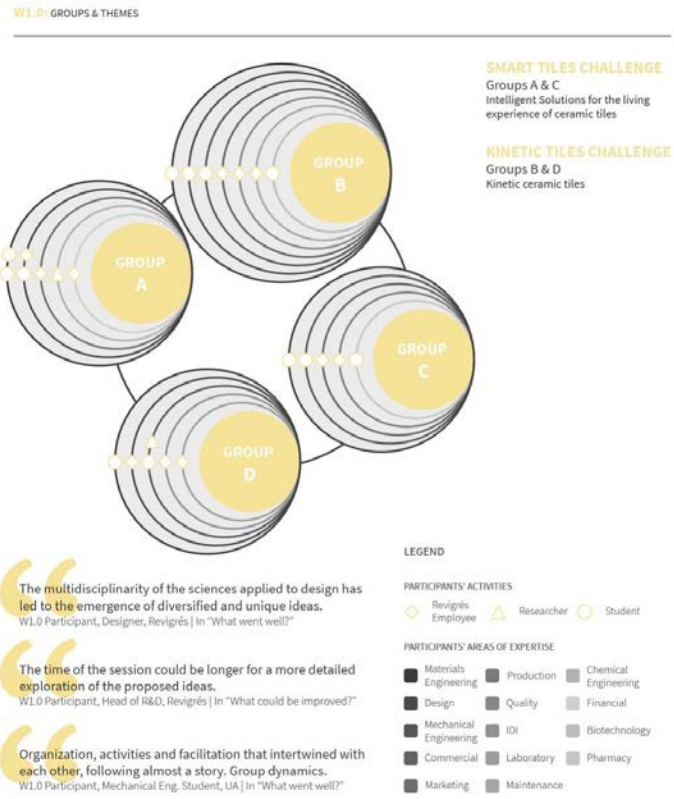

Figure 3. Workshop 1.0 group structure and participants' feedback.

Time Constraints and Adaptability

The workshop's time constraints posed challenges to the ability of the participants to adapt to the exercise in the timetable defined. Indeed, 48% of the feedback given by participants rated time management less positively, pointing out the difficulty to fulfill the objectives of the exercises in the given time. These observations were more prevalent in groups with the "Smart Tiles" challenge due to the broader scope of the topic. Given the inherent constraint of workshop duration, it is imperative to consider refining time management for exercises in upcoming sessions. This adjustment is essential to ensure the effective execution of activities within the allocated timeframe.

The research team's adaptability in leveraging the participants' diverse backgrounds and perspectives aimed to

compensate for this limitation. Whenever any difficulty was identified, the facilitator approached the group to address it. This adaptation reflects the flexibility inherent in design thinking, where teams adjust methodologies to suit the context and available resources.

Implications for Revigrés: Fostering Design-Led Innovation

The implications of Workshop 1.0 for Revigrés encompass the fostering of a culture of creativity and collaboration, the identification of diverse perspectives and expertise, and the potential for disruptive product development. The study reveals how Workshop 1.0 acts as a catalyst for driving design-led innovation within Revigrés, offering valuable insights into the significance of the CDO role, the power of design thinking methodologies, and the potential for future co-creation endeavors. Implications for Revigrés were expressed by the following actions:

— ☒ Identifying Diverse Perspectives and Expertise

The participant selection process for Workshop 1.0 was meticulously designed to gather a diverse group of individuals. The diversity of perspectives and expertise enriched the co-creation process, allowing for a comprehensive exploration of ideas and problem-solving approaches. By involving individuals from different backgrounds, Workshop 1.0 tapped into a vast pool of knowledge and creativity, resulting in the rise of four innovative project proposals, which will be further developed in the remaining workshops in this series. This may further evolve the product range could lead to more creative solutions and broaden the company's offerings.

— ☒ Unleashing the Power of Design Thinking Methodologies

Throughout Workshop 1.0, design thinking methodologies were employed to frame problems, and generate ideas. Reverse brainstorming, a key exercise during the workshop, allowed participants to explore potential causes of failure rather than seeking immediate solutions. This approach encouraged critical thinking and enabled the identification of previously overlooked challenges. Additionally, future backcasting provided a powerful tool for envisioning the ideal future and mapping the steps needed to achieve it. Fast speeding decision-making exercises and ideation to generate concepts were also crucial exercises to a more fluid session. By applying these design thinking methodologies, Workshop 1.0 demonstrated the potential of such practices in unlocking innovation and creativity within Revigrés.

— ☒ Paving the Way for Future Co-Creation Endeavors

Workshop 1.0 served as a foundational step in Revigrés' co-creation journey. The success of this workshop showcased the potential for future co-creation endeavors to drive innovation and product development. As Revigrés continues to embrace design-led practices, future co-design sessions can further enhance the organization's ability to respond to emerging challenges and market demands. The positive outcomes of Workshop 1.0 provided compelling evidence for the value of co-creation as a driver of design-led innovation, offering Revigrés the foundation structures of four different innovation design projects, that one day may position the company at the forefront of transformative product development.

— ☒ Empowering the Role of Chief Design Officer

Workshop 1.0 emphasized the potential of the CDO in championing design-led innovation within Revigrés, through the exploration of the facilitator’ s role. Design leaders such as the CDO appeared to play a pivotal role in facilitating workshops as tools to educate and guide stakeholders through

the design thinking process and promote a design-centric mindset. This way, the CDO seems to act as a catalyst for creativity and collaboration, leveraging design thinking methodologies to inspire participants and drive innovation. This workshop showcased through the exploration of the facilitator’ s role and the relevance of communicating and educating company functions and stakeholders. It also explored the significance of the CDO's role as a strategic leader, bridging the gap between design and business objectives, and propelling Revigrés towards a design-led future.

Conclusion

In the contemporary business landscape, the strategic role of CDOs in fostering innovation and nurturing design-oriented cultures has gained prominence. This article is an integral part of an ongoing Ph.D. research endeavor that centers on the exploration and affirmation of the CDO's significance within companies. The experimental platform for this investigation is Revigrés, a prominent Portuguese ceramic tiles manufacturer. The focal point of this article is the inaugural workshop, Workshop 1.0, of the Co-Design Sessions initiative orchestrated by the research team that delves into the intricate realms of design thinking and collaborative ideation, aimed at probing diverse assumptions surrounding the CDO role.

Workshop 1.0 encapsulated the essence of this experimental journey, strategically designed to navigate the subtle yet potent balance between open-ended and structured briefings. The facilitation work during this workshop assumed the role of an imperceptible guide, expertly maneuvering through diverse design methodologies and mindsets. The ensuing collaborative environment not only spurred creativity but also enhanced collaboration among participants from various domains. The research team adeptly balanced between offering direction and fostering creative freedom, encouraging participants to explore their unique perspectives and frame meaningful problems. The interactive nature of design thinking exercises, such as reverse brainstorming and future backcasting, promoted active engagement and idea generation, fostering a culture of constant exploration and learning.

This balance encouraged participants to think freely and explore innovative solutions within the defined context of the two challenges given, fostering a culture of curiosity and openness. The time constraints of the workshop-imposed adaptability and efficient use of time, prompting participants to prioritize ideas and refine concepts. The importance of feedback was emphasized throughout the workshop, nurturing a positive and supportive environment that encouraged iterative idea development.

The success of Workshop 1.0 was further amplified by the multidisciplinary collaboration among participants, which proved to be a driver of innovation by sparking creative idea generation and broadening problem-solving horizons. The interactive and inclusive nature of the workshop fostered collaboration and networking, leading to the formation of cross-cultural wisdom that can shape the future directions and methodologies to be applied in Revigrés.

As the workshop laid the groundwork for future co-creation endeavors, it posed intriguing questions and highlighted the main issues for the next workshop. The research team may explore how to further enhance design culture within the organizational context, promoting a mindset of continuous innovation and exploration. Additionally, the workshop's success in navigating the open and closed briefing paradox prompts further investigation into how to strike the right balance between providing a focused framework and encouraging creative freedom.

In conclusion, Workshop 1.0 of the Co-Design Sessions initiative at Revigrés exemplified the power of design thinking in inspiring innovation and shaping a design-oriented culture. The workshop's implications span from fostering creativity and collaboration to empowering the role of the CDO in driving transformative product

development. The multidisciplinary collaboration and interactive nature of the workshop underscored the value of design thinking as a common practice used by CDOs and seems to support positioning Revigrés at the forefront of design-led innovation in the ceramic tile industry. As the company continues its co-creation journey, Workshop 1.0 serves as a visionary stepping stone, offering insights that will propel Revigrés into a future of boundless innovation and design excellence.

Acknowledgments

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Human-Computer Interaction Design for Engineering Machinery Virtual Reality Remote Control Based on Information Flow

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Abstract

With the advent of the intelligent era, the digital transformation of the industrial field has become one of the trends, in which the application of virtual reality (VR) has greatly promoted the development of remote control of construction machinery. The interaction medium for traditional remote control of construction machinery is mostly a two-dimensional plane, resulting in the operator's lack of a sense of presence and immersion, reducing the quality of interaction and the presence of safety hazards. The human-computer interaction characteristics of VR technology address the lack of immersion in traditional remote control, low interaction efficiency, and other issues. However, in current research, there is a lack of analysis of the information flow direction in the process of human-computer interaction, making it difficult to produce human-computer interaction design solutions for construction machinery that are more suitable for the VR environment. Therefore, this paper takes a rotary drilling rig as an example, constructs a VR remote control human-computer interaction model for construction machinery based on the theory of information flow, proposes a human-computer interaction design scheme for the virtual cockpit of the rotary drilling rig, and develops a prototype of the virtual simulation system to verify the usability of the proposed scheme. The results show that the proposed scheme is of great significance in improving the user experience and interaction efficiency of remote control of construction machinery in a VR environment, providing a reference for subsequent design research in this field.

Author keywords

Virtual reality; Human-computer interaction; Remote control; Information flow

Introduction

With the rise of Industry 4.0, the industrial sector is undergoing a comprehensive digital transformation. This transformation involves the integration of digital technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), Big Data, and Virtual Reality (VR) into industrial processes (Muhuri, 2019). Among these technologies, VR is widely utilized in the field of robot remote control. For instance, in the context of post-disaster rescue, Yang et al. (Zou, 2020) enhanced a disaster detection robot using VR technology, which

recreated the disaster environment in three dimensions, thereby improving perception and search and rescue effectiveness. Zhang et al. (Xu, 2017) developed a remote control system (RCS) for a coal mine detection and rescue robot using VR technology. They combined dynamic modeling technology to reconstruct the rescue area, enabling real-time visualization of the rescue environment conditions, resulting in a significant boost in rescue efficiency.

In the realm of construction machinery research, VR technology is predominantly employed for remote control purposes. This includes assisting operators in obtaining information more intuitively through digital twins to reduce operator cognitive fatigue (Asad, 2023), optimize control actions (Mourtzis, 2023), and enhance human-computer interaction(Dai, 2023). However, current research on human-computer interaction design for remote control of construction machinery in a VR environment lacks an in-depth analysis of the underlying design principles and VR interaction characteristics. Consequently, this deficiency leads to a human-computer interaction design solution that is less suitable for the virtual environment.

Therefore, this paper uses the rotary drilling rig as an example to construct a VR remote control human-computer interaction model for rotary drilling rigs based on the theory of information flow. It then proposes a VR remote control human-computer interaction design scheme for construction machinery by incorporating the characteristics of human-computer interaction in the virtual environment. The paper also conducts usability evaluations of the proposed scheme, offering valuable insights for the research of VR remote control human-computer interaction design for construction machinery.

Related works

Virtual Reality Human-Computer Interaction Models

Virtual reality technology integrates computer graphics, computer vision technology, multimedia presentation technology, and other technologies to create an interactive virtual world. Information from this virtual world is fed back to the user through multiple sensory channels, enabling the user to achieve an immersive interactive experience. Currently, this technology represents one of the important research directions in cutting-edge disciplines (Yang, 2021).

The core feature of virtual reality technology is the real user experience and interactive engagement. Immersion, interactivity, and conceptualization are the three fundamental features of a virtual reality system (Zhang, 2016). The authenticity of the user's experience primarily relies on the maturity and perfection of the output feedback technology of the terminal equipment in the virtual reality system. Meanwhile, the user's interactive experience largely depends on the rationality and usability of the interaction mode of the virtual reality system. In the present research, various virtual reality human-computer interaction modes can be broadly categorized based on different interaction mechanisms, including posture interaction mode (Xia, 2022), three-dimensional virtual interaction mode (Feuchtner, 2018), voice interaction mode (Hudson, 2018), haptic interaction mode (Kilian, 2022), and others.

Information Flow Related Theories

Information flow (IF) is a concept in information theory that describes the process of information flow and delivery in a system or network. It is primarily used to study the problem of information transmission and processing in communication systems. According to information theory, human beings communicate and exchange information in various ways, and these complex communication activities constitute an information flow system or communication system (Kumar, 2018). An information flow system involves two entities: the source of information transmission and the receiver of information. Information flow represents the specific connections between the source and the receiver, acting as a "bridge" connecting elements within the system. In

any information exchange activities, the source and the receiver cannot be directly linked but must pass through a system of information transmission and conversion processes. Scholars have constructed the information flow structure of communication systems based on Shannon's fundamental information flow model, which includes the source, receiver, channel, coding, decoding, and signal noise relationship (Wu, 2020), as illustrated in Figure 1.

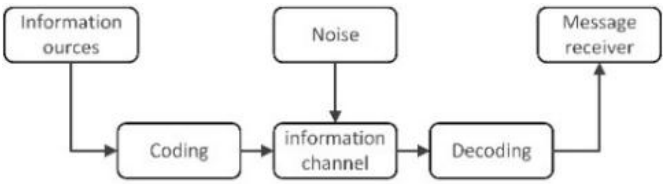

Figure 1. The structure of the information flow direction of the communication system.

Methods

The subject of this study is construction machinery equipped with a cockpit. Based on the components of the information flow structure of the basic communication system in Figure1 and considering the characteristics of remote control for this type of construction machinery, it is proposed that the key elements present in the information flow for remote control of construction machinery should include: the user, the remote control interaction devices, the construction machinery, the Information feedback display devices, and the visual information acquisition devices at the work site. The process of transferring, sending, and converting information among these entities forms the framework of the remote control information flow for construction machinery, as illustrated in Figure 2.

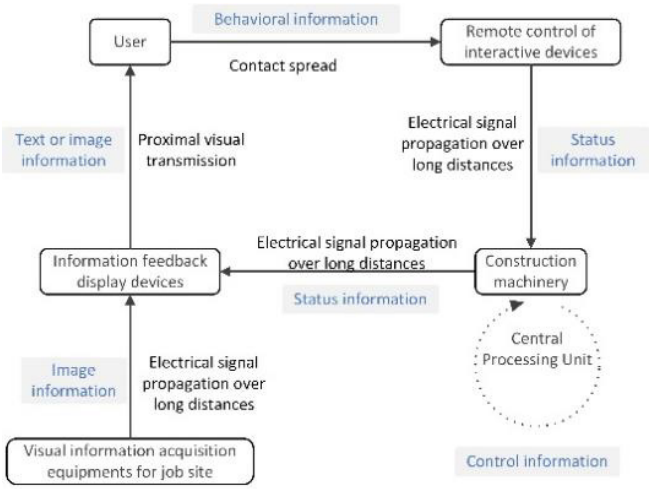

Figure 2. Remote control information flow framework for construction machinery.

Based on the information flow framework for remote control of construction machinery, we analyze the information flow during the interaction process of the construction machinery VR remote control system. This analysis leads to the development of an information flow-based human-computer interaction model for remote control of rotary drilling VR, which will serve as guidance for the subsequent design of human-computer interaction, as illustrated in Figure 3.

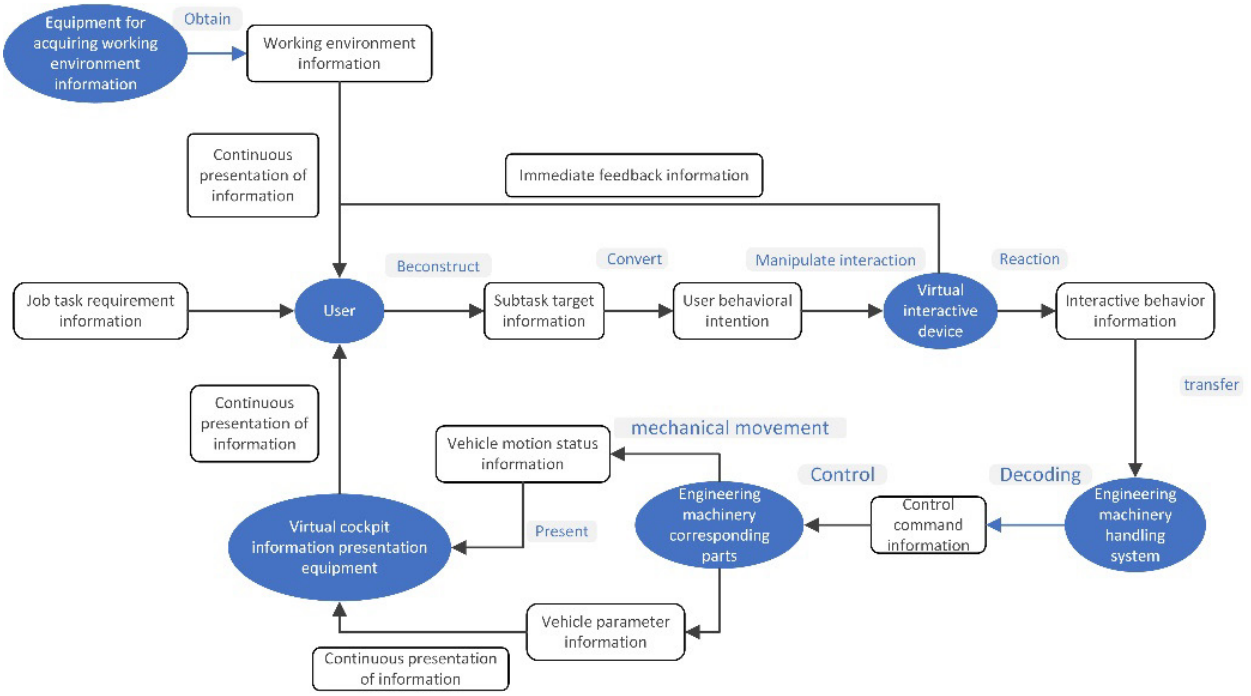

Figure 3. The human-computer interaction model of remote control of rotary drilling VR based on information flow.

First, the operation task requirement information is transmitted to the user as the starting point. After receiving the task requirement information, the user deconstructs the information and transforms it into sub-task target information at each level. Next, the user generates behavioral intentions and performs interactive actions on the virtual interactive device. Simultaneously, the virtual interactive device provides instantaneous feedback to the user.

The virtual interactive device translates the user's interactive actions into interactive behavior information and transmits it to the processing system of the rotary drilling rig. The processing system decodes the interactive behavior information into control command information and sends it to the corresponding part of the rotary drilling rig.

Finally, the corresponding part of the rotary drilling rig receives the control command, initiates mechanical movement, and the sensor collects information on the vehicle's movement status. This information is then displayed on the virtual cockpit information presentation equipment. Additionally, the rotary drilling rig's parameter information is continuously presented in real-time on the virtual cockpit information presentation device and is transmitted to the user visually. Furthermore, the operating environment information captured by the operating environment information acquisition device is transmitted to the user in the form of continuous presentation information.

Design

As one of the commonly used large-scale construction machinery, rotary drilling has a well-defined operational purpose and process. Therefore, it is reasonable to use rotary drilling as an example for the subsequent research and design in this paper, and the conclusions obtained have a certain degree of universality.

Taking the VR remote control human-computer interaction model of a rotary drilling rig based on information

flow, as constructed above, as the guiding principle, and combining it with the interaction modes in virtual reality, we propose the design of VR remote control functions that can meet the operational needs of rotary drilling rigs, along with the design of human-computer interaction for these corresponding functions. The main functional modules include the rotary drilling miniature model module, intelligent interaction integrated display module, vehicle traveling module, camera image presentation module, and vehicle basic control module.

The rotary drilling miniature model module is a holographic model interaction method proposed in this paper, improving the interaction mode of the Voodoo Doll (Frankfurter, 2020). The principle of this interaction mode involves reproducing and mapping the rotary drill as a three-dimensional miniature model. Real-time synchronization between the miniature model and the rotary drill action is achieved through inertial measurement unit (IMU) technology. The state of the vehicle's components is presented in real-time in the miniature model, allowing the user to monitor the vehicle's state information in real time. The driver touches the target part of the miniature model with a virtual hand, and the miniature model will display the operational parameters of the corresponding part in real-time in the form of a semi-transparent floating window. Additionally, any parts with abnormal data will be highlighted on the miniature model, triggering a warning message to the driver along with a suggested solution.



Figure 4. Renderings of the rotary drilling miniature model module’ s functions.

The intelligent interactive integrated display module serves as the platform for presenting comprehensive vehicle data and information, functioning as the central control center for integrated operations. Certain mechanical operations, traditionally performed manually, are encoded as preset programs. These programs are then integrated into a function library through the intelligent control system module installed in the vehicle. The detailed interfaces for each integrated function are displayed within the information display area.



Figure 5. Operation diagram of rotary drilling vehicle’ s movement module.

The vehicle moving module is primarily responsible for controlling the rotary drill's movement and upper body rotation. The traditional lever control mode is not suitable in the virtual reality environment due to the absence of resistance feedback information. In this paper, we integrate the interaction features of VR and ultimately select the 6 DoF VR handle as the primary interaction device for the virtual cockpit of the rotary drilling rig, tasked with controlling the vehicle's movement. The operational diagram is illustrated in Figure 5.

Considering the driver's natural operating habits and the rationality of interaction, the layout and interaction between the camera image presentation module and the basic vehicle control module follow the traditional rotary drill cockpit to ensure the module's usability.

Simulation and evaluation

To validate the feasibility of the proposed rotary drilling rig VR remote control human-computer interaction design scheme, it is essential to create an interactive rotary drilling rig VR remote control simulation system. The system's usability will be assessed using the system usability scale (SUS) method to further evaluate the proposed design.

Unreal Engine 5 is employed to develop the virtual simulation system, construct the interactive virtual remote control system for the rotary drilling rig, and simulate all interactive functions outlined in the proposed design. This enables users to experience the process of controlling the rotary drilling rig for operations within a virtual environment. The virtual simulation system is illustrated in Figure 6.



Figure 6. Renderings of the virtual simulation system.

Through the questionnaire and pre-experiment, a group of 20 male rotary drilling drivers with varying levels of operating experience, aged between 20 and 45, were selected as participants. At the outset of the experiment, the experimenter provided instructions to help the subjects become familiar with the operation of the system. Subsequently, the subjects were asked to complete five predetermined rotary drilling tasks in a quiet environment. After accomplishing these tasks, the subjects were requested to fill out a system usability scale (SUS) questionnaire to evaluate their experience with the system

Once all 20 subjects had finished the experiment, the collected SUS scale data were analyzed using SPSS software to determine the system's usability. The calculated average SUS score for this system was 76.25 (SD=6.062). According to the SUS score range, which falls between 70 and 85, this suggests that the product's usability is good. Thus, it can be concluded that this system demonstrates good usability.

Next, the internal consistency of the scale was assessed through the calculation of the Cronbach alpha coefficient. This evaluation aimed to gauge the reliability of the SUS scale. Generally, a Cronbach alpha value

greater than 0.7 is considered acceptable (Sijtsma, 2021). In this case, the Cronbach alpha coefficient was calculated using SPSS and found to be 0.789, indicating that the scale exhibits acceptable reliability.
In summary, the results of the SUS usability evaluation indicate that the system prototype effectively fulfills the user's task requirements, enhances the user experience, and demonstrates high usability in terms of human-computer interaction.

Conclusion

This study constructs a human-computer interaction model for virtual reality remote control of construction machinery based on information flow theory. Using the rotary drilling rig as an example, this paper proposes a novel human-computer interaction design scheme for virtual reality remote control of rotary drilling rigs, utilizing the constructed model as the design guideline. Through experiments, the study verifies that the proposed scheme has high usability and enhances the user experience.
The developed information flow human-computer interaction model dissects the information flow involved in the virtual reality remote control of construction machinery, which helps deepen the understanding of the design logic. Furthermore, this research provides practical solutions to enhance the user experience of virtual reality remote control of construction machinery. It holds significant reference value for future human-computer interaction design research in this field.
For future research, the team will collaborate with relevant enterprises to integrate and test the proposed design program with actual construction machinery to further validate its effectiveness.

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Digital Replicants. Enhancing Adaptive Reuse Design, Teaching, and Learning Through Digital Twins

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Abstract

The possibilities offered by Digital Twins and related technologies are far beyond mere Interior Design visualization, instead offering opportunities to reconsider Interior Design Processes and Methodologies, as well as Interior Design Teaching and Learning experiences. This essay is based on four-year international research focused on the role of Digital Twins in Adaptive Reuse Design between Italy and the People' s Republic of China and between universities, private research, and professional experiences focused on the role of Digital Twins in the innovation of the Discipline.

These experiences set both the theoretical and practical ground upon which the 2022-2023 didactical experiments conducted at the Interior Department of Istituto Europeo di Design University in Milan are founded. From Digital Surveys to Digital Twin creation and Virtual Reality Classroom experience, students have been involved in a completely new workflow, set in a virtual space of interaction where to test, fail, and repeat concepts and strategies until the final proposal presentation.

A one-model, three-dimensional, and real-time rendered environment where new solutions have been created, tested, visualized, made, and constantly evaluated in a Digital Twin space. A Digital Replicant space, in whose autonomous design life the existing heritage matter and memories have been constantly intertwined by designers with the visions of the hosting space' s future social reactivation scenarios.

This essay will present the complete workflow of this study and analyze how the innovative digital procedures described positively influenced the mental processes, the personal engagement, the student-student, and student-teacher interaction, opening new possible frontiers of learning, teaching, and evaluating Interior Design. The possibilities of real-time linking strategies and formal solutions; materials, lights, and atmospheres; the relationship between physical and digital materialities, are just a few aspects of the possibilities that Digital Twins offered to this experiment. And more will be developed from next year, in terms of Artificial Intelligence integration and Extended Reality Training.

Author keywords

Digital Twin, Adaptive Reuse Design, Interior Design Innovation, Interior Design Learning Innovation, Digital Classroom, Digital Twin Laboratory, Extended Reality Training.

Introduction

Adaptive Reuse, the design process of reactivating existing structures through new functions is gaining prominence in sustainable architecture. The necessity of tailoring a compatible and relevant new function seems even more important in those historical buildings that need a social reactivation strategy, in synergy with

the preservation aims. But no matter the age or cultural relevance of a considered building, the possibilities offered by a Digital Replica to Designers are noteworthy. Digital Twin-related Technologies could offer great opportunities in terms of researching an intimate relationship between existing matter and contemporary matter. This fact is true in both Professional and Educational Design environments. We know that the different and higher levels of engagement, accuracy, and speed in the design process offered by these technologies are inspiring the Design Community at all levels and in all Design application fields.

However, the fast-moving and polyhedral nature of Digital Twins offers challenges to practical applications and introduces technical, hardware, logistical, and organizational issues.

This article presents the vision, aims, process, results, and possible future development of a Digital Twin didactical experiment that concretely addressed the topic's challenges. With the aim of setting the students, not a structured laboratory, at the very center of the experience the author suggests a new methodology that changes the perspective of how we Practice, Learn, and Teach Adaptive Reuse Design. The complete adopted workflow will be presented, as well as how the challenges were addressed and overcome, imagining future scenarios of implementation.

Digital Twin and Digital Replicant: Concept and Significance

Digital Twins have been defined as a living model which represents a physical asset or system that continually adapts to changes in operations based on online data and information collected and can predict the future of the corresponding physical counterpart (Lui et al., 2018).

This Virtual Representation collects data from the Physical Realm in real time and uses this data to create a virtual model of the physical object. Its functionality depends on the bi-directional coordination of data between the physical and virtual models. While Digital Twins have found applications in various industrial sectors, their applications in the Construction Industry are still relatively limited. Nonetheless, they show promising possibilities in the Design, Construction, Operation, and maintenance of a facility. (Madubuike et al., 2022).

Considering Architecture, Interior Design, and Construction industry, this essay focuses on the Application of Digital Twin in Adaptive Reuse Design. The purposed research tested the possibilities of implementing this technology in the design process, opening to methodological innovation possibilities in the discipline. While the predictive features (intended as non-automatic, instead the core of the design learning experience) of Digital Twin seem adherent to the experience results, the possibility of a bi-directional relationship (the Digital Twin possibility to in-turn interact with reality), seems missing. For this reason, Digital Replicant seemed a more suitable definition of the experiment's Live Digital Realm. A 24/7 accessible virtual reality replica not only intended for experiencing the hosting heritage building (Demetrescu et Al. 2020) but where to Test, Fail Repeat in a safe and free digital environment. A Virtual Realm of Live Design Experiences.

Teaching and Learning Adaptive Reuse Design

This article is considering the point of view of the author as an Adaptive Reuse Design Specialist and university teacher at both bachelor's and master's degree levels. Experiences acquired in Architectural and Interior Design Studio Classes, as well as Thesis Supervisor in Private and Public Universities, in both Interior Design and Architectural Preservation and Reuse fields. Courses held in the School of Interior Design of Istituto Europeo di Design (Milan, Italy), the Department of Architecture and Urban Studies in Politecnico di Milano (Milan, Italy), and in the School of Architecture of Hunan University (Changsha, People's Republic of China).

Adaptive Reuse Design is in fact polyhedral and multidisciplinary. It questions and connects both pre-existing and contemporary matter, both memories and future visions, and both architectural and human concerns.

it requires a deep understanding of the hosting structure's qualities and problems to define the design opportunities. And it challenges professionals and students alike from general strategies definition to materials and detail control. In this sense, Adaptive Reuse Design is linked by a double tread to the hosting space in all design phases.

Even considering the understandable international differences in the discipline's praxis and interpretations, on-site visits and surveys are unanimously considered crucial operations to get in touch with the often complex and layered physical architecture and the frequently vibrant and inspiring atmospheres of the design object space. This fact commonly raises proximity and safety-related issues and often leads to limiting the relationship between the designer and the object of the design. This fact is even more evident in teaching and learning contexts, where the on-site visits are in most cases considered as very positive experiences by the students, but these issues are even more relevant. In an Adaptive Reuse Design Studio Class an on-site visit, when possible, is performed at the beginning of the course and remains a distant even though pleasant memory at the end of the course.

The comprehension of the hosting space is also one of the first operations and often appears as a complex activity, including and intertwining the research and understanding of location, history, memories, human activities, traces, thresholds, materials, spatial relationships, morphology, problems, and threats, citing only a few. Even considering the best results in the students' Adaptive Reuse Design products it is very frequent to observe a disconnected and partially oblivious result. This is especially true when the Values of the projects are compared to the final strategies: due to the overall complexity it is very difficult to control the connections. The gaps between the documents' themes, usually boards or slide decks, and the step-by-step materials production, even though correct from the methodological point of view, often induce an even more dispersive design flow. The need for a coherent set of documents where problems outlining and understanding clearly become design opportunities has long been pursued by Studio Classes Teachers.

At the same time, considering a Designer's product as a document, it is important to keep track of the whole complexity and all the research results, even the details that were not selected as part of the reuse strategy. These elements might inspire and become assets for future designs. In this sense simplifying might become a potentially detrimental operation.

How can these two aspects, research completeness, and a clear problem-opportunity-result strategy creation coexist is another recurring theme in what is generally considered a subsequent phase in the Adaptive Reuse Design process: the design Strategies and Concept creation.

Once the strategies are set, the third operation is Project Development. Developed in 3D or 2D, this is a critical phase where the design prototype's parts may disconnect from strategies. This is partially due to the complexity of the materials created. Step-by-step content production often leads to design solutions that rely on unplanned intuitions more than strategies.

Finally, the visual production phase often relies on static renderings. These fixed-view products show only the framed scene. This may be a very powerful tool for the project's communication but does not offer the opportunity to control most of the aspects of the project.

To summarize, the Adaptive Reuse Design processes adopted in Studio Classes, even though correct from the methodological point of view, cannot often generate a fluid design environment that could stimulate the strategies-outcomes connection and in the end a virtuous design-fail-repeat reiteration. Moreover, leads to mechanical, impersonal, and hypocritical exploitations of the teacher's opinions and tastes, de facto negating the facilitator's role and aims.

The Digital Replicant: Integrating Digital Twins in Adaptive Reuse Education

During Academic Year 2022-23 Students of the author's courses and bachelor thesis in Istituto Europeo di Design, Milan, Department of Interior Design, were involved in three experimental Adaptive Reuse Design Studio Classes. The core idea was to test the concrete possibility to let the students create and manage a Digital Twin Environment, a single three-dimensional model, where to stage the complete process of Adaptive Reuse Design. What happened, in terms of results, engagement, and innovation, encourages deep reflections on how Digital Twins are representing a concrete turning point in Adaptive Reuse Design teaching, learning, and professional processes that might be extended to Interior Design in general.

Of three classes, two Studios were semestral courses, the last was a one-year Studio course that ended in a bachelor thesis discussion. All three experiences shared the same vision and workflow and were directly conducted by the Author in all phases.

The two semestral courses were intended as Pilot Courses to test undefined touchpoints and uncertain hardware, workflow, and technology issues. The One-year Studio Class was intended to take advantage of the Pilots' experience and included on-site laser scanning operations for complete management of the Digital Model.



Figure 1. The main façade of the Cusago Visconti Castle, Milan, October 2022. The South Wing of the Castle was the case study of the Author's 2022-23 Experimental Adaptive Reuse Design Bachelor Thesis Course.

The two semestral courses started in September 2022 and ended in February 2023.

The student's task was the reactivation of a historical Limonaia, an abandoned warehouse and court, through temporary design. The selected building is a protected heritage building, part of the Villa Borromeo Litta complex in Lainate, Milan, Italy.

Students in these two courses received a three-dimensional model of the building as part of the design kit,

different from the one-year course experience.
The one-year course started in late October 2022 and ended in July 2023.
The objective of the Studio Class was the Social Reactivation through an Adaptive Reuse Design of the South Wing of the Visconti Castle in Cusago, Milan, Italy.
The three courses shared a similar digital workflow that can be described as the following.



Figure 2. The laser scanning and surveying operations with the students in Cusago Castle, Milan, November 2022.

Phase One: On-site Survey, and Points-Cloud Acquisition.
In this phase, students visited and surveyed the hosting heritage building, understanding the building's context, morphology, materiality, stratification, thresholds, memories, stories, problems, values, and more.
In Cusago Castle students could also experience a laser scan survey. After the acquisition, divided into groups, they could produce a complete and detailed Points Cloud model.
The beginning of the Digital Journey.

Phase Two: Redrawing and Understanding Morphology, Shaping an Accurate 3D Simulacrum.
A Points Cloud has been used as a solid reference for 3D redrawing operations. Each group created its own 3D representation of the space, choosing its favorite software. The result was an accurate model of the space in terms of dimensions and morphology. Details such as bricks and mortar or plaster imperfections were not modeled though. The quest for realism is instead tackled by the next step.

Phase Three: Final Texturization and Digital Replicant Environment creation.
Using points-cloud extracted photographic elevations as a geometrical reference and pictures shot during the on-site survey students were able to texturize the 3D model to create the Digital Replicant of the hosting space. This operation was entirely conducted in real-time rendering software, live connected to the previous modeling one.

Phase Four: Research, Analysis, Concept Creation.
This phase was performed parallel to the previous Phase Two operations. Through a Design Thinking tools-based research and analysis students transformed problems into design opportunities and into a set of strategies composing their Design Concept.

Phase Five: Test, Fail, Repeat.
Concept values and strategies are tested directly from sketches to 3D representation. The live connection between modeling software and real-time rendering results is the key to a more engaging and mindful design definition. Details, solutions, and design choices are visualized in real-time. Positive and negative repercussions on the whole design system can be easily and very quickly tested, allowing for a positive reiteration of the creative problem-solving process. A more direct connection between ideas, formal and material choices, and result visualization is staged.

Phase Six: Executables and Media Creation.
Real-time rendering and eventual BIM models greatly enhance the speed and accuracy of executable and media creations. Plans, sections, and details could be easily implemented if not automatically extracted from the modeling software. Videos, walkthroughs, static renderings are just a few examples.

Phase Seven: Laser cut and 3D printed maquette.
From the design 3D file, a laser cut file could be saved and processed for an easy and impressive 1:50 scale maquette of the design proposals.



Figure 3. Phases of the experimental workflow. From the top, clockwise: Points Cloud management, Existing volumes and textures creation, 3D Adaptive Reuse Design Solutions modeling, Real-time Rendering Test of the Design Solutions in the Virtual Realm.

Advantages of a Digital Replicant
The advantages of the presented workflow can be summarized as follows, in chronological order.

- The Points Cloud-based 3D remodeling ensures at the same time an accurate, lightweight, and flexible file. Easy to manage and personal. The 3D redrawing operations ensured a greater comprehension of the existing space morphology and problems (for example the identification of walls' deformations).
- ☒ The operations of texturization offered even more clues about the materials and features of the hosting structure, as well as the problems affecting it (for example the observation of distant alterations and deteriorations). Moreover, could add further realism and accuracy to the model without compromising file management.

- The real-time rendering environment, directly linked to the 3D design model (Digital Replicant) solution offered the opportunity to "live" the space. An immersive experience that upscales personal, team, and classroom didactics to another level of engagement and design awareness. VR provides opportunities to change materials or interact with the design solutions from within the Digital Replicant Realm. This fact made a Virtual Classroom Experience possible and rewarding in terms of engagement and results. (Fig. 4 and 5)
- Greater coherence with a reiterative creative problem-solving methodology. A Digital Replicant seems a perfect environment for quickly testing solutions and managing complexity through an interactive and real-time responding digital realm. The Digital Replicant environment helped the students' comprehension of their strategies' application and their repercussions on the whole design system.
- The Digital Realm is a safe and 24/7 accessible Replicant of the hosting space. An invaluable asset for Adaptive Reuse Design, as the discipline benefits from a constant, instant dialogue with the preexisting environment.
- Executable documents (plans, sections…) can be quickly extracted from the one-file digital environment. This leads to a deeper control of design details and possibly greater results in terms of design realization problem-solving.
- The very quick media assets extraction (videos, static renderings, walkthroughs, ...) granted by the real-time rendering environment greatly enhances final design communication in terms of creativity and efficacy. As the content is rendered during the design process, designers can focus on creating engaging multimedia storytelling.



Figure 4. Real Time Rendering made a Virtual Classroom Experience possible opening new frontiers of engagement, student-student and student-facilitator dynamics, and results through real-time strategy-result visualization.

Adopted Methodologies and Equipment

The experimental workflow followed in Istituto Europeo di Design in Academic Year 2022-23, presented in this paragraph should be intended as the achievement of four-years international research of the Author on the topic of Adaptive Reuse Design and Teaching Innovation. This research was started by the author in 2019 in the city of

Changsha, in the People's Republic of China, under a cooperation frame between Politecnico di Milano, DAStU Department, and the Architecture School of Hunan University. More information about this fundamental early experience will be soon available from the Author, a dedicated paper will be published this year.

In this sense, this essay' s previously unreleased experiences have been made possible by a considerable number of preceding partial tests and failures, necessary to first clarify the Author' s vision on the topic, then to create and test the complete methodology described here.

Fundamental experiences were also conducted by the Author' s Design Studio, Rigamonti and Partners Architects, where hardware issues and software exchange uncertain touchpoints have been overcome by testing on professional Adaptive Reuse Design case studies and on different hardware and software configurations.

For what concerns the theoretical background two approaches have been put to system. The approach to Architectural Heritage Reuse have been guided by the Preservation Principles of the ICOMOS Charter. Moreover, the interpretation of the value of Authenticity and the Additional approach to intervention has been greatly influenced by the theories developed in Politecnico di Milano by Marco Dezzi Bardeschi and Maurizio Boriani.

For what concerns the research for a compatible, contemporary relevant, and user-centered new function the methodology followed Stanford Design Thinking's creative problem-solving approach (Meinel et al., 2011). Different Design Thinking Tools were used and adapted by students to the purpose. Mind Maps resulted among the most useful and Miro online software was used as an asset for this purpose.

For what concerns hardware, all digital acquisitions were performed using a Faro Cam2 laser scanner, and the Faro Scene software to produce the needed files. The Points Cloud format of choice was e57, which proved to be a solid and versatile option.

The manipulation of the points Cloud and the creation of several reduced-size files was done using Cloud Compare software. It is important to note the decision to redraw the Points Cloud for easier management of the files and to achieve a deeper understanding of the hosting building' s features, as described in the previous paragraphs.

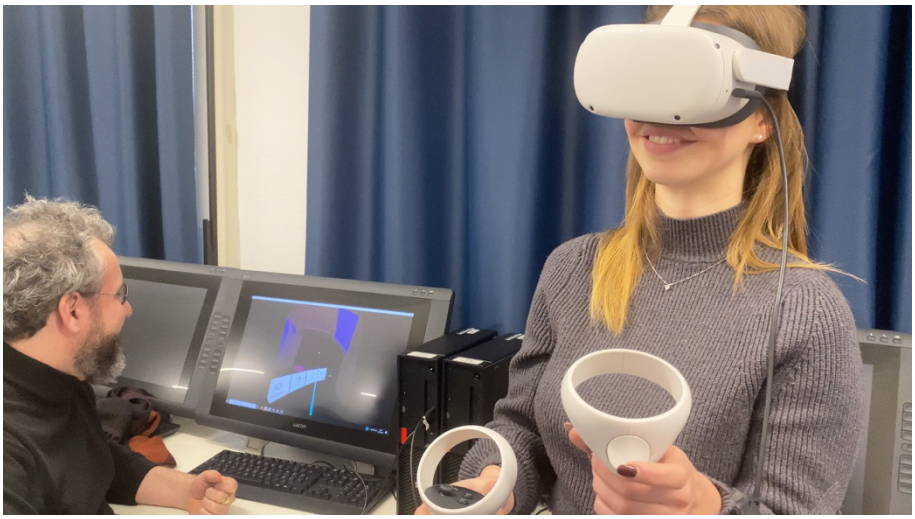

Figure 5. Real-Time VR Navigation offered the possibility to enhance the experience of exploring and controlling the 3D Adaptive Reuse Design solutions.

For what concerns 3D modeling production, as already described, the Author decided from the beginning to let students choose their favorite software. Rhinoceros was by far the students' favorite choice. This fact is most probably due to the software's training possibility offered by the school (a two-year experience), and resulting confidence.

Adobe Photoshop software was very useful in retouching, quickly preparing, and optimizing all Textures, Bumps, and Normals.

Epic Games Twinmotion software was chosen as the Real Time Rendering software. The multi-platform Direct Connection possibility offered by the Datasmith plugin was crucial to adapt to the different student's choices in terms of modeling software. Moreover, Twinmotion offered smart solutions for in-class and individual real-time navigation experiences, and very quick and versatile rendering output solutions (360° panoramas, desktop walkthroughs, raytracing-based static renderings, VR explorations, and more) (Fig. 5 and 6).

Classroom revisions were performed using a class computer and a projector (Fig. 4). The computer was a Lenovo workstation with Quadro p4000 graphic card. The projector had a full-HD resolution which resulted in more than enough for the purpose. The possibility to Project on screen and on an underlying whiteboard, by simply lifting the projection fabric, made revisions more engaging and creative, as solutions and comments could be directly sketched on projections. (Fig. 4)

Real-Time rendering VR Experiences were made possible by a more recent Quadro RTX4000 via direct cable connection to the headset. As we imagined, the Oculus Quest2 VR headset proved to be limited for the purpose, offering a not completely satisfying resolution and fluency compared to the desktop navigation experience. In the desktop version, all student models could be displayed using raytracing lights and reflection calculation algorithm, although the real-time navigation experience was offered to the audience in Walkthrough Mode, preferring fluidity of movement to superior realism. Even at a reduced quality, VR Real-Time navigation experiences offered great opportunities in terms of class engagement and Design Detail Control, in a fun way. The possibility to project the VR live exploration was fundamental to creating a Virtual Classroom Experience. The VR exploration solution unexpectedly proved to be more effective during the Design Development Phase, when controlled and shared by the involved students, rather than a Design Communication tool, when the 3D VR walkthrough experience was presented to the public. This fact convinced the Author to consider this technology in the future more as a valuable classroom asset and a design-oriented tool, rather than a mere visualization experience. (Fig. 5 and 6)

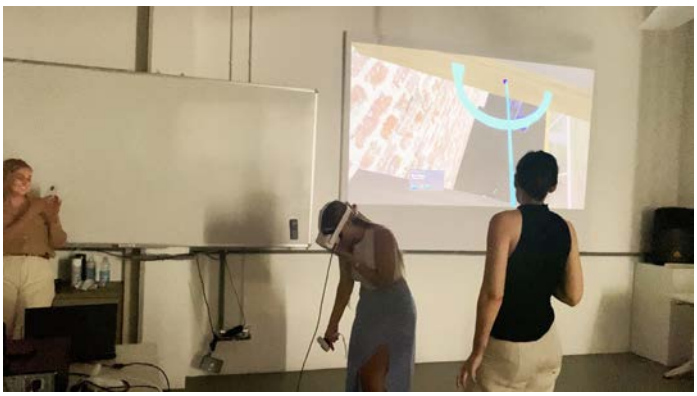

Figure 6. Real-Time VR Navigation offered the possibility to enhance the experience of exploring and controlling the 3D Adaptive Reuse Design solutions.

Overcoming Challenges of Creating a Digital Replicant

One of the biggest challenges was presented by one of the Author’ s aims: let the students, their assets, and their knowledge acquired so far be the protagonists of the workflow. The successful execution of the experiment was made possible by the development of a streamlined workflow that accommodated the limitations of the students' computers. The design and implementation of this workflow addressed technical challenges, ensuring that the digital twin remained accessible to all participants, regardless of their hardware constraints. System requirements awareness of all the specific chosen software was crucial.

The second great challenge was connected to the multidisciplinary nature of Digital Twin itself. To create our Digital Replicant many different software were involved, as described in the previous paragraph. Each of them is subject to system requirements, and most of them are subject to constant updates. This fact was more impactful than supposed on the Classes organization. It was very important to keep track of the software versions and create a class standard. This fact was especially true for the Twinmotion Real-Time Rendering software, which dramatically changed in one year in terms of accuracy, stability, and system requirements. Downgrading software versions was a useful method to overcome software and hardware issues. It is very important to notice that these software fast-paced patch releases often correct problems. It is then important to have a generally safe attitude towards new software releases as a class standard, at the same time try to install fresh updates when specific modeling problems or glitches show up. Interoperability addons versions are very important to manage and control, especially during upgrading-downgrading software releases operations.

On the other hand, the apparent difficulty of giving students freedom of choice on modeling software was overcome more easily than the Author imagined during the three courses' planning phase. It is important to underline, however, that possessing each software’ s sufficient knowledge is recommended to the Class facilitator and staff.

The workflow leveraged techniques such as cloud-based processing for complex simulations, and adaptive rendering techniques to maintain real-time interactivity even on computers with limited hardware resources. Textures optimization, wise rendering light control and limitation, and very careful management of external references or imported objects are core procedures for video game developers. This approach underscored the feasibility of implementing Digital Twins in educational settings, even in cases where hardware limitations might pose a challenge.

Overcoming Phase One Problems (Survey)

Access to historical buildings required permission from the school and the municipalities. This fact required planning the classes’ case studies four to five months ahead of the actual course’ s starting date.

Laser scanning operations required scanners and specialized personnel to operate. Partnership with an advanced surveying service firm was crucial.

Overcoming Phase Two and Three Problems (Modeling and Texturing)

In this Phase, most of the problems were connected to Points Cloud Management. Specific plugins for the management of Points-Cloud were needed and a Points-Cloud density downgrading was often necessary to allow a more fluid 3D redrawing operation.

The principal problem in this phase of 3D modeling operations is details over-modeling, which leads to useless larger files. We managed this problem by constantly intertwining the results of phases Two and Three. Constant testing of the realism offered by textures and textures’ connected features like bump and normal was useful. Every time the result was not satisfactory, a more detailed modeling effort regarding an architectural element

was needed. Deep holes, missing parts, projections, and every architectural feature that should produce a perceptible shadow have been more in-depth remodeled. As a rule of thumb, considering the South Wing of Cusago Castle proportions (a seven hundred square meters rectangular space, ten meters tall) an appreciable result was achieved by modeling projections and holes measuring from five to ten centimeters, up. Every other detail was, in general, managed through appropriate and careful texturing processes achieving a valuable level of realism in the real-time rendering environment.

For what concerns texturing, once learned and tested the bases of texturizing a 3D model for rendering, the biggest difficulties were connected to large textures management, especially in terms of positioning, but all issues could be solved with a careful alignment operation.



Figure 7. A picture of The South Wing of the Cusago Visconti Castle. The Author’ s 2022-23 Thesis Students were asked Adaptive Reuse Design Proposals for the Social Reactivation of this space.



Figure 8. Comparison between Points-cloud visualization (Left) and the Real-Time Rendered Digital Replicant Virtual Space representation (Right) of the Visconti Castle’ s South Wing.



Figure 9. One of the Static Renderings Extracted from the Real-Time Environment, illustrating one of the student's group Adaptive Reuse Design Proposal.

Overcoming Phase Four Problems (Research, Analysis, and Concept)
The main problem that occurred during this phase is quite common in Interior Design Studio Classes: A clear connection between identified values and strategies is often missing. The design challenges offered by Adaptive Reuse Design are in fact innately connected to the complex and polyhedral nature of the discipline. Mind maps were an essential tool to control the early design phases of strategy making. Weekly based round-robin class presentations helped strengthen connections and identify weaknesses in the research-analysis-strategies-concept process and touchpoints.

Overcoming Phase Five Problems (Test, Fail, Repeat)
All problems in this Phase were related to the Modeling and Real-Time Rendering Software Plug-in correct installation. Once the live link was established all major problems were solved permitting a very fluid design management. Sometimes uncareful management of file names within the groups created confusion. A careful file-naming code setup solved these minor problems easily.

Overcoming Phase Six Problems (Executables and Media Creation)
The extraction of executables was a very easy operation once a detailed and complete 3D model was created, and all its parts correctly tested in a Real-Time Rendering Environment. Twinmotion offered a very simple and quick extraction of videos and a variety of other Media content. A Deep understanding of this software was needed but achieved in a few hours by all students, completely compatible with the Courses' schedules and operations.

Overcoming Phase Seven Problems (Laser-cut and 3D printed maquette)
To reduce production time and costs, only one model representing the existing Castle conditions was produced. Every group, in turn, could install their specific design proposal maquette representation. Moreover, Laser-cut production was favored, while 3D printing was reserved for a few elements. QR codes linking to multimedia

products were inserted in the model to create a more engaging experience for visitors.

Future Directions, Implications, and Scenarios

As the experiment results are encouraging, the workflow direction will be maintained in further research development. This means a continuous adaptation to software releases and new features is needed.

Hardware may be upgraded so that a raytracing level and real-time rendered walkthrough will easily improve the overall visual experience dramatically.

The introduction of AI tools in Phase Four: Research, Analysis, and Concept Creation is already planned by the Author, and a test is ready to be performed in Academic Year 2023-24.

The introduction of BIM software as a modeler is also already under testing since 2018, and the results in terms of workflow fluidity and design control at all stages are more than encouraging.

The possibility to leave the modelling software choice open to students is in any case a plus and will still be maintained. But BIM software technologies will always be suggested by the Author.

AR implementation will be considered, but the proximity-related issues considered in the previous chapters will remain a possible gap, now, toward the full integration of this technology in Adaptive Reuse Design.

The use of Unreal Platform will open more AI implementation scenarios, intended as live interactions with AI-assisted operations to be performed inside the Digital Replicant Realm. We can imagine receiving suggestions in terms of design optimization or load metadata (like tomography or spectrometry data, for example). And much more.

In general, this experience convinced the Author that Extended Reality Training will play a fundamental in future scenarios of design learning. Specific topics and learning experiences can be staged inside specifically conceived Digital Replicant Realms.

All these future scenarios will be researched but a balance between what can be implemented without affecting the overall fluidity of the design experience will be the benchmark, from the author’ s point of view, of the quality of the didactic experience.



Figure 10. Students exploring and sharing Virtual Experiences during the last weeks of The Digital Replicant Adaptive Reuse Design Studio Class.

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Towards a multidimensional view of the body in HCI

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Abstract

With the Third-wave Human-Computer Interaction (HCI) shifting towards the Phenomenologically-Situated Paradigm and computing technology becoming integrated with the human body, the body has garnered increased attention in the HCI field. The body is an inherently complex and ambiguous subject, and the ongoing development of technology and societal transformations continually brings the body into emerging issues. The body in HCI also involves diverse viewpoints and practices, which is still an unstable concept. Since the "corporeal turn" in the 1980s, Humanities and Social Sciences have delved deeply into the body, providing a multidimensional understanding of the body. This foundational exploration has also informed discussions and reflections on bodily matters within HCI. Hence, we reviewed relevant Humanities and Social Sciences theories regarding the body to create a cognitive framework encompassing three perspectives: the phenomenal body, the technological body, and the social body. We further introduced this framework into HCI, aiming to clarify the concept of the body and reevaluate practices related to the body within HCI. Furthermore, this article reflects on the potential challenges that technological advances may bring to the body, calling for more attention and reflection when dealing with the body in HCI within the context of evolving technology and society.

Author keywords

multidimensional view of body; Human-Computer Interaction(HCI) ; critical reflection

Introduction

Third-wave HCI treats interaction as a form of meaning-making in which interaction aims to support situated action and meaning-making in specific contexts (Harrison, 2007). The concept of "embodied interaction" proposed by Dourish traces back to phenomenology, bringing the body into the core of situated action and meaning-making (Dourish, 2001). In Merleau-Ponty's theory, the body serves as the nexus of all perception, forming the basis for the human experience of the material world. The process of human perception commences with the body, where each part actively engages when we interact with external objects. We direct ourselves towards the external world through bodily intentionality, and the meaning of the world unfolds via the body. Therefore, the body is essential in interacting with humans and external things.

As computing technology moves onto the human body, diversified discussions and practices related to the body have become increasingly present within the field of HCI. The body is inherently intricate and elusive, evolving diverse meanings in different contexts, and the same holds for the body in HCI. Disciplines like phenomenology and sociology have provided comprehensive discussions of the body, which offer multiple perspectives for analyzing the body in HCI. Consequently, through a retrospective examination of the body related theories in the Humanities and Social Sciences, we endeavoured to summarize a cognitive framework for the body and then introduce it into HCI.

The cognitive framework of the body

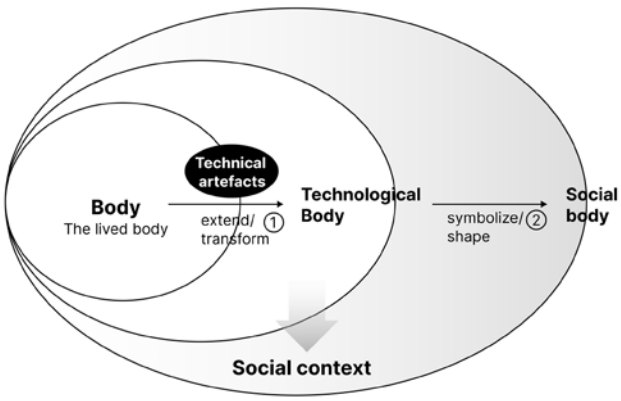

Figure 1. The cognitive framework of the body

The body occupies an absolute spatial position, just like other objects present in the perceptual world, and people can directly perceive the existence of the physical body. Such a body has long been suppressed and devalued in the history of Western thought. Rene Descartes' mind-body dualism has profoundly impacted modern philosophy, which excluded the body from the cognitive process and positioned it in opposition to consciousness. Phenomenology of the body has sparked a vivid resurgence of the lived body. Merleau-Ponty defines the body as the "phenomenal body", representing the unity of the objective, material body and subjective, lived experience (Merleau-Ponty, 1962). He says our perception of the world is embodied and shaped by our bodily experiences, movements, and senses. Hence, our perception is not passive but a skillful and active engagement with the world, and meaning is not something inherent in objects but is constructed through our embodied interactions with them. From this, we can see an active and lived body-subject, which is the bond between humans and the external world. People can interact with the world only with the lived body, perceiving and gaining meaning.

The lived body itself is, in fact, the becoming body, which is co-constituted by its interactions with the external world and things. "The blind man's stick has ceased to be an object for him and is no longer perceived for itself; its point has become an area of sensitivity, extending the scope and active radius of touch and providing a parallel to sight (Merleau-Ponty, 1962)." Through the example of blind individuals and canes, Merleau-Ponty illustrates that the lived body could integrate tools into its perceptual-motor system. During its use, the cane gradually becomes incorporated into the body of blind people and extends their physical ability. Merleau-Ponty's theory revolved around the body, while Don Ihde argued that Merleau-Ponty lacked consideration from the technological dimension (Ihde & Selinger, 2004). Ihde's view of technological mediation theory posits that

technology is a mediator between human beings and their engagement with the world. Technology becomes integral to our sensory and perceptual experiences, influencing how we understand and interact with the world. He referred to this phenomenon as "technological embodiment" (Ihde, 1990). In modern society, we are surrounded by diverse technologies. Full engagement with technology leads to a symbiotic relationship between the human body and technology. Technology becomes an extension of our bodies, allowing us to perceive and perform in new ways. Thus, our bodies are all already technological bodies.

The body is also the social body. Both technical artefacts and the technical body are embedded in the formation and changes of social systems, constrained by forces such as culture and society. Therefore, the body possesses natural and social attributes belonging to individuals and the broader social environment. The body is deeply embedded in social discourse. As Foucault put it, the body is constituted within the specific nexus of culture or discourse/power regimes (Butler, 1989). Modern society is like a beautifully made "panopticon (Foucault, 1975). The constant surveillance within the panopticon induces individuals to internalize norms and rules, leading them to discipline their bodies according to societal expectations. In everyday life, people carefully present themselves to others in ways that align with societal norms, roles, and expectations (Goffman, 1959). The body plays a central role in this presentation, as it is the most visible aspect of an individual's identity. People use their bodies to communicate messages about their lifestyle, social class, and personal aspirations. With the advent of consumer society, the body becomes a canvas for the consumption of signs, symbols, and desires (Baudrillard, 1970). Consumer culture promotes new body ideals through advertising, media, and popular culture. Consequently, it influences individuals' efforts to attain those body ideals. Shaped by cultural and social factors, the body becomes a highly symbolic and socially constructed entity, conveying specific cultural and social meanings.

Body phenomenology attempts to break the duality between body and mind by offering a holistic and embodied perspective on human experience, bringing the lived body back to the life world. The development of technology, while extending the lived body further into the external world, continuously breaks the body's boundaries, ushering in the emergence of the technological body. However, both technology and the human body are intertwined with society. Thus, the body is a sociocultural construct subject to society and culture. We integrated various body dimensions and establishes a framework for understanding the body (Figure 1).

The cognitive framework of the body in HCI

The body as the source of HCI: from the physical body to the phenomenal body

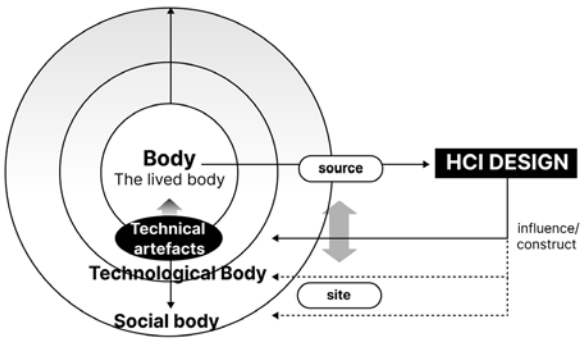

Figure 2. The cognitive framework of the body in HCI

The body in HCI is also an inherently complex subject encompassing diverse discussions and practices. Thus, we further introduced the cognitive framework of the body into HCI (Figure 2), intended to critically examine the body in HCI and analyze the relationship between HCI and the body.

Influenced by Western traditional philosophy and the traditional paradigm of cognitive science, the body in HCI has also undergone a shift from the physical body to the phenomenal body. The first wave of HCI was inspired by industrial engineering and ergonomics, aiming to optimize the fit between humans and machines. The second paradigm of HCI research focuses on computational capability, information processing and transmittal (Harrison, 2007). These two paradigms view the body as a material, mechanical entity subjected to the mind, denying the essential role of the body in HCI. Therefore, the body appears scattered or absent in early HCI practice and research. The physical body is merely considered one of the factors to consider in ergonomics and quantified into objective data.

The third-wave of HCI introduces phenomenology theory and strongly emphasizes meaning-making, situated knowledge, and experiences. Paul Dourish's concept of "embodied interaction has significantly contributed to the perspective that interaction is fundamentally an embodied phenomenon (Dourish, 1999; Dourish, 2001). He argues that the body plays a central role in engaging with and making sense of the world. The body's sensory experiences and actions are integral to constructing meaning during interaction. However, the body here is not merely an objectified, physical body. Instead, it is the active phenomenal body. For example, interacting with digital screens involves not only physical touch but also the active engagement of all our senses. We can feel the touch of the screen, see the visual information from the interface, and even hear auditory feedback. All our senses interconnect and integrate during interaction, forming a holistic perception. Only emphasizing the mind or a single sense could not represent actual perception and experience. Therefore, when designing HCI systems, designers should view the body not as a collection of separate parts or senses but as an integrated and inseparable entity. The key to enhancing cognition, interaction, and experience during the interaction is to consider holistic bodily experience and perception, and so does the situated context (Noë, 2004).

Ongoing research into the body seeks to incorporate the phenomenological body into all design stages. Some studies encourage designers to invoke a first-person perspective and apply their own bodies and bodily experiences as resources (Svanæs, 2013; Svanæs & Barkhuus, 2020). Other research attempts to create more natural and immersive interactions that fully engage the body by aligning with natural bodily movements and sensory experiences (Kozel, 2010). The HCI community has already realized the existence of users' phenomenal bodies. The lived body, which stands at the core of all human interactions and meaning construction, is an essential source for the design of HCI.

The body as the site of HCI：the technological body and the social body

In the HCI community, the lived body is also becoming the site of design (Britton & Semaan, 2017; Homewood et al., 2021). Modern technology is constantly breaking down the body's boundaries, and HCI is showing us entirely new ways of body modification. The emergence of a series of new technologies in HCI, such as wearable computing, has led to a fundamental shift from human-computer interaction to human-computer integration (Britton & Semaan, 2017). By designing and manufacturing technologies that appear on the human body, HCI influences perception, behaviour, and presentation of the body, thus participating in the construction of both the technological body and the social body.

Wearable computing and some other technologies in HCI are transforming the surface and even the body's interior into sites of technology. In addition to being physically closer to the human body and coexisting with the body for longer durations, these technologies also demonstrate the potential for deep integration with

bodily perception and behaviour. When we use these technologies, we will not pay attention to the presence of the technology itself and almost forget they are there. These technologies are transparently merging with our perceptual capabilities thanks to their computational capabilities (Rapp, 2021). For example, during the use of wireless headphones, we will not pay attention to the presence of headphones. Instead, we focus more on audio content. The subject's intentionality flows freely towards the object without being stopped by the device as if it were a part of the subject's body (Liberati, 2020). Thus, the classical perceptual pole of a subject has to be turned into a symbiotic union of the subject plus the technology (Don Ihde, 1990). Further technological advancements enable technical artefacts to dynamically and proactively change our perceptions without our active control or intervention. They coordinated with body perception and behaviour, intentionally compensating for the human body's limitations. Still taking headphones as an example, some smart headphones' active noise reduction (ANR) technology can significantly reduce unwanted background noise by actively picking up and cancelling out external sound, enhancing our perception of the audio itself. New technologies like this all operate proactively without the body's awareness, transparently integrating novel perceptual modalities into our perceptual apparatus (Rapp, 2021) as if a new "organ". When the body integrates these technologies, the body is altered or extended by these technologies, and our perception and behaviour are all mediated by these technologies. In other words, HCI design and technology can mediate our perceptions of our physical and external worlds (Loke & Robertson, 2011), even furthering our behaviours. HCI enhances or alters the human body by designing and manufacturing these technologies. Skin interfaces and implant technologies further change how technology integrates with the body, accelerating the complete emergence of the technological body. Practices and research in the HCI community tend to apply various devices to the human body. "We hack ourselves with electronic hardware to extend and improve human capacities (Ramoğlu, 2019)."

In addition, when technologies are placed on bodies, they inform the aesthetic and communicative layer of fashion, which constitutes people's social bodies (Tomico et al., 2017). They serve as symbols of expression and communication, shaping how humans behave in everyday life and how individuals present themselves to the external world (Bernabei, 2017). These technical artefacts often go beyond their functional purposes and become means of self-expression and identity construction. These artefacts might communicate a strong symbolic meaning related to the wearer's lifestyle and value that signals membership in a specific cultural taste (Nieroda et al., 2018). Thus, People wear these artefacts to communicate their desirable body images. Taking the example of the Apple Watch, to some extent, they signify the wearer's concern and pursuit of their health status and quality of life. The use of different visual styles of wristbands further signals their social status and identity, such as "tech savvy", " business elite", or "fashionista". Thus, these artefacts attached to the body can be seen as part of the social system of reproducing symbols and identity through consumption and display (Barnard, 2014; Entwistle, 2023). They integrate into people's daily lives, becoming a meaningful part of their bodies and participating in constructing multiple manifestations of the body. These technologies in HCI further shape the body inwardly through functionality and interaction logic. For example, wearable self-tracking technologies turn people's behaviours, habits, and health metrics into detailed data and give corresponding recommendations and guidance. In this way, societal norms about body image or health can lead individuals to track certain metrics or engage in specific health practices to conform to these ideals. Under the influence of societal goals and ideals constructed by society, individuals actively self-regulate their bodies. Therefore, whether from the symbolic or functional dimensions, these HCI designs related to the body are complex practices embedded in the construction of the social body.

From the physical body to the phenomenal body, the body gradually moves to the core of HCI and becomes the

essential source for interaction design. However, with the HCI moving onto the body, the body is also becoming the site of HCI. By designing and manufacturing a series of technologies attached to the human body, HCI participates in the construction of the technical body and the social body. The body in HCI is both the source and the site (Figure 2).

The objectification crisis of the phenomenal body

When the body becomes the site of HCI, technological advancement endows the body with increasing possibilities while presenting unprecedented risks. Technology may dominate or fragment the body into digitized and constrained pieces dictated by societal discourse.

When HCI technology moves onto the body and expands further inward, the subject is remade and redesigned, which implies that the body is seen as a material that can be changed, expanded or even reduced. The boundaries between the body and technology become blurred. People increasingly relinquish the essence exclusive to the human body to technology (Yan & Cao, 2020). As mentioned, some technologies have already demonstrated the potential to alter human perception transparently and actively. As technology advances and is endowed with a certain level of intelligence and autonomy, technology no longer remains a tool subservient to human beings. Technology may possess its own logic, rules, and even the potential for self-evolution. If abused or improperly designed, technology may potentially deviate or even completely diverge from the original purpose of the subject, exerting reverse dominance and control over the body. In that case, human behaviour may become subordinate to technology, and the body may no longer be the active subject but a passive and objectified technology dependency.

Moreover, these technologies integrating various sensors indeed expand our knowledge and perception of ourselves and the external world. However, these technologies also, to a greater or lesser extent, fragment our bodies and our perception of the external world into digitized and structured pieces. Just as self-tracking technology turns our behaviours health metrics into detailed data, and even emotional dynamics are all quantified as objective data obedient to various standardized scientific discourses. The body seems to be an active subject that strives for healthy living, an ideal body, and other goals. Actually, it is a site where power relations and knowledge are enacted and inscribed. Moreover, "quantification" and "tracking" have gradually changed from means to the very purpose. People's bodily experience and motivation to keep exercising all rely on data feedback, which may fundamentally change the individual's understanding of the body and bodily experiences. The range and abilities of human perception have steadily expanded. At the same time, the body itself has been relegated to objectified objective knowledge, easy to grasp but also easy to control by technology.

The body in HCI returns from the physical body to the body-subject. However, it is again faced with the c crisis of being objectified by technology and social discourse. When technological advancements turn the body into a site for design, the choices made by designers can potentially bring the body in danger. We must rethink grasping and conceptualizing the HCI design practice in this context.

Conclusion

The body in HCI is also the becoming body, presenting different patterns as it interacts with different technologies in various social contexts. Through a review of concepts and theories related to the body in the humanities and social sciences, we proposed a cognitive framework of the body. We further introduced this framework into HCI and reflect on the potential issues the body may encounter. The lived body is the foundation of understanding all concepts related to the body. When HCI design possesses the potential to change or even

reconstruct the body, even a slight misstep could potentially lead the lived body into a crisis. The technical artefacts created by design are not independent objects outside the body but are closely related to the body. Designing technological objects is designing the body itself. We should pay more attention to the body's subjectivity in HCI design practice to avoid the objectification and alienation of the body-subject. In future work, we will continue to reflect on these issues critically. We also advocate for more attention and discussion of the body in HCI.

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Visualization Exploration of Facial Image Distortion and Reshaping Under Digital Technical Conditions

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Abstract
Technology and digital media intertwine, shaping a visual world that challenges traditional bodily perceptions. As a vital medium for perceiving the world, the body undergoes multifaceted reconstruction and transformation within this emerging communicative context. With continuous advancements in image capture technology, this transformation offers richer avenues for visual expression of bodily images. Focusing on facial images as a subset of bodily representation, this study delves into characteristics of facial image transformation in terms of color, form, and structure. It introduces a novel visual approach which combined digital technology and artistic creation, to create a virtual face that simulates hyperreality. In order to upgrade and break the visual limitation of the real body, create special visual landscape.

Author keywords
Digital technology; Facial images; reshaping; Visualization

Introduction

In the digital age, the pervasive influence of internet and digital technology has transformed daily life. Data has become central to production, fostering new media forms. Images, as humanity's primary mode of expression and communication, now play a pivotal role in new media communication. According to Marshall McLuhan's, "The age of the image is coming"(Marshall McLuhan.,1994, p39). In this context, "image" refers to dynamic, unstructured data in varying lengths, shapes, and forms, shaped by digital technology. This transformation is especially evident in bodily images, which are becoming distorted. Artists have developed a more diverse understanding of bodily images, no longer merely representing the physicality and normativity of the body, but transforming it into symbolic representations.

Facial features, rich in identity symbolism, frequently appears in digital world. Highly digital technology redefines the face by deconstructing traditional physicality, distorting facial images and reinterpreting related works. At present, the researches on facial images are focused on the fields of computer technology and social science, and few people focus on exploring the alienation of facial image from the perspective of visual aesthetics. These phenomena pose challenges to the current methods of acquiring and visualizing facial images.

Related studies

Facial image alienation

During the process of visualizing facial images in digital space, due to the close-up features of image technology and its selectivity towards specific parts, the face is often fragmented and objectified in the images. Each part,

such as the eyes, lips, eyebrows, is zoomed in on and isolated from the whole, forming disconnected and scattered fragments. Body images are becoming increasingly digitized, fragmented, and idealized. This image-oriented approach breaks down the overall integrity of the face, turning the complete body into separate part images and establishing boundaries for the body. Some even hold the post-human perspective like N.Katherine Hayles believes that human body has long been deconstructed by information technology. Some other scholars argue that this deconstruction-induced alienation has stripped facial images of their agency, rendering them mere symbols, leading to the body being disregarded and subjugated.

Research status of facial image visualization

In the early digital art era, artists used cameras to replicate human form precisely. Yousuf Karsh restored facial details through portrait photography. With VR's emergence, artists gained innovative tools. Shen Li, Liu Yiguang, and Xiong Zhiyong explored facial recognition progress since the 1970s. Huang Yanhui developed facial detail restoration methods, enhancing fidelity through intricate facial restoration.

Although the new visual approaches brought about by digital technology have a novel impact on facial senses, this study believes that this alienation is a way to accurately interpret the body from a postmodern perspective. Through the concept of deconstructive fragmentation, faces are shattered, overlaid, and reconstructed, emphasizing the importance of each facial organ. By using facial components themselves as creative elements, opposing wholeness, fragmented and uncertain feelings are generated. This decentralized organizational pattern allows the face and the entire body to exhibit a more open and dispersed distribution trend, which paradoxically becomes more vital when facing the challenges of the current fragmented information space. It bestows facial images with more realistic value and visual forms.

Design concepts

Reliable visual outcomes necessitate collaborative efforts across the realms of digital technology, design thinking, and artistic research(Fan Xiang., 2020, Visual design vision of visual art research). Thus, this research integrates the technological and artistic aspects of facial image capture to unlock the potential of new tools in the field of image visualization.

It systematically explores face representation in digital media, expanding on prior distortion research to uncover reshaping possibilities. Current scholars fuse digitization and visual arts, like Shukai (Shukai Wu,2022,RefFaceNet: Reference-based Face Image Generation from Line Art Drawings).Who introduced "Ref Face Net" to generate line drawings from facial profiles.

Our preliminary phase establishes a style framework for visual features in virtual spaces. In an era where everyone has grown numb and aesthetically fatigued by precision, beauty in facial visualizations, the capabilities brought about by computers, such as replication, scanning have led digital images to pursue a kind of "order of errors," embracing randomness, chance, unveiling fresh expressions. This initial phase involved objectively summarizing basic visual elements and characteristics to precisely translate later abstract and reshaped images. The definition stage purpose is to employ various technologies to acquire facial image information and data, defining problems and setting goals to challenged ingrained body concepts and artistic approaches. The exploration phase generates design concepts, shifting focus to imperfect states for innovative facial image visualization. The prototype phase employs various technologies like Midjourney and 3Dscanner to acquire facial images, so a rational image acquisition pattern was established, extracting features from virtual space and glitch art to form a logical transformation process from the initial image to distorted results. Meanwhile enhancing facial organ visualization involving technology through collage, painting, and digital modeling.

Specific methods of visualization

Each organ's transformation introduces new symbolic meanings and visual impacts. Through digital technology, facial organs are repositioned and reconfigured, becoming primary artistic elements with renewed significance. So this study breaks down the face into separate organs, elaborating on examples such as eyebrows, teeth, and ears in the following sections.

Beginning with eyebrows, 3D scanning methods encompass point cloud, radar, and depth-sensing camera. Laser scans rapidly create virtual 3D models. Also, lectronic microscopy provides micro-level visualizations.

For teeth, we use ChatGPT generates descriptive text input into Midjourney, producing novel teeth through AI algorithms. Observing the AI generation process reveals that when generating facial organ images, AI converts "tooth images" into various probabilistic outputs such as data, instructions, and code, fundamentally deconstructing the materiality and stability of teeth. Finally,seven different forms of teeth are generated, each in a different direction of variation.

Finally, five volunteers are invited to using a high-definition scanner to obtaining high-quality reconstructed ear images. An image retrieval method is then used to extract a massive visual library of facial images. Utilizing the search engine in the digital device's album, further narrowing the focus to the ear region.

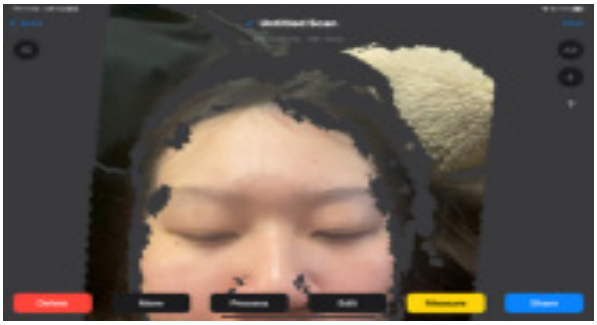

Figure 1. Capture the image of eyebrow

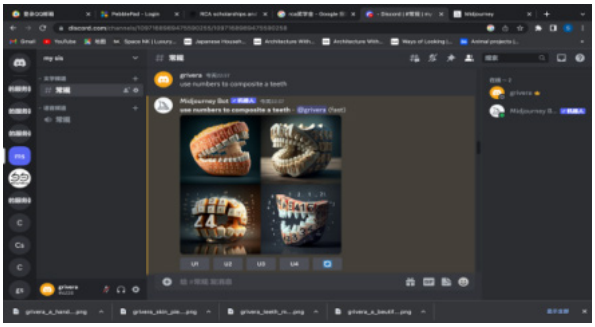

Figure 2. Develop teeth image from AI image generator

Further Visual Creative Processes

Building upon these obtained images, the study begins to reshape facial images. The study employs high-saturation neon colors to mention unreality, randomly integrating them into facial images for an enhanced virtual sense.

Next, the author simulates digital display compression, horizontally and vertically compressing scanned eyebrow images. Recognizability diminishes and fine details vanish as compression increases. This controlled phenomenon meets transmission needs but transforms the shape into abstract lines, creating a new artistic form.

Continuing, the author delves into the microscopic analysis of eyebrow structures using associative thinking. From this perspective, it is discovered that eyebrows share significant similarities with barcodes within this medium. Subsequently, the author generates five QR codes based on the prototype of eyebrows. These QR codes, patterned and arranged through encoding, create unique identifiers. Each QR code carries specific information and data, enabling rapid and accurate recognition and interpretation of eyebrow images.

Using dashed lines often implies the absence of an object. In reconstructing teeth, the author utilizes Photoshop software's dashed line selection tool to create images of two thousand teeth. This visualization is intended to metaphorically represent the nonexistent virtual teeth within the context of the internet.

As for the ear section, collage and modeling techniques are employed, combining the unordered nature of virtual space narrative with cut sections assembled in new ear forms.

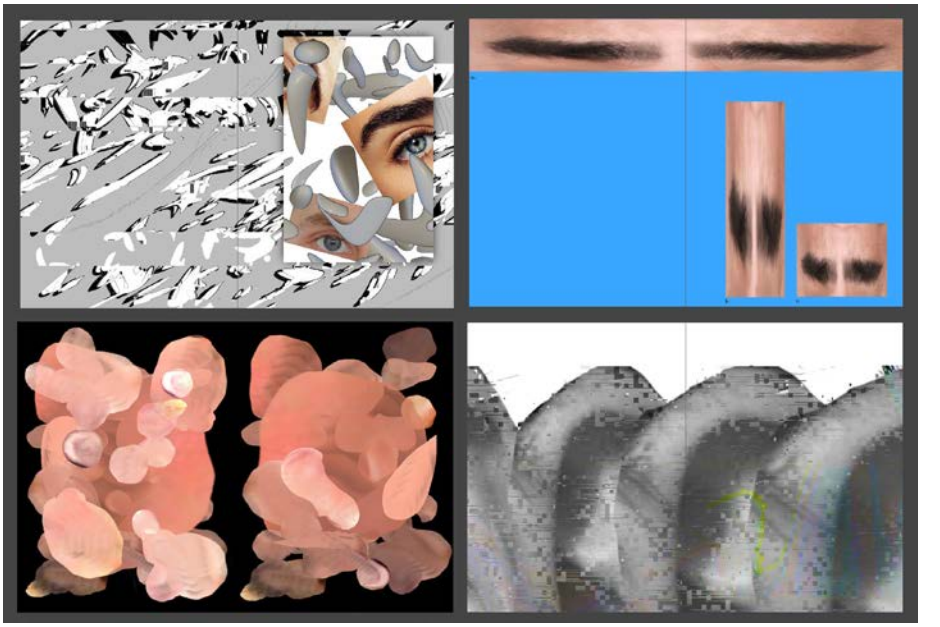

Figure 3. The new forms of eyebrows and ears

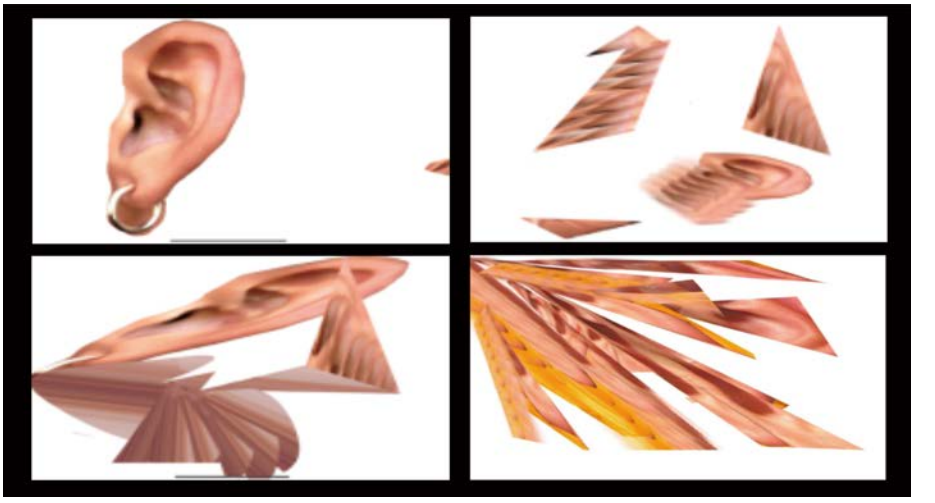

Figure 4. The process of creating a new ear

Conclusion

Using new digital technologies, our study focused on facial image alienation and remodeling, utilizing tools like Midjourney and 3D scanners. Simultaneously, our study introduced the visual value of "malfunction" and "randomness" in visualization, seeking innovative paths for image creation techniques, thus offering new perspectives and approaches for artistic depiction of facial organs. Also the new way of deconstructed and reconstructed virtual body superimposes different meanings with different transformation modes, achieved the extension of the value of the virtual face. However the limitations of this study included tech constraints

and small volunteer group. Future goals involve interdisciplinary work for human-computer interaction and metaverse virtual identities. We aim to incorporate senses like sound, smell, and touch for diverse virtual facial representations. Moreover, we'll turn our goals from physical aesthetics to visually stunning experiences controlled by digital technology, embracing the uncertainty in AI era.

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Advanced Design for human-non-human digital and creative ecosystem

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Abstract
Contemporary societies are experiencing local and global challenges which have highlighted the complex nature of our present and its systemic problems; in this context, human actors find themselves collaborating and interacting with new technological tools which are becoming increasingly relevant in daily activities. The main changes concern the relationship between human/technology and human/environment, whose relations are in continuous transition and evolution. This new collaborative modality allows us to imagine new future scenarios and design spaces where human and non-human agents cooperate and interact, producing increasingly accurate information and artifacts. In this contribution we discuss possible strategies for integrating Advanced Design (AD) methodology with the growing availability of technological tools and data. In particular, we argue that the support of technology and the information it produces in design drive processes is helpful in establishing an empathic relationship with the heterogeneity of agents that inhabit the ecosystem and can foster more conscious and sustainable processes and innovations.

Author keywords
Advanced Design; Non-human Actors; Data; Methodology

Introduction

Contemporary societies are experiencing social, environmental, and institutional challenges due to critical issues intertwined in complex and systemic problems, creating a confused and troubled present (Haraway, 2016), where different actors, such as individuals, public administration, companies, researchers and environment, find themselves collaborating in different contexts and relating to new technological tools and system which are becoming increasingly relevant in daily activities.
Climate change, increasing economic inequality, and the clear criticality of the current economic system, characterize today's society and identify it in the concept of "permacrisis" (Turnbull, 2022), or "polycrisis" (Lawrence, Janzwood & Homer-Dixon, 2022), which is defined as "a series of serious long-term challenges, now often labeled as global systemic risks".
Due to its specific features, the concept of crisis offers a dual perspective: it can be conceptualized as an

opportunity for progress, but at the same time it can be seen as a contradiction between opposites forces that allows for acceleration from past to future (Koselleck & Richter, 2006; Turnbull, 2022), observing how the resulting impacts are interconnected.

The topic of acceleration and overlapping, in turn, is identified by the increasing velocity at which transformations are happening across society, culture, and environment. Technology-driven transformation has a noticeable impact on human cognitive, creative and social skills and evolution (Hayles, 2012; Stiegler, 1998). Potentially, every aspect of human daily activity is mediated by interaction with technological interfaces. According to models of embodied and extended cognition, digital interfaces and media shape not only the way we think but also our bodies (Clark, 2008). On the other hand, the productive system struggles to adapt to such transformations due to its intrinsic inertia. Although initiatives such as Industry 4.0 support and finance technological innovation in the industrial sector, established manufacturing processes, especially in heavy industrial sector, still rely on significant amount of energy consumption, raw material extraction and cheap labor cost.

In order to address such challenges, community-based and shared vision presents itself as a possible opportunity to address such complexity and foster a transition to a more sustainable future (European Commision, 2019), including solutions derived from collaborative actions and integrated planning among the ecosystem of actors and tools, through multidisciplinary approaches (Akata et al., 2020).

Design cultures have developed design spaces and approaches to managing such complexity assuming different characteristics depending on the context; currently, digital technologies, such as machine learning and Internet of Things, have begun to permeate design-driven disciplines, leading the design community to ask different questions about the ways in which design is done (Giaccardi & Redström, 2020). Among these approaches, Advanced Design (AD) has focused on the time factor as a central parameter to consider in developing design-driven innovation (Celaschi, 2015; Celi, 2010, 2015). Together with the adoption of anticipatory and speculative practices (Celaschi et al., 2018; Celi & Formia, 2015), advanced designers engage with multiple specializations and disciplines to decode the complex structure of possible future scenarios.

In recent decades, the growing availability of electronic devices equipped with a variety of sensors and interconnected through mesh network and to the web, has generated a layered structure of digital georeferenced information (Zannoni, 2018). Social transformation can be observed by applying computational methods on cultural data (Manovich, 2020) as well as climate change is studied through the analysis of environmental data. Over time, data has become a central aspect to consider during the design process. However, the complexity of connecting data between the global and the local dimension emerges due to both the heterogeneity of collected information and the definition of an appropriate knowledge structure (Cattabriga, 2022).

The successful or adverse relationships established among those participating in this transition are also constantly evolving, and one of the major changes concerns the relation between humans and technology, and between humans and the environment.

These interactions have enabled a process of consciousness-raising in relation to the diversity between individuals themselves, context and technological tools, where the concept of difference assumes the characteristics of an ontological source of societal empowerment which, however, allows for the connection of the individual with the collectivity itself (Haraway, 2018).

The heterogeneity of society is reflected not only in the identity of individual people but also in the defining characteristics of the physical objects and technological systems with which people interact every day; this redefinition of the relationship between human and non-human, decreases the gap between physical and digital worlds, detaches itself from standardized ideals and accepts the fluidity of bodies (Ferrando, 2017). In fact, it

is possible to identify a new space for the expression of the individual, of personal exploration and relationship with technological tools where corporeity is no longer defined by its material characteristics but assumes the definition of virtual corporeity (Braidotti, 2018). Human and artificial capabilities interact and define new forms of relationship, immateriality of bodies and overcoming of social patterns, according to the concept of glitch, that is an error in the corporeity of the binary society that is identified thanks to digital tools (Russel, 2020).
In this contribution we discuss the possible strategies to integrate the AD methodology with the growing availability of data. In particular, we argue that using data to establish an empathic relationship with the heterogeneity of agents that inhabit the ecosystem, can foster more context-aware processes and innovations.

Design-driven innovation in complex environments through Advanced Design

The transformations taking place in the relationship between people and digital tools have made it possible to initiate a series of experimentations and identification of possible future scenarios related to the evolution of this interaction and to figure out what could be the ways to develop a multi-agent collaborative process, moving from the concept of "Human-machine interaction" to that of "Human-machine Cooperation" (Hoc, 2000) and heteromation (Ekbia & Nardi,2014), introducing a collaborative and knowledge-sharing aspect.
Collaboration represents a human behavior naturally present in people's genes, but it is a capacity that must be exercised and deepened to foster an environment and context that can lead to open, cross-sectoral (Sennet, 2012) and responsible innovations (Blok & Lemmens, 2015). The theme of cooperation acquires particular relevance when included in the current process of digitization of our society, which is considered among the most relevant changes taking place and is an intrinsic condition of today's society (Escobar, 2018).
In fact, technological support to human, cognitive and operative capacities (Monari & Baraldi, 2020) can be an asset for policy making, public interest actions, and innovation of operational and project processes (Hoc, 2000), stressing the need to identify hybrid spaces which allow the co-existence of human and non-human agents.
According to this perspective, technological systems, their development and the information it produces would no longer be neutral and indifferent from a functionally and ethical point of view (van de Poel, 2001) but becomes an agent who interacts and actively participates in the design process, initiating a context in which human actors design not for technologies but with technologies (Giaccardi & Redström, 2020).
The experience of these digital systems is undergoing a change. In fact, the industrial design artifact is created to perform a function in relation to an operator (Troncon, 2016), becoming a complex performance of object properties and senses according to the Donald Norman’ s affordance concept (Norman, 1988, 2007, 2011, 2013) and the relationship with the "ecological psychology" (Gibson, 1979) theme of the surrounding environment; technological systems and the data produced by them, become active agents of the process in the mode of "co-performance," (Kuijer & Giaccardi, 2018; Giaccardi & Redström, 2020) i.e., an approach to design where such objects collaborate together with people, introducing the possibility of conceiving the artificial activities of things as a decentralized design practice in a hybrid mode based on intentionality and experience (Akata et al., 2020; Kamar, 2016). This 'co-productive' aspect introduces the field of socio-technology, a field of innovation in which complex technological systems have a political, ethical and environmental impact wherever technological development involves a heterogeneous combination of human and non-human elements. (Vermaas, 2011).
Accepting this multi-agent collaborative vision, it is therefore necessary to inquire in what way design disciplines and cultures can evolve through the presence of non-human actors participating in the process, overcoming the limitations due to the current approach of a few methodologies, such as Human Centered Design.
As the human agent opens to new forms of co-operation, it is important to identify future scenarios and new design spaces based on the more-than-human concept, including technologies in the discussion.

Therefore, it is relevant to understand how the conceptual design space can change to a new modality of interaction with technologies and data, which become designing actors (Nicenboim et. Al, 2020) and address a further level of complexity of the reality around us where the cognitive flows of humans, animals and machines co-exist (Hayles, 2006); identifying new design-drive modes that are collaborative and declined in the multi-agent sphere, the figure of the designers also evolves, finding themselves interacting with actors of a different nature, and the role that is exercised in the relationship with digital tools also changes (Cattabriga 2020; Lim & Jung, 2018).
Starting with an in-depth analysis of some design driven methods and processes currently put into practice, it is possible to explore their characteristics and understand how they can be reshaped, according to the previously mentioned methods and tools.

Introducing non-human actors in Advanced Design methodology
In order to introduce these theoretical models into design practice, the research proposes to use an Advanced-Design driven approach, trying to understand how and if it is possible to include non-human agents in this design framework.
Advanced Design (AD) is to be considered as an articulated system of design practices used to design processes, products or services for complex scenarios set in the future (Celaschi, 2015), a systemic approach that is based on collaborative practices between multiple actors to drive transformative change within the realities in which it operates.
In the last 15 years, it has started to emerge how the concept of anticipation and future studies (Poli, 2010,2019; Zamenopoulos & Alexiou, 2007) can be drivers to support an "advanced design approach" capable of responding to the complexity of the ever-changing dimension of innovation, trying to clarify the "relationship between the evolution of the time factor and design-led innovation" (Celi, 2010 cited in Celaschi, Celi & Formia, 2014, p.22).
Over the years, this methodology has opened up the vision of industrial design to the concepts of anticipation (Celi, 2015; Formia, 2017; Iñiguez Flores et al., 2019; Celaschi et al., 2019) and has led it to propose itself as an approach that intervenes in the complexity of relationships linked to the changing context (Celaschi, 2015), and to innovation processes conditioned by environmental and social factors and lack of resources.
In the synoptic framework developed in recent years, which includes four main integrated and interconnected macro-fields of action in AD (Succini, 2022; 2023), the factor “Time, future and anticipation” has relevance to our reasoning. AD inserts the time factor as a field of action (Celaschi, et al, 2018) within the design process, linking past, present and future and seeking to "anticipate change and make it accessible through the materialization of processes, paths, artefacts and conjectures" (Celi & Morrison, 2019, p.807). It enables the ability to imagine possible, probable, potential futures (Celaschi et al., 2019) and applies to the context by reacting to change through continuous innovation.
Another macro-field is represented by Innovation of Collective Sharing Processes, in which people - the community and the territory - interacting through co-design processes and collective intelligence practices (Celaschi, Celi & Formia, 2014) - are considered actors and active agents for the development of new forms of design capable of responding to current challenges. The foundation is the idea that "the collective, social and shared construction of the vision is the key to success" (Celaschi et al., 2014, p.28) of more sustainable products, services, systems.
A third subject on which AD focuses its work is Transformative Innovation. It is based on three principles: i) adaptability (Mozota, 2006; Iñiguez Flores et al., 2014), which supports change, activates collective forms of learning, and allows design to transform critical issues into opportunities through anticipating practices; ii)

sustainable transformation, which leads designers to reflect on responsibilities in transforming the behavior of individuals and communities; iii) cultural change, through iterative and continuous experimentation, creating forms of design that start from the future and lead to changes in the present (Celaschi et al., 2019).
Last but not least is Knowledge Innovation: in AD the sharing of knowledge and the activation of collective knowledge constitute forms of innovation (Celaschi et al., 2019) characterized by: i) interdisciplinarity and cross-fertilization between both academic and non-academic competencies; ii) forms of 'Reflection-in action' (Schon, 1983) in which design is read as a reflective practice; iii) 'learning by doing' training systems and by the collective (Iñiguez Flores et al., 2014) and co-produced learning processes.

Conclusion

In this contribution, we hypothesises that a design approach such as AD, which already has in itself ingredients such as multi-stakeholder collaboration and cocreation, anticipation, collective intelligence and knowledge practices, and cultural change through continuous experimentation, can be thought of as introducing non-human agents to facilitate design problem-solving, using data as real active agents that can act on the outcome, thanks also to the mediation of designers who are able to manage this new variable.
The re-definition of the mediation roles considering the emergence of non-human agents in the Advance Design system can be addressed from two main directions. The first aspect concerns knowledge transfer and facilitation between specialized research and technology providers, companies, professionals and users. The second one is the definition of new tools and strategies to embed in the design practice in order to extract value from the continuous data collection and systematization that designers carry on.
Regarding the first aspect, design education is characterized by a significative multidisciplinary approach, as well as the professional practice articulates across multiple specializations. These intrinsic qualities, together with the capability of designers to build effective narratives around their research, give the designers the opportunity to build empathic connection between stakeholders and consumers. Also, through their mediation, designers have the capability to demystify preconceptions towards technology, but also to address and intervein in complex topics such as privacy and data use. Such mediation is of growing importance as new technologies, such as AI-based systems, raise concerns across professionals, institutions, consumers and regulatory bodies. Strategies to transfer information and vary depending on the targeted audience. Practices that are commonly used in AD and that translate complex data into more comprehensible and usable information include data visualization, scenario building, design fiction, and reports.
Such practices need to be developed in synergy with data collection and systematization tools. Since 2019, the Advanced Design Unit of the University of Bologna has been developing a digital tool to systematize the continuous process of case studies collection. This custom system is built on relational connections between the database elements. This structure allows to highlight the emergence of patterns, relations and relevant insights.
As discussed so far, the framework proposed by Advanced Design addresses the complex challenges that the production system is facing. The development of a wider sensibility in respect to data and their interpretation appears to be relevant in design practice dealing with future and anticipatory scenarios. The ongoing development of design strategies and tools is a significant aspect of Advanced Design methodology, in which designers become mediators between different stakeholders, production sectors and customers (Celaschi, 2008). The mediating role of the Advanced Designers, we argue, is extending towards the new emerging technological and non-human agents.

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Research on Product Form Design of Brain-Computer Fusion Spatial Grid Structures

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Abstract

In order to solve the problem of individualized ergonomic adaptation in non-invasive consumer-grade head-mounted brain-computer interface products, that is, the contradiction between the universal product shape and the matching of different head contours, this paper proposes a morphological design method for non-contact brain-computer interface products integrated with spatial grid structures. This method is based on the Grasshopper parametric software platform, by adjusting the grid structure parameters to fit different head shapes, and utilizing industrial-grade 3D printing technology to achieve personalized ergonomic optimization. The results show that thanks to the good wrapping property and structural freedom of the spatial grid structure, compared with traditional brain-computer product shapes, this personalized design method greatly improves comfort, usability and lightweight design, and enhances the stability of EEG signals.

Author keywords

Spatial grid structure; Grasshopper; Parametric design; Non-invasive brain-computer interface

Introduction

In recent years, the application research of brain-computer interface technology in the medical field has gained significant attention, becoming a critical domain in global technological competition. However, for consumer-grade non-invasive wearable brain-computer interface products, their universal form designs often fail to adapt well to personalized head shapes, leading to issues concerning wear comfort and electrode stability. Moreover, as a crucial anthropometric technology for headwear products, there has been limited domestic research on standard simulation head models, and there hasn't been any appearance of head model products, which to some extent restricts the development process of consumer-grade wearable brain-computer interface products [1]. Therefore, innovating design approaches and actively exploring solutions that cater to personalized needs have become essential strategies to address this issue.

1.Research Status

Non-invasive brain-computer interface (BCI) products are primarily composed of two components: the brain electrode module and the product headgear. Among these, the product headgear, as the carrier for the brain electrode module, not only plays a pivotal role in measuring the comfort attributes of the headgear but also

significantly influences the stability of the brain electrode signals due to the alignment of its lateral cross-sectional arc contour with the curvature of the human head contour. Presently, consumer-grade non-invasive BCI products fall into two categories. One category encompasses research-oriented EEG brain-machine products with carriers made from soft materials such as felt (Figure 1), exemplified by the g.SCARABEO product from the g.tec brand. The other category includes conventionally versatile EEG products that have undergone extensive sample testing (FIG 1), represented by the EMOTIV EPOC X product. While the former exhibits good adaptability to head shapes, it faces issues of complex adjustment during installation and the generation of heat discomfort during prolonged use. The latter offers higher flexibility when worn, yet its universal nature impedes optimal adaptation to diverse head shapes, resulting in imprecise electrode-to-scalp adherence, thereby affecting EEG signal acquisition and input.

In the academic realm, progress has been made in headgear research for non-invasive BCI products as follows. B.S. Lin et al. designed a laterally-oriented strip headgear structure with flexible electrode positioning, showcasing strong region selectivity and convenience [2]. Y.P. Lin et al. drew inspiration from Lego assembly and designed a modular headgear structure that allows free assembly to accommodate various head contours[3]. J. Kim et al. developed two wrap-around face-shaped headgear structures tailored to specific EEG treatment areas, displaying a mature inclination towards product implementation, i.e., wear-and-use[4]. Jochen Vleugels et al. designed a prototype based on a double-layered lateral strip headgear structure with local sliding rails for adjustable electrode positioning, addressing electrode adjustment based on mechanical structure on the foundation of universality[5]. In summary, although the aforementioned studies have alleviated headgear human-machine issues in non-invasive BCI products to varying degrees, they still require external assistance for wearing, installation, and calibration. Additionally, they fail to adequately meet the diverse wearable needs of individual consumers in various scenarios such as home and outdoor use. Furthermore, they continue to employ a universal approach to tackle headgear adaptation to personalized head contours, inevitably resulting in different degrees of human-machine experience issues.

Therefore, this study adopts a cross-disciplinary approach by considering architectural spatial grid structures with exceptional degrees of freedom, strong envelopment, and stability as the headgear carrier for non-invasive BCI products. It further explores a personalized custom design approach based on industrial 3D printing to address the prevailing human-machine issues in these products.



Figure 1. current major brain-computer product forms.

2.Architecture Spatial Grid Structures and Their Advantages

2.1 Overview of Architectural Spatial Grid Structures

Space grid structure (Figure. 2) usually refers to a space structure made of hard metal materials such as steel pipe or section steel and connected by nodes in a certain grid form. It has rich and colorful shapes, strong aesthetics, high freedom of form, high stiffness and light weight, and can effectively use space, which is a common carrier of architectural art and space art [6]. Its styles are various, mainly divided into cross truss system, trigonal cone system, quadrangular cone system and hexagonal cone system. Among them, the grid structure of the quadrangular pyramidal system is more in line with the quadrilateral optimization rules of mesh surfaces in digital three-dimensional space due to its good stability and geometric non-deformation, and can better wrap special-shaped surfaces than other types. Therefore, this study will take the quadrangular system grid structure as the main design carrier.



Figure 2. Common architectural space grid structure in daily life

2.2 Man-machine advantages of space network structure as the carrier of brain-computer products

As mentioned above, due to the difficulty in obtaining standard simulation head models with the texture of human head muscles and skin, and the types and quantities required are more diverse, experimental conditions are not yet available. In addition, because of the good mathematical logic and geometric characteristics of the building space grid structure, it has a mathematical basis, and can be simulated in the virtual environment through the parametric program. Therefore, this study adopted the virtual digital design environment grasshopper software platform and its simulation tool kangaroo to conduct simulation and verification, and explored the degree of compatibility of the spatial network structure as the carrier of brain-computer products to the contours of different people's heads [7].

In this study, a 1:1 digital 3D head scanning model was randomly selected from the Internet platform digital sculpture website as a virtual digital experiment case, and a spatial grid structure that can wrap the head outline was built (Figure 3). In order to facilitate the presentation of the experimental effect, the First front view and Top top view, which can clearly present the trend of the head outline, are selected as the display angles.

The results in the figure clearly show that the network structure constructed by the quadrangular vertebral unit frame has excellent compatibility and wrapping to the head contours of different types of people, and has good adaptability to the head contours of different age groups. It is suitable to be used as a head-wear shape carrier for non-invasive brain-computer interface products, providing design ideas for solving the current ergonomic problems.

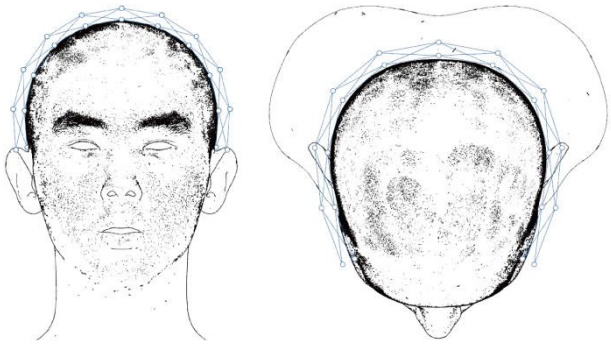

Figure 3. Good wrapping of the head by the space grid structure

2.3 Summary

To sum up, the flexible, free, beautiful and lightweight architectural space grid structure as the basic design carrier of non-invasive brain-computer interface products can break through the limitations of traditional universal design methods and match the personalized characteristics of brain-computer interface products due to the difference in human head profile.

3. A parametric design method for non-invasive brain computer product headwear integrating space grid structure

3.1 Overview of parametric design and its advantages

Because the installation position of the brain electrode of non-invasive brain-computer interface products often needs to contact the human scalp, and it needs to be suitable for the head shape of different types of people, the design method of universal mass headwear can not meet the needs of such personalized design. To solve this problem, parametric design has its unique advantages, that is, it can perfectly meet such personalized design needs through the establishment of program logic, real-time parameter adjustment and free design process [8]. By adjusting the parameters of the grid structure to match the contours of different people's heads, it is used as the main method to integrate the head-wear design of brain-computer products with space grid structure, and further strengthen the personalized customized design features of such products.

3.2 Description of key steps of parametric design method

This paper takes a medical non-invasive brain-computer interface product based on focused electric field technology as an illustration of the parametric design method flow (Figure 7), which is mainly divided into four key steps: 1) the construction and processing of the 3D digital model of the user's head; 2) Generate the basic demand curve consistent with the user's head contour; 3) Generate the basic space grid structure; 4) Adjustment of basic grid structure and product optimization. Through this process, the frame structure matching the head contour trend is finally constructed. The key steps are described as follows.

Firstly, the 3D digital model of user virtual head contour is constructed. The 3D scanning method (scanner, related app, RealityScan3D with the mapping modeling method proposed by Zhangjie et al. [9]) is used to construct a 1:1 virtual digital head grid image of users, and eliminate useless areas below the ear, while retaining the brain area above the ear (Figure 4). Then smooth mesh and weld mesh tools were used to optimize the brain area grid, and the central point position was determined by the mesh area tool to prepare for the setting of the horizontal fixed grid in the next step. The program logic is shown in Figure 5.

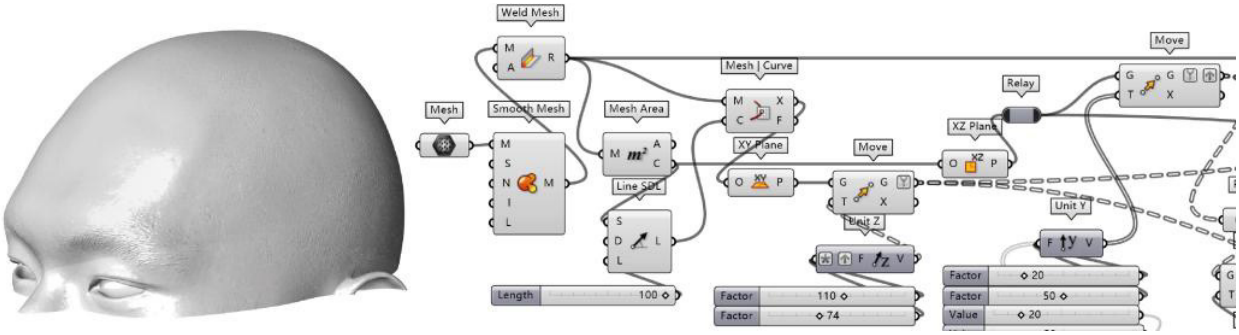

Figure 4 and 5. head digital models with grasshopper program logic

Secondly, the basic demand curve which is consistent with the trend of the user's head contour is generated. According to the functional requirements of the selected product, the main brain electrode distribution points are 3 points in the front of the brain, 4 points in the back, and a total of 14 points are symmetrically distributed for the treatment of neurological diseases. According to the arrangement sequence of brain electrode points, the horizontal fixed grid and the plane where the brain electrode trend grid are located are adjusted and constructed. The mesh|plane tool is used to calculate the basic contour curve of the grid structure that is consistent with the user's head contour trend, as the basis for the generation of the grid structure (Figure. 6). The design and selection of this step is extremely critical. The appropriate grid structure contour base curve determines the human-machine experience of the final product. The key program logic steps are shown in Figure 7.

Thirdly, the basic space grid structure is generated. Based on the above basic curve of the grid structure, the

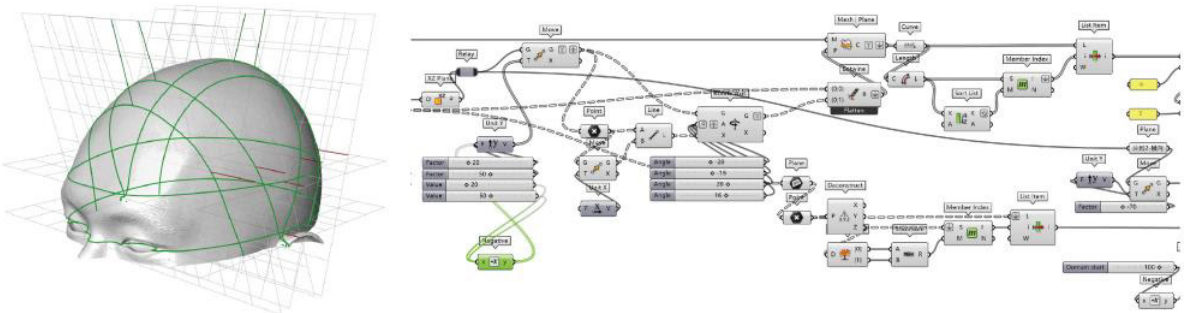

Figure 6 and Figure 7. Basic curves and program logic of the head of the grid structure

space truss structure1 tool in the luchbox tool set is used to generate the spatial grid structure, disassemble its data structure and generation logic, adjust the distribution of its space points, and reorganize the original data structure into an overall spatial grid structure with adjustable parameters (Figure. 8). Make it fit the user's head fixed points 1 (sphenoid bone), 2 (temporal bone) and 3 (occipital bone) to improve the stability of the overall structure of the product. The key procedural logic steps are shown in Figure 9. Because the brain electrode points corresponding to different types of brain diseases are also different, the spatial network structure will be different, which can meet the needs of different types of brain computer functions.

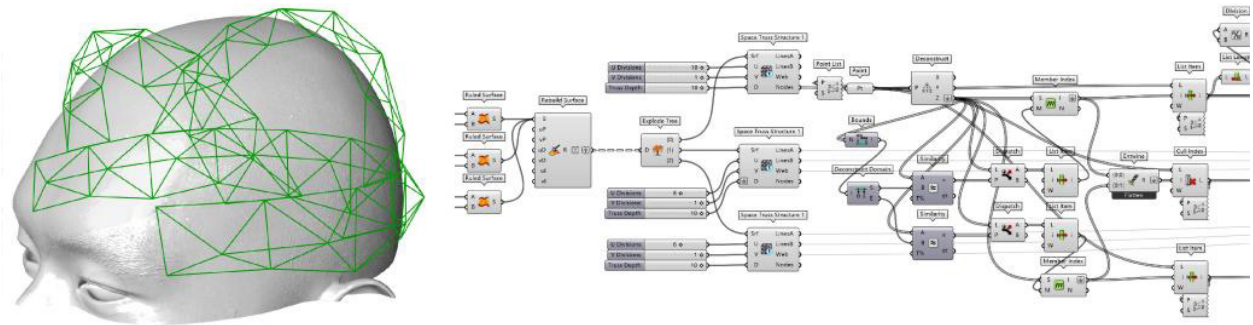

Figure 8 and 9. Basic space grid structure and parameterized program logic

Finally, the adjustment of the basic grid structure and product optimization. Using the spatial mesh structure generated by the above steps as the design carrier of the product headwear, the optimization program can be built on the logic of the original parametric program, and the mesh structure can be baked into the frame line for free adjustment and personalized design. And by adjusting the parameters of the MultiPipe tool, it can generate a more beautiful product shape that matches the contours of the user's head (Figure 10). Then, based on this form, the structural design and development are carried out and produced by the production method of industrial 3D printing, which can produce finished products with personalized characteristics in a short time (Figure 11).

According to the feedback of users' trying behavior, the headwear of non-invasive brain-computer interface products based on space grid structure has good comfort, air permeability and stability due to its good match with the user's head profile. Moreover, the TPU 3D printing material used makes the final product more lightweight, so that users can flexibly use it in various indoor and outdoor scenarios. It will not cause behavioral obstruction.



Figure 10 and Figure 11. Product renderings and 3D printing effects

3.3 Influence of headwear of space grid structure products on brain electrodes

Brain electrode is a key part of brain computer interface technology and the source of signal processing. The head-wear design of non-invasive brain computer products should not only protect the user's comfort, but also provide stable pressure for the brain electrode, so that it can be stably attached to the scalp [10]. Because the spatial grid structure itself has good structural stability, and the spatial contour trend of its shape is consistent with the human head contour, which provides good stability for the brain electrode and ensures that each

electrode can play its role stably. Therefore, personalized design can improve the comfort of the head, ensure the accurate positioning of the brain electrode, and help to obtain better and more stable EEG electrical signals, which is one of the key design elements of brain-computer interface products.

In summary, based on the parametric design method, the architectural space grid structure is used as the basis for the head-wear design of non-invasive brain-computer interface products. The frame structure style and personalized customized design are used to solve the problem that the head-wear shape of traditional universal brain-computer products does not match the head contour of specific individuals. Thus, it can meet the adaptability needs of most non-invasive brain-computer interface technologies to the headwear form of products.

4. Conclusion

In this study, experiments were carried out in grasshopper parametric virtual digital environment to wrap different human head contours with space grid structure, which initially confirmed that under the personalized customized design idea based on intelligent manufacturing, brain-computer product shapes of space grid structure can better match the contours of different human heads. It provides an innovative perspective for solving man-machine problems such as comfort and stability of such products. In the grasshopper visual programming environment, a brain-computer product form and function module integrating spatial grid structure is built, which provides ideas on the key nodes of the method and provides corresponding references for similar research. In the subsequent research on product shape design optimization, generative design methods such as simplified shape grammar [11] will be considered to find the optimal shape solution that is most suitable for brain electrode layout and man-machine comfort.

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Beyond Thinking: Transcending Traditional Artistic Barriers Through Cutting-edge CNN—Evidence from Malaysia Batik

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Abstract

Given the complexity and technical demands inherent in the Batik creation process, contemporary efforts toward its innovative preservation and comprehensive development face significant challenges. In response, the author employs Convolutional Neural Networks (CNN) to create 'Neural Batik,' a sophisticated fusion of artificial intelligence and venerable Batik traditions. This innovative initiative not only introduces diverse dimensions to digital expression but also adeptly addresses issues of adaptability. Moreover, it seamlessly blends the tapestry of tradition with the intricacies of technology, resulting in a paradigm shift characterized by pioneering transformation and catalytic creative progress.

Author keywords

Batik; digital making; Convolutional Neural Networks; style capture.

Introduction

Batik, a practice spanning countries like Indonesia, Malaysia, Japan, and China, has evolved into a globally diversified traditional craft, blending cultures (Yamashita et al., 2018). Digital technology now plays a pivotal role in preserving and developing traditions. Extensive work explores digital techniques for recording, showcasing, and educating about heritage. For instance, Geng Guohua's team at Northwestern University employed rapid data collection for artifact digitization (Nurcahyanti, 2020). This paper envisions 'Neural Batik' as a means to modernize Batik. Using AI-based CNN-style tech, we transform ideas into reality for Malaysian Batik (Murrell & Denise, 2010).

To develop the "Neural Batik" painting system, we conducted extensive field research, visiting twelve Batik studios in Malaysia and engaging with five Batik artists (Figure 1). Diverging from previous endeavors, "Neural Batik" enhances proficiency via computational methods. For instance, iWareBatik employed participatory service design using the AWARe model to capture stakeholders' Batik Intangible Cultural Heritage (ICH) domain needs (Ghartey et al.,2022). Unlike prior work, our focus is Batik's adaptability in modern contexts, seamlessly blending heritage with technology. Leveraging digitization and virtualization, the system pioneers transformative innovation, harmonizing tradition and innovation.



Figure 1. Recording of a documentary conducted at a Malaysian Batik workshop.

Establishment of the Neural Batik Painting System

Establishment of the Batik Style Transfer Model

In the context of this system's development, to enable computers to learn and establish specialized Batik style transfer models and facilitate highly responsive user interactions, we referred to the paper "Real-Time Neural Style Transfer for Videos"(La Vattiata et al.,2021). Unlike conventional style transfer methods, we employ CNN to achieve efficient and rapid style transfer, enabling computers to generate visually transformed effects from real-time camera images(Raja Fuziah et al.,2012).With the introduction of CNN by Alex Krizhevsky in 2012, the process of image capture and classification became more convenient and efficient, as depicted in Figure 2. Furthermore, CNN seamlessly integrates interactive features and AI content generation. This facilitates the capture of image entropy, allowing the model to be trained on thousands of image samples to accurately generate various Batik-style images，as depicted in Figure 3. This presents new possibilities for art creation and cultural preservation(Wanda Warming et al.,1981).

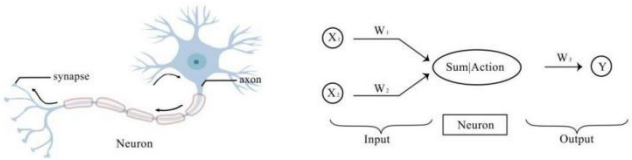

Figure 2. Illustration of Neural Network Algorithm Constructed upon the Human Neural Network System.

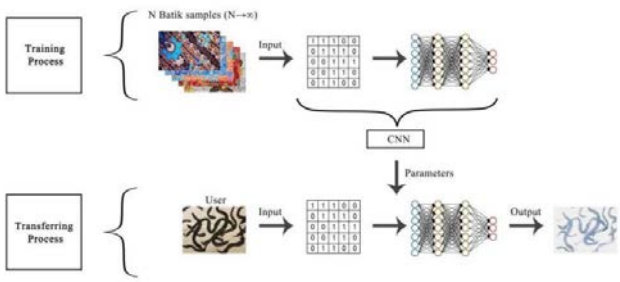

Figure 3. Building Batik Style Transfer Models Using Convolutional Neural Networks.

Training of the Style Transfer Model and Establishment of Stylistic Brushes

For model training, we use the COCO dataset and a specific target to learn Batik style. Cloud-based training on a GPU virtual machine within the TensorFlow environment through the Spell platform boosts computational efficiency. The trained TensorFlow model is then converted to ml5.js format, integrated with p5.js for real-time style transformation display.

To establish stylistic brushes, we employ p5.js' s pixel processing to create Batik brush styles that retain marks only where strokes are applied. By scanning pixels in the original camera image and calculating their brightness, we identify black ink marks based on a threshold. Subsequently, these pixels are replaced with transformed colors, effectively converting user-drawn marks into Batik-style strokes.

Construction of the Web Interaction Platform

To enable remote creation of unique Batik-style artworks, we've developed an innovative p5.js-based online platform. It transcends constraints, fostering creative exploration anywhere, anytime (Bianco et al., 2022). Within, we've curated four Batik artworks (two from Malaysia, two from China). User clicks trigger the ml5.js style object for style model application.

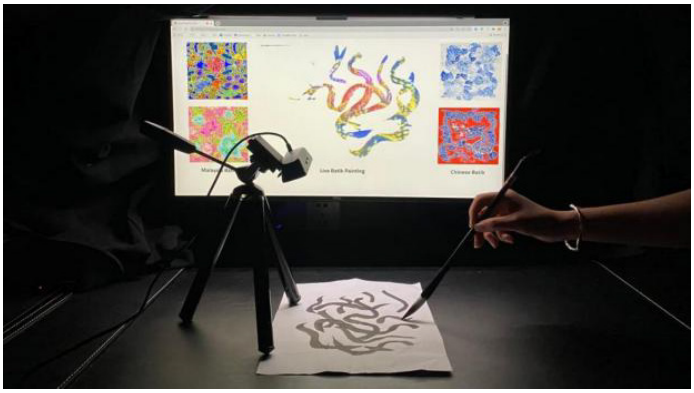

Figure 4. Users can employ paper and brushes to instantly transform their brushstrokes into a chosen Batik style through a webcam.

Advantages of the Neural Batik Painting System

Real-time Experience

"Neural Batik" has transcended previous temporal and spatial limitations, providing a novel avenue for the dissemination of traditional culture. The system enables users to observe, in real time, the shapes they draw on paper. This real-time interaction represents a breakthrough, synchronizing Batik creation with computer feedback. Experimental results from GUPTA A et al(GUPTA A et al.,2023). Demonstrate that the trained feedforward network alleviates the burden of real-time optical flow computation, achieving real-time stylization of videos with higher stability compared to previous-generation techniques. We organized a testing event for the "Neural Batik" system' s art creation. According to data from online questionnaire responses, this real-time interactive experience not only enhances the intuitiveness and flexibility of artistic creation but also stimulates users' creative potential, as depicted in Table 1.

Table 1. Survey Form for the ‘Neural Batik’ Online Dataset.

Online survey questionnaire		
Top option in the questionnaire	Percentage of the statistical results	Number of participants in the survey(178/200)
1.Are you familiar with the traditional craft of Batik.	46.07%	81
2.Reasons for Batik low popularity: Insufficient promotion and limited number of successors.	96.35%	170
3.Ways of understanding Batik: Derived from internet platforms.	60.67%	106
4.Requirements for Batik: Practicality and commemorative significance.	59.35%	105
5.The use of the "Neural Batik" painting system is believed to help Batik preserve and innovate.	84.27%	149
6.The use of the "Neural Batik" painting system is believed to help inheritance and development.	83.15%	147
7.After using the "Neural Batik" painting system, I think it can create a new situation of cultural inheritance.	67.42%	119
8.Using the "Neural Batik" painting system feels convenient, fast and attractive.	92.70%	163

Multiple Style Customization

Building upon the foundation of traditional Batik styles, "Neural Batik" offers users the opportunity to customize styles according to personal preferences. This empowers users to create art that is imbued with their own creativity and preferences, resulting in a diverse range of artistic patterns and fostering the diversified development of Batik art. The system can also preserve artworks created through its online interactive platform, contributing to the digital protection of traditional Malaysian cultural art. Currently, we have integrated four styles of Batik models into the operational interface, allowing users to freely choose from a variety of styles for their experience, as shown in Figure 5(Nurcahyanti D et al.,2020).



Figure 5. Users can achieve real-time changes in painting style by directly clicking to select from four images representing different artistic styles.

Creative Development and Innovative Transformation

"Neural Batik" not only addresses the adaptability of Batik in modern society, but it also seamlessly integrates traditional craftsmanship with modern technology, fostering creative development and innovative transformation in Batik through digitization, virtualization, and other means(Krizhevsky A et al.,2017). Traditional artworks are susceptible to degradation over time and due to environmental influences, making the digital creation and preservation provided by this system crucial. Through digital preservation, the original designs of these works are permanently safeguarded, unaffected by the passage of time and environmental conditions, ensuring the continuation of their historical significance and the preservation of valuable cultural heritage(Traore B B et al.,2018).Furthermore, this avenue of digital development enhances the presentation of Batik art in a more diverse and modern manner, attracting greater participation and understanding. This open dissemination approach provides an opportunity for individuals from different regions, backgrounds, and cultures to engage with and comprehend Batik art.

Conclusion

Batik occupies a unique and indispensable role in the global art landscape, leaving a profound impact. Thus, promoting and innovating Batik craftsmanship has gained paramount significance (Steelyana W., 2012). After three months of on-site research, the author noted that while Batik boasts distinct ethnic colors and forms, its intricate traditional craft and demanding expertise restrict its adaptation and evolution in the contemporary milieu . To tackle these challenges, the team devised "Neural Batik," a painting system. This system eases Batik creation, transcending its traditional confines to enable diverse styles swiftly. It leverages multidimensional technology to introduce an interactive approach, engaging participants in digital Batik crafting. This method offers a diverse digital platform for Batik art, revitalizing ancient skills and bridging cultural divides. It stimulates cultural migration, fosters integration, fuels global artistic exchange, and provides new directions for intertwining AI with traditional culture preservation.

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AIGC: The Reform and Hidden Worries of Advertising Design

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Abstract
Depending on powerful knowledge reserve and generation technology of AIGC, it has been increasingly applied in advertising design field. It has been continuously breaking through the barriers between form and content. However, there are a number of cultural phenomenon such as changes in cultural production, upgrades in social perception, and the impact of consumer symbols. At the same time, there are also some risks and challenges such as copyright disputes, information security risks and encroachment on the human subject status who are advertising practitioners. On the one hand, it is necessary to promote a positive understanding on AIGC's productivity and creativity in the advertising industry throughout society. On the other hand, it is also crucial to approach the potential negative impacts with a rational and cautious attitude.

Author keywords
AIGC; advertising design; consumer symbols; technical concerns.

Introduction

With the rapid development of AIGC, many brands have been using AIGC in advertising design which attracting widespread attention. Although AIGC has been applied in advertising since 2011 (Qin & Jiang, 2019), it showed extraordinary talents until 2016 in this industry. In 2017, Alibaba's intelligent design robot "Luban" was launched, which can create 170 million advertising images in a short time and greatly saved labor costs. In 2019, Watson's "Wilson" the virtual advertising spokesperson created by AIGC appeared in the Chinese market. It brought consumers a more novel and personalized service experience. In 2022, La Laiti è re, a yogurt brand from Nestle, utilized OpenAI's DALL-E2 model to expand the advertising film production of Johannes Vermeer's famous oil painting The Milkmaid. It unexpectedly contributed to promoting their brand concept. In 2023, Coca Cola combining with Stable Diffusion, 3D and live production technology produced the advertising film Masterpiece, which showcased an artistic fantasy journey for consumers. In the same year, commercial brands such as Feizhu, Heinz, McDonald's, KFC, Zhong Xuegao, and Yili also launched their own AIGC advertisements, that frequently attracting high attention from consumers. The cultural phenomenon and risk challenges behind this are worth exploring.

The AIGC Trend in advertising design

1.1 AIGC

AIGC (Artificial Intelligence Generated Content) is not only a type of content that is classified from the

perspective of content producers, but also a method of content production and a collection of technologies used for content automation generation (CAIAT. 2022). It combines multiple AI technologies such as computer vision (CV), natural language processing (NLP), and generative adversarial networks (GAN) to achieve automatic generation and optimization of various types of content through learning and pattern recognition of a large amount of data (Yin, Chen, & Zhao, 2020). Computer vision technology enables AI to automatically generate image content. Natural language processing technology enables AI to understand and generate human language. Generative adversarial network technology generates realistic images, animations, and audio through training AI systems (Jin, & Xia, 2021).

1.2 New Stage of Advertising Design Pattern

AIGC, with its strong knowledge reserve and generation technology, continuously breaks through the inefficient and single "Designer design pattern" in original advertising design, presenting a trend of efficient and diverse "H(human)-AI(artificial intelligence) design pattern" and "AI design pattern". Alibaba's AI design robot "Luban" produced 170 million advertising images in a short period of time in 2017, and maintained a good standard, which effectively reduced costs and increased efficiency for enterprises. While AIGC significantly improves productivity, it also continuously optimizes the production path of advertising content. For example, Zhong Xuegao's new product Sa'Saa series ice cream advertisement, which uses AIGC to intervene in the entire process of product development and advertising design, from naming to taste, to packaging design, as well as posters and videos, are all designed, suggested or automatically generated by artificial intelligence, fully demonstrating the powerful diversity of AIGC.

1.3 Role Transformation of Advertising Designers

In Understanding Media: The Extensions of Man, McLuhan (1964) proposed that "media is the extension of man". In the era of intelligent media, AIGC has greatly lowered the threshold for advertising content creation. It helps advertising producers overcome the limitations of their skills and greatly extend their abilities. AIGC can also integrate and recreate a large number of works, as well as breaks the inherent thinking inertia of humans and provids inspiration for advertising designers. Moreover, it promots the improvement of work quality. For example, in the 2023 advertisement of Feizhu which placed in the subway, the design team used AI to imagine the "fantasy and alternative" beauty of various parts of the world. It broke people's stereotypes and aroused people's tourism consumption impulse and received widespread praise. The artistic value of AIGC works have been gradually recognizing by mainstream aesthetics. Furthermore, the boundaries of advertising creation previously monopolized by humans have been gradually breaking.

The creativity level of AIGC equally matches humans. Li, Pang, & Tan, (2023) conducted a double-blind experiment to recruit experts and consumers to evaluate the differences in copywriting abilities between artificial intelligence and humans. The results indicate that experts can identify the identity of the copywriter, while consumers cannot distinguish. In the future field of advertising design, AIGC will not only be an important design tool, but also will be regarded as an important designer, which will occupy an increasingly important position in the advertising industry. The development of AIGC may bring a new round of human capital substitution in the advertising industry.

Multiple Deconstructions of Culture, Society, and Consumption

2.1 Cultural production transformation

Benjamin extracted the concept of "Mechanical Replication (Benjamin, 2002)" from Marx's criticism of the "Machine System" and believed that modern culture also exhibits a characteristic of "Machine Production" in terms of production tools. The automatic printing machine has ushered in the era of "Mechanical Replication" in modern cultural production, and the large-scale production and dissemination of written works have also opened the prelude to the popularization of cultural consumption. With the emergence of movies, television, and other industries, modern cultural machine production has entered the stage of "Electronic Replication". It helped to promote the popularization of cultural consumption once again.

Television and other devices mainly triggered the "Consumption Revolution" of mass culture, while AIGC triggered the "Production Revolution" of mass culture. The emergence of AIGC symbolizes a new stage of "Intelligence" in computer technology. The modern cultural production has leapt forward and has entered a new stage of "Mechanical Production", which has epoch-making revolutionary significance. The "Mechanical Originality" caused the cultural information contained in advertisements to extremely expand. Consequently, the production and launch of advertisements became fast and accurate. The "Production Revolution" of popular culture has also rapidly transformed into a new wave of consumption. The cultural production of AIGC has achieved a transformation from what Benjamin described as "Mechanical Replication" to today's "Mechanical Originality (Liu, 2019)".

2.2 Social Perception Upgrade

AIGC enriches the perception and presentation forms of social culture. The culture represented by AIGC is a technological, cultural form centered around human needs. It presents human’ s wisdom and essential strength, while transcending the limitations of human organisms and exhibiting distinct technological characteristics. From a technological perspective, both humans and society are technologically formalized (Koslovski, 1999). The development of AIGC brings people an intelligent advertising experience. For example, Watson's virtual spokesperson, innovative advertising presentation and interaction methods can bring users a more personalized service experience and a more innovative perception of the product.

Creating brand spokespersons through AIGC is an innovative attempt in the advertising industry, which achieves integrated marketing communication of culture, scene, and time. The development of social culture needs to keep up with the times. In addition, the cultural forms that integrate current technological trends will become an important component of social life.

2.3 Reconstruction of consumer symbols

AIGC technology is updating the way of cultural consumption symbols. The continuous development of modern society has made the symbolic value of goods a significant consumer cultural feature. Cassier (1985) believed that humans, as "symbolic animals," use symbols to create culture. Baudrillard (2001) identified that goods firstly become symbols in a consumer society in order to become objects of consumption in terms of their individuality and differences. In the trend of upgrading social and cultural consumption symbols, people need more differentiated cultural consumption symbols. The young consumers of Generation Z are enthusiastic about showcasing their individuality. They build their circle by consuming products with trendy symbols. The large number of AIGC hot posts on social platforms reflect the interest and pursuit of Generation Z in this trendy symbol. Using AIGC to create advertisements undoubtedly hit their excitement point. Furthermore, using AIGC technology to construct cultural consumption symbols in the new era can show the unique technology, trendy, diversity, and personality of a brand. In results, the Generation Z consumers can be attracted. This "leverage" design and marketing plan reflects a profound grasp of user consumption psychology of the brand.

Technical Worries

3.1 Dynamic Game of Creativity and Technology

The priority issue of creativity and technology in the advertising industry have always been a hot topic. In addition, the popularity of AIGC in the advertising industry has gradually weakened the importance of traditional advertising designers. Human thinking and labor are gradually being replaced by machines, which to some extent weakens the opportunity for advertising designers to stand out through creativity and planning. The competition between creativity and technology can also be transformed to some extent into the relationship between human intelligence and machines. Human intelligence symbolizes creativity, while machines represent technology. This involves a controversial topic that has existed since the birth of artificial intelligence: whether human intelligence will be replaced by machines.

Although AIGC exhibits efficiency and precision in advertising design, user insight, and final placement, the content generated by AIGC may not have the same empathy, creativity, and personalized style as humans. Therefore, the creative talent and copywriting ability of advertising designers still play a crucial role in advertising practice. Looking ahead, seeking a balance between creativity and technology will be crucial for promoting the healthy development of the advertising industry.

3.2 Copyright disputes

AIGC works are built on the scheduling and patching of existing databases. It is also the fusion and reconstruction of human past works. If there was a high degree of consistency between AIGC advertisements and existing human works, copyright disputes would inevitably arise. For example, the famous designer website Artstation has launched a massive anti AI movement. The commercial nature of advertising itself places particular emphasis on the copyright ownership of works. It brings a huge challenge to the copyright management of AIGC works.

3.3 Information Security and Privacy Disclosure

As an important design method emerging in the advertising field, the widespread application of AIGC will also trigger a series of content security issues. AIGC requires training and learning through massive amounts of data. The information infringement incidents are common during this process. For example, AIGC privately calls photos and videos uploaded to social media platforms without the user's consent. It seriously endangers the privacy and security of users and poses a huge challenge to legal regulation.

3.4 Capital Alienation

The popularization of AIGC has gradually made machines become the main producers of advertising within the capital framework, which poses a challenge and even a threat to the dominant position of humans in advertising production. The resistance of advertising designers towards being offended by their dignity can be understood to some extent as a brand new "Luddite ovement". Workers who oppose the mechanization process believe that the application of automated machines in the production process will reduce the demand for human resources. As a consequence, it causes rising unemployment. In fact, under the capitalist system, machines are used as capitalist tools, which become the dominant force. In results, machines may threaten workers and even may replace their position. Nowadays, this concept is more intuitively reflected in the relationship between humans and AIGC. Marx's criticism of automated machines at the time still has reference value in analyzing AIGC: the former mainly affects material production, while the latter directly affects cultural production. The competition between human advertising designers and AIGC will not be working smoothly.

Conclusion

At present, in the field of advertising design, AIGC intelligent technology participates in intelligent text, images, videos, and virtual spokespersons. AIGC is not only liberating manpower and achieving the upgrading of advertising products, but also invisibly creating new advertising pop culture, as well as bringing new visual and auditory advertising forms. Technology is closely related to the evolution of human society. It constantly influences and reshapes advertising culture. However, the widespread application of AIGC also brings some risks and challenges, such as copyright disputes, information security risks, as well as encroachment on the human subject status of advertising designers.

In conclusion, human advertising designers should have a correct understanding of AIGC's production capacity and creativity in the advertising industry. It should also adopt a rational and cautious attitude towards the potential negative impacts. They should constantly learn and improve to build their own unique values and abilities. Moreover, people requires to pay more attention to human intelligence cooperation and to bring a leap in the advertising industry together with AIGC in the future.

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Research on the Redesign of Oracle Bone Inscriptions Based on the theory of Metrical Design

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Abstract
Oracle bone inscriptions are the oldest mature type of writing in China as well as a treasure of Chinese culture. However, due to the development of information technology nowadays, the traditional oracle bone inscriptions seems to be lack of readability and aesthetic modernity. Therefore, redesign of oracle bone inscriptions are particularly crucial in contemporary times. The "Metrical Design" proposed by professor Chen Nan is a design theory that combines rationality and aesthetics. Based on this theory, this paper will aim to conduct a further research on analyzing the structural characteristics and aesthetic value of oracle bone inscriptions. On the basis of respecting traditional glyphs, it will delved into the redesign methods of oracle bone inscriptions from four dimensions: Simplification and refinement, Layout, Adjustment and Style unification. It will also conduct design practice to endow oracle bone inscriptions with new era characteristics which will contribute to promote their heritage and development.

Author keywords
Oracle bone inscriptions; theory of metrical design; font design; redesign.

Introduction

As the earliest writing system in China, oracle bone inscriptions are a treasure of Chinese culture. However, with the development of the times, there are number of research gaps and possibilities for improving in the readability and aesthetic modernity of oracle bone inscriptions. Due to the difficulty in recognizing and understanding of most oracle bone inscriptions, it is common challenging for the general public to distinguish and read oracle bone inscriptions. In addition, the popularization of information technology makes traditional oracle bone inscriptions unable to meet people's needs in terms of readability. Therefore, it is necessary to redesign oracle bone inscriptions using normalized design methods for modern society, which has a potential of motivating the heritage and development of oracle bone inscriptions in contemporary times.

Redesign of Oracle Bone Inscriptions

The definition of oracle bone inscriptions is a type of characters which are carved on animal bone or tortoise shell by imperial family for divination. They are the oldest mature writing in China now which were invented in the late Shang Dynasty (Wang, Y., & Wang, S. 2016). Oracle bone inscriptions have different kinds of shape features, such as pictographic property, abstract property, proportionality and so on. These make it possible to

describe the meanings of words visually and simply.

The term "Re-design" was mentioned in the first time by Hara (2006) in his book Design in Design. He argued that defamiliarizing the existing design material can achieve the purpose of re-creation. The re-design of oracle bone inscriptions is to make use of the innovation of modern technology to adjust and normalize the structure of glyph, writing rules and writing styles in terms of adapting to people's current reading habits and aesthetic aspirations.

Metrical Design

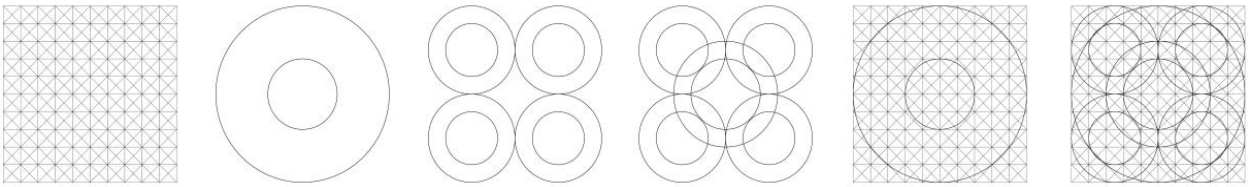
Dr. Chen Nan (2013), professor at Academy of arts & design in Tsinghua University proposed the design theory of "Metrical Design" based on the study of Chinese ancient format of system regulation. Metrical design is based on the methodological research of pre-design of format system rules (Wang, & Ling, 2020). Based on the basic external frame and the pre-designed format regulations which aims to support the whole design forms, the systems, formats and regulations of the design objects, as well as the framework of the modeling structure and the pre-designed construction rules are found out. For example, the Fibonacci arrangement of seeds or petals, the spiral growth pattern of the nautilus and the golden ratio, and the spiral structure of the universe and galaxies are all belonged to specific regulations. These orderly patterns can inspire human art and design creation, such as using these natural forms to rationally arrange shape proportions, positions, and element relationships, or to guide an entire design process. This kind of design thinking and design pattern are the core of the theory of metrical design.

Redesign of Oracle Bone Inscriptions based on the theory of Metrical Design

Following the theory of metrical design, this paper aims to conduct research on the redesign of oracle bone inscriptions from four aspects: Simplification and refinement, Layout, Adjustment and Style unification. First of all, the simplification of oracle needs to be focused by eliminating redundant elements and retaining their core features to present the essence of oracle clearly and concisely. Secondly, the layout has to be studies. The arrangement and combination of oracle characters strokes, spatial relationship and visual hierarchy are required to be explored to build a harmonious visual effect. Thirdly, adjustment should be noticed. It is necessary to balance the traditional and modern elements of oracle bone inscriptions to achieve the harmony of each component. Finally, designers should uniformize every glyph in the font to balance the visual style. Furthermore, the authors will employ the new theory of metrical design on the practice of oracle bone inscriptions redesign, as well as injecting modern aesthetic elements on the basis of tradition of oracle bone inscriptions (Fig. 1. – Fig. 4).

3.1 Simplification and Refinement

No matter how complex the original design object is, the original form must be simplified and refined before the metrical design. Relying on the principle of geometry can assist the simplification of the object to ensure the process has reliable reference basis. Taking the sheep oracle character as an example (Fig. 2.), the main features are extracted from its original image: the triangle and circles of the sheep head and horns can be considered as consisting of a non-closed inverted triangle and two spiral circles of the same diameter. Moreover, the triangle and circles are connected by a straight line. The symmetrical structure gives readers an intuitive sense of balance. In the process of simplification and refinement, it is necessary to consider the relationship between the structure and each element in the template.



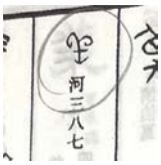


Figure 1.

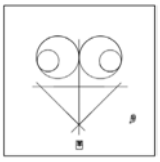


Figure 2.

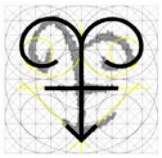


Figure 3.



Figure 4.

3.2 Layout

In the creation process, it is essential to follow certain rules rather than relying on an intuitive feeling or extemporaneously play. Applying geometric principles such as right-angle placement, composition principles and golden section ratio method to arrange the reference pictures in an orderly way. In layout design, placement and proportion are the most important factors to be considered.

For example, when analyzing the shape of the horn, it can be built on the basis of several circles with different diameters. The golden section ratio can be used to determine the diameter ratio of these circles, so that the lines of the horn show a smooth aesthetic feeling. At the same time, it is necessary to coordinate the proportion of size, height, width in the overall font to control the size and position relationship between the horn and the sheep head (Fig. 3.).

3.3 Adjustment

In the process of frame building, it is impossible to foresee the final presentation of characters. Therefore, the characters need to be gradually depicted and constantly adjusted. When adjusting the overall proportion and the position of the individual parts, the designers should confirm to maintain the beauty of the pattern and sustain the interest of the original strokes.

The simplification and characterization of characters can be re-designed by using the relationship between geometric shapes. Even the complex pattern elements, it is possible to identify the relevance between each component from the geometric point of view. If multiple elements are intertwined, it is necessary to pay attention to size, dimension and distance between elements to organize the entire picture of the font, as well as to build a sense of rhythm of the font design. Consequently, each element and each design step have a specific goal and sufficient theoretical reference.

The sheep oracle character is unique, simple and intuitive in the image. With the constantly adjusting, each part is beautifully and skillfully presented in the metric. The redesign of the sheep character is properly organized and simplified relying on the original pattern. It can adapt to the aesthetic of the new era and retain its original elegance and simplicity (Fig. 4.).

3.4 Style Unification

According to the Dictionary of Jia Jin Zhuan Li (Xun, 2005) and relying on the new theory of metrical design, the authors created a number of oracle bone script characters, including animal characters (such as cow, fish, turtle, etc.) (Fig. 5.), natural characters (such as sun, moon, mountain, etc.) (Fig. 6.), and human-related characters

(human, child, walk, etc.) (Fig. 7.). In order to unifying the style of each character in the re-designed font, the authors made a minor adjustment in terms of maintaining their geometric features after the all characters completed. As a consequence, the structure of the re-designed font was evenly distributed and the strokes were consistent, as well as the visual effect was unified and harmonious (Fig. 8.).



Figure 5. “Sun”, “Moon”, “Mountain”, “river”, “rain”, “Grow” and “wind”



Figure 6. “Hand”, “Walk”, “Son”, “Light”, “Smell”, “Dance”, and “Open”



Figure 7. “Deer”, “Mouse”, “Worm”, “Tiger”, “Raven”, “Turtle”, and “Ox”

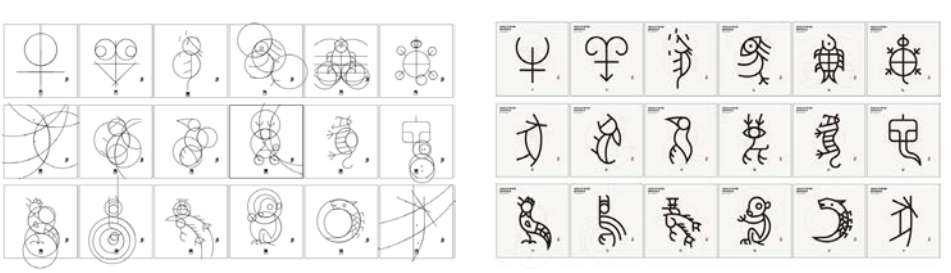


Figure 8. Unified Style Fonts



Figure 9. Product Design

3.5 Derivative Design

Derivative designs (Fig. 9.) have also been created such as posters, postcards, handbags, folding fans and canvas bags on the basis of the redesign of oracle font, trying to strengthen its commercial application value. In order to make the design more suitable for the public life, the authors chose the zodiac as the main content of the derivative design, and designed the oracle zodiac poster after enhancing the three-dimensional sense, color, and re-arrangement. In this way, zodiac story ensures this oracle font a better narrative and narrow the distance between people and oracle. Furthermore, it helps to attract the public's attention on oracle and make oracle obtain better protection and inheriting.

Conclusion

This paper explored a new design theory of oracle bone inscriptions which based on professor Chen Nan's theory of "metrical design". On the premise of respecting the original font of oracle bone inscriptions, the authors conducted further research and design practice on the redesign method of oracle bone inscriptions

which including four dimensions: Simplification and refinement, Layout, Adjustment and Style unification. This research can give a contribution to promote oracle bone inscriptions and arouse the society's attention to this ancient cultural treasure of China.

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Research on the Presentation of Screen in Science Fiction Films

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Abstract
As a visual device, screen, a representative product of technological developments since the information technology revolution, often appears as a subliminal presence element in science fiction films. In addition to the usual roles of atmosphere rendering, visual construction and presentation of information, the screen also serves to complement the narrative and sometimes plays the role of a medium. At the same time, as a visual symbol, the screen has a rich connotation and metaphor in science fiction films. Therefore, studying the presentation of the screen in science fiction films can not only help audiences better understand the connotations of these science fiction films and help the creators of science fiction films construct a more plausible worldview, but also observe changes in the relationship between people and technology. This work presents some examples of science fiction films, and explores the presentation of the screen in them.

Author keywords
Screen, Science fiction film, Presentation, Visual construction

Introduction

The imagination of technological developments has accompanied science fiction cinema since its inception. As an intuitive visual representation of the development of technology and information dissemination, screen is often presented in science fiction movies. As the form and content of screen representation in science fiction films increase, so do the philosophical implications, which makes a systematic study of screen representation in science fiction films all the more necessary.

I. Overview of science fiction films and screens

Science fiction film is the product of the combination of science and technology and artistic imagination, which is both realistic and forward-looking. Screen is an electronic device with display function, which itself has the property of representing the development of science and technology. Therefore, the screen and its various variants often appear as important props in science fiction films. As early as 1908, Méliès' s Photographie électrique à distance appeared a screen with display function. The protagonist created a mind projector that could project people' s inner world on the screen. In different science fiction films, the screen is sometimes used as a prop to build the atmosphere of a scene, sometimes it plays a narrative function, and sometimes it is used as a visual symbol to imply a metaphor.

II. The visual construction of screen presentation in science fiction films

i. Classification of visual constructs

The screens in science fiction films can be summarised in three categories: traditional screens, virtual screens

and variant screens.

Traditional screens must rely on material entities. The display screen of the spaceship radar in 2001: A Space Odyssey has a material entity, including the screen itself and the hidden electronic components.

Virtual screens do not have to be attached to a material entity and are not restricted in form or location. The screens in Minority Report are able to display images directly in space and do not produce physical occlusion.

Variant screens retain only the display function of the screen on the retina, broadening the definition of the screen in every dimension. In Free Guy, the hero, who is the NPC of the game, sees the virtual content of the PC through his AR glasses. It is a kind of augmented reality screen. In Ready Player One, real-world people perceive the panoramic virtual world through the use of VR glasses and accompanying somatosensory devices. It is a kind of virtual reality screen. In The Matrix, humans in the matrix are plugged into a brain-computer interface, with information going straight to the central nervous system. It is a kind of brain screen.



Figure 1.1. The computer display in 2001: A Space Odyssey



Figure 1.2. The virtual screen in Minority Report



Figure 1.3. Augmented reality screens in Free Guy

ii. Aesthetics of visual constructs

1. The aesthetics of visual constructs of form

Represented by the traditional screen, the screen in science fiction films is mostly presented as a square, with a computer-programmed sense of order. This is not only because a square can carry more information and make it neatly arranged and legible, but there is also a requirement for aesthetics. The sense of stability and order of the square complements the high-tech, rigorous feel of science fiction films. The array of square displays

appears several times in Johnny Mnemonic to render a sense of technology.



Figure 2.1. Johnny Mnemonic

2. Visual constructs of colour aesthetics

In cinema, colour is often given multiple interpretations while highlighting its own qualities, which makes it a special symbolic language in cinema.

In early science fiction films, screens were often shown in a single or similar colour, with blue in particular dominating. Blue has a deep, calm quality that adds a sense of mystery and technology. As in Figure 2.2, the dominant colour in the street scene of Blade Runner, released in 1982, is blue-cyan. Subsequent screen presentations have added colour levels to show a highly informed future. In the street scenes of Artificial Intelligence, released in 2001, the colours and forms of the screen are much bolder and freer, as shown in Figure 2.3. Many science fiction films use unconventional colours to construct sci-fi landscapes, similar to the way electronic music uses synthesisers to create sci-fi sound effects.



Figure 2.2. Blade Runner



Figure 2.3. The Artificial Intelligence

iii. Factors influencing visual constructs

Firstly, mechanical aesthetic affects visual constructs. The mechanical aesthetic is an aesthetic standard formed in the industrial age, and the picture of the future in this perspective is like that shown in films such as The Matrix - full of metal, speed and order. As a product of technology with a modernist look, the screen also plays an important role in shaping the mechanical aesthetic.

Secondly, the technological aesthetic affects visual constructs. Science fiction films are famous for the visual pleasure brought by spectacle. This kind of pleasure is completely realized by technical mechanisms in some future landscapes with simulacra as the main body. The proliferation of technical aesthetics will make the representation of the screen more appear in science fiction films.

Thirdly, science fiction films have different requirements for authenticity. Science fiction films focus on art concept design, and scenes and props as important elements of visual construction determine the authenticity of the film. The authenticity is based on a certain scientific basis and rationality. Therefore, the art design of

science fiction films needs to be adapted to the different themes and eras, with a degree of subjectivity in the future outlook. In the Blade Runner film series, the difference in time and space in 30 years presented by the screen can be seen: the screen changes from an LED advertising screen to a stereoscopic projection.



Figure 2.4. Blade Runner 2049

III. the evolution of screen presentation in science fiction films

i. From flat to three-dimensional

In Alien II (1986), for example, the operating terminal is still a two-dimensional plane. However, in Prometheus (2012), the interface has become a holographic stereoscopic projection, and the depth and breadth of the information presented have been greatly increased, reflecting the progress of human beings in the quality of information presented on the screen and the operation technology. This is the change in the presentation of the screen medium.





Figure 3.1. Screens in Alien II and Prometheus

ii. From the visible to the perceptible

In the first phase of Total Recall, for example, the screen can switch between the functions of a TV and a window; in the second phase, all real entities can become vehicles for the screen. The sensable screen increases the operability and interactivity over the visible screen.

Another manifestation of the sensory screen is that the content presented on the screen can directly access the central nervous system and provide senses. In The Matrix, the screen brings the subject directly into the virtual world through brain-computer technology, where the subject is within the screen.



Figure 3.2. Screens in Phase 2 of Total Recall



Figure 3.3. The Matrix

IV. The role and metaphor of screen presentation in science fiction films

i. The role of screen presentation

1. The role of narrative

The screen is intuitive and efficient as a medium for information that can be embedded directly in the film to account for key messages. In the film Arrival, the electronic screen held by the human scientists in the alien spacecraft as they rise in a lift switches back and forth between horizontal and vertical screen modes due to gravity-sensitive confusion, setting the scene for a later episode in which the scientists test the direction of gravity.

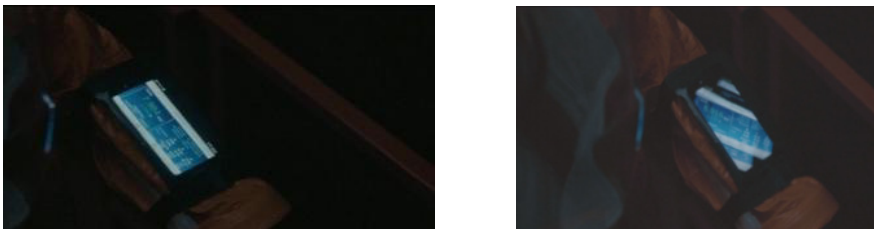

Figure 4.1. Gravity-sensitive chaotic screens in Arrival

2. The role of re-mediatisation

The science fiction film and the screen are media, and the representation of the screen in a science fiction film is a re-medialisation of the medium, and this re-medialisation will vary the the representation of the screen according to the subject matter of the film. In cyberpunk science fiction films, the public screen is often a propaganda tool for capitalism and consumerism. For example, the new Tokyo scene in Akira is filled with led holographic projection ads.



Figure 4.2. View of New Tokyo in Akira

ii. The metaphor of screen presentation

Firstly, the metaphor about the virtual replacing the real. The sci-fi film represented by Ready Player One explores the boundary between reality and screen virtuality: in the film, a highly simulated game world is created through VR glasses, which creates a competitive relationship with the real world, and even the real world Facing the risk of being replaced by the virtual. In reality, most people live a life of poverty, but the virtual game world gives them comfort, and many people are addicted to the virtual world and cannot extricate themselves.

Secondly, the metaphor about power relations. The Truman Show is a fictional 24-hour live reality show in which only the protagonist is unaware of the truth. Under the omnipresent surveillance, every detail of Truman’ s life is put on the TV screen. Through the screen, the metaphor of the panopticon that embodies unequal power is interpreted. This unequal power relationship is brought to an end when Truman finally discovers his situation,

tries to break out of his predicament and finally walks out of the studio from the end of the fake sea, free from the surveillance of the screen.



Figure 4.3. The Truman Show

Thirdly, the metaphor about anti-utopian. The Matrix, The Truman Show and Free Guy all use the failure of utopia to suggest that a highly technologically advanced society does not allow humans to achieve real freedom. In these films, the screen presentation often constitutes the plight of the protagonist.

Conclusion

As visual symbols with a technological aesthetic, the screens shape the unique atmosphere of a science fiction film, either directly or indirectly complementing the narrative, playing a variety of roles in the role of a medium and implying a variety of metaphors at the symbolic level. In the animation The Town of Samsara, I applies the virtual screen and the variant screen in conjunction with my research. With the development of technology, the presentation of the screen in science fiction films will change even more and generate new philosophical and sociological implications of technology, waiting for scholars to explore and conclude.

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Innovative Technology Driving Collaborative Design Shift：a Workshop Aided by the Metaverse

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Abstract

Collaborative design plays a critical role in the field of design. In response to the rapidly changing world, it is imperative to update collaborative design to meet current needs. Traditional collaborative design was often restricted by physical space, which has been further exacerbated by the global impact of COVID-19. Additionally, integrating individuals with non-design backgrounds into a design team has always been a challenge. Leveraging the Metaverse technologies can effectively overcome the limitations of traditional collaborative design in terms of time and space and facilitate the integration of non-design professionals into the design process. This paper presented a workshop that explores the potential of using a metaverse platform assisted by AI for collaborative design. The advantages and disadvantages of traditional design collaborative tools and the Metaverse technology were compared based on convenience, degree of participation, and satisfaction. The findings indicated that the use of the Metaverse platform can enhance the participation and interest of non-professional designers, which can improve the quality of the design output. This study aims to contribute to future research by exploring the potential of the Metaverse in collaborative design.

Author keywords

Collaborative design; The Metaverse; non-professional designers; Workshop

Introduction

Industry and academia are confronted with more and more complex problems(Freigang et al., 2018) , especially in design. According to Brosens, to face the new challenge, the cultivation of collaboration ability occupied a crucial position(Brosens et al., 2022).

Over the past 30 years, research on collaborative design has made considerable progress in defining the key issues (Nguyen & Mougenot, 2022) and promoting cognitive coherence among teams(Kleinsmann & Valkenburg, 2008). However, due to professional limitations, the mode of collaborative design is mostly limited between designers or led by designers. With the increasing complexity of design, the acquisition and combination of multiple disciplines is also increasingly important, which means that collaborative design needs to consider the role of non-professional designers more (Figure.1).

Design, as a highly specialized practical discipline, past experience in design collaboration has shown that traditional design collaboration makes it difficult for non-professional designers to participate efficiently. With the development of technology, this deep interdisciplinary design collaboration may become possible.

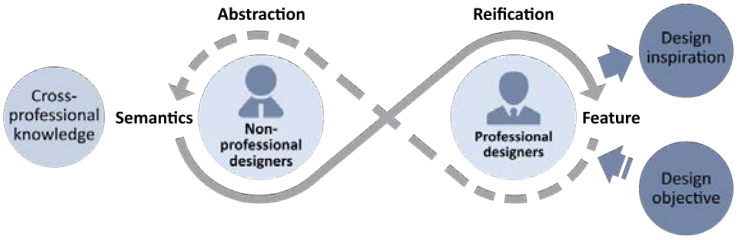

Figure 1. Collaborative design mode between professional designers and non-professional designers.

The Metaverse and its related technologies comprise sophisticated visual experiences, such as virtual reality, artificial intelligence and machine learning, which has led to changes in design collaboration methods and reduced collaboration barriers. Firstly, researches similarly emphasize the benefits of integrating advanced technologies, such as multi-touch meters and immersive VR, to enhance design collaboration and communication(Sharma et al., 2019). Secondly, researchers attempted to integrate AI into collaborative design, which means a change in collaborative team members：not only non-professional designers, but robots will become partners(Seeber et al., 2020). Besides, with the help of technologies, people could collaborate effectively across various geographical locations and time zones(Lee & Ostwald, 2022). However, although contemporary research on design collaboration has explored digital modalities(Idi & Khaidzir, 2018), we still cannot say for sure whether changes brought by technologies can play an important role in improving interdisciplinary design collaboration teams.

Therefore, this article attempts to investigate the impact of a metaverse collaboration space assisted by AI on the efficiency of interdisciplinary design team collaboration compared to traditional design collaboration methods.

Method

We organized an interdisciplinary collaborative design workshop, requiring participants to rapidly establish an understanding of the issues involved in the creative generation of complex products and to propose solutions to these problems within a specified timeframe. During this process, we aimed to investigate whether the Metaverse related technologies can effectively address the various issues mentioned previously through a comparative approach (Figure.2).

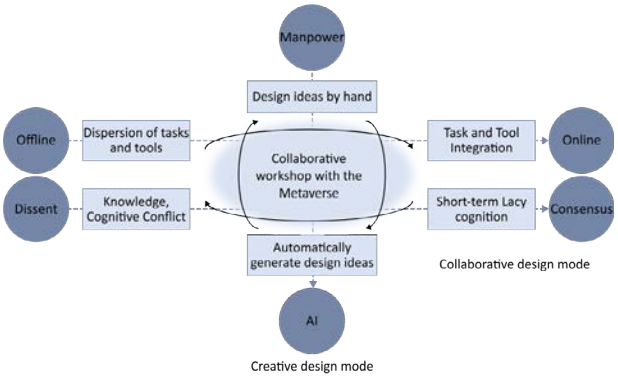

Figure 2. The transformation of collaborative design modes through the Metaverse technologies.

Construction of an online platform for collaboration

Before the workshop, we built an online platform with the Metaverse technologies, which was opened to the public (Figure.3). The present platform integrates all the necessary materials and processes required for the experiment. We also created a link, by which participants were able to articulate their ideas effectively by utilizing AI-generated tools, which were all open-source software.

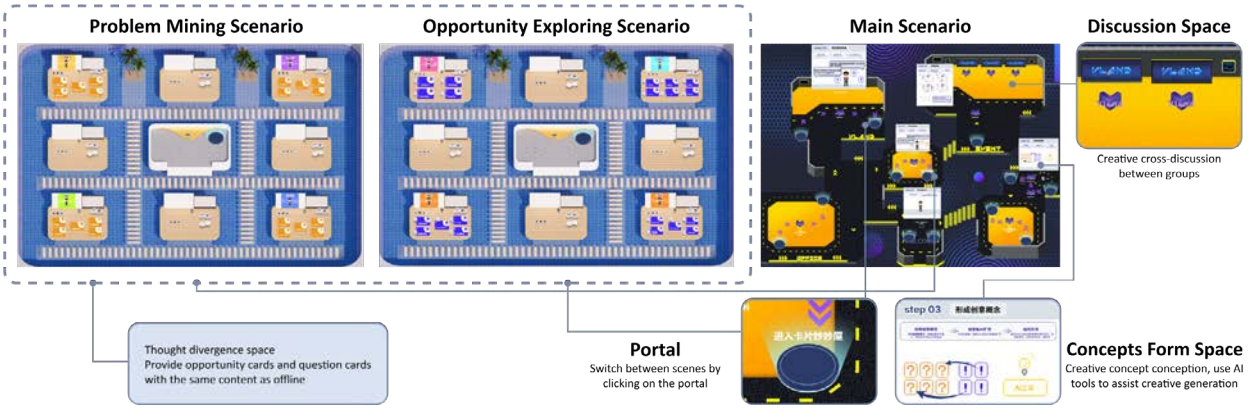

Figure 3. The online platform based on the Metaverse technology used in the workshop

Workshop design

This study employed a controlled experimental design that combined observation, data analysis, and subjective evaluation to examine the impact of different types of technology and tools (with or without the Metaverse related technologies) on participants' teamwork willingness, teamwork communication, and team's collaborative design efficiency. By utilizing this approach, we were able to identify significant differences between participants in these key teamwork-related factors.

Participants

In our research, we selected 20 students aged between 22 and 27 in the Hunan University to participate in our workshop. The participants were composed of 12 master's degree students majoring in design and 8 people with non-design background. In the workshop, the participants were divided into two different groups.

At the same time, we also required three professionals with over five years of experience in design to participate in our workshop. They served as judges for the workshop, evaluating the final output produced during the event.

Procedure

The workshop lasted seven hours, during the workshop, each group was asked to finish the following tasks (Figure.4):

1. **Introduction**: group members introduce themselves.	30 min	two-hour break	5. **Discussion**: discuss with participant from different group	1 hour
2. **Problem**: find out the problems that needs to be solved	1 hour		6. **Scheme iteration** : modify the scheme according to the suggestions	1 hour
3. **Opportunity exploration**: work out the way to solve the problems	1 hour			
4. **Scheme generation**: create a concept story and design plan	2 hour		7. **Evaluation**: selection of the best proposal	30 min

Figure4. The whole process of workshop

To ensure comprehensive monitoring of the experiment, two observers were designated to oversee the entire collaborative design process throughout the workshop.

Data collection

The experimental data mainly included subjective and objective content. Also, the excellence of each group of conceptual proposals was always an important indicator to consider. The following methods were employed to collect evaluation indicator information from the following four dimensions: 1) Evaluations about the workshop(figure 5); 2) Time and efficiency at each task; 3) Performance of collaboration; 4) Excellence of the design proposals.

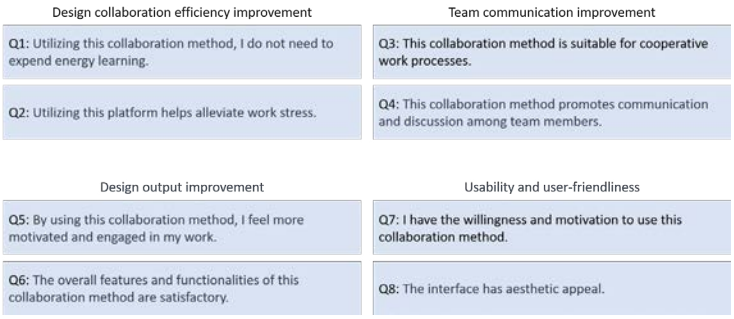

Figure5. The questions in the questionnaire

Hypothesis

Before the workshop, we developed the following hypotheses:

Hypothesis 1: Non-professional designers in the group which with the help of the Metaverse platform will understand the workshop's tasks and get into the teamwork mode faster than those with the same background in the group which using traditional collaborative design tools.

Hypothesis 2: Throughout the workshop, teams utilizing the Metaverse, and its related technologies were expected to experience fewer obstacles and achieve smoother communication during the collaborative design process.

Hypothesis 3: Groups members who were assisted by the Metaverse and its related technologies were able to generate more conceptual proposals, and these proposals exhibited higher levels of aesthetic appeal.

Hypothesis 4: The evaluations of the Metaverse and its associated technologies differed between professional designers and non-professional designers, with the latter group demonstrating a propensity to offer more favorable assessments of these technologies.

Results

Initially, we conducted an analysis of the user evaluation questionnaires, considering the presence or absence of Metaverse and related technology interventions in different groups, and the perspectives of both professional and non-professional designers. We sought to determine the mean values, with the findings illustrated in Figure. 6.

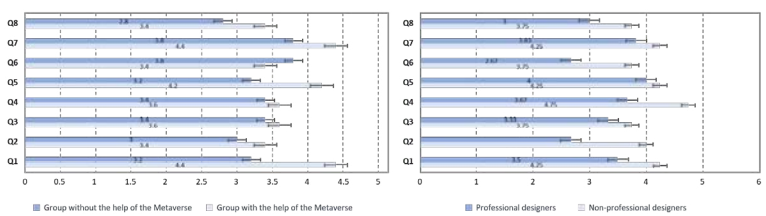

Figure6. The questions in the questionnaire

The understanding and reactions of each task

Observers meticulously documented the duration of each phase within the collaboration process (Figure. 7). the findings revealed that, throughout the workshop, groups supported by the Metaverse and associated technological tools exhibited a significantly reduced duration in understanding task objectives and establishing team consensus compared to those utilizing traditional collaborative design instruments.

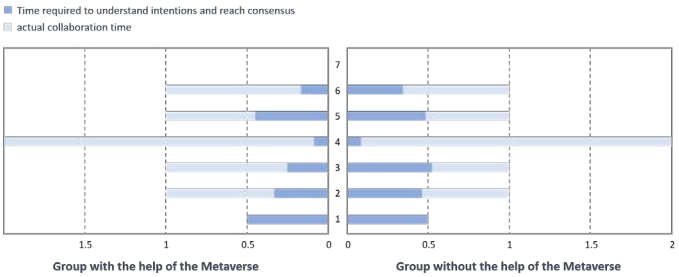

Figure7. The time taken to reach consensus and perform actual work at each task

Simultaneously, incorporating the observers' evaluations throughout the entire co-creation process (Figure.8), we ascertained that, owing to the instructional videos embedded within the Metaverse platform, participants were able to achieve a swifter understanding of task requirements and efficiently acquire the corresponding methodologies.



Figure8. The time taken to reach consensus and perform actual work at each task

Moreover, based on the mean values derived from Figure. 6, groups utilizing the Metaverse, and related technologies offered more favourable assessments of their capacity to bolster team comprehension of task objectives and facilitate consensus-building.

It became apparent that through the assistance of the Metaverse and its related technologies, participants' capacity to understand tasks within a limited time frame was effectively improved. This outcome provided strong support for the assertions put forth in Hypothesis 1.

The communications between each group during the workshop

By comparing the average characters output per minute during each task recorded by the online speech-to-text tools during the design collaboration process (Table.1), we discovered that throughout the entire design collaboration, groups assisted by the Metaverse related technologies were more inclined to engage in

communication with their group members. Concurrently, the survey results from questions three and four reveal that non-professional designers offered higher ratings, suggesting that the use of related technologies positively influences communication for non-professional designers in collaborative design processes.

Table 1. Average characters output per minute during each task, recorded by online speech-to-text tools

	Group with the help of the Metavers	Group without the help of the Metaverse
Task 1	173	167
Task 2	162	125
Task 3	167	134
Task 4	76	53
Task 5	145	116
Task 6	96	87
Task 7	0	0

Consequently, Hypothesis 2 is in alignment with the outcomes presented in this section.

The output of each group

Regarding the quantity and completeness of proposals, as illustrated in Table 2, the findings suggest that no substantial disparities existed between the two groups concerning the ultimate number of proposals produced.

Table 2. Statistical analysis of concept proposal outputs for each group

	Group with the help of the Metaverse	Group without the help of the Metaverse
Problem finding	16	13
Solutions	3	5
Stories	1	1
Proposals	1	2

At the same time, by observing the process of each group at each stage (Figure.9), the group with the Metaverse and its related technologies achieved better performance in the richness and aesthetics of the ideas.



Figure 9. Outputs of each group in various tasks

During the assessment of the concept proposals generated by each group, three expert reviewers considered various criteria, such as the urgency of the issues addressed by the proposals, the prospects for near-term implementation, and the overall effectiveness of the proposals. The results were surprising, as the top-rated proposal, chosen by the expert panel, originated from the group utilizing conventional collaborative design approaches and tools, diverging significantly from our initially posited Hypothesis 3.

Professional and non-professional designers' evaluation about the workshop

As depicted in Figure.6, it became evident that, all groups of participants manifested affirmative inclinations toward the implementation of the Metaverse platform in the collaborative design process. Furthermore, groups that were supported by related technologies proffered more favourable evaluations in aspects such as usability, collaborative efficiency enhancement, communication and interaction facilitation, and overall contentment throughout the collaborative design process. In addition, the analysis of questionnaire results indicated that this optimistic endorsement was particularly conspicuous among non-professional designers.

Discussion and conclusion

Through the research, we found that the Metaverse platform had significant impacts in the following areas:

The first key finding highlights the improved participation and understanding of participants, especially non-professional designers. This improvement can be attributed to 1) Enhanced accessibility and user-friendly interfaces of the Metaverse, catering to individuals with varying design expertise; 2) Overcoming professional barriers for non-professional designers by providing necessary resources and support. These improvements not only enhance overall design outcomes but also create a more engaging and enjoyable experience for participants, consistent with previous research findings.

The second key finding highlights the Metaverse and its related technologies in facilitating efficient communication within teams, specifically breaking down communication barriers between professional and non-professional designers, which attributed to:1) Immersive virtual environment: The Metaverse promotes natural and fluid communication, enabling participants to express thoughts more effectively, accelerating consensus-building; 2) Reduction of communication barriers: The Metaverse bridges technical barriers between professional and non-professional designers, fostering a more inclusive and cohesive team dynamic, contributing to efficient consensus-building.

The third key finding emphasizes that while the Metaverse related technologies enhance outputs in the collaborative design process, there is insufficient evidence to demonstrate the successful resolution of critical issues in the final outcomes. This may be attributed to several potential reasons. 1) the technological immaturity of the selected platform could limit its ability to support optimal design solutions. 2)the effectiveness of the Metaverse in generating successful design outcomes may depend on factors such as participants' expertise, experience, and adaptability.

Conclusion

Through the collaborative design workshop, we have derived conclusions about the potential applications of the Metaverse and its related technologies in design collaboration processes. However, there were several limitations in this study. Such as sample size, subjectivity, and potential bias and so on which need. As the Metaverse technologies continue to advance, these prospects highlight the potential for a transformative impact on collaborative design processes. However, further research and development are essential to fully explore and actualize the benefits of the Metaverse in this field.

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Compound Eyes from Viewers: Opportunities and Challenges of Social Interactions in Digital Media

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Abstract

Social interaction stands as a crucial design tool in contemporary digital media art, leveraging new media technologies to tightly connect creators and viewers, thereby reinforcing the representation of sociality in art design. However, the challenges and opportunities faced by social interaction applications in art design have yet to be fully explored. This paper based on the interactive presentation of digital media art, examines issues and challenges in applying social interaction from two perspectives: communication of perceptual and the subject of creation. Furthermore, it proposes specific design pathways for social interaction within the context of immersive media, presenting the design space for social interaction in immersive media.

Author keywords

Digital media; Social interaction; Immersive experience; social viewing.

Introduction and related works

The rapid advancement of communication and information technology has led to an increased diversity of digital media expression, providing new opportunities and means for societal communication and connection. Within contemporary digital media art, communication and interaction between artists and viewers have emerged as significant forms of expression. In these novel artistic forms, viewers' participation transcends the confines of passive observation, evolving into active engagement, collaborative creation, and interaction with others within the artistic context. This shift in the dynamics of viewership has brought forth new possibilities and challenges, alongside a host of socio-ethical and moral questions.

New technologies such as the Internet, the Internet of Things (IoT), immersive media, artificial intelligence and etc. have expanded the opportunities of societal interactions in real world. With the advent of emerging media formats like live streaming, barrage comments, short videos, and interactive visual imagery, the public is now capable of establishing personalized interactive identities, and selecting adaptive information presentation. Obviously, social interactions reaffirm the importance of viewers to creation, recreating the process of experiences in art design. The viewer regains the liveness, social presence of seeing and creating artworks which have been cut off by time and space. Digital media can be served as a conduit for multifarious social signals, offering means for communication among individuals, between individuals and objects, and between individuals and the environments. It has reinstated the processes of shared experiences, community engagement, and relationship building which lie at the heart of art appreciation. By providing a rich array of digital tools, digital media enables the establishment of new models of social interaction. Within the interaction and participation, the locus of power in artistic creation continually shifts downward, to decentralize the authority of creators and to drown out the individual. Driven by a desire for mischief, an increasing number of

viewers have engaged in social interactions through real-life conflicts. While digital media provides novel modes of presence, it simultaneously deceives viewers' senses and allows wrongdoing to occur, which heralds the dissolution of the traditional role -- creators.

This paper adopts a perspective of digital media art, elucidating novel modes of viewership behaviors stemming from extrasensory and the viewing power transforming within a context of social interaction. Furthermore, it delves into contemporary challenges and potential design pathways concerning the application of social interactions in digital media art. The paper's focal point is the interpretation and reconstruction of design approaches for social interactions in digital media art.

Extrasensory Spectacle: Ubiquitous Social Interactions

The body serves as the ultimate medium of perception, carrying the activities of communication and perception in order to achieve unity in form and content for the viewers. With the emergence of computational technologies and immersive media, sensory tools are increasingly being integrated into artistic creations. These embedded instrument modules precisely record the viewers' signals, such as their position, movements, heart rate, and brainwave activities. These tools extend the reach of the viewers' organ into the real world, constructing a multitude of sensory-rich scenarios that provide viewers with diverse experiences. Just as Marshall McLuhan postulated, "Media is an extension of human," the use of perceptual tools has broadened the spectrum of capturing reality in art. Simultaneously, it has reconfigured the viewer's perception under the guidance of these technological mechanisms. In other words, the sensory systems of creators and viewers have been numbed within the exaggerated virtual mechanism.

Alex Mulder and others introduced a classification system for perceptual systems like motion tracking in the late 20th century (Mulder, 1994). They categorized motion tracking into three forms: Inside-in systems attached to the body, Inside-out systems that recognize relationships with the environment, and Outside-in systems that rely on external position tracking. This classification method, initially applied to motion capture systems, also can be extended to the creating processes with augmenting sensory. Inside-in systems, such as VJacket, utilize wearable controllers to detect the bodily movements of live video performers (VJs)(Zingerle, 2001). They process this data visually and feed it back to the performers and viewers to ensure that the VJ produces appropriate visual content. Inside-out systems, like Bill Evans' incorporation of sound and electronic eyes on dancers in 1969, link the movements of dancers with stage lighting, enhancing the viewer's understanding of stage expression (Wechsler, 2006). Outside-in systems, as demonstrated by Yanxiang Zhang et al. in 2017, construct real-time augmented performance systems using various sensory channels like infrared LED sensing to assist performers in position tracking on stage (Zhang, 2017). These systems adapt stage effects accordingly, thereby strengthening the social interaction between the viewer and the artistic creation.

Digital media strives to adjust the disappearance of the viewer's body in the virtual creating expression. It endeavors to construct a virtualization process of bodily perception, with sensors acting as the medium's tentacles to extend human bodies. This practice has ushered in an artistic context characterized by sensory experiences beyond the ordinary. Bruno Araujo and others designed an interactive installation called Snake Charmer, where viewers in a VR experience can not only watch but also physically touch a mechanical snake to receive tactile feedback (Bruno Araujo, 2016). Such designs instill trust in viewers concerning virtual environments. Due to the convenience of sensors, creators may no longer focus solely on their creative activities and expressive language but instead become engrossed in the layering of sensory experiences. Embedded perceptual feedback within the body extends perceptual experiences but simultaneously profoundly influences the creative process itself. Artists freely employ scenarios that transcend the senses to build stimulating

experiences, deliberately blurring the boundaries between reality and virtuality, creating a continuum that confuses reality with its virtual counterpart.

However, relying on technology to construct sensory modularizes the perceptual faculties of the body. These technologies replicate various sensory in reality, such as visual, auditory, and tactile sensations. Yet, this has given rise to false social relationships. Video games, live streaming platforms, and immersive media systems, characterized by extreme realism, immerse people in fantasies where they cannot distinguish reality from dreams, rendering them numb and indifferent. These extrasensory scenarios, bloody and thrilling, excite the viewer's nervous system with the intention of fabricating experiences defy human norms and ethics. This aims to help non-participating viewers regain intense sensory experiences. viewers accept and immerse themselves in virtual spaces, where they do not stop the horrible behavior in screen. Instead, they may borrow identities from virtual media and engage in provocations of reality. Extrasensory interactions will eventually wipe out social sympathy.

Seeing and Being Seen: The Transfer of Viewing Power

Arnold Aronson once stated that new media enables drama to exist "without scripts, stages, sets, lights, props, or even actors, only the act of viewing (Leiman, 2010)." Traditional media-focused expression primarily revolves around the creator's self. However, as emerging media technologies intervene, the act of viewing is no longer limited in time and space. Sensing technologies, immersive media, and other technical methods allow viewers to engage in acts of viewing remotely, even when they are not physically present. This shift in the power of viewing also brings forth new ethical challenges. The emergence of virtual media has empowered the viewer with stronger interactive methods. They can participate in various public scenes, the creative process, and other people's experiences. This process of interaction has evolved into an interactive experience within the medium. However, this kind of social interaction is fraught with crises, as Marina Abramovi stated in her performance piece "Rhythm 0," where she proclaimed, "When you give the power to public, you may be killed."

The subject of artistic creation is dissolved within this social interaction. The Taiwanese band No Party for Cao Dong utilized a livestream to present an interactive musical drama. In livestream room, the viewers could collectively choose the narrative direction by commenting (No party for Cao Dong, 2020). The band introduced many absurd options, such as putting bananas in a hotpot. When faced with narrative selections, the viewers wholeheartedly opted to fool the actors to satisfy their sensory desires. In the end, when selecting to save one of three actors or not, a significant number of viewers chose the "Do not redeem them" option. The band then performed as the viewers wished and informed them that the livestream may have actually happened in reality. Artists, actors, game streamers, or other creators within the medium fully immerse themselves in virtual content. In this process, the medium establishes an interaction of controlling, and the viewers become the ones making selections. Consequently, the situation of those impersonators in social interaction becomes quite precarious.

Artists choose to enhance interactivity through viewer participation, infusing the entire process with more social exploration. However, most collective creations result in failure. For instance, various collective paintings via livestream have finally been destroyed and messed up to black, which has proved that the viewers in social interaction is usually rabble. In this multimedia age, the power of the viewer continually shifts downwards, presenting an opportunity for mass media to allow everyone to participate in the art design process. This indeed enhances the communication channels between creators and viewers, strengthening the collectivity of art. However, such a trend toward an imbalanced viewing relationship may ultimately lead to issues where the viewer outweighs the creators. The role of the viewer has transformed in the digital media landscape, and the boundaries and interactions between artists and viewers are challenging to regulate, creating irreconcilable

contradictions between collective artistic expression and the awareness of the creative subject.

Social Interaction Experience Design from the Perspective of Immersive Media

The process of social interaction has been consistently emphasized in artistic creation, with creators envisioning new interpretations it can bring to their works. However, there has been limited attention paid to its significance for individuals. With the development of technologies such as artificial intelligence and mixed reality, immersive experiences increasingly strengthen the connection between virtual spaces and reality through social interaction. This is achieved by introducing forms of social interaction such as multiplayer collaboration and asymmetric interaction to enhance the social attributes and presence in immersive experiences. Specially from the perspective of immersive media, the design of social interaction in digital media needs to focus on sensory feedback and empathic experiences.

Tangible Interaction and Bodily Perception

Social interaction in immersive media should cautiously introduce tangible interaction processes. Social interaction designs in immersive media often take two paths: introducing real-world activities into virtual scenarios or introducing virtual activities into real-world situations. These interaction processes shape the extrasensory experiences in immersive media. Indeed, this enhances the tactile perception of interactions of virtual content, providing possibilities for the embodiment of virtual content in reality. However, tangible interactions, while enhancing bodily perception, may also lead to sensory illusions and interruptions in immersive experiences. When real-world activities are introduced into virtual scenarios, such as incorporating bystanders or real-world tasks into immersive experiences, it may result in a misalignment of bodily perception and visual observation. Moreover, the power imbalance in viewing can lead to behaviors like bystanders mocking immersive media viewers. Conversely, when virtual activities are introduced into real-world situations, the overlap of visual presentation between virtual scenarios and reality, as well as spatial disorientation, can lead to erroneous tangible interaction processes. Due to technological limitations, these anti-realistic social interactions weaken the sense of presence and social attributes in immersive experiences.

Strengthening Empathy through Visual, Narrative, and Embodied Elements

In immersive media, employing visual presentation, narrative content, and embodied cognition enhances empathy within the experience, strengthening positive feedback in social interaction. The process of social interaction is challenging to constrain and regulate, akin to a cooperative engagement in design process. Immersive media possesses advantages in visual presentation, narrative expression, and embodied cognition, which deeply enhances viewer-centric connection to regulating the social interaction process. The incorporation of narrative content into immersive experiences intensifies emotional expression. Simultaneously, the embodiment aspect provides viewers with a first perspective and identity immersion, allowing viewers to understand the social interaction and build relationships within it more effectively. These approaches help viewers develop empathy and comprehension of the social interaction process, reducing instances of malicious behavior driven by a sense of superiority.

Conclusion

This paper has explored the opportunities and challenges of applying social interaction in digital media, focusing on perceptual communication and the shift in viewing power. Social interaction offers a broad pathway for the socialization of artistic design and strengthens the relationship between viewers and creators.

Extrasensory scenarios intricately collect viewer behavior and deceive their perceptions. As the decentralization of viewing power, social interaction disrupts the traditional role of creators in the creative process, potentially eroding expressive capabilities of artworks.

In light of these considerations, this paper proceeds to discuss design pathways for social interaction in the context of immersive media, offering recommendations centered around the reduction of tangible interaction and the enhancement of empathy.

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Productionism and Its Discontents: Viewing the Influence of Russian Avant-garde on the Bauhaus From VKhUTEMAS

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Abstract

After the October Revolution in 1917, the Russian avant-garde established a close relationship with the German left wing. Vkhutemas, as the center of Russian avant-garde also had an important influence on the development of the Bauhaus. Under the overall guidance of productionism's action strategy and functionalism, the two shaped the basic outline of modernism. While developing the modern design education system and establishing the historical position of the Bauhaus, the influence of Russia also foreshadowed the final fate of the Bauhaus. This research investigates the specific path and performance of Vkhutemas' influence on the Bauhaus from the aspects of conception, structural transformation and production strategy in order to clarify the relationship between them. From an external perspective, the comparison between Vkhutemas and the Bauhaus also reflects the far-reaching influence of social and national systems on the modern design style. Today, when the "Bauhaus" has become a spiritual symbol of modern life, the purpose of reorganizing the relationship between the Russian avant-garde and the Bauhaus is no longer just focusing on the history of modern design, but also trying to reorganize modernism design system, and Vkhutemas may provide us with a new research perspective and theory for re-thinking "Modernism" today.

Author keywords

Vkhutemas; Bauhaus; Productivism; Modernism; Constructivism

Introduction

Vkhutemas (Higher Art and Technical Studio, ie Vkhutemas), one of the most important centers of the Russian avant-garde art movement in the early 20th century (Solomon R, 1992:283-293), and its predecessor, the State Free Art Studio (CBOMAC), established a framework for the basic teaching of modern design in the context of the Russian Art program as early as 1918 (S.O. Khan-Magomedov, 1995: 24-25). After that, Vkhutemas and the Bauhaus jointly established the basic system of modern design education, providing theoretical basis and style reference for the formation of modernist design (Pu Anyuan, and Zhang Lei, 2021).

However, due to the influence of political, cultural and other factors, research on Vkhutemas is relatively recent and smaller than that of Bauhaus. Some Western scholars habitually refer to Vkhutemas as the Soviet Bauhaus or Communist Bauhaus. However, with the deepening of the research on Vkhutemas, it is now seen that the established perspective of "West-centrism" not only intentionally or unintentionally includes Vkhutemas and Bauhaus as the "two centers of Eastern and Western modernist design" (Anna, B. 2019) at that time, but each with its own unique historical status. As a result, Vkhutemas is often misunderstood as part of the Bauhaus' historical heritage. Some scholars even believe that the chaotic Vkhutemas at that time could hardly have any

definite influence on the Bauhaus (Anna, B, 2019; Lodder, C, 2019).While blurring the conceptual boundaries between Vkhutemas and Bauhaus, such viewpoints also imply the discourse construction of the bourgeois camp's ideological criticism of the socialist system represented by the Soviet Union, in an attempt to continue the habitual perception from the perspective of Western-centrism.

This paper takes Vkhutemas as the center, based on the analysis of conceptual beginnnings, structural transformation, and production action strategy, and then explores the specific paths and manifestations of the influence of the Russian avant-garde on the Bauhaus in various periods in the 1920s. In addition to looking back, I also hope to provide a new perspective and theoretical approach for today's re-understanding of "modernism", especially the rethinking of the relationship between social systems and national design methods.

1、Exotic Resonance: New art in Russia and the Bauhaus in Germany

The First World War had disastrous consequences for both Russia and Germany, and after a common left-wing revolution, the nascent Russia and the Weimar Republic embarked on comprehensive cooperation from politics to culture. Russian avant-garde artists including Kandinsky and Tatlin began to create a different kind of "new art". Moreover, the impact of the revolution was more profound in Russia than in Germany, and immediately after the 1917 Revolution the Russian People's Committee for Education under the leadership of Anatoly Lunacharsky began to reorganize the fields of culture and education.

For Vkhutemas and the Bauhaus, the link between the two was evident as early as 1918. In January 1918, the Russian People's Committee for Education established the Art Department (ИЗО) in Petrograd, led by the most progressive avant-garde artists of the time, responsible for the management of Soviet cultural institutions and artistic activities. Its founding member Kandinsky called the art department responsible for creating a "new art" to achieve a new life, advocating that artists should "actively and directly participate in all areas of artistic life". The art plan drawn up by the Ministry of Arts called for "eliminating the categorical boundaries between sculptor and craftsman, painter and sign painter, and elevating craftsmanship to art." The Stroganov Central Academy of Art and Industry (МГХПА) and the Moscow School of Painting, Sculpture and Architecture (МУЖВЗ) were reformed, and the first and second state free art studios were established respectively, aiming to spread the class consciousness and ability of the new art to the formerly disadvantaged working and peasant classes. The Liberty Art Studio specifically provides that a place will be reserved for each artistic genre, and art (painting, sculpture, architecture) and production departments (printing, ceramics, metalworking, woodworking, textiles) were established, and the educational program of which the students go through three years. After the common skills training, in the fourth year, they enter the tutor's studio to learn four years of professional knowledge.

Almost at the same time, Gropius, who had experienced the baptism of war and revolution, was also planning to establish a new art school to realize his vision of cultivating new people and transforming society. The Russian Art Nouveau Reformation made Gropius, as far away as Weimar, the first to respond to this revolutionary call in Russia. In fact, Gropius and Kandinsky knew each other and were in close contact long before the war. After the outbreak of the October Revolution, Kandinsky continued to inform Gropius of his activities in the field of education. Since the end of 1918, members of the Russian People's Commissariat of Education had successively established contacts with German left-wing organizations, including the Workers' Art Council, led by Gropius, the November Group, and the West-Ost Group. The exchanges between the Soviet People's Committee for Education and the German Workers' Art Committee showed that the development of new Russian art had a certain influence on Gropius's subsequent "Bauhaus Manifesto" and the founding of the Bauhaus.

For Gropius at that time, there was a group of fellow travelers in Russia who shared the same ideal and had already put it into action. This kind of resonance from a foreign country undoubtedly made Gropius see hope

for the future and he gradually became better prepared for the establishment of a school of modern art - the Bauhaus. From the historical point of view, during 11 years of teaching at the Bauhaus, Kandinsky continued his teaching plan established at the Moscow Institute of Art and Culture, that is, the pursuit of subjectivity and spiritual pure art. And as a reclusive idealist, Gropius retained Kandinsky's lessons in abstract art even after the Bauhaus turned to functionalism. On the surface, this abnormal phenomenon can be regarded as the embodiment of the Bauhaus's open and pluralistic modern education concept, and secondly, it can be explained as the fit of the two in artistic thought and aesthetic concept. Perhaps more importantly, however, in addition to being a great artist, for Gropius, perhaps in Kandinsky there still resided his original aspirations—in this Russian-born and experienced artist. The artists who led the artistic reform carefully collected Gropius's grand vision of the new general appearance of society after the October Revolution in Russia. Since then, whether it is regarded as a transitional stage that established the historical status of the Bauhaus, or a period of pan-politicization that Gropius sneered at, this avant-garde concept from Russia gave birth to the Bauhaus with more than ten years lasting impact. At this time, Russia, as the final entity after a drastic reform is also about to emerge.

2、Structural Transformation: From "Expressionism" to Productionism

1. Productionism in Vkhutemas

Since the schools of Futurism and Cubism that occupied the mainstream in Moscow Free Art Studios still focused on spiritual teaching methods, it was imperative to find a new paradigm that could reflect the material production and life of socialism. With the cooperation of the Moscow Institute of Art and Culture on December 18, 1920, Lenin made it clear in the meeting of the People's Congress on the establishment of the Higher Art and Technical Studio (ie Vkhutemas) that "The Higher Art and Technical Studio is a special art studio. A significant higher technical industrial educational institution whose aim is to train artists - masters of the highest industry standard and instructors and leaders of vocational education," with three art faculties (painting, sculpture, architecture) and five production faculties (ceramics, textiles, metalworking, woodworking, graphic printing), with the aim of combining art with production, science with technology, and with the new content of socialist life with the needs of the people. In his book Art and Production, the then production art theorist Boris Arvatov pointed out: "Russian productionists tenaciously searched for the connection between art and social practice, and in the revolutionary Under the Marxist worldview, they inevitably came to the conclusion that they must sever ties with any kind of 'pure art', including the art of the left."

Obviously, in the choice of art and function, the productionists of Vkhutemas reached a consensus and chose the latter. From the outset they declared a break with Gropius's "intention to convey craftsmanship and industrial production as the basis of artistic practice" for the Bauhaus: craftsmanship exists only to satisfy the aesthetic interests of a small number of people and is thus regarded as a representative of a certain elite tendency, which is contrary to the design concept of daily life in the modern sense. It was in this year's Vkhutemas that the "Objective Analysis Working Group" of the Institute of Art and Culture aimed at a large number of proletarian students who lacked artistic and cultural foundations. The basic research based on "composition" set up the overall basis of graphics, color, volume and space. The curriculum, which focuses on the search for common formal principles across all disciplines, the analysis of basic elements common to all visual and plastic arts, and the training of abstract generalizations of artistic elements.

2. The influence of Vkhutemas' Productionism on the Bauhaus

The most direct influence of Vkhutemas on the Bauhaus is reflected in the overall basic teaching based on the constructivism of reason and order, and it was Moholy Nagy who first brought this systematic influence on the

Bauhaus. Long before Moholy joined the Bauhaus, he had met Lissisky in Germany and was deeply influenced by the Russian Revolution. He took the initiative to absorb the ideas of Russian constructivism and became a constructivist. During his time at the Bauhaus, Moholy Nagy also maintained close ties with the Russian avant-garde, even when Gropius was drawing up plans for the Bauhausbücher in 1924. Moholy-Nagy also "looked to Lissysky for Russian contributions". Under the leadership of Moholy-Nagy, the teaching of the Bauhaus became more rational, giving more space for practice and the principles of constructivism, and gradually established a teaching model centered on the basic curriculum, that began the transformation of handicraft technology to industrial mass production and the move from liberal expressionism to rational functionalism.

Superficially, this shift, as affirmed by Nikolaus Pevsner and Reyner Banham, marked a fundamental shift in the history of the Bauhaus, from an individualistic handcraft orientation to the practical shift in the orientation of machine production also means a shift from irrationalism to a "more Rational, international, and even Academic Aposition". Combined with the publication of the Bauhausbücher, this shift undoubtedly puts the Bauhaus on the verge of a moment of its own theorizing in history.

Gropius claimed the Bauhaus Manifesto in 1919 that the Bauhaus strived to unify all creative endeavors, to unify the principles of the applied arts under the new architecture, in order to achieve the sublime unity of art and craftsmanship ideal. However, the reality is that for a long period of time, the Bauhaus did not have a clear guiding principle for the direction of teaching and the purpose of training students. Some painters, such as Johannes Itten, tended to think in metaphysics, emphasizing the spiritual rather than the material aspects of art and design. As a result of their emphasis on theory, the academy sometimes discussed more than acted, conceived more than produced, and was even swayed by the expressionism of traditional German artists and the mysticism dominated by Johannes Itten, which obviously violated Gropius's original intention.

Between 1921 and 1922, the Bauhaus gradually moved out of expressionism and began to transition towards functionalism. It was also about the beginning of this period, and the public image of the Bauhaus was considered to be gradually changing from individualism to collectivism, and from expressionism to productionism. The Congress of Constructivists and Dadaists and the First Russian Art Exhibition, held in Weimar, Germany in September 1922, gave Europe the first comprehensive presentation of the Russian avant-garde. The achievements of the movement soon led to the convergence of the myth of the European avant-garde with the ideology of Russian productionism, an ideological turning point in the history of modernism. At this point, the Russian avant-garde artistic concept began to exert a comprehensive influence on the burgeoning modernist movement.

3. Defects in the formation of Bauhaus' Productionism

However, on a practical level, even after Moholy Nagy took over the basic teaching and actively introduced the functional orientation of constructivism, the Bauhaus did not immediately turn to full-scale productionism. On the one hand, the reason is that the Bauhaus under Gropius never showed excessive pursuit of a certain doctrine or stance-this is obviously the reason that Gropius has maintained tensions in the school for a long time and avoided it. On the other hand, what had previously been dominated by Johannes Itten turned to a balance of Moholy Nagy, Josef Albers, Kandinsky and Paul Klee. Among them, Kandinsky and Klee were skeptical about Moholy Nagy's dogmatic technical aesthetics.

With the in-depth practice and continuous development of the concept of "construction", Moholy-Nagy's constructivism gradually has a layer of "fundamentalism", and the final "constitutive" work exuded a certain "neo-expressionist" spirit the form of rhyme (Aura) means. In teaching practice, although the design that pursues the sense of composition takes structure as the starting point, it often shows the tendency of formalism in the

specific plan, and thus moves towards the opposite of them. This modeling-based design method not only contributed to the so-called "Bauhaus style" but was also criticized by Bauhaus critics as "precise, feigned technical forms", which became the object of postmodernism. From this, we can further clarify that the Bauhaus in this period of basic teaching led by Moholy Nagy and the transition to productivism was essentially endowed with an incomplete sense of "Productivism".

Of course, we cannot deny the historical significance of Moholy-Nagy to the Bauhaus during this critical period, nor can we pass on the historical status of the Bauhaus. If the Bauhaus took from Johannes Itten a critical stance against reality and advocated the liberation of the senses and the ability to develop the sense of touch, then Moholy Nagy's contribution was based on the idea of constructivism, appropriately, promptly push the Bauhaus to a certain constructive stage: from open and free creation to system construction, and then effectively participate in the construction of the collective. This may also explain why this period is called the "outward-facing" transition of the Bauhaus' public image.

3、Productionism and its discontents: From Art to Production

Although the Bauhaus proposed as early as 1919 in its manifesto to establish lasting links with industry to improve the quality of industrial products, the actual results were not ideal. The reason is that, on the one hand, the reconstruction of Germany after the war was very difficult, and some domestic industries were still dominated by family workshop-style manual production. Most of the Bauhaus ideas of "the combination of art and technology" could only stay in the prototype and experimental stage; on the other hand, this situation is directly related to the residual handicraft position in the Bauhaus ideology. Admittedly, we can argue that Gropius's original Romantic tendencies aimed to reorganize the fragmented sociocultural environment by retracing the production patterns of pre-industrial societies - which can be seen as a detour and compromise in the face of the political environment of the time.

For the Bauhaus, it was the Hannes Meyer period that really regarded art as a "non-art" pure production act. In order to let the Bauhaus teachers and students understand the essence of functionalism more intuitively, Meyer continued to strengthen the communication between Bauhaus and Vkhutemas after Gropius. Obviously, as a communist, Meyer's democratic tendencies are more thorough, but also closer to the original appearance of functionalism in Russia. Reflected in the design, it is a completely functionalist "de-artistic" design. Meyer believes that "all objects are the product of the same formula: function × economy. They are not works of art, art is composition, purpose is function".

If Moholy-Nagy's almost paranoid construction idea introduced Soviet constructivism more formally, then Hannes Meyer's takeover in 1928 carried out the more complete "communist" core of constructivism in Bauhaus. More precisely, the Bauhaus, which had previously been led by Gropius, was only formalist constructivism and aestheticizing technology, while Meyer exposed its essence, rejecting any aestheticism, giving way to functionalism and engineering. The reason is that the economic crisis of 1929 completely exposed the insurmountable contradictions of capitalism itself, which made Meyer more confident in Marxism. If there is still a place for art in Meyer's mind, then art is the organization, and the artist is the creator of order, which is in line with the concept of "interpreting art as a political decision" by the Soviet constructivists.

In Gropius's view, Meyer was "a stain in the perfect picture" . However, if Meyer's ideas are juxtaposed with Gropius's 1926 Bauhaus Dessau - Principles of Bauhaus Production, when Meyer made the ideals of socialism openly public at the Bauhaus, it was "Socialism" appeared in public for the first and last time at the Bauhaus. Rather, Meyer thus cuts through, in a straightforward manner, the triple connection that Gropius originally envisioned for the Bauhaus— "first the connection between artist and craftsman, and then "the connection

between teacher and student"— The last link of the school is "the connection between school and society", and the medium he uses is "production". From basic material production to spatial production, to knowledge production, to the production of social meaning. From the historical point of view, it is precisely the complete functionalism advocated by Meyer in this period that really bridged the gap between the theory and practice of the Bauhaus from "art" to "production" in the 1920s. In the final historical stage endowed the Bauhaus with a short but complete "Productivism" connotation.

Conclusion

It can be said that with Vkhutemas as the center, the productionism from Russia profoundly influenced Bauhaus's conception and positioning, structural transformation, and production strategy. This all-round and multi-dimensional Russian influence not only develops the modern design education system and finally establishes the historical status of the Bauhaus, but also lays the groundwork for the final fate of the Bauhaus.

First, on the ideological level, the goals of Russian productionism are directly linked to the construction of socialism, the eventual establishment of what Avartov refers to as a system of proletarian culture, which is in line with Gropius' left-wing ideals to a large extent. If the specific form of "new art for the public" was still in the exploratory stage during the initial period of the Bauhaus, then the later Bauhaus was to a large extent relied on the ideas and forms of productionism to form in a short period of time. Hannes Meyer used his communist ideals as the first and last public socialist manifesto of the Bauhaus, bluntly opening the path between art and reality in the vague and gradual way that Gropius had lingered for years before. If Moholy-Nagy is regarded as a transition adapted to the transformation stage of Bauhaus, Meyer realized the closed loop on the rational road of Bauhaus production in an extreme way contrary to Gropius, and his left-wing ideas also became the direct reason for the closure of Bauhaus.

Secondly, at the level of artistic thought, Productivism and Constructivism, as new ideas in the early 20th century, represented the contribution of the Russian avant-garde to modernist design. In the context of the rising modernism from the end of the 19th century to the beginning of the 20th century, Gropius absorbed the ideological connotation of the Russian new art project before founding the Bauhaus and used it as a reference to improve the totalization of the Bauhaus. This strong resonance from a foreign country may also continue to inspire his confidence in taking Bauhaus as the isomorphism of society and one day achieving the renewal of total society. From free art studios to Vkhutemas, from Futurism to Productionism, the Russian avant-garde had a huge influence on many Bauhaus teachers including Gropius, Meyer, Moholy-Nagy, Kandinsky, and then profoundly affected the Bauhaus' teaching philosophy and school-running purpose.

Finally, at the level of educational practice, through the introduction of Russian Constructivism by Moholy-Nagy, the Bauhaus established the prototype of the three major components of modern design education after drawing lessons from Vkhutemas' composition teaching and opened the transition from expressionism to function. It was a new stage in the transformation of socialism, and thus shaped the classic image of the Bauhaus to the outside world. After integrating and absorbing other schools of thought, Bauhaus gradually established a system architecture based on its own rationality, science, and modernity. However, due to personal reasons and the constraints of real production conditions, the Bauhaus productionism at this stage was too ideal in practice and tended to be dogmatic in concept. Constructivism, as the conceptual practice of Productionism, did not overcome the self-institutionalization as art in the end, and fell into the rut of formalism again.

As the theoretical practice of Productionism, both Vkhutemas and the Bauhaus have fallen into the myth of technical aesthetics due to excessive pursuit of the formal rules of "Construction" and the idealization of design, thus ignoring the practical problems of practical production and manufacturing. But what is more worthy of

our attention is that in the face of the advent of the emerging industrial society and the complex stage of social transformation, both Bauhaus and Vkhutemas are trying to construct the core of meaning in the process of contradiction, seeking the possibility of a new era in the contradictory results, and the potential of art and design to transform society is manifested in the construction and repetition of contradictions. At the same time, it is worth noting that in the past historical accounts, the contribution of Soviet design to modern design is often underestimated or even ignored.

Today, when "Bauhaus" has become a spiritual symbol of modern life, the purpose of reorganizing the relationship between the Russian avant-garde and Bauhaus is no longer just focusing on the history of modern design itself. More importantly, we try to review the history of "modernism" as an opportunity to open up another possibility of understanding the modern design system that is still mainly referred to by Western-centrism and capitalism. In this way, it reshapes the self-identity of design and re-understands the historical responsibility of "design for the people, design for the society" underlying modernist design. And Vkhutemas may provide a new research perspective and theoretical approach for us to re-discuss Modernism today.

Acknowledgments

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S.O. Khan-Magomedov, Vkhutemas, Book 1, Moscow, 1995.. After two artistic reforms, Russia established the first and second state free art studios in 1918, which were merged into Vkhutemas in 1920. The system architecture of Vkhutemas, such as art, production academy, basic courses, etc., originated from the free art studio, which is considered to be the result of two artistic reforms.

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Lodder, C.(2019) VKHUTEMAS and Bauhaus. In Баухауз и художественные школы эпохи авангарда, 2019: 21-28. In fact, this dwarfing and even contempt can be traced back to the 1920s-30s. Alfred H. Barr Jr., the founding director of the Museum of Modern Art (MoMA) in New York, paid a two-month visit to Moscow in the winter of 1927-1928 and visited Vkhutemas about three times. In Barr's "Cubism and Abstract Art" exhibition in 1936, there were many works by Vkhutemas teachers Tatlin, Lisisky and Rodchenko. Barr, however, did not mention the existence of Vkhutemas at all.

Graphic Design understanding of visual elements in historical cartography Historic evolution of London in colour language

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Abstract

This paper presents the discussion of colour language in historical London maps from a Graphic Design perspective. Identifying how changes of London recorded by using colour language on maps. A design level of colour use shows more than the basic understanding of colours, which showed "beautiful" London maps in the history. Therefore, suggesting colour language can offer information for researching historical culture, cities and mapping from urban maps. This approach not only suggests new source in the Graphic Design fields, but also create a perspective for researching visual culture.

Author keywords

graphic design; historical London maps; colour language

Section1. Values of historical maps in academic researches

The importance of historical maps can be shown in the way they are influencing modern map area designs. For example, this is certainly true in the case of maps by John Norden, who in 1593 used map tables as a precursor to the key for reference symbols that still influence modern Ordnance survey maps (Lynam, 1953). Historical maps offered navigational overviews for travellers; they also formed collections for royalty; and were political tools for the government (Barber, 2012; Brotton, 2015). Except these, historical maps are especially valuable. They act as a visual medium that helps scholars to research historical knowledge and information, for example historical visions through their pictures/drawings to record history: social culture, economy, politics, environment (Skelton, 1975; Hodgkiss, 1981; Brotton, 2020). Thus, historical maps as a type of visual archives could represented some of the history. Goffart (2011) defines historical atlases are "the eye of history". Therefore, historical maps are a rich source of information for researchers. These images have academic values to research details, information and functions. Thus understanding how graphic elements translate information by the Graphic Design perspective on these historical maps could offer a fresh view for understanding history.

Section2. Graphic Design and Map

This study requires a discussion on the link between Graphic Design and Map. There is a disagreement about the date of origins of Graphic Design (Crowley & Jobling, 1996; Triggs 2011). Graphic Design is referred to as a discipline either in the late 19th (Eskilson, 2012) or in the early 20th century (Crowley & Jobling, 1996; Lupton & Phillips, 2008). Thus, how Graphic Design applied to historical images (maps), especially those published before the 19th century, needs to be considered. Graphic Design is the embellishment of visual sign systems to translate information and represent culture on media for aesthetic and meaningful communication, in a graphic manner (Barnard, 2005; Chen & Yu, 2016; Crowley & Jobling, 1996; Kalman, 1991 cited in Barnard, 2005, p18; Noble,

2016; Opach, 2009; Walker, 2017). Urban maps seem to be similar (Novin, 2016; Opach, 2009). Historical maps, in essence, are an aesthetic resource through graphic elements to represent detailed information of the world for visual communication (Andrews, 1996; Hodgkiss, 1992; Opach, 2009; Owen, 2005; Propen, 2007; Whitfield, 2006). Therefore, urban maps can be viewed as a form of graphic design. This means there is the possibility that Graphic Design perspectives applied on urban maps much earlier than the "Graphic Design" in literature.

Another way of understanding the link between Graphic Design and maps is through an analysis of their aims. Graphic Design includes informative, decorative, social, political, royal, cultural and economic functions (Barnard, 2005). These functions also appeared on maps. For example, cultural and commercial information has been recorded on maps (Novin, 2016) from the beginning of the royal map-making process in the 13th century in England . Therefore, maps and Graphic Design, through visual languages, aim to achieve similar purposes, and fulfil similar functions. Graphic Design is suggested here as a new perspective for researching historical maps. A Graphic Design perspective, which has previously been used for archival research culture in historical images (Walker, 2017; Xie, 2021), can be extend to include urban maps. This not only brings a new perspective to understand maps, but also a fresh area for Graphic Design research.

Images use graphic elements to visually communicate. Colour is considered part of the visual language that translates information through a visual process into a psychological understanding (Connellan, 2012; Feisner & Reed, 2014; Gage, 1938; Gage, 1999). For example, Connellan (2012) discussed the meanings of white in the visual language or Feisner and Reed's (2014) analysis of the cultural symbolic use of colours from the Middle Ages Christian Church. So colour plays an important role in visual media, for communication.

Therefore, colour language is one of the main factors in presenting visual information, which can be suggested as a key part of graphic design. If meanings of colour, as part of a visual language, can be applied to graphic design, they may also apply to historical maps.

Section3. Colour language in historical cartography

The process of creating a map is summarised in five stages, which are "information gathering; information processing; reproduction; distribution; map use' (Hodgkiss, 1981, p.21). The processing of information partly includes the translation of information into graphical elements on maps for readers (ibid). Fels and Wood (1993) discussed the myths included in maps, showing the representation of symbols of cultural significance through graphic signs (Bagrow, 1964; Fels & Wood, 1993). Symbolism of shape, line and form on maps has been discussed, in relation to physical, social or culture information. However, colour language has not been analysed in this respect. Indeed, colours use has simply been seen as decoration on maps.

Decoration is the main understanding of colour on historical London maps (Darlington & Howgego, 1964; Hodgkiss, 1981; Whitfield, 2006). This suggests colour language in cartography may offer perspectives for researching coloured London maps, even different types of maps required different purposes and different types of information. For example, the road network between two locations was important on some network maps or landscape maps (Brotton, 2015). Thus, colour use in historical cartography only can be a reference rather than the answer for London maps. This brings a discussion on the colour grammar in historical cartography. Scholars (Brown, 1977; Lynam, 1953) summarised how colour used from earlier historical cartography to become a "rule" of colouring. For example, John Smith (Brown, 1977) recorded rules for colouring maps in 1700 that stated that red used for the roofs of building and blue for rivers and seas. Thrower (1972) in his analysis of colouring pointed to a different idea of colour grammar, which is that dark green means forest and woodland; light green as grass; brown for arable land; yellow may present gardens; orchards were purple; buildings, yards, roads used red on maps. Colour played an important role; it has functions to represented natural world and information in historical

cartography (Ehrensvärd, 1987). This suggests that the roles of colour on historical London maps may be more than just decoration.

Visual language includes colour considers the role of representing information through graphic design process into a psychological or cultural understanding for social communication (Connellan, 2012; Feisner & Reed, 2014; Gage, 1938; Gage, 1999 Lupton & Phillips, 2008), for example, colours that represent objects, such as the sun as yellow (Gage, 1999; Itten 1970). The use of colours in various graphic design areas have been studied (Lupton & Phillips, 2008), for example, the role of colour language for designing commercial posters in the 1890s (Crowley & Jobling, 1996). If meanings of colour, as part of a visual language, can be applied to graphic design, they may also apply to historical maps. For example, Riley (in Gage, 1938) summarised colours that were used for directions in different countries, with Ehrensvärd (1987) noted South was represented as white by the Babylonians, green in Israel and red in ancient china. Thus, colours represent meanings on historical maps. This brings a reflection on the functional direction of colour use on historical London maps. Moreover, the colours in historical cartography are also clearly culturally dependent. This suggests cultural symbols of colour may also appear on historical London maps.



Figure 1 top: London(1572) © British Library Board, 215.f.1; bottom: London(1588 century), © The British Library Board, Sloane 2596, f.52

Section4. A sample of the changes of London in colour language

With reducing powers of religion, the roles of churches changed also. This change could be understood as reflected on these London maps through reading their colour languages. For example, information like identifying individual churches is seen as no longer important in the applied colour on maps in 17th century. Thus colours record historical changes on these maps.

Religion was important leading to parish churches becoming powerful in managing the development of cities, their population, politics and economies. Details of churches recorded on historical urban maps was important . This can be suggested on two oldest maps (Figure1). These maps published in the 16th century have the largest

number of churches highlight by colour. Churches are coloured differently when compared with common buildings. This increased the cost and time of creating maps in the 16th century. In addition, the shapes of buildings on these maps could help to identify the churches. Thus the importance of these parish churches are represented by colour. As discussed above, those parish churches that were selected to be coloured differently also suggests their importance.

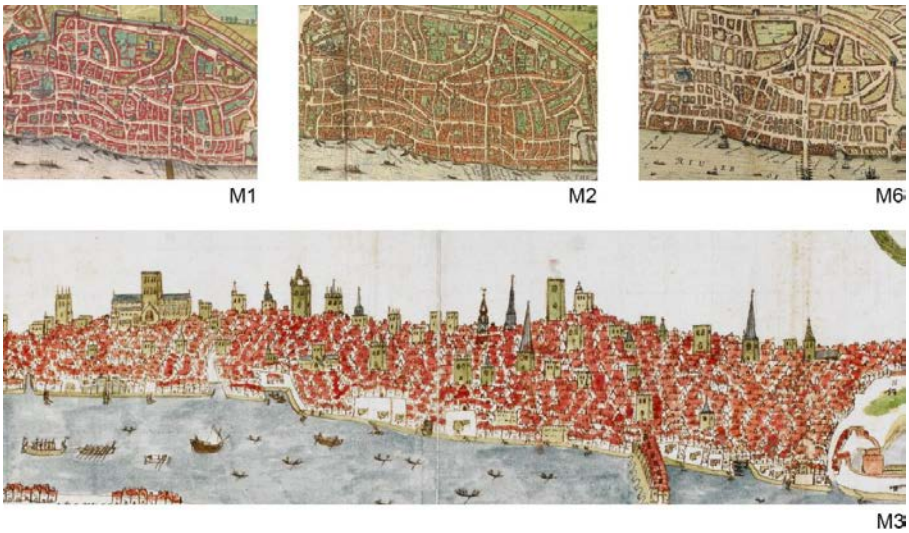

Figure 2 the area in the City Wall from top left to bottom are Map1 (a), Map2 (b), Map6 (c), Map3 (d)

The important of religion was in decline, this is clearly shown on the sampled maps via applied colour. Compared with colours for churches on maps in the 16th century (Figure 2 a; d), parish churches in the same areas are hardly identified by colour on maps in the 17th century (Figure 2 b; c). For example, there are two maps from a same black and white map (Figure 2 a; b). It is unlikely that this many churches were damaged and closed before the Great Fire of London. There are fewer churches highlighted by colour on Map2 (M2-1) (Figure 2 b) compared to Map1 (M1-1), even though they have the same overall number of churches on the black and white map prints.
The river Thames was the main water supply, traffic system, economic supporter, and allowed for the supply and daily requirements for citizens and traders. Roads were dirty and narrow in London. However, with the development of city, more farmlands became covered by buildings and roads could become one of the main traffic systems. These changes could be recorded on maps. For example, the River Fleet slowly disappeared in the 17th and 18th century. If the colours used can match with those changes, then this again suggests colour language can be used for track history of London on these maps.

Section5. Conclusion

Information has been recorded on historical London maps, such as culture and social structure. This information requires colour in order to translate and explain, offering further meanings and functions for colour. This suggests the importance of understanding colours on maps. Colour languages show the development of London and changes of mapping on maps. The application of colours changed with a new forms of mapping beginning in 1666 and the Great Fire. However, this is not the only factor that influenced changes of colours on these London maps. The development of London as a city itself also plays a main role in the changes of colour application and function in mapping. Thus it is important to understand the colour languages on these maps and their meaning.

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History in Design - Water Culture in the Aesthetic Concepts of Ethnic Miniority in Southeastern Guizhou

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Abstract

This article is originated from the author's love for water culture, inspired by Laozi's thought of "water conserves all things without contention", aspiring to learn from water, admire it, and become it. Since studies on the cross-border aesthetics of well-drainage culture and dress is quite few in number, the author takes the well-drainage forms of three regions in southeast of Guizhou Province, namely, Danzhai, Baibei and Leli, as the classification standard, and refines the basic units of water patterns on the dresses of Miao and Dong Ethnicities through the viewpoints of styling and survival aesthetics, and explores the aesthetic perception law of water culture of ethnic minorities in Southeastern Guizhou through the pattern factor and the modelling of the dresses to summarize the ways of each ethnic group's love for "water", and constructs a community of artistic aesthetics transcending the boundaries of ethnic groups by taking water as a clue.

Author keywords

Southeastern Guizhou; Water culture; Dress patterns; Miao Ethnicity; Dong Ethnicity

Introduction

Yellow River and the Yangtze River are essential to Chinese water culture. Since China's political culture over the past thousand years has been centered on North China and the Yellow River Basin, and the Yangtze River Basin has not yet escaped from the stereotype of the barbarians' non-authentic status. The Wu River, the largest tributary of the upper south bank of the Yangtze, is the "mother river" of Guizhou, whose turbulent water flow in the basin due to the large geographical difference endowed this region's cultural development with rapid ups and downs, and shaped the flexible, resourceful and strong psychological character of the people (Jinhui, 1987), with the migrated Miao people being the most representative of them. The Miao ancestors, to escape the war and the oppression of the rulers, migrated to Southeast Guizhou. In order to obtain sufficient water, the settled Miao people have developed the custom of "living in ten thousand house foundations and digging ten thousand wells". Wells, as a means of collecting water, ensured the Miao people's access to water for farming and living, and at the same time rendered the ethnic group's need to live by rivers due to geographical constraints unnecessary.(Wang Jun, 2022). In the "Ancient Songs of the Miao People - Opening of the Sky and the Earth," it is sung: "The clouds and mist were born in the earliest days"(Pan Tingzhi, Yang Peide, and Zhang Hanyuei, 1997).This can be seen in the generative philosophy of the Miao people, who believed that "qi", the most primitive element constituting the world, is one of the forms of water, and developed an attachment to water. At present, most of the research on wells in China stays at the architectural and geographic level, and a cross-border aesthetic exploration of well culture has yet to appear. Therefore, based on the data collected from the field survey in Southeastern Guizhou, the author will explore the relationship between water culture and the aesthetic design of local ethnic artifacts from the perspective of stylistic aesthetics and survival aesthetics with water wells as a clue, and summarize the most representative basic units of water patterns in each county.

Art and Imagery - The Diverse Beauty of Water Culture

Wells, the means of water extraction, and canals, the channels for guiding water flow, have provided the ethnic minorities in Southeastern Guizhou with a continuous and stable source of clean water for generations. Human intervention goes beyond changing the way of water existence, and extends to give the wells artificial aesthetics and imagination and metaphysical spiritual pursuit to a certain extent. However, with the gradual enlightenment of the ancestors, beautification is not just imitation, but the result of the subject's thinking and emotional activities, which is related to specific living objects, containing richer connotations. This unity of sentiment and external objects can be referred to as Artistic Imagery (Zhu Liyuan, 2014).

Paidao Village and Baibei Village - Water Wells - Clothing Necklines - Basic Units of Water Patterns

Regarding the Artistic Imagery of Paidao Village, the author will start from the uniquely shaped water well on the street side (Fig.1). The author found a uniquely shaped well on the street side of Paidao Village. According to Ms. Li Yuxiu, an inheritor of intangible cultural heritage from Danzhai County, the well's mouth is divided into two to represent yin and yang. The author stayed here, finding that the pedestrians passing by did not have a clear rule that they must drink water on the left if they

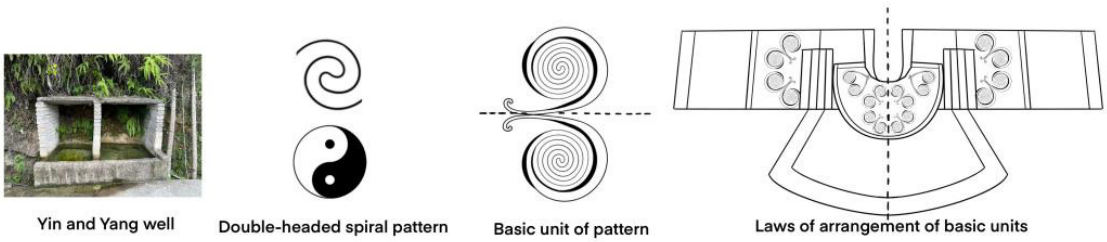

Figure 1. Yin-Yang well and Paidaomo type Miao costume

are men and the right of if they are women. Therefore it can be seen that the yin and yang are the code words hidden in the architectural culture of, representing a kind of good hope for the drinkers.

The concept of artistic imagery of "yin and yang" is also reflected in the local Paidaomo type of Miao clothing. The most recognizable symbol of this subgroup is "Wotuo", but it means batik clothes in Miao language, which does not accurately describe the pattern characteristics of the Paidaomo type of clothing. Therefore, the author will address "Wotuo" as "double-headed swirl pattern" so in this paper. Based on the interview with Mr. Yang Wenbin, the author comprehensively decided that the "double-headed swirl pattern" is the image of the classical Chinese philosophy of yin and yang, as well as the basic unit of the water pattern of the Paidaomo clothing see Figure 1. Double-head has two meanings, one is that the center of the swirl pattern forms the intertwined form of the Taiji yin and yang double-fish figure. The other is that basic unit of Paidaomo type Miao clothing pattern is the figure made of two butterfly-like tentacles or two water vortexes in mirror image symmetry whose method of mirror image is just like the reflection of the object and the water surface. All the basic unit patterns decorating the Paidaomo type costumes are arranged in mirror-image symmetry, which may be the externalization of the local ancestors' knowledge of things.

Yin and yang represent the dualistic understanding of the Miao compatriots of the nature, "It is DAO that Creates" Being "Out of Nothing". The use of "double lines" instead of single lines in the spiral pattern is a reflection of the concept of yin and yang (Jia Jingsheng, 2010). In addition, the eight double-headed swirls around the center of the bronze drum pattern radiate in all directions, forming a mirror image of the diagonally symmetrical cross (Zhang Yongfa, 2004), which is also an expression of heaven and earth, male and female. Mr. Yang Wenbin mentioned in an interview with the author that the "double-headed swirl pattern" is a beautiful hope for reproduction, which is also the tentacles of a butterfly and a variation of the cross pattern of reproduction. A migratory people with no writing applied their own understanding of yin and yang in the shape of wells and dress patterns to express the hope for the reproduction and prosperity of the ethnicity. Yin and yang as the source of life "water"

in general has become the spiritual pillar of the people in Danzhai unceasingly.

When researching at Baibei Village in Rongjiang, the author did not see the natural water wells. Village local Mr. Yang explained to the author that wells have been sealed since they happen to be in the way of road construction, rendering the local water for domestic use shift to a water supply pipeline and only pools with fire extinguishing function were left for the entire cottage. When the author photographed the hundred-bird clothes at the home of Jiang Laoben in Baibei Village, it is found that the basic unit element of the local water pattern is the fish scale pattern, which is the simplification and refinement of the ancestral people on figurative fish pattern. The basic unit of the pattern is mainly presented in two ways in Baibei Village. First, the eyes or whiskers of the fish are depicted in an exaggerated way, and different fan-shaped color blocks are embroidered with flat embroidery techniques to represent the fish scale pattern. Secondly, the pattern is artificially recreated by composing the fish scale pattern with other animals, for example, the horns of a cow's head, the body of a bird, the body of a leech are all embroidered with flat embroidery to create a colorful fish scale pattern in the shape of a fan. Through comparison, the author found that both Danzhai and Baibei use simple geometric lines as the filling elements of patterns, which involves the relationship between line performance and psychology: the more complex the line, the weaker its sense of power, the worse the sense of order. The simple lines that keep repeating are more likely to deepen the human image memory (Liu Zhenling, 2018). The rules of arrangement of the basic units of the patterns in the two regions are centered on the neckline with mirror symmetry to express the dependence of the regional ethnic group on water culture through the repetition and symmetry in a multidimensional manner.

Leli - water well - clothing waist head - basic unit of water pattern

When the author researched the water wells in the 72 Dong villages in Leli, I found that there is a fan-shaped stone corner on each side of the water wells. According to Long Zhengju, the owner of the local Dong clothing store, the fan-shaped stone corner

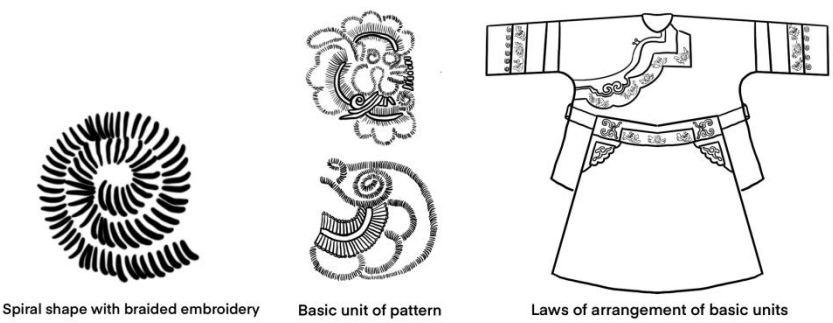

Figure 2. Dong Clothing in Leli - Basic Units of Water Patterns

is for people who line up here to put their buckets. This unique corner shape that is also found in the embroidery of the waist of the Dong women's clothing in Leli.

Through the author's summarization of the embroidery and pattern forms of the Leli costumes, it can be found that the "spiral" is the most representative basic unit of the water pattern in the region see Figure 2. The head of the Dong waistband is embroidered with a twisted nail needle, which rotates in a spiral during the winding process, just like the vortex pattern produced by the water flow, said Mr. Yang Wenbin in an interview with the author. The Dong people use the spiral to show the most important parts of the pattern, such as eyes, wings and tails, and to strengthen them. Secondly, due to the strong sense of relief generated by twisted nail needles, the folds formed imitate the stomach of a cow, an animal that are the main labor force in farming whose prosperity cannot be achieved without sufficient water resources. Therefore, the spiral form in the Leli region has become an imagery symbol linking the development of productive forces and the worship of the water culture under the surface of the subsistence appearance.

Art and Spirit: Reflections on the Relationship between Dress and Water Culture of the Minority Groups in Southeastern Guizhou

In examining the wells and costumes of the Southeastern Guizhou Minorities, two cross-border disciplines, architecture and costumes, are intertwined because of the maker's love for water. The physical wells and canals satisfy the water needs of the various minority groups living in Southeastern Guizhou, while the metaphysical ideas of the water culture are passed down from generation to generation by means of costumes in the form of techniques for carrying the Truth. Wells and dresses are both characterized as man-made objects on the material level. Wells belong to the earth, whose inner part is hollowed out to contain well water. Clothing is wearable because the front and back pieces are hollow, creating a space that can accommodate the human body. As the 11th chapter of the Tao Te Ching says, "When you knead and make clay to make a vessel, you have the empty part in the utensil to make the vessel useful. Thus, "something" gives convenience, and "nothing" fulfills its function." I can feel the water culture's depth of thinking from "uselessness's usefulness".

The water culture implies the survival needs the common interests of the entire population and the ethnicity. One of the unforgettable perspectives for the author is to see the community of villagers in Leli, who are dressed in different clothes with different personalities, but the scene of sharing the same well with the same ladle impress the author with the charm of "water



Figure 3. Villagers coming to fetch water at different times of the day in Leli.

is invisible, and therefore it has a million shapes".

Conclusion

The author demonstrates the water culture in the aesthetic design of Southeastern Guizhou ethnic minority costumes through existing artifacts and literature. The author also summarized that the carrier category of metaphysical water culture includes three major aspects: pattern, edge decoration and waistband. Every ethnic group would generate wisdom from the love of water, conveying the metaphysical dialectic of water culture and the idea of harmony through the form of facilities are for conveying the truth. Culture, as a link between each other, connects different ethnic groups together. We should understand each other, seek common ground while reserving differences, and work together to build a community of shared future for mankind.

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I am grateful to my professor for giving me the breadth and freedom of thinking, who transformed me from loving knowledge to loving it. Secondly, I thank my professor for giving me the opportunity of field investigation. Just as reading a thousand books is not as good as traveling ten thousand miles, the field has given me the experience as well as the resilience of thinking, without which this article would not have been possible.

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A study of the historical development of font design based on the producer's perspective

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Abstract

By analyzing the historical migration of font design and font production activities, this paper argues for three stages of development of font design and production forms based on producer perspectives. It also defines the categorical characteristics of every stage and focuses on the practical activities of brand-exclusive enterprise font in the context of Chinese and Western cases and the author's own project, exploring the value and significance of font development for the future of the economy and society after it has been detached from the publishing industry.

Keywords

font design; font production; enterprise branding

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Font library is both an important support system in the field of cultural communication and an significant part of the narrative in the field of design. Its history is closely related to humanistic activities such as chronicles, calligraphy, and publishing. Since the invention of Movable-Type Printing, the font library, as a fundamental element in the development of the publishing industry, has demonstrated a great role in both productivity and cultural style. Early representatives of typography technology were Bisheng's clay type in the Northern Song Dynasty(960-1127) and Johann Gutenberg's lead type (around 1450 AD) in Germany. However, in terms of publishing and other font applications in China, it was not until the Ming-Qing Dynasty that the use of typography on a large scale began. With the arrival of Western missionaries in China at the end of the Qing Dynasty(1616-1912) and the outbreak of the Opium War(1839-1842), typography and publishing technology returned to China, which made far-reaching effects on China's publishing and economic activities.

From the producer's point of view, the main body of font production has gone through stages including the traditional design and production of publishers, third-party professional suppliers (font developers), and then

modern commercial brands have also joined the "co-production" from " application purchase". On the one hand, there are "entry of newcomers" and on the other hand, there are "departure of the old" (especially in the publishing industry, where font producers are almost invisible any more). This unique developmental path is a historical phenomenon of the industry that has rarely been noticed. This paper discusses the three stages of transformation in the font industry and provides a study of contemporary industry practices.

1.From Publishers to Multi-Participation: A Three-Stage View from the Perspective of Font Producers

The initial concept of font can be traced back to the physical type block models [1] that appeared due to the invention of movable type printing technology. For the convenience of printing and retrieval, the publishers stored the models in the library according to their font style, size and number, sound and rhyme distribution and other attribute characteristics. This physical entity character model collection can be regarded as the initial prototype of the font library. When sorts out the history of the development of Chinese font library from the perspective of the font producers, one can identify that these font libraries have gone through the following three stages.

1.1Stage I: Publishing Industry Undertakes Font Production

Since the birth of typography, the design and production of font library have been undertaken by the publishing industry, and this phase has continued until after the founding of New China, spanning a fairly long historical cycle.

Before the appearance of typography in China, woodblock printing was the main publishing technology, which was not earlier than in the first year of Tang Dynasty (around 627 AD) [2]. Used mainly for Buddhist texts and cultural dissemination, the woodblock printing was used until the late Qing Dynasty. In order to improve the efficiency of publishing, there were many explorations of typography technology during this period, such as the exploration of Bi Sheng's clay type in the Northern Song Dynasty(960-1127), as recounted by Shen Kuo; and the exploration of wood type, as recounted by Wang Zhen in ''Agriculture Economics'' in the Yuan Dynasty(1271-1368) [3]. Although the early movable-printed edition, such as "Amitayurdhyana-sutra", appeared since the Northern Song Dynasty (960-1127) [4], and the archaeological discoveries from the Xixia and Huihu show that there were wood type around the Southern Song Dynasty [5], the large-scale application of typography was not until the Ming-Qing Dynasty, especially after the middle of the Qing Dynasty. Therefore, the concept of the font library referred to in this paper became increasingly distinct after the publication of typography on a large scale after the middle of the Qing Dynasty.

Typical cases of the application of typography publishing is the opening of the Printing Institute in Wuying Palace of the Forbidden City in the 19th Year of KangXi Period (1680). In order to protect the work of publishing and printing, the Qing government has set up the Pavilion of Copper type production factory,Pavilion of Treasure Collection, respectively, is responsible for the printing based on the technology of copper type and wood type [6], a total of more than two hundred and fifty thousand font engraved during the period and applied to the official printing institutions [7].

Since the Jiaqing years (about 1807), some foreign missionaries such as Robert Morrison, Joshua Marshman, Richard Cole, and William Gamble entered China and the neighboring countries successively, and began to improve the technology of Chinese typography[8] . In 1813, Marshman printed "The Gospel of the apostle" in Chinese [9] (Figure 1) in India by lead type, and in 1815, Morrison engraved metal type in Macao and printed it into the "Dictionary of the Chinese Lauguage" [10]; later the printing institutions such as, the Anglo-Chinese School (1838), the Chineseand American Holy Classic Book Establishment (1844), and the American Presbyterian Mission

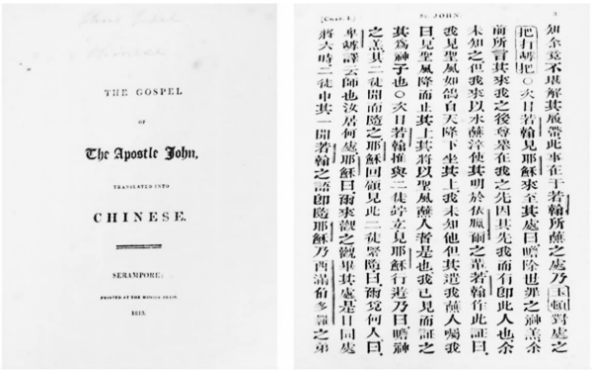
THE GOSPEL
OF
The Apostle John,
TRANSLATED INTO
CHINESE.
SERAMPORE:

Fig. 1 Sample of the leaded typography book "The Gospel According to John".

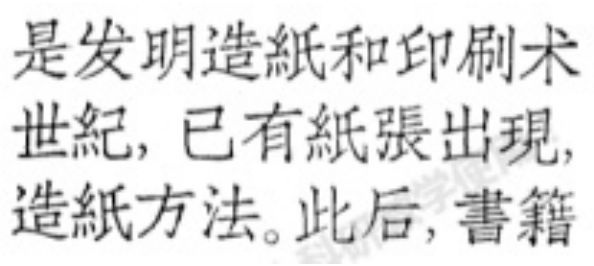
是发明造紙和印刷术
世紀，已有紙張出現，
造紙方法。此后，書籍

Fig. 2 Sample of JuZhenFangSong Font from Zhonghua Book Company

Press (1845), etc, successively attempted to produce Chinese metal font library. Among them, Gamble of The American Presbyterian Mission Press developed the electroplating molding method and produced seven types of Chinese fonts, which were later transferred to Shozo Kimoto of the Japanese Live Plate Transmission Institute (1869) [11]. The Book Integration Bureau established in the 10th year of the Guangxu reign (1884) spent three years producing No.3 flat fonts, and typeset and printed books such as "Collection of Ancient and Modern Books" [4]. In the fourth year of the Republic of China (1915), the Commercial Press developed FangSong metal font [5] using "YuPian of Song Dyasty" as a blue print and adopting a photographic method. In addition to acquiring the JuZhenFangSong font family (Fig. 2) through the acquisition of the JuZhenFangSong Book Companies in 1920, the Zhonghua Book Company also independently produced other type libraries, such as the LongFangSong Pinyin-connecting font family [6].

From the aforementioned cases, it is evident that from the Song Dynasty to the end of the Qing Dynasty, the design, development and production of the font have been undertaken by the publishing industry, characterized by the production of the font only to meet their own business needs. It is the core asset of the publishing enterprise, and does not provide leasing and sale of the font to others. This stage is referred to as "Publishing industry undertakes font production".

1.2 Stage II: Font Provider

With the development of the commercial economy and society, the industry began to segment for more efficient social productivity, and specialized font producers appeared. They regarded font design and production as their main business, and took the role of a third-party supplier to the publishing and printing industry, helping publishers to detach themselves from the full process of the labor process, and focusing more on content production.

In the early stage of the separation of font manufacturing from the publishing industry, some publishing and printing companies adopted a hybrid method that encompassed printing, casting and rentals. For example, the seven types of Chinese movable font produced by the American Presbyterian Mission Press using the electroplating mold-making method were so popular that they were successively adopted by the Tou-se-we Printing Company, the Printing Department of the School of Combined Learning, the Declaration, and other publishing and printing organizations[10]. As the comparison with the "stage when the Publishing industry undertakes font production" mentioned in the previous section, at this time, there was a situation in which the production of font was leased and sold to other printing organizations. This change contributed to the separation of the publishing industry from the font industry and the gradual withdrawal of publishers from the font production industry.



Fig. 3 Lead font library of Shanghai No.1 Font Factory



Figure 4 Font Sample from FounderType

Founded in 1915, the Huafeng Printing Casting Institute, since 1926, developed copper mold manufacturing, and expanding the casting workshop, casting the LaoSong, FangTou, Regular script, FangSong, LongFangSong Typeface and other copper molds and lead type. It sale to the country and Southeast Asia, and its business has gradually shifted to casting and sales of lead-based characters. After liberation, through government-led mergers and acquisitions, public-private partnerships, etc., it consolidated Hanwen, Yongxin, Qiuguzhai and other casting small factories, and formed a professional font producer——Huafeng Casting Copper Mold Factory, later renamed Shanghai No.1 Font Factory [7], transformed into a professional font producer.

In the context of the times, after the founding of the People's Republic of China gradually began to pay attention to the design and production of typography font, and successively set up the Shanghai Institute of Printing Technology, Shanghai No.2 Font Factory and Beijing Xinhua font factory and other enterprises. This means that the production of font is completely separated from the publishing industry, and then formed an independent font supplier industry.

Along with the development of "Chinese Character Information Processing System Project (Project 748)" and informationized printing technology such as Laser Typesetting, the metal typography was withdrawn from the stage of history overnight. However, the font production industry has entered a new milestone - computer font - due to the technological leap, which has led to the emergence of modern font suppliers such as FounderType, SinoType, HanYi Fonts, and Arphic.

At this stage, font library are produced by specialized enterprises. They develop by selling or licensing the use of font library (both physical and digital) to publishers, printers, publicity agencies, etc., and realize the independence of the font production industry. This stage is called the "font provider". This phase continued from the middle of the 19th century to the present day and is still thriving.

1.3 Stage III: Bespoke Font and Participation of Enterprises in the Font Library

With the development of modern business branding, from the West to the Middle, more and more companies have released Bespoke Font through customization or self-development. This unique phenomenon shows that the producers of font library have emerged as more entrants outside the two types of organizations, publishing and font suppliers - even if their business is not substantially related to the publishing and font industries.

From the historical axis, in the era of physical font, first the German company AEG (1908) realized its own bespoke font and then the French independent transport company RATP in Paris designed the Parisine font (1996). Entering the era of digital font, enterprises involved in bespoke fonts is accelerated, including Nokia: Nokia sans (2001), General Electric（GE）: GE Inspira (2004), Sony: SST (2013), Geely Automobile: Geely series font (2014), Samsung: Samsung one (2016), Tencent: TTTGB-Medium (2017), Xiaomi: Lanting Pro (2019), Alibaba: Puhui Font



Figure 5 Coca-Cola Care font and application effect

(2019), OPPO: OPPO Sans (2019), Vivo: Vivo Type (2019), Smartisan: Smartisan T Black Font (2019), and Coca-Cola: Care Font (2020) have all released or applied enterprise customized font.

This type of font producer is neither in the publishing industry nor in the font industry, which means that font producers are no longer confined to traditional industries; so why do these non-publishing/font producers get involved in font production? Let's take Samsung as an example, they regard their enterprise font --Samsung One as a core tool to help us build the visual experience. Behind the phenomenon of "bespoke font and participation of enterprises in the font library" is the hidden demand of enterprises to enhance their brand visual identity and expand their brand influence.

2.Brand Engagement: Bespoke Fonts Classification Based on Licensing Approach

In the process of branding, enterprises are provided with the design of logos, standard colors, auxiliary graphics and other elements through Visual Identity Systems (VIS). However, for the enterprises standard characters, some kind of universal computer font is often specified, and the obvious problem is that it is difficult to create a genetic link between the font style of the specified universal font and the brand identity of the enterprise. Companies that have extreme requirements for branding gradually find that generic fonts are unable to guarantee the continuity of the brand's intrinsic, deep-seated identity genes in the communication process. In order to meet the requirements of enterprise branding, more and more enterprises are involved in bespoke fonts, and in recent years, there have been an endless number of exclusive bespoke fonts launched by enterprises. However, according to the application authorization attributes of enterprise font, we can divide enterprise font into two types:

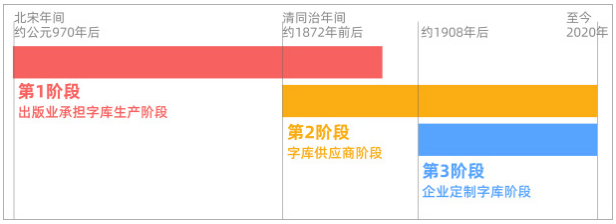

Figure 6 Three-stage division of the font from the producer's perspective

Type A: Open-access Enterprise Font:

As branding increasingly focuses on social evaluation of diversity and enterprise citizenship, some companies are also using bespoke fonts as an "open-access" public resource, open to external applications for free or for a fee. For example, AlibabaPuhui Font(2018) and Coca-Cola Care Font(2020) allow the public and other organizations to use them.

Type B: Brand-exclusive Enterprise Font:

Generally speaking, brand-exclusive enterprise font aims at its own brand dissemination. Therefore, in addition to the requirement of brand recognizability, it also requires brand exclusivity: this type of font is only limited to the construction, dissemination and application of the enterprise brand; it is forbidden to be used by other external organizations and individuals.

The "brand-exclusive enterprise font" is the focus of this paper, because its development has an extraordinary significance. As its design and development is for the purpose of enterprise branding, its use of authorization is not open-access to the outside, limited to the brand or the internal application of the enterprise, so that it is completely different from the traditional general-purpose font. Specifically, this type of font is no longer limited to

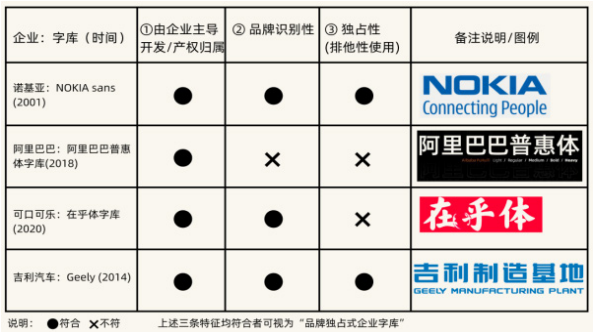

Figure 7 Classification judgment reference of bespoke font

the function of information exchange and dissemination, but more extended to the function of brand building and protection.

Based on the above, we can give a clear definition of the characteristics of "brand-exclusive enterprise font": ① design and development led by the using company; ② clear enterprise brand identity; ③ brand exclusivity (exclusive use). Typical examples are Nokia sans (2001) and Tencent TTTGB (2017).

3.An overview of brand-exclusive enterprise font practices

Brand-exclusive enterprise font is a very special phenomenon. On the one hand, it spans multiple fields such as brand communication, typeface design, and computer font development; on the other hand, it reincarnates a circular path of historical change of the font as "self-use (publishing industry) → public use (pan-industry) → self-use (exclusive use of the enterprise's brand)".

There are relatively few studies on brand-exclusive fonts. Therefore, in addition to defining their categorical characteristics, this paper also focuses on the development of the segment of brand-exclusive enterprise fonts. From the results of the author's known literature review, the earliest case of modern enterprise exclusive font can be traced back to 1908, when Peter Behrens served as art director at AEG, in order to realize the owner Emil

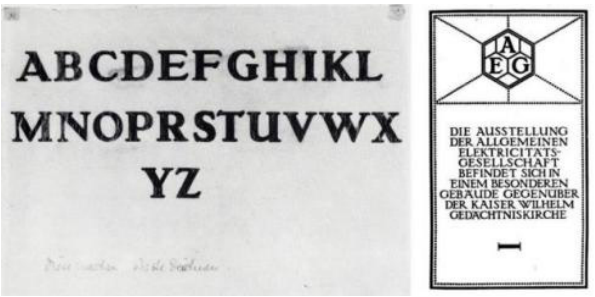

Figure 8 Berens' manuscript and AEG prints

Rathenau wanted to "unify the company's products, environment, and communication-related visual symbols" [14], the Behrens Antiqua typeface was designed by Peter Behrens , and the font was mass-produced at the Klingspor Type Foundry for enterprise advertising, collateral, printing and other branding practices. This series of design actions has helped AEG become a highly recognizable and attractive company, and has inspired the business community to understand the value that visual identity can bring to a company's business.

With the improvement of the modern company system and the rise of corporate brand awareness, especially after the gradual and widespread application of computers in business activities, and the rapid development of digital technology-based corporate font, many internationally renowned companies have designed corporate brand fonts and developed a bespoke font. Such as RAPT, a foreign independent transportation company in Paris to enhance the accuracy of the brand communication, in 1996 commissioned Jean François Porchez design and development of Parisine font. Nokia in 2001 launched Nokia sans series font. Its brand recognition is extremely distinctive, and the corporate logo font style is the same, together constitute the dominant elements of Nokia's visual image. The United States of General Electric Company (GE) in 2004 commissioned Monotype to design and develop the exclusive font GE Inspira font, its design inherited from the corporate identity of the rounded curves of the characteristics and the essence of a clear brand. Sony launched the SST font in 2013 in order to embed corporate brand identity attributes in different user touchpoints to enhance product value and user experience. Samsung launched the Samsung one font in 2016 and sees it as the heart of Samsungs new visual language DNA.

Geely launched the Geely series of bespoke font in 2014, with Geely English word mark as the brand gene linkage, inheriting the core cognitive elements of the enterprise. Tencent in 2017 released its corporate exclusive font - TTTGB-Medium, in upholding its brand cognitive genes under the premise of creating the font, as Tencent's brand identity of the standard word to use, in one fell swoop to solve the unification of many subsidiaries of the brand recognition of the split problem, unified corporate It also unified the visual style of the brand fonts of the eco-group and established a brand protection barrier for the Tencent system.

Conclusion

This paper observes the following conclusions by combing the changes of the producers from the physical living font to the digital font: ① China's publishing industry, as the original creator of the font, has completely withdrawn from the font production field today, which is the inevitable result of the division of labor refinement brought about by the development of the socio-economy; ② the participation of enterprises in the font production is a necessary requirement for the development of branding to the stage of refinement; ③ compared with the shared enterprise font, the brand exclusive font can better serve the enterprise brand building.

Although many studies have confirmed the influence of fonts on the communication of brand value perceptions, as shown in Terry L.Childers' and Jeffrey Jassr's studies [23], compared with the developed countries of enterprise branding, the design practice and application of bespoke fonts for Chinese enterprises, especially brand-exclusive font libraries, are still insufficient, and the academic research on brand-exclusive enterprise font in Chinese context is still lacking. In this paper, through the combination of case practice of the participating enterprises and the analysis of typical cases of well-known companies' fonts at home and abroad, the development of the segmented field of brand-exclusive enterprise font library is briefly summarized, which is expected to provide a reference for the research in this field.

Design serves social development, and designers should observe social economic changes from the perspective of future historical review. We deeply realize that the design, development and related research of brand-exclusive enterprise font library not only directly affects the enterprise's own brand building, but also involves the national soft power behind the enterprise's brand as well as the output of the national brand in the global cognitive dissemination of the relevant cultural values. The strategic evolutionary relationship between the enterprise font library, the enterprise's branding strategy, and the national image is worthy of attention and research.

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Research on the Basic Logic of Technology Norms of Chinese Gongjiang Culture

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Abstract

The paper believes the study on design history includes not only the issue about history of design but also the construction of theoretical system of designology in China. The study on the Chinese gongjiang cultural system is an attempt to construct a theoretical system of designology in China. This research takes the Chinese gongjiang cultural system[The major project of the National Social Science Foundation of China, "Chinese Gongjiang Cultural System and its Inheriting and Innovating"(Grant No.16ZDA105), proposed for the first time a systematic study from a cultural perspective on the subject of gongjiang before the 1920s, focusing on gongjiang as the theme, gongjiang culture as the center, and spirit of gongjiang as the belief or core value pursuit, systematically organizing, exploring, and showcasing the living world of Chinese gongjiang culture.] as the basic starting point, uses institutional philosophy as the research method, is based on technological norms for the research object to investigate the basic logic of the technological norms of Chinese gongjiang. By using the analytical framework of institutional philosophy, it is found that the standardization and inheritance issues of the technology fully reflect the basic logical characteristics of taking ritual and law as the leading elements of technical norms.

Author keywords

Designology; kaogongology; the Chinese gongjiang cultural system; technology norms; technology inheritance

Introduction

The writing of design history in China has always been a complex problem that professional and interested parties in the design community dare not easily touch. Many scholars have tried to explore the construction path of Chinese design history from the perspectives of dynastic history, power composition, materials, process technology, people and culture, and have made great contributions. Among them, Qichang Zou found another way to construct the theoretical system of traditional Kaogongology in China[Qichang Zou believes that the theoretical System of Modern Designology in China presents two basic forms: the theoretical system of traditional Kaogongology in China and the modern system of designology. Due to the significant differences in social and historical backgrounds, there are both essential differences and substantial close connections between them. In terms of differences, the kaogongology is a product of the historical background of agricultural civilization, traditional handicraft industry, and has great characteristics such as individuality and self-sufficiency in design methods. And the deisgnology is a product of the era of great industrialization, intensive integration, and multi industry cooperation, with great characteristics such as group and collaborative design methods.]—the part of the theoretical system of modern designology in China-from the perspective of gongjiang culture, taking the Chinese gongjiang culture system as a tentative path. This is also the basic foothold of this argument.

In traditional society, the technology and skills of gongjiang have always been at the level of physical

instruments. Technology is often manifested as a specialized industry skill, and it is demonstrated through practical activities such as war, civil construction and creation. The so-called technical norms refer to the formal rules and regulations and informal conventions of gongjiang in various industries to maintain their technical professionalism, confidentiality and continuity through a series of means in the activities of creating objects. Based on Pierre Bourdieu 's domain theory, the specialization of ancient gongjiang 's technology can be understood as a game process in the field of rights. In this process, technical specifications play a vital role in the development and continuation of gongjiang 's professional technology, and fully reflect the logical characteristics of legal and ritual factors as the dominant factors of technical specifications, which can be proved by the standardization system of craftsman technology.

Standardization of the Technology

Standard refers to the unified provisions on repetitive things and concepts. It is based on the comprehensive results of scientific, technical and practical experience, and is approved by the competent authorities through consensus and issued in a specific form as a common compliance criterion and basis. (GB3935.1-83,1983) The object of setting standards is repetitive things and concepts. The standards for things are generally management standards and methodological standards, while the standards for things are generally standards for objective products, that is to say, only repetitive things need to be formulated. Then the gongjiang technical standard refers to the standard of technical matters that need to be negotiated and unified in the field of craftsman production, and it is also the technical basis that must be observed jointly in the process of gongjiang work. For gongjiang, the core content of technical standards is the standard of technical implementation, which is mainly reflected in the unification of concepts, the unification of values and parameters, and the unification of procedures and methods.

Unification of the Concept

For gongjiang technology, the concept refers to professional technical terms, symbols, graphics, logos, etc., which is the basis for gongjiang to carry out various activities, and is a necessary condition to exchange ideas and communicate information between superiors and subordinates. According to The Book of Changes recorded "ancient knot rope and rule", "Fu Xi began to make gossip, no book, to draw things", it can be seen that in ancient times, daily affairs were recorded in the way of "knot rope" and "draw things" to show future generations. In the Qin Dynasty, for the first time, the overall framework and system of ancient Chinese technology with "ritual" as the dominant logic were basically established through the unification and standardization of the concept of the same track for vehicles, the same text for books, and the same system for degrees.

Unification of the Parameter

For the operating object of the craftsman, the values and parameters of the components, such as standard length, width, thickness, etc., are the fundamental basis of the craftsman 's technical specifications. Taking carpentry work as an example, it is generally based on the architectural design scheme to select wood with composite standards such as type, specification, and quantity as the best standard, and these standards are based on numerical values and parameters. The current regulations on the use of large wood materials in The Current Code of Practice for the Painting of Large Wood, Stone, Tiles, and Earth Oil Mounted Paintings in the Inner Court：
"Each column has a diameter of eight or nine inches plus one inch and five centimeters, and a diameter of one foot to one foot and three inches plus two inches."（Qing Dynasty, Yunli,Chinese Science and Technology Classics Collection - Technical Volume,1994:1131-1132）Taking the copper car unearthed from the mausoleum of the first

emperor of Qin as an example, the standardization of the vehicle is analyzed. The structure of the copper car is completely simulated and manufactured by the real object, and the axle, the shaft, the vehicle, the vehicle, the vehicle, the door, the window, the vehicle and other parts are cast according to the standard of certain process parameters. Another example is the bronze chariot unearthed in the Mausoleum of the First Qin Emperor. The structure of the bronze chariot is completely made by simulating the real object. The axle, shaft, cart, cart, door, window, cart and other parts are cast by the military according to certain process parameter standards, including the ratio of copper, tin, lead and trace elements such as iron, magnesium, nickel, and calcium in the alloy copper used. According to the theory of ' hardware is gold and tin is secondary ' in the six-qi theory, the proportion of copper in the copper car is between 8 % and 18 %, and the proportion of lead is between 0.12 % and 3.7 %. It can be seen that the numericalization and parameterization of gongjiang 's operating objects belong to the technical extension of information form to some extent. Integrating gongjiang 's technology into the formulation and implementation of standards is an important link in the process of realizing the materialization of the objective world.

Unification of the Method

In the technical norms, the procedures, rules, process regulations, operation methods, quality inspection procedures, safety rules and environmental conditions in the practice of gongjiang belong to the category of unified standards of procedures and methods. As the Kao Gong Ji has a unified standard for the selection of materials, the link method, the production of the car shaft frame, and the requirements, procedures and methods of different vehicle production. Now take the technical method to inspect the wheel as an example:

a.The simplest way to check whether the wheels are qualified as a whole is to "look far" and "look close".（Kao Gong Ji · Lun Ren）

b.The method of checking the wheel locally is to see whether the height and diameter of the wheel meet the standards.（Kao Gong Ji · Lun Ren）

c.The inspection standard of the vehicles is that the place of the circle should conform to the circle, the place of the square should conform to the right angle relationship, and the place of the standing should let the suspension rope perpendicular to the ground, parallel to the water surface horizontally, and the standing is like growing out of the ground.（Kao Gong Ji · Lun Ren）

It can be seen that in the vehicle production process, there are corresponding unified inspection standards and technical specifications only on whether the wheel is round, whether the spokes are straight, whether the overall density of the wheel is uniform, and whether the two wheels are equal.

The relevant legal documents such as "the size, length and breadth of the objects are the same as the objects " and "the names of the objects are used to examine their sincerity, improper merit, must be guilty, and to exhaust their feelings" are the basis for the technical specification system of gongjiang. If the artifacts do not meet the process standards or quality standards, the gongjiang can be punished for serious crimes.

Inheritance of the Technology

Inheritance, originally a folklore term, generally refers to the behavior of a certain group to inherit cultural heritage and the things it inherits. At this time, there are many similar associations between inheritance and tradition. Technology is the core element of flaunting the identity of the gongjiang. The inheritance of technology is a process of retaining the professional knowledge structure such as experience knowledge, pithy formula and tool use methods accumulated in the long-term practice through the path of specific legal legitimacy. Looking at historical materials, the author found that the inheritance of process technology has basically formed three types:

the model of technology inheritance by government based on "political relationship", the model of technology inheritance by master based on "industry relationship", and the model of technology inheritance by family based on "genetic relationship".

The Model of Technology inheritance by government

Specifically, this model is based on the "handicraft industry and commerce rely on the government" system, implemented to meet the demand for human resources in the production of workshops. It is an official collective artisan technical training and apprenticeship system with government handicraft institutions as the implementation subject, official gongjiang as the recipients, workshops as the production site, and skill training as the guidance.

Gongshi

Gongshi is the people who responsible for managing and training gongjiang. Generally, highly skilled gongjiag are qualified to serve as "gongshi", and imparting skills is their core function. generally, the responsibilities of "gonghsi" mainly include the following points:

a.Gongshi need to inspect, review and calculate the materials stored in the warehouse, ensure that the quantity and quality of the materials meet the requirements of creation, and prepare for the work of gongjiang before operation.

b.Gongshi is in charge of the production of utensils, participating in and guiding the design work of the gongjiang.

c.Gongshi manage gognjiang, supervise their technical operations, inspect whether the quantity and quality of products comply with regulations, and stipulate that gongjiang must strive for excellence to achieve the responsibility of efficient work.

d.Gonghsi is the main responsible person for training handicraft technology to gongjiang.

Gongjiang

In this link, gongjiang is the object of skill teaching. Due to the diverse composition of government gongjiang, including recruited gongjiang, slave, and criminal, who work together in workshops and projects, resulting in varying levels of craftsmanship. Therefore, gongjiang entiring the government must receive different levels of training, and different training systems have been formed for craftsmen from different sources.

Restrictions

The most significant feature of the model of technology inheritance by government is the teaching criterion with restrictions the core. So- called the "limitations" of technology inheritance are more reflected in the systematic and professional training system. For example, in the Qin Dynasty, based on the level of gongjiang of newly entered palaces, they were divided into "unskilled gongjiang" (generally referring to unskilled service gongjiang or servants, military craftsmen, etc.) and "skillfu gongjiang " (regular or hired gongjiang with certain skills)". And they will provide "two year old" or "one year old" regular training for different types of gongjiang, and corresponding reward and punishment measures will be taken based on the learning achievements of craftsmen during the regular training period.

The Model of Technology Inheritance by Master

This technology inheritance model mainly relies on a master apprentice inheritance system based on industry relationships within the same region. In traditional social practice activities, industry relationships mainly

manifest as professional relationships that occur within various types of workshops within the same industry and are linked by mentors and apprentices, with the main body of inheritance being folk industry workshop owners, and the object of inheritance being apprentices who seek skills from teachers. The content of inheritance is an implicit unique skill, forming a form of mentorship, a strict system of apprenticeship from passing on skills to graduation.

a.Formally become a pupil to a master.

This is an important link in establishing a master apprentice relationship In general, apprentices with connections will choose local well-known or skilled gongjiang as their masters, and they need to be introduced by intermediaries. The intermediary mainly plays two roles, one is to introduce both parties to each other and the other is to guarantee apprenticeship. Once the master apprentice relationship is established, the intermediary must take full responsibility for all actions during the apprenticeship period. In addition, draw up the regulation book and hold the apprenticeship ceremony are the main contents of established the master apprentice relationship. The so-called regulation book is a contract aimed at restricting apprentices, commonly known as the death and life document.

b.Skills imparting.

Due to historical limitations, process techniques exhibit implicit features centered around experience that cannot be written, leading to limitations in the skills passed down between masters and apprentices. This means that the skills and benefit cannot be taught in a systematic and explicit form of knowledge. Apprentices mainly learn through observing the master's techniques and hands-on practice, and the master will not completely impart all the technical secrets and tricks to the apprentice. Generally, the principle of passing on the form but not the spirit is adopted, which is the saying "leave one step in ten steps to prevent the apprentice from hitting the master" to ensure that the apprentice will not break the master's financial path, and the master will not impart the secrets to the apprentice until the end of the master's life, which is particularly evident in the traditional Chinese medicine industry.

c.completed one's apprenticeship.

In general, after graduation, apprentices need to host a thank-you banquet to express their gratitude to their master, and the master needs to give the them a set of basic tools as a souvenir. But usually after the apprentices have completed their apprenticeship, they cannot immediately become independent gatekeepers. They usually stay with their master for another six months, a year, or even longer to repay their kindness.

The Model of Technology Inheritance by Family

This family technique inheritance model has existed for a long time and is a common way of inheritance in the handicraft industry. That refers to a way of inheriting skills, methods, and values related to handicrafts from the previous generation to the next generation through father son transmission, which is based on blood ties and family workshops as the field. To ensure that craftsmen in various industries can specialize in their own fields, key unique skills can only be passed on to men rather than women, and passed on to daughter-in-law rather than son-in-law.

In addition, specialized techniques require elders to adopt a "prototype" approach for training, while the latter needs to be acquired through observation, self-awareness, and self-understanding. Secret pithy phrases and jargon are obtained by gongjiang through long-term practical experience, with strong generality, comprehensiveness, and practicality. For some simple technical operations, the recipient can only learn them through simple imitation, and the imparter needs to conduct teaching demonstrations through sample setting.

Conclusion

From the perspective of theoretical system of traditional Kaogongology in China, the professionalization and continuity of technology can be achieved through two paths: standardization and empirical inheritance. Through the standardization norms and the models of technology inheritance, it can be seen that the technology norms is a system with "ritual" as the ideological source and "law" as the dominant element as the basic logic.

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Digitization and Retelling of Historical Images of the Qinling Mountains: A Case Study of the Ecological Design "Wandering Taiba"

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Abstract

The Qinling Mountains, an important natural and ecological space in Chinese history, have undergone continuous shaping and reconstruction. In ancient times, the Qinling Mountains were regarded as "dragon veins" and gradually became a cultural realm for literati. The modern period has seen the "Disenchantment" of natural sciences encircling the Qinling Mountains, changing them into industrial zones. However, in the context of the contemporary "Anthropocene," designers are utilizing technology to "re-enchant" the Qinling Mountains. The ecological data art project "Wandering Taiba" employs multidimensional analysis and interpretation of geographic, altitude, climate, and soil data to construct a technological context for the "re-enchantment" of the Qinling Mountains' ecology.

Author keywords

Qinling historical images, Qinling ecological design, data art, "Wandering Taiba"

I. Shaping and Reconstruction of Historical Images of Qinling

The term "Qinling" has been endowed with multiple meanings throughout different historical periods. From the cultural landscapes shaped by literati in ancient times to the industrial spaces under modern industrial civilization, Qinling has been associated with multidimensional social and cultural significance in history.

The literati left important visual representations of Qinling. In the Tang Dynasty, Wang Wei painted "Wangchuan Painting" on the Bishan of Qingyuan Temple, representing daily life scenes of literati surrounded by the picturesque mountains of Qinling. It became a paradigm of images representing retreat. Wang Ding, a compiler in the Qing Dynasty, described this painting as follows: "Wangchuan is a famous place in Zhongnan. Since the painting by Wang Youcheng, there have been many imitations, but Guo Zhongshu in the Song Dynasty was the best...it will be immortalized alongside this painting."(Li M.Z., 2009) Guo Zhongshu's "Wangchuan Painting" in the Song Dynasty depicted pavilions and towers hidden among the Qinling mountains. His brushwork was similar to Wang Wei's but more meticulous.

In the Yuan Dynasty, Wang Meng painted "Imitation of Wangchuan Painting " which differed from the embracing-style representation of mountains and rocks in the Tang Dynasty. It focused more on the application of the "Three Distances" technique and portrayed the mountain formations and vegetation of Qinling in a more realistic and delicate manner.(Wang J.Y.,2010) Qiu Ying of the Ming Dynasty also created "Ten Scenic Views of Wangchuan," once again imitating the image of Wangchuan and adding rich green colors. He also used meticulous techniques

reminiscent of boundary paintings in the representation of objects.

Wangchuan is adjacent to Mount Huashan, and in fact, bothare part of the same mountain range. In the Ming Dynasty, when Wang Lu was unable to pick herbs from Zhongnan Mountain, he traveled to Huashan and created a series of forty paintings known as "Huashan Tu." He used a realistic approach to depict the true forms of the mountains and rocks of Huashan and wrote the preface "My teacher's heart, the heart's teacher's eyes, the eyes' teacher is Huashan."(Xue Y.N.,1988) Dai Benxiao of the Ming Dynasty created "Twelve Scenic Views of Huashan" using dry brush and charcoal techniques, as well as sparse and clear compositions, portraying a different sense of authenticity than Wang Lv's paintings.

The "Complete Map of Mount Taibai" produced in the Qing Dynasty depicts the slender and overlapping shapes of the rocks in Mount Taibai. It distinguishes the black-and-white hues of the rocks and clouds using the unique material of stone inscriptions and superb carving techniques.. The " the eternal snow of the TaiBai mountain " and " Hua Yue fairy palm " in the collection of the Beilin Museum's " Eight Scenic Poems in Guanzhong " also depict the artistic conception of Qinling's mountain forms.

Whether it is Wang Wei's "Wangchuan Painting," imitations of Wangchuan Painting in various dynasties, or the "Huashan Tu " album by Wang Lu, Dai Benxiao's "Twelve Scenic Views of Huashan," and the "Complete Map of Mount Taibai," all these images indicate the places visited in Qinling. While depicting the visuals, the artists kept a leisurely mood and enriched Qinling with many cultural significance.



Figure 1 Complete Map of Mount Taibai

II. Retelling Qinling Art in the Anthropocene Era

In the traditional historical context, Qinling has been constantly retold and reimagined, and people's cultural imagination of Qinling has continued to evolve. Today, we find ourselves in the era of the Anthropocene, attempting to transcend the dichotomy between technology and nature and reexamine the relationship between ecological art and technology.(Zheng D., Ai J& Liu X.D,2020) As explained by Chinese scholar Liu Yuedi in the paper " The Ecological Mission of Post-Anthropocene Human Art : Towards a ' Daily Ecological Aesthetics ", we need to reinterpret the ecological responsibility of art and its relationship with "ecology" and "living organisms."(Li, 2022) So, in the era of the Anthropocene, how do we "rediscover the fundamental connection between art and life through technological means"?

In recent years, scholars have focused their research on spatial exhibition design and graphic design in the context of Qinling museums. Papers have been published on topics such as "Research on the Application of Memory Space Activation inthe Design of Museum Space Exhibition"(Chen, 2021) and " on the analysis of the cultural and artistic elements of the Great Qinling Mountains in modern graphic design "(Wang X.X., 2017) have been published. Based on comprehensive comparative analysis, it is evident that there is a lack of systematic research on data art in the field of Qinling's ecological cultural preservation and development.

Qinling has abundant climate data, soil data, vegetation data, river data, geological movement data, and more. In the logic of data technology, different contents are unified and processed as indistinguishable "data." Artists map this data into aesthetically transformed works, constructing diverse relationships between ecology and human perception.

The challenge lies in integrating this data with the rich historical images of Qinling and transforming it into perceptible works that possess a shared human emotional connection. As artist Zheng Bo said, "Art helps humans become true Homo sapiens, with emotions and morals connected to all things on Earth." We strive to transform the geographical coordinates of Qinling into coordinates with warmth and substance through technology.

III. Historical Image Reconstruction of "Wandering Taibai"

"Wandering Taibai" refers to the overlapping elements of the mountain formations in the calligraphy and stone tablets of the " Eight Scenic Poems in Guanzhong " in the Beilin Museum, particularly the " the eternal snow of the TaiBai mountain " image. Based on the actual topography of Mount Taibai in the Qinling Mountains, the concept of its shape was summarized. Additionally, elevation contours and geographic information data were referenced for mapping, achieving the transformation of Mount Taibai's spatial representation from two-dimensional to three-dimensional (Wang L.H. & Huang,2020).

This transformation is a reinterpretation of the shape and order of mountains in traditional Qinling images, combined with modern surveying and mapping data. The "Wandering Taibai" logo is designed in three dimensions, capturing the main contour when viewed from above.. It depicts the unique biological scene of Mount Taibai by representing the main body of the mountain and incorporating the element of melting snow on the mountain summit in June, employing a unique kind of data aesthetics.. The graphical elements of the "Wandering Taibai" brand logo are combined with the latitude and longitude of Mount Taibai's elevation. Based on the bird's-eye view of the three-dimensional spatial model, additional graphic elements are extended, with each circle in the logo symbolizing a snow-capped peak on the two-dimensional brand logo. The number of circles represents the size of the mountain. "This design concept gives the "Wandering Taibai" brand logo a sense of three-dimensional dynamics, making it a new means of brand communication in the era of multimedia."(Wang L.h. et al.,2020)



Figure 2. Brand Design and Creative Application Design for Wandering Taibai

In addition to the design in data form, "Wandering Taibai" also combines scientific data with historical and cultural information, incorporating multiple cultural interpretations of Mount Taibai into the design. "abundant" signifies "rich and plentiful" in the "ShuoWen JieZi".(Xu,2015) This indicates that ancient people discovered the abundant resources of Mount Taibai early on, and the mountain was named "abundant resources." This also implies a link between Mount Taibai and economic development at that time. In the " Han Book Geography," it is referred to as "Mount Taiyi," which is said to be the location where the immortal Taiyi practiced cultivation. "Gu Jin Tu Shu Ji Cheng," "Guan Zhong Sheng Ji Tu Zhi," and "Mi County Annals." The earliest mention of the name "Mount Taibai" can be found in the "Geography" section of the book "Wei Shu," and it has been used continuously since the Sui and Tang dynasties. Mount Taibai and Mount Ao (formerly known as Mount Wugong) are both high and treacherous mountains, giving rise to the proverb"Wugong Taibai, three hundred miles to the sky." According to the "Shui Jing Zhu," Mount Taibai is described as "the most outstanding among all mountains, covered in snow in both winter and summer, appearing bright and radiant." (Li D.Y.,2007)

"Wandering Taibai" is a digital landscape scroll that combines historical imagery of Mount Taibai with the integration of geographic information from the Qinling Mountains. It creates an interactive digital scroll that provides an immersive experience. The project visualizes the geographical coordinates of Mount Taibai in a digital format, incorporating historical markings of scenic spots from the imagery of the Qinling Mountains. The overall image of "Wandering Taibai" also includes textual components relating to the historical and cultural significance of Mount Taibai, aiming to convey technological data in a humanistic manner. The project has also transformed the data-driven geographic information into creative design products, allowing the audience to interact with Qinling data art in their daily lives.

Compared to traditional imagery of the Qinling Mountains, "Wandering Taibai" expands the viewer's sensory perception through a combination of re-narrating the ecological landscape and digital representation. Based on the characteristics of Mount Taibai, such as the accumulation of snow in June, and rich climate data, the project designs the logo of Mount Taibai. Historical records such as the "Shui Jing Zhu" describe Mount Taibai as "the most outstanding among all the mountains, covered in snow in both winter and summer, appearing bright and radiant." (Li D.Y.,2007) Wang Qi of the Ming Dynasty described in his " San Cai Tu Hui " that Mount Taibai always has snow at its peak that doesn't melt, even in midsummer, and it appears radiant. (Wang Q.,1988) In the past, during the cold and snowy era, the towering peaks of Mount Taibai were covered in snow all year round, shining brightly, visible for miles. Therefore, the phenomenon of "accumulated snow on Mount Taibai in June" originated from this.(Wang L.H. & Huang,2020)

Based on the unique soil data of Mount Taibai, "Wandering Taibai" collects soil samples from different heights of the mountain, enhancing the audience's sensory experience in the era of data visualization. The strong vertical differentiation of Mount Taibai's climate results in corresponding vertical zones for the distribution of plants and animals. The climate and the differences in flora and fauna also influence the surface weathering of rocks and directly contribute to the formation of different types of soil. The natural landscape of the integrated complex, characterized by climate as the gene and vegetation and soil as the markers, forms different types of landscape belts at different vertical positions. "Wandering Taibai" collects soil samples from different heights of Mount Taibai in containers and conducts data analysis based on the unique soil data of Mount Taibai. This allows the audience to reconnect with a materialized sensory perception in the era of data visualization and re-establish their intuitive understanding of soil.

Conclusion

"Wandering Taibai" opens up new avenues for combining traditional historical imagery with futuristic

technologies. It generates a digital representation of the Qinling landscape that awakens the viewer's spatial and temporal perception using traditional photographs of the Qinling Mountains and Mount Taibai's unique geographic information data. This landscape not only embodies historical authenticity but also incorporates universal emotions that transcend historical reality. "Wandering Taibai" designs and creates a hyper-realistic space of the Qinling Mountains that is more real than reality itself. When entering this virtual hyper-realistic space of the Qinling Mountains, the audience engages in visual and perceptual interactions, traversing the concepts of geography and the physical world in terms of space and time. This enables them to transcend the boundaries between the virtual and the real, the historical and the present, the past and the future.

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Space and Identity: Studies in the Titles of Publications by Talented Women in Qing Dynasty China

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Abstract

Talented women have been around since ancient times, however the naming of their publications took a sharp turn in late Ming Dynasty: naming publications after buildings in garderns largely replaced naming publications after people or contents as the mainstream. The trend increased sharply in Qing Dynasty publications by them, but it did not receive enough attention from either garden studies or gender studies. This study categorized the names of buildings and architectural forms found in the titles of 3,643 publications by women during Qing Dynasty. During this time, thousands of women's studies were separated from their boudoirs. They became independent of one another, and were used as the titles of anthologies to reveal the social identity of talented women. The architectural formulas of women's study rooms exhibited throughout a large number of anthology books indicate that women's study rooms began to migrate from residential areas to the interior of private gardens, social gathering places outside residential courtyard walls. Women's activities shaped the garden. As opposed to residential compounds, which strictly adhere to the domestic space norms of Confucian social gender ethics - the separation of male and female, the separation of internal and external - private gardens establish a more fluid and complex gender spatial relationship. Combined with the residential courtyard, gardens with a large number of buildings provide a more complete picture of domestic space. We then offer the possibility of studying talented women's study rooms as the next step in this research. In this paper I re-conceptualize and recreate the social lives of talented women. In breaking down inherent stereotypes, we can see that the talented women of the Qing Dynasty gradually established their social identities and built their own social discourse with the support of their families.

Author keywords

Chinese talented women; female study room; literati garden; domestic space

Introduction

Extant studies of a talented woman (cainǚ, 才　女) have highlighted their writing as a means of gendered self-expression and self-construction. Nevertheless, as the perfectly preserved concept passed down generations and across dynasties, the term "talented women" was coined not only for its orientation towards family-centred morality but also, more importantly, for its emergence along with the professionalisation of women and the societal recognition accorded to them. In this progress, the scope of the concept of "talented women" gradually expanded along with the marketisation of female publications. Amid the massification of the concept, the familial element associated with social hierarchies lost part of its significance to professionalisation. Therefore, talented women examined in this paper entail two dimensions: societal and familial, or professional and moral. Talented

women's wandering between family homes and private gardens has shaped the dual attributes of talented women.

Women's collected works were merged into the literary trend of the Wanli 万历 era (1590), when the publishing industry flourished after the end of Ming Dynasty. (Yu Shiling, 2022) Because of the abundance of research materials, many scholars have devoted themselves to the study of publishing by talented women in the Ming and Qing dynasties, drawing on women's publishing behavior and market conditions to explore the interactions between talented women and society in order to refute the solidified notion that women "never leave the boudoir door "(三 步 不 离 闺 门). We find that the naming of talented women collections changed and shifted significantly with the times. Before Tang dynasty, women's literary collections were often named to emphasize moral discipline and literary character, such as Women's Discipline 女训 by Li Wan 李婉 in Jin Dynasty (around 260A.D.)and Lanxue Ji 蘭雪集 by Zhang Yuniang 张玉孃 (1250-1277), a famous female lyricist in the Song dynasty （Hu Wenkai,1985）. After Ming Dynasty, there were collections of women's literature named after buildings, such as the 30 volumes of Lanxue Zhai Ji 蘭 雪 斋 集 by Lu Jing 陸 靜 , which was recorded in Scriptures and Records of Jinhua 金华经籍志著录 , apparently alluding to her female identity and paying tribute to the ancients by means of architectural names. Female poetry collections named after buildings became popular during the Qing Dynasty, such as Shuhui Xuan Poetry Notes3 树蕙轩诗钞 by Yu Youlan 虞友兰 (1739-1821), Green Autumn Book House Poetry Notes4 绿秋书屋诗钞 by Zhang Yin 张因 (1741-1807)(Hu Xiaoming & Peng Guozhong,2019), and LengxiangGe Cao5 冷香阁草 by Yang Hanhui 楊含輝（Hu Wenkai,1985）. Types of architecture that appear in these anthologies are numerous. Such a large scale is an element of high interest. Due to an increase in women's publications, these specific volumes caught researchers' attention. However, unlike textual studies, the development and evolution of the titles did not become a mainstream research content.

If the content of women's anthologies has shifted from moral precepts and the promotion of socially accepted norms of female behavior to cultural constructs and expressions of talent, the anthologies can be named by words with literary intent that highlight the author's talent, such as plants favored by the literati (such as plums梅, orchids 兰).However, after the Ming Dynasty, not only were these flowers rarely directly named in the collection of talented women, they were not even a common subject of their paintings and poems.(Li Shi,2008） Instead, why did the naming of buildings gain strength and become a trend? How did the expression of space become so influential in the naming process of the women's collection? We can try to find the answer from collections and the family spaces.

Numerous historical studies, especially women studies, have paid attention to the proliferation of women's publications since Ming and delved into women's texts. For example, Dorothy Ko (1994) uncovered a vibrant network of communities built on a pattern of association, based on the intricate and intertwined relationships between women's poetry and literature. She emphasized the fact that women's activities broke through family boundaries. Study after study examines how writing by women provides resilience to orderly lives and blurs the boundaries between family and society. However, these studies focus on the poetic texts and the women's activities behind them, without touching on women's real writing spaces (those garden buildings that were independent of the boudoir dwelling space) and the role these writing spaces played in the domestic space.

I attempt to situate my research in a left-over area of textual studies, publication history, and garden studies, which is rarely tapped by experts in these fields. I attempt to correlate the information of text and space and place that correlation in the historical context to explore the changing conception of talented women. As the paper examines the naming information of publications of talented women in the Ming and Qing dynasties, it finds that the building forms they depict are very different from what we usually imagine as women's living spaces.

A shift in the naming of talented women's publications

This study selects the 1985 edition of Research on Works by Women in All Dynasties（历代妇女著作考）as the basic data framework, and supplements it with 10 volumes of Corrections by Women in Jiangnan1-5（江南女性别集）and Corrections and Supplements to Liuxu Ji of Women's Poems in the Qing Dynasty（国朝闺秀诗柳絮集校补）to build a database of named collections of talented women's writings from the Tang Dynasty (618 A.D.) to the Qing Dynasty (1912A.D.). In the Tang Dynasty, twenty-one women authored collections and were recorded. This number grew to 46 in the Song Dynasty. The number of female authors in the Ming Dynasty increased significantly, reaching 244（Hu Wenkai,1985）. During Qing Dynasty, 3,643 talented women were excavated and compiled (Louis Meng, 2007). More than 3,000 female authors in Qing Dynasty were passed down, as similarly documented by (Susan Mann, 1997).

In addition to the striking increase in numbers, the way names were also shifted to new content. In this study, the titles of talented women's anthologies were divided into five groups, including anthologies, actual books, picture books. (Figure. 1) A digital analysis of the flow of titles seeks to uncover the hidden motives behind this phenomenon. From the Tang to the Ming dynasties, women's publications had more naming methods. Until Song Dynasty, collections of talented women were usually named with connotations of discipline. A method of naming anthologies after authors and literary words emerged after the Song Dynasty. By the Ming Dynasty, the naming of women's publications mingled with the various categories of previous eras, while a more modern type of approach - denoting collections after buildings - emerged and profoundly influenced the trend of women's collections in the Qing Dynasty. Anthology's title conveys and amplifies the building's message, such as (Ting 亭、Tang 堂、Xuan 轩). Information on architectural names helps us understand the context in which women's buildings are located and the cultural identities that women assert.

From Tang to Qing, the difference in topic categories is significant, even without the sudden rise in quantity. Explanatory titles (e.g. describing content, authorship) and titles admonishing female behavior dominated the Tang Dynasty. By the time of the Qing Dynasty, the proportion of building-named anthologies exceeded half of the overall anthologies, becoming one of the most dominant forms. Coupled with the large publication base of the Qing Dynasty, the volume of collections under this name had far exceeded the total number of anthologies of the previous dynasties. (Figure. 1) Women's talent was placed in an unprecedented position of importance in Qing Dynasty publications.

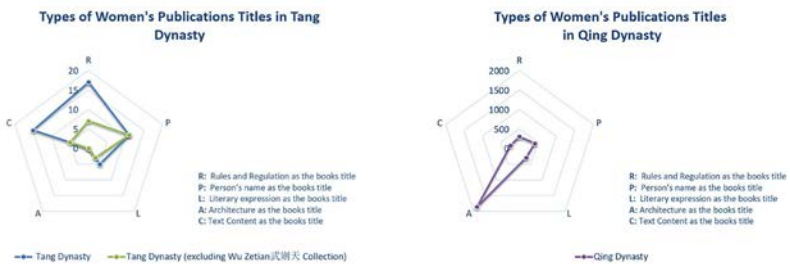

Figure 1. Types of women's publications titles in Tang Dynasty and Qing Dynasty

Publishing circulation shapes the identity of a professional talented woman

How does this manifestation of talent relate to the emphasis on buildings? An iconic Qing Dynasty title of female work consists of three parts: the name of the building, the shape of the study, and its content. For example, Kong Guangfen's 孔廣芬 7 Conggui Xuan Poems 叢桂軒詩稿 can be split into "Conggui" 叢桂 8, "Xuan" 軒 and "Poems". First part, " Conggui "- the meaning of cassia grove - usually indicates the plaque of a building while showing the

environment. A building's name typically expresses the owner's character and interests, as well as alluding to the building's function. "Conggui" denotes a study, because "gui"(cassia) signifies the career of a literati. Historically, provincial examination (乡试)9 were generally held in the eighth month of the lunar calendar, when the cassia blossom bloomed. People metaphorically refer to winning the exam as 'Plucking the cassia'. In a poem written by the Tang Dynasty poet Wen Ting Yun 温庭筠 to praise his friend on the imperial examinations list.'I am glad that my old friend plucking the cassia first"

It is clear that Conggui Xuan was a studio building with cassia planted around it. Kong Guangfen's Conggui Xuan cannot be examined at the moment. However, Xiaoshan Conggui Xuan 小山丛桂轩 10 in the surviving Qing Dynasty garden Master of Nets Garden 网师园 in Suzhou can help us to understand the circumstances about the house. n this relatively independent environment, corridors, walls, and rockeries connect this small building. The courtyard is very quiet, surrounded by cassia grove. Building boundaries are not sealed, and many doors and windows offer views outside. (Figure. 2a-2b) The architectural form of "Xuan" features a few walls and several windows and doors, allowing easy access and visual communication. It differs from traditional Chinese female architecture previously studied.

Wen Zhengming 文 徵 明 11 created especially for his friend Zichong 子 充 a painting called The Cassia Grove Studio (Conggui Zhai 藂桂齋图) 12, which depicts a study beside a rocky mountain (there are books and scrolls beside the rocky mountain), seven cassia trees around the study, only an ignorant young scholar and a study master pacing out of the study, leaning on the door and watching. (Figure. 2c) Conggui (cassia grove) represents a common element of study naming. A literati's study was Kong Guangfen's inspiration for her works title. The title of her poetry collection accentuates her identity as a talented woman. This message confirms her professional status in two ways. First, she has her own independent writing space - a talented woman's study. Secondly, this study resembles a literati study, although the dimensions are different. The situation of poetic couples conversing in poetry is very common, but couples sharing a study is not unusual. In literary couples, however, independent studies are more common.

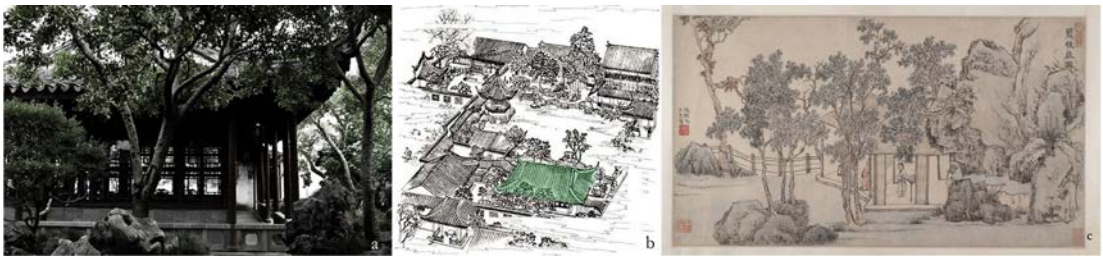

Figure 2. a.Xiaoshan Conggui Xuan 小山丛桂轩 b.in Master of Nets Garden 网师园 c. Wen Zhengming 文徵明 . The Cassia Grove Studio (Conggui Zhai 藂桂齋图), Metropolitan Museum of Art, USA

Unlike the Song Dynasty's women's collections, which simply emphasized literature, the message of architecture or women's access to independent study buildings is particularly reinforced. Women's publications entered the consumer market. As more women's anthologies were reprinted, their reputation spread. Most women's collections were prefaced by literary figures of regional influence, as the identity of the "talented woman" was full of uncertainty. Women were frequent participation in poetry groups, both within and outside the family, harmony with her husband's poetry, and ownership of a study strengthened her identity.The study of a talented woman was more like a studio than a purely private domain at this time compared to the study of a literati. Naming the collection after the study also implies the branding of the talent girl. This provides evidence of the professionalism of the publications and the professionalism of the talented women's identity.

Female body flow in a typical private garden model

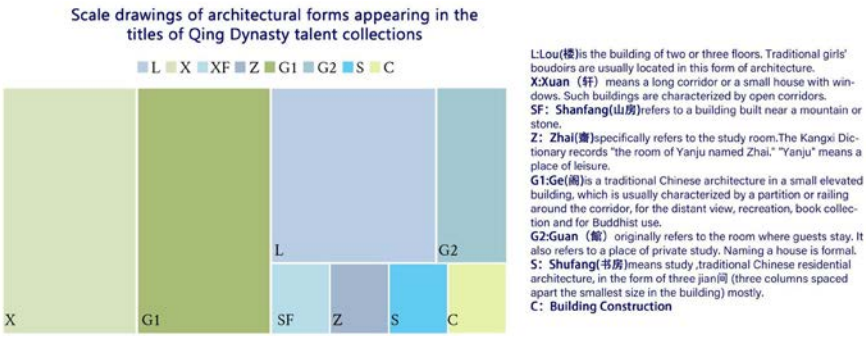

Figure 3. Scale drawing of architectural forms in the title of talented collections in Qing Dynasty

Diverse types of female buildings are included in the titles. (Figure. 3）The central problem is that, both in the southern and northern regions of China, residential houses are very static. They are generally built around one courtyard or multiple consecutive courtyard quadrangles 四合院 . In the quadrangles, living spaces for members of different generations are primarily confined to Tang 堂 and Wu 屋 in the first courtyard and the second courtyard, and Lou 楼 in the last courtyard. The courtyard of the residential building lacks a female study.

The most widely cited model of domestic space in gender studies was from C.A.S.Williams (1974). (Figure. 4a) Women live in the innermost courtyard, the family's private area. We insert an actual domestic space for comparison: the residence of Shen Bingcheng 沈秉成 13 and Yan Yonghua 严永华 14 in the Qing Dynasty, located in the Ou Garden 耦 园 in Suzhou. The gender distribution of the actual residential space matches very well with the domestic space model, and the female living area is indeed located in the innermost layer, red in the figure. (Figure. 4b）Where is Yan Yonghua's study located? In response to Yan Yonghua's collection Renlan Shi Poems15 and garden literature (Fei Yuqing, 2004), we identified this small building. East and west gardens divide the Ou Garden. The residential area lies between the east and west gardens. Renlan Shi 纫兰室 located on the west side of Ou Garden residence compound, south of Zhilian Lao Wu 织帘老屋 16where the male master's study.(Figure. 4c)



Figure 4. Women's space in the home

In the previous stage of research, it was evident that women's study rooms were extremely rich in form and showed distinct architectural characteristics. As a result, women's studies could only exist in private gardens outside the family courtyard, as it is in Ou Garden, not in residential areas with strict architectural and courtyard regulations. This area is generally considered to be the area of the male master and is not placed within the discussion of domestic space. Outside living areas, these women's studies were just within the gardens.

Therefore, when we visit the courtyard that carries the daily life of family members, the spatial order seemingly does not change too much. And this spatial evolution actually occurred precisely within the private gardens connected to the mansions. This is the reason why researchers ignore the transformation of the identity of 'talented women" revealed by domestic space. Women's writing space began to separate from the living room and shift to an intervention in private garden with social and cultural attributes. Female spatial environments and female living space texts reveal that talented women's lives flow extensively between domestic and private environments.

This situation departs from the Chinese family's default spatial model. The flaw of the 'inside and outside" model, which divides the family space according to the traditional Chinese courtyard 'Jin"(进)17, is that it presupposes a static and absolute bifurcation of family space - men are extensively located in the outer space of the family, while female members, including daughters and wives, remain in the innermost part (in the last courtyard at the northern end of the courtyard). Much of the exploration of women's space is based on the widely defaulted model of domestic space in Figure 4a, an assumption that seems to be settled. As Alvaro Semedo (1655) has documented, the female boudoir never had a window facing the street. Working women's places were damp and dark; resting women's boudoirs were inward-facing and sheltered. This one-sided emphasis shapes the miserable living conditions of women, yet in fact the vast majority of traditional Chinese architecture does not open windows to exterior streets, including male spaces. In an effort to break through the model's discussion of women's lives, scholars have continued to demonstrate that women have many opportunities to step outside the home in their daily lives (Dorothy Ko,1994). However, this argument also acquiesces to a certain extent to the mechanistic separation of the female space from the significant life scenes of the male master in the internal space of the home. Once we incorporate the flexible space of the private garden into the scope explored in domestic life, this bifurcated internal and external relationship is broken. The living space of women, especially talented women, encompasses both domestic and social content, and is more complex and fluid. The iconic spaces in private gardens provide a broad and universal authentication within society for the transfer of talent between female family members across generations when we expand the spatial concept of family from the residential courtyard to the private garden. For example, the lotus pond in the Half Garden 半　园 is the poster child for the realistic space of the Changzhou School of Painting 常州画派 . The talented woman Tang Ruyun 唐若　云 , who learned the family school at the Half Garden pond, was recognized by a wider society. This distinct upbringing from that of boys propelled daughters into the gardens. More importantly, the prestige of the gardens acted as a label by which society judged the talent of talented daughters. As a halo for the work of a talented daughter, the entire family can serve as a model. In the gardens, the "talent" of educated bachelorettes was

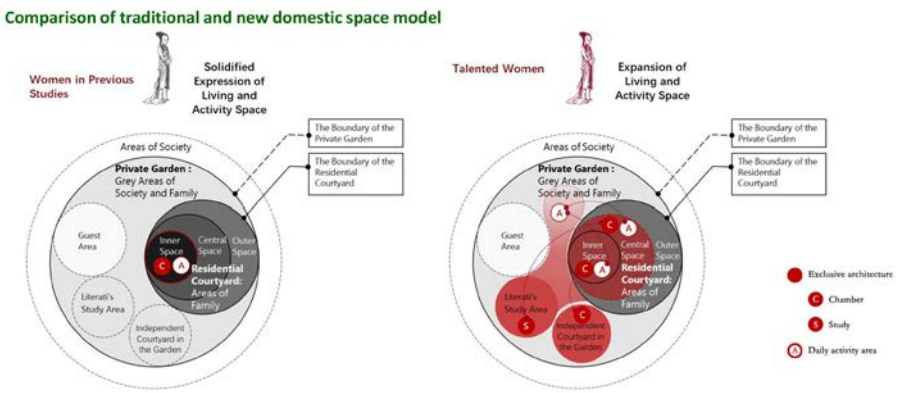

Figure 5. Comparison of traditional and new domestic space model

amplified, and 'talent" not only constituted a condition for daughters to be educated in the gardens, but those talents gave women the right to enter the gardens to live and work. Furthermore, 'talent" moreover functioned as a medium to draw the hostess into the social space of the garden to participate in family affairs. This 'talent' began to materialize in gardens (including plants, boudoirs or study rooms, and pillar plaques that fit the characteristics of talented women) as external society recognized women's talent.

Due to the limitations of the previous model of the family house, this paper expands the traditional model for exploring family space by including private gardens as part of the family space, as well as establishing a broader framework for discussing family space. (Figure.5) In such a domestic space model, women of different identities move between the residential courtyard and the private garden. Mistresses can attend elegant gatherings or entertain guests in the garden's main hall. They can also play teachers in the children's study room.

Conclusion

Talented woman is no longer a cultural term, a status that only the daughters of families from the "Shi" 仕 class had the opportunity to achieve in Qing Dynasty. It became a term with professional attributes, closely associated with the publishing market. The sinking of this identity made it impossible for talented women to rely solely on their literary value to solidify their identity. Instead, all activities of a professional nature were incorporated into the daily lives of talented women. The most prominent of these activities is the possession of a studio that is separate from her residence, the talented woman's study. Garden extends the concept of "family" outside of the general family dwelling. Women are not just subordinate members of this internalized social space, but participate in the shaping of this social space.

This study provides a method to correlate textual and material spatial remains, making it possible to excavate new materials for case studies of talented women or gardens. By positioning the female study, this study breaks the limits of the domestic spatial model. The domestic space gains a dynamic and rich aspect as the social elements of the private garden become part of it. It contrasts with what was traditionally considered a solidified and dichotomous situation.

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Notes

1. Collected in Categories of Confucian Classics in General Catalogue of the Siku Quanshu. The meaning of Lanxue 蘭雪 is Orchids opening in the snow. Li Bai 李白 had a poem: "Independence between heaven and earth, clear wind sprinkling orchid snow". Orchids represents the noble character of the literati.

2. Zhai 齋 , common architectural forms in gardens, a small building for reading, resting, contemplating or fasting,specifically refers to the study room. Built in the 22nd year of the Qianlong era of the Qing Dynasty (1757), the garden in the Royal Garden of the North Sea 北海 is the garden of the Jingxin Zhai 静心斋 , that is, the study for the Crown Prince. The Kangxi Dictionary records "the room of leisure said Zhai."

3. Xuan 轩 , common architectural forms in gardens, always refers to a long corridor or a small house with more windows on the waterfront. Such buildings are characterized by open corridors. As recorded in The Travels of Xu Xiake 徐霞客游记 , "In a new house (xuan) by the roadside".

4. Book house, means study . House, more closed traditional Chinese residential architecture, in the form of three jian 间 (3 columns spaced apart, the smallest size in the building) mostly.

5. Ge阁 is a traditional Chinese architecture in a small elevated building, which is usually characterized by a partition or railing around the corridor, for the distant view, recreation, book collection and for Buddhist use. It also refer to the girl's boudoir.

6. Liuxu Ji of Women's Poems in the Qing Dynasty compiled by Huang Zhimo in the Qing dynasty collects 1,949 poets and 8,343 poems, to which 2246 "records of corrections" to poems of 632 poets were added, and 495 pieces of materials on the life stories of 297 poets and editions of collected poems were supplemented.

7. [Qing] Kong Guangfe 孔廣芬 , character Huanzuo 字暎左 . Tongxiang 桐乡 , Zhejiang Province.

8. The meaning of "Conggui" 叢桂 is a clump of cassia grove.

9. Chinese civil official selection test: The imperial examination is divided into four levels: the examination of the academy 院 试 , Provincial Examination 乡 试 , Capital Examination 会 试 , Palace Examination 殿 试 . Provincial Examination is held once every three years, and the referee is a Xiucai 秀 才 , the passer is a Juren 举 人 . The first place is called Jieyuan 解元 . August is also known as "autumn examinations."

10. Xiaoshan Conggui Xuan 小山叢桂轩 ,a building surrounded by small rocks and osmanthus trees.

11. Wen Bi 文壁 (1470-1559), character Zhengming 字徵明 , called Hengshan Jushi 号衡山居士 , was a painter in the Ming Dynasty, known as the "Ming Four" 明四家 (also known as the "Wu Men Four" 吴门四家) together with Tang Yin 唐寅 , Shen Zhou 沈周 and Qiu Ying 仇英 .

12. Wen Zhengming 文徵明 .Conggui Zhai 藂桂齋图 , Color on paper, 31.6 × 56.2 cm, Metropolitan Museum of Art, USA. 藂 as same as 叢 , Two different ways of writing the same text.

13. Shen Bingcheng 沈秉成 (1823-1895) Qing official and book collector. Character Zhongfu 字仲复 , a Self-named Master of the Ou Garden 自号耦园主人 , a native of Gui'an 归安 , Zhejiang Province. In the 16th year of Guangxu (1890), he founded educational institutions such as the Nanjing Marine Academy 南京水师学堂 and the Jinggu Academy 经古书院 , and authored the Silkworm and Mulberry Series 蚕桑辑要 .

14. Yan Yonghua 严永华 (1837-1891),Character Shao Lan 字少蓝 ,Tongxiang 桐乡 , Zhejiang Province. The author of Three volumes of Renlan Shi Poems 纫兰室诗钞 , two volumes of Dieyan Lu Poems 鲽砚庐诗钞 , and one volume of Dieyan Lu Lianyin Collection 鲽砚庐联吟集 . Lianyin 联吟 is a literary form of letters or questions and answers in verse between literati couples.

15. Renlan Shi 纫兰室 , Room named Stringing Orchid.

16. Zhilian Lao Wu 织 帘 老 屋 ,the meaning is the old house for woven straw curtains. The word "weave curtain" comes from the allusion to Southern History - Shen Lin Shi biography 南史·沈麟士传 , Shen Lin Shi's 沈麟士 family is poor but never ceased to study. He weave curtain to read, in order to praise the high scholar to study and keep the will of the classics.

17. Jin 进 ,the traditional residential courtyard has a longitudinal level of units, each entering a square courtyard, becoming one Jin.

One Projection of Human Preferences: The Architectural Imagery of Traditional Chinese Birdcages

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Abstract

Aviculture has long been a popular pastime in China. Over the years of keeping birds, enthusiasts have formed deep bonds with both the birds and the birdcages. The birdcages, with their excellent structural designs and rich artistic decorations, suit the interests and aesthetics of the literati by providing a functional, durable, yet transparent and airy tiny space. So now for the query: Where do birdcages' specific design language and aesthetic styles come from? By their very nature, birds are wild animals. When birds lose their freedom and are imprisoned in cages, as a compensatory emotional strategy, people console themselves by considering the birdcages as "home" created for the birds. The exquisite craftsmanship of birdcages can be seen as a projection of people's love for birds. This study concludes, through literature review, image research, and personal observation, that there is a strong correlation between traditional Chinese birdcages and Chinese architecture in terms of their shape and decorative design. In human society, "home" often refers to a specific building. Birdcages and architecture share functional similarities and emotional resonances. As a result, Chinese architecture offers craftsmen a variety of inventive materials for making birdcages. In the design of birdcages, one can often observe the appropriation of architectural structures and architectural decorations. Exquisite birdcages have a somber beauty, narrating the love of birdkeepers.

Author keywords

Traditional Chinese Birdcages; Chinese architecture; decorative design; projection; healing

Introduction

Humans and animals have maintained a longstanding symbiotic relationship throughout biological evolution and the progression of civilization. Humans naturally develop spiritual pursuits and aspirations after their basic material needs for safety and physiological are met. In the early stages of civilization, humans were highly curious and in awe of nature. Birds can travel freely with wings, reach distant places inaccessible to humans, overlook the land from the sky, etc. Because they possessed abilities beyond those of humans, birds were worshipped. Evidence of bird worship can be found in the relics of early civilizations such as ancient China, India, and Mesopotamia. For example, "The Sun and Immortal Birds Gold Ornament"(Figure.1) unearthed from the Jinsha site of the Shang and Zhou dynasties (12th to 7th century BCE) depicts a combination of the flying birds and the sun in the sky.

As mankind transitioned from nomadic to sedentary life, civilization developed and became more sophisticated. With mastery of tools and improved skills in animal domestication, human displayed greater subjectivity and initiative in their interaction with nature. Qu Yuan (during the Warring States period) has already made reference

to a caged bird in "Chu Ci" (Songs of Chu): "The phoenix is in the nú, and the chickens and wild ducks are soaring and dancing."(Qu, p.192) The scholar and lexicographer Xu Shen later compiled the "Shuo Wen Jie Zi" (Analytical Dictionary of Characters) during the Eastern Han Dynasty, in which he clarified that " nú" refers to a birdcage (vol.9, p.1836). This indicates that China has a history of at least two thousand years of caged birdkeeping.

Modern psychotherapy for healing includes the use of animal-assisted therapies. Research has revealed that interactions between people and animals have many positive effects on mental and emotional health. According to Orloff(2018), studies have shown that such interactions can lower blood pressure, alleviate pain, reduce anxiety, and lessen depression. (p.296) Over time, humans and birds developed an increasingly harmonious symbiotic relationship. Birds became spiritual friends for humans, similar to cats, dogs, and horses. "As WH Auden said, healing is not a science but the intuitive art of wooing nature."(O'Sullivan, 2016) People can relax by using birdcages to create a little, artificial version of the natural environment. Keeping birds in cages has developed into a means for individuals to find comfort in nature while promoting physical and mental rehabilitation.



Figure 1. The Sun and Immortal Birds Gold Ornament (photo by Wanhui Huang)

The history of birdcages in China

Design thinking runs through human civilization, serving the aesthetic and functional needs of people in different eras and regions. The design of objects often reflects the habits and preferences of the designers. The pursuit of artistic expression is also embodied in the design itself. (Yin, 2009) The "Biophilia Hypothesis" (Wilson, 1993) asserts that people are inherently inclined to focus on processes related to life or lifelike entities. From the biological perspective, as we evolved from natural habitats, our emotional and cognitive gratification can be obtained through contact with natural life. Small ornamental birds kept in cages, unlike other livestock, do not significantly contribute to a productive livelihood. Since the beginning, it has been regarded as an elegant activity that nurtures the body and mind while offering tranquility and contentment. This lifestyle, which developed as a byproduct of spiritual civilization with the goals of self-fulfillment and healing, has been primarily driven by human amusement.

Back in the pre-Qin period, birdcages were basically practical devices for confining birds, they likely resembled chicken coops (Yuan, 2017). However, with the rise of the literati class during the Song Dynasty (960–1279), cage-raising of birds became fashionable as a leisure. This culture gradually influenced the populace as well. Those literati not only attached great importance to the melodic sounds and alluring appearances of birds but also observed and studied their habits and behaviors. People paid a particular emphasis to the aesthetic quality of birdcages since then.

During this period, the societal division of labor became increasingly specialized. The thriving commercial market gave rise to the specialized production and design of birdcages. Birdcages began to receive attention for their own aesthetic values. Ancient texts about skilled birdcage makers highlight the extent to which this craftsmanship was valued and the prevalence of this trend at the time.

In the Yuan Dynasty, a historian Tao Zongyi documented a master birdcage maker named Zhan Cheng in his work "Nan Cun Chuo Geng Lu". Zhan Cheng was an exceptional craftsman during the reign of Emperor Gaozong

of the Song Dynasty. "Zhan Cheng was a skilled artisan who created intricately carved birdcages. The sides of the cages were adorned with carved palaces, figures, landscapes, flowers, and birds, displaying remarkable craftsmanship."(p.100) This indicates that during the reign of Emperor Gaozong in the Southern Song Dynasty, birdcage-making had already achieved a remarkable level of artistry. During the Song Dynasty, not only were the materials meticulously selected, but also the craftsmanship of bamboo carving and painting was used in birdcage-making. Unfortunately, due to the perishable materials used (such as wood and bamboo) and the delicate nature of the birdcages, typical artifacts of birdcages remain relatively scarce in our country's archaeological discoveries.

However, the presence of birdcages can be seen in various paintings and literary works from many dynasties.



Figure 2. An Itinerant Vendor in Spring (National Palace Museum, Taipei)

After the Song Dynasty, birdcages began to appear frequently as artistic subjects in genre paintings such as " Kids Playing Games" and "The Itinerant Vendor". In this Yuan Dynasty painting titled "An Itinerant Vendor in Spring"(Figure. 2), we can see that the design of birdcages at this time was already very rich in shapes and designs, including round, lantern-shaped, square, official seal-shaped, and so on.

The Ming and Qing Dynasties (1368-1912) marked prosperous periods for birdcage culture as well. During the reign of Emperor Qianlong in the Qing Dynasty, birdcage design and innovation reached new heights. The royal aristocracy and wealthy merchants of that time often decorated their courtyards and gardens with ornate birdcages. Keeping birds was not only a chic lifestyle but also a symbol of social status and wealth.

In modern times, birdcages and the culture of bird-keeping have undergone significant changes compared to the past. Before urbanization, we resided in cities that were surrounded by nature, but even in today's concrete jungles, "we still strive to create ideal natural landscapes to fulfill our inherent need to connect with nature."(Chen, 2021, p.5) Therefore, amidst the hustle and bustle of urban life, modern people still enjoy creating a natural landscape through birdcages and birds. Raising birds in cages allowed people to experience and appreciate nature, relax their minds, and feel a connection with the natural world.

The Architectural Imagery of Traditional Chinese Birdcages

In China, there has been a long-standing aesthetic pursuit of the unity and harmony of man and nature. People believe that the beauty of things lies in the fitness with nature. Design is a special kind of art, and the creative process of design follows the principle of practical beauty (Yin, 2009). The particular form and decoration of objects reflect this pursuit. In the production and design of birdcages, Chinese craftsmen seek a harmonious proportion between the cages and the birds. In order to create a harmonious and unified aesthetic space, they also pursue a proper proportion and connection between the birdcages with local architecture and furnishings.

Birds provide people with visual and auditory dual-sensory healing. Through the years, people formed strong empathy with their birds. They are dedicated to using birdcages to create a suitable and arranged nest for the

birds. Due to the emotional compensation of caged birds and the requirement to show personal preferences, humanistic design concepts have been extended in the design of birdcages. Although the process of merging architectural design into birdcage design is a natural outgrowth of people's love for birds, people's tastes in architectural aesthetics have a significant impact on how birdcages are designed. The design of birdcages is mostly influenced by our understanding of beauty.

People apply their familiar architectural language and decorative techniques in designing birdcages, in forms of borrowing, deconstructing, decorating, referencing, and creating. Architectural imageries are manifested in the form, decorative design, and spatial design of the birdcages.

The Form

The origin of architecture stems from humans' need for safety in challenging natural surroundings. Similarly, the primary function of a birdcage is to provide a safe shelter for birds, making stability and safety paramount considerations. For example, in the case of a square birdcage(Figure.3), the cage is generally constructed with four major pillars and four main beams as the basic supporting framework. Similar to architectural mullions and lattice, other wires in the cage distribute gravity, facilitate ventilation, and divide the space to restrict the



Figure 3. Rosewood birdcage (made by Sanwei Jin)



Figure 4. A silver royal birdcage (Kunming Yashide Auction Album)

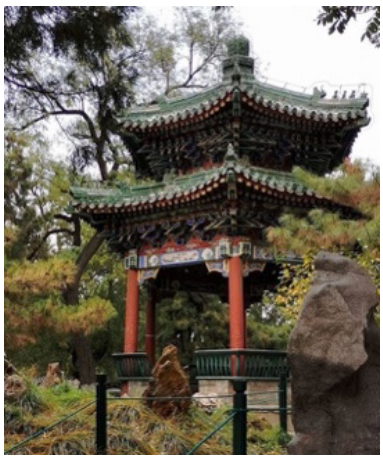

Figure 5. SongBaiJiaoCui Pavilion (photo by Wanhui Huang)

movement of the birds. Birdcages are often well-bearing. The cage bodies are frequently attached with two or three horizontal rings to enhance the overall construction. These rings assist in pressure relief and horizontal stability maintenance. Traditional architectural joinery, such as mortise and tenon joints, is sometimes used in birdcage frames to create a more compact and durable structure.

In the Ming and Qing dynasties, through those birdcages made by the palace, we can see the use of architectural design more obviously. During the Kangxi reign of the Qing Dynasty, the Imperial household department organized skilled craftsmen from all over the country to make birdcages for the palace. These cages showed a very high level of craftsmanship, quality, and value.(Jiang, 2007) Birdcage design in this period, not only used more luxurious materials but also formed various shapes. Even "pavilion-shaped," "palace-shaped," "loft-shaped," and other traditional architectural style birdcages began to appear to meet the need for aesthetics. (Xu, 1999)

This birdcage(Figure.4) is a royal birdcage supervised and produced by the "Imperial Household Department" during the Qing Dynasty. From its design, we can observe its reference to a traditional Chinese architecture

known as the "Double-eaved Hexagonal Pavilion" (Figure.5). Hexagonal pavilions were widely used in traditional Chinese gardens, palaces, courtyards, and temples. They emphasized aesthetic principles of symmetry, balance, and harmony while allowing the free flow of light and air. This birdcage borrows the design concept of "double-eaves" to elevate the top of the birdcage to expand the space for bird activities. Like the hexagonal pavilion, this birdcage shows emphasis on the exquisite decoration of its load-bearing pillars. It uses enamel color to embellish the main pillars and decorates colored glasses to adorn the cage door and the eaves.

The Decoration

In human society, architectural decoration emerged in the late primitive society (Zhou, 2020). The "Zhuang Zhe" of traditional architecture is now known as "decoration". Professor Zhou Xueying from "the Oriental Architecture Research Institute"(Nanjing University) discussed "decoration" in his book "Outline of Ancient Chinese Architecture History (Vol.1)": "The contents of adornments in ancient architecture mostly consist of auspicious patterns and motifs that are pleasing to the eye, expressing people's desire for good fortune and blessings."(p.27) These decorative themes have been adopted in the specific design of birdcage accessories. Birdcages are usually equipped with perches, food and water pots, and other furnishings. The pots are relatively heavy and need to be used with pot holders. The pot holders are attached to the cage wires and can be changed from time to time. Different styles of birdcage decorations showcase the aesthetic tastes and interests of bird owners. Despite the limited space, just like architectural decoration, the production of birdcages emphasizes intricate carving, decorative details, and appropriate proportions.

The birdcage creates a space that is both practical and ethereal, not only confining the birds but also allowing people to observe birds. Therefore, birdcages take inspiration from Oriental architectural ornaments like "hanging



Figure 6. Birdcage decoration modules (collected by Wanhui Huang)



Figure 7. A suit of bird pots (Huashengtang Brand)

lattice" and "window lattice" in numerous ways. These architectural elements divide the space while preserving transparency. For the same reason, these architectural decorations are appropriated in different positions of birdcages, including the frame, pot holder, door ornament, and ceiling. Sharing these decorations results in an artistic coherence between Chinese-style birdcages and Oriental buildings.

In terms of decorative themes, birdcage continue the motifs found in architectural decoration. They can be broadly categorized as follows: exotic birds and animals, geometric patterns, botanical flora, landscapes, and

figures (Figure.6). The utilization of these decorative themes in birdcages not only reflects people's aspirations for a blissful life but also conveys their blessings for the well-being and happiness of the birds.

The Space

In China, the commonly kept birds include parrots, larks, canaries, syringes, grosbeaks, indigo buntings, hwamei birds, yellow canaries, etc. These birds vary in size and behavior. Families have different furniture arrangements, which are typically based on residents' body sizes and habits. The internal design of birdcages varies depending on the species of birds as well. A birdcage typically consists of the cage frame, cage grids, cage wires, cage door, cage perch, cage hook, and feces tray.(Jiang, 2007) Depending on the species, one or two perches are placed inside the birdcage for the birds to rest and move around. Food and water pots can be changed to suit the preferences of the birds.

As an example, a marsh-tit cage often includes two perches. At first, there were only two pots (one for water and one for food) in the birdcage, but after the observation of the birds' habits, two more pots were added. By the end of the Republic of China, the current "one cage, five pots" (Jiang, 2007) pattern had been formed by the addition of one more short food pot.(Figure.7) People design the space of birdcages similar to how they design their own homes. Like furniture, the layout of the food and water pots can be changed and arranged according to human preferences and the habits of the birds observed by humans.

The aesthetic of architecture cannot be separated from the specific context it serves. In China, birdcages have long been classified into two main categories: the southern type, characterized by rectangular shapes; and the northern type, characterized by round shapes. The adaptation to local conditions is what led to these variances. A monograph about classical garden architecture and decorative artifacts, "Zhang wu zhi [The Elegant Life of the Chinese Literati]" (Wen, Z.H., the Ming Dynasty), states that "Furniture should be appropriately arranged and objects should be well-proportioned...design should be simplicity, refinement, and naturally harmonious."(p.4) Furniture with a clean, refined style, smooth lines, and minimum adornment is more appropriate in the southern areas due to the condensed population and constrained architectural space. Simple and compact square-shaped birdcages are therefore more acceptable in this setting. Round-shaped birdcages are more common in the northern regions since they fit the bigger architectural spaces. These birdcages harmonize with the large, luxurious, and well-rounded furniture commonly used in northern areas. Northern dwellings, like the courtyard houses (Si he yuan), have more open areas leading to fewer limits on furniture shapes. Due to their bigger sizes and heavier materials, birdcages in the northern areas show more possibilities in space design.

Conclusion

In a certain sense, architecture is also a means for humans to heal themselves. They provide us with a feeling of safety and comfort on a psychological level. This emotional connection is projected onto the design of birdcages. As the practical and aesthetic values of architecture continue to develop and become more solid, a vibrant architectural culture emerges. It intertwines with other cultures, giving rise to secondary and iterative cultural phenomena. We now have a broader context to comprehend the beauty of Chinese architecture.

Traditional Chinese birdcages serve as a microcosmic model for understanding architectural aesthetics. Although birdcages may appear to serve birds, in reality, the craftsmanship and artistry of these cages serve the emotional and aesthetic needs of humans. People use their understanding to interpret the behaviors of birds and employ architectural principles in designing birdcages. Birdcages can be seen as a unique product of spiritual civilization, serving humans' aesthetic tastes.

Birds, with their graceful postures, embellish the mundane settings; with their melodious songs, adorn the rigidity

of urban life. Moreover, their inherent freedom heals the souls of humans, evoking thoughts of the wilderness. It can be said that birdcage is not merely a culture itself, but also a carrier of different cultures. They represent various cultural connotations such as craftsmanship, carving, totems, social hierarchy, and architecture.

Exquisite birdcages have a kind of somber beauty, narrating the love of birdkeepers. It may seem that the exquisite design and decoration of the birdcage are for birds, people are compensating for their confinement of them. However, it is a form of self-healing and consolation for human themselves, as they beautify their actions and project their feelings onto the birds they keep.

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Disorientation and the Construction of Order: A Study of Stylistic Changes in the Chemise Dress during the French Directoire（1799-1804）

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Abstract

Influenced by the French Revolution and Rousseau's New Fashionism, women gave up Rococo dresses in the early years of the Directoire, and wore a kind of Chemise Dress, a light cotton dress, in pursuit of the spirit of democracy and republicanism. With the social upheaval in the late years of the Directoirent, the Chemise Dress was made of rare fabrics and in an exaggerated style, which was used by women to flaunt and indulge in ballroom dancing, forgetting the pain of the revolution. The transmutation of dress reveals the restructuring of the social order. The Chemise Dress, as a popular dress during the period of the Directoire , evolved to reflect the demands and status of different groups, and also hinted at the changes in the new bourgeois social order.

Author keywords

the peorid of Directoire; Chemise Dress; neoclassicism; social semiotic

The Social Background of the Hidden Thin Clothes

The Bourbon dynasty of Louis XIV and Louis XV still indulged in the extravagance of Baroque and Rococo, and the aristocracy gathered at the Palace of Versailles to enjoy a life of pleasure. The ladies and young ladies look like huge cones, wearing a tight, waist-cinching blouse over a sunken, bulging underskirt that depended on their skeletons, with towering hairstyles on their heads, and taking small, slow steps through the court. As the wealth of the bourgeoisie was gradually on par with with that of the nobility, the king's fondness for pomp and pageantry led to the use of dress as a political symbol. The aristocrats distanced themselves from the bourgeoisie and maintained their honourable status through extravagant and exaggerated dress. The bourgeoisie, however, gained inner satisfaction by following the example of the aristocrats and dressing more nobly than their status.

The royal government has issued several bans on extravagance with little success.The aristocracy and bourgeoisie needed large amounts of money to satisfy these desires, so they constantly levied large amounts of taxes on the peasants, so the conflict between the peasants and the feudal powers became increasingly intense.

Scholars, represented by Rousseau, proposed a new ethos at this time, in which they condemned female extravagance by celebrating natural female beauty. This perspective is derived from Greco-Roman rationalism, which, firstly, was a critique of social disorder and extravagance, and secondly, stood on the idea that women's dress and grooming were designed to please others. This is a powerful new voice for dress improvement, and simple dresses gradually appeared in society. Marie Antoinette, Queen of Louis XVI, wore a looser, tiered white gown in the Rococo style portrait Marie Antoinette in a Muslin Dress. The dress was influenced by the English pastoral style of three-coloured gowns and the elegant Greco-Roman aesthetic. In feudal France at the time, public opinion was not in favour of Queen Mary's costume, which was considered anachronistic and demeaning.



Figure 1. Marie Antoinette in a Muslin Dress(Painter: Louise Elisabeth Vigée Le Brun, Year: 1783, Location: National Gallery of Art)

Regardless of the political purpose or the influence of niche trends, new aesthetic tastes and dress patterns have emerged from the afterglow of the old system. To a large extent, the simplicity of the Revolution, the Directoireand the Empire regime had been established during the reign of Louis XVI.

The Era of Thin Clothes and the Beginning of Chemise Dress Styles

During the French Directoire period, women commonly donned the Chemise Dress, also referred to as the Robe chemise, characterized by its loose-fitting, petticoat-style design. This dress was constructed from high-quality white cotton and derived its name from its resemblance to both an undergarment and a long petticoat (Smith, 2000). Notably, the Chemise Dress epitomized the prevailing fashion trend of the Era of Thin Clothes (Jones, 2005).

The dress of the Era of Thin Clothes can be divided in France into three phases: the Revolution, the Directoire , and the Empire. The storm of the French Revolution, while destroying the feudal despotism, also cleansed the artificial aestheticist tendencies that had bound people for three hundred years, and brought about the simplicity of the Era of Thin Clothes. The most noticeable change was the reduction of skirts, with the elimination of skirt supports and corsets, and the popularity of lightly textured white fabrics. Dress for women in the Revolutionary style consisted mainly of long red, white and blue dresses, hats with tricolour badges, and a few categories of dress that were shaped by the revolutionary viewpoints (the trouserless han style), which was a kind of Spartan, unadorned style; Dress for the Directoire following the Revolution was modelled on the Chemise Dress, an emulation of Greco-Roman semi-exposed sculpture with its sheer, exaggerated high-waisted skirts, short, close-



Figure 2. Portrait de Juliette Récamier(Painter: François Gérard, Year: 1805, Location: Carnavalet Museum)



Figure 3. Les Merveilleuses（Painter: Louis Darcis,Year : 1797, Location: Bibliothèque nationale de France)



Figure 4. White linen gown with empire waist,circa 1810, owned by Elizabeth Patterson Bonaparte（Location：Maryland Center for History and Culture)

cropped hair, and Roman flats with cross-laced straps. Subsequently, the costumes of the Empire continued the style of the Directoire, but added decorations with a touch of courtly extravagance, such as empire puff, to the original foundation.

Exemplified by Les Merveilleuses from 1797, Portraitde Juliette Récamier from 1805, and surviving long dresses from the early 19th century,the Chemise Dress during the Directoire peorid is first strikingly a floor-length, white, plain, pinstriped gown, swept up over the shoulders due to the excessive length of the skirt; then there is the low-cut V-neck and flat-shoulder sleeves, which are completely different from the previous extravagant and conservative styles, running in nature and boldly displaying the body shape; the high-waisted design replaces the compression of corsets; and the feet wore strappy Roman shoes or none at all; wide hats covered the head; expensive woolen shawls were thrown over the body. This clothing look is a liberating attitude towards the skin of the body that is bare and shows the natural beauty inherent in women with simple long dresses.

With its classical Greco-Roman styling, this style seems to come out of nowhere, but it doesn't.

The French Revolution bore the brunt of the fight against the culture of luxury. The Revolution wanted to establish a republican and democratic paradise, hoping to emulate the democratic politics of the Greco-Roman city-states, where citizens were equal and free, and attained the same splendor. The French nation boasted of being the heirs of Rome, and had long carried the literary banner of the Greco-Roman revival. As Pompeii was excavated in the middle of the 18th century, a sizable number of Greco-Roman semi-nude sculptures were placed in French museums and public places, influencing people's clothing styling orientations. Rationalism, with its roots in Greco-Roman natural law, swept across Europe during the Enlightenment of the 17th and 18th centuries, and it was in France that rationalism flourished. The long cultural heritage led to a natural inclination towards the Greco-Roman natural style of dress. Also, it has something to do with scientific developments. People realized the damage that the tight underwear and skirt supports of the past were doing to their selves, and unclasped their corsets and bulky skirt supports and hip pads.

Typical evidence of this is the fact that the Chemise Dress is a prototype of the Greco-Roman toga, which seeks to be rational and sacred. Having broken through the Bourbon feudal hierarchy, everyone was called to be a free citizen, as in Greco-Roman paintings and sculptures, wandering in the Garden of Eden. This nudity was not vulgar, but close to the divine.

Also, it was inextricably linked to the development of the textile industry. The popular fabric at this time was fine cotton from England. In 1760, the British Industrial Revolution led to significant development and progress in textile technology, and the colonies were able to supply large quantities of raw materials all the time, so fine cotton fabrics with high-count yarns and thin cotton fabrics such as leno and gauze came into being, replacing the expensive silks of the past. These fabrics are perfect for the Chemise Dress and can be cut to create natural flowing curves. Moreover, similar fabrics were available at both high and low prices, enabling this type of clothing to become popular among the bourgeoisie and, with it, the civic class, which meant that fashion became popular.

Lost in the Metamorphosis of the Chemise Dress

The period of the Directoire was only four years long, during which, although the luxury of Baroque Rococo was abandoned, a style of simplicity and enjoyment was not developed, but rather a kind of Spartan asceticism. Women wore old-fashioned tailored styles in monochromatic colours with little ornamentation, or masculine clothing to express women's political power.

In the early days of the Directoire, social order was temporarily restored and people were given a temporary respite from the tension in their hearts. The emerging bourgeoisie made appearances at various ball salons as they said goodbye to the past and welcomed the new republic. By moving from a social milieu of elaborate

fashions to one of "revolution is abstinence", women themselves were repressed, and this repression was finally released during the Directoire in the garb of Greco-Roman classicism.

Scholars represented by Winckelmann argue that rationalism derives from the beauty and freedom of the world, and from the egalitarian freedom of city-state politics. People aspired to all this and unleashed their yearning by borrowing Greco-Roman costumes.

Looking at women's portraits and caricatures from the late years of the Directoire, it can be seen that the exposed area of the Chemise Dress became larger and larger, and a thin dress style appeared in which the entire leg could be seen through the material of the dress. The skirts were also made longer and longer so that ladies had to carry them in their hands when walking. As a popular symbol, this elegant gesture also displayed the connotation of bourgeois elegance. It was fashionable for women in Paris to wear their skirts up to their knees, with skirts up to 3 m in length for walking and 8-9 m for social occasions. Some of the noblewomen wrapped one end of their long skirts around their bodies, or over their arms, and a draped bodice fold formed over a man's shoulders when dancing. At this time, the length and thinness of the dresses tended to transgress the boundaries, and women were active in various Parisian salons and balls in such distorted and exaggerated dresses.

Even during the cold winter months in Paris, women still wore the Chemise Dress. This overly thin clothing was a far cry from the cold winters in Paris, and caused many people to develop respiratory organ-type illnesses. There was a lot of criticism in society, but women have always turned a blind eye to it in order to chase fashion.

The society considered that luxury and frivolity were growing again in France and that the democratic republican spirit was being violated. But the pain caused by the Revolution had to be woken up, and at this time there were many balls in Paris for the bereaved to numb their minds and forget their wounds. The balls held at the Hôtel Thellusson on the rue de Provence in the 9th arrondissement of Paris even limited their guest list to the adult children of guillotines. People also still think about how the times have changed too quickly, overthrowing the Bourbons for the sake of a democratic republic while reflecting on whether their democratic republic was truly



Figure 5. La Bouillotte（Painter:Bosio Jean François,Year : 1804, Location: Rijksmuseum Amsterdam）



Figure 6. Parisian Landies their Winter Dres for 1800（Painter: George cruikshank,Year:1799,Source:scanned by H. Churchyard）

obtained and where to go with the idea of faith. At this time, through the exaggerated and distorted Chemise Dress, more indulgence after the experience of injury and the lack of faith and confusion are seen, and people put a part of their painful loss in the distorted dresses and numbness in the non-stop salon dance.

New order constructed by Chemise Dress through details

French classicism was, in the garb of ancient Rome, staged a new spectacle of world history in a borrowed language. Seemingly austere and shouting about the equality of all people, the period of the Directoire was in fact a time when the white dress concealed magnificent textures, signalling the establishment of a new social order.

When entering the social system through dressing, taste has a sense of superiority of social position. As before the Revolution, the aristocracy and the bourgeoisie were clearly defining and challenging each other's position through dress. Hundreds of salons in Paris each year were a level playing field for bourgeois women, in which whoever was able to lead the fashion trends of the salon was reflected in a higher social status. As a result, dress has become a form of public art that fills the streets of France. However, unlike the elaborate decorations before the Revolution, the Directoire, which favoured equality and freedom for all, was opposed to elaborate costumes. Women's athleticism to portray themselves as different from the aristocrats of yesteryear was seen in the details of the white Chemise Dress. Thanks to the development of the textile industry and the expansion of inter-regional trade, fabrics for dresses were no longer rare and were readily available to an increasing number of bourgeoisie and even citizens. Women focused on the floral patterns of the Chemise Dress and the matching gadgets to show that they were different from the lower classes through small details in their dresses, which was actually a careful extravagance that didn't cause public outrage. They had well balanced how to express the lavish extravagance in a subtle and understated way, forming this into a new fashion, and spending a lot of money without showing it visibly so as to achieve an effect that would make people in their circle guess quietly, a kind of elegance that does not move.

Most of the way was to apply embroidered patterns of navy silk or silver thread to Chemise Dress as decoration, which could not be detected without a close look, but could always be noticed by a lady and young lady who cared to do so. Even in the magazine The Female Elf, a very unusual example of a bourgeois lady weaving her own hair with scarce chenille threads for a distinctive effect was described. Another universal typical decoration was the fur shawl in autumn and winter, with different furs, with elegant gestures to achieve the display of their reserve and good taste.

It's a reflection of taste. The bourgeoisie is different from the feudal aristocracy in that the latter takes complexity and elaboration as beauty, while the former has to look like the knowledge and rationality of the new era with classical connotation and elegant taste.More importantly, this taste was the criterion for the display of social intervals by which to measure and discriminate between kindred spirits and to construct new bourgeois social classes.



Figure 7. Portrait of Miss Riviet（Painter: Jean Auguste Dominique Ingres, Year: 1806, Location: Louvre Museum）

Of course, this kind of taste is the threshold of the upper bourgeoisie, but also a sign that it can be imitated by the lower class. Smart ladies know how to make themselves elegant and distinctive. The establishment of subtle changes in dress is an excellent way for groups or individuals to express their attitudes, strengths and aspirations, which is the need for self-identification and reflects new social class relations and interpersonal patterns.

Conclusion

Based on the Chemise Dress, a popular women's dress during the French Directoire, the paper discusses what fashionable women wore during the Directoire. Taking into account the social context of its emergence, to the shapeshifting of styles and exaggerated details, it explores how people reflected psychological changes with their dresses after undergoing a drastic social revolution, and ultimately reappropriated the language of dress to construct new symbols of social class.

Firstly, it traces back to the social conditions and costumes of the Bourbon dynasty in France before the Era of Thin Clothes, and analyzes how its elaborate Baroque Rococo-style fancy dresses gave rise to a trend of extravagance in the society, which was one of the factors leading to the dynasty's decadence and the Revolution. At the same time, through Rousseau's New Fashionism, Queen Mary's pastoral white dresses, and the admiration of Greco-Roman, the society of that time had already shown a vague trend of natural beauty, and it was the seed of the Chemise Dress of the Era of Thin Clothes.

Then, typical images are used to illustrate the ideas embedded in the costumes. Analyzed in the form of the Chemise Dress as a Greco-Roman toga, it originated from the people's desire for France to be as prosperous as the Greco-Roman Republic, with full democratic political rights, and to follow the example of the rationalist concept of the Chemise Dress. The fabrics of the Chemise Dress again reflect the technological changes in society, the development of the textile industry and the expansion of the colonies made it possible for the bourgeoisie to the civic class to have a wide variety of fabrics to choose from, and it can be seen that the development of social life and the gradual popularisation of fashion. Reflecting on the pre-Revolutionary zeal of the Directoire, the Spartan abstinence, the brutal dictatorship of the Jacobins, and the use of Greco-Roman dresses by women to indulge themselves in Eden-like salon dances and to enjoy a rest, it fully implies the impact of the drastic changes in the society on the people and their perplexity.

Even in under these complex social conditions, the bourgeoisie established a new social order through the details in the almost clear Chemise Dress, showing the bourgeoisie's understated restraint with a kind of luxury different from that of the feudal aristocracy.

As a popular dress during the period of the Directoire, the change in Chemise Dress reflects the demands and status of different groups, and also hints at the change of the new bourgeois social order.

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Revisiting Italian Futuristic Clothing from Three Sets of Contradictions

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Abstract

In the history of clothing design, it is usually believed that futuristic clothing mainly refers to the cosmic style of the 1960s, but in this paper, the futuristic clothing discussed specifically refers to the design of the clothing field in the Italian futurist movement in the early 20th century. In the history of design, the discussion of futuristic clothing is often covered by the futuristic style as an art movement. Therefore, this paper focuses on Italy before the World War I, and revisits the history of the emergence of futuristic clothing by combing the three sets of contradictions: position, orientation and action. The viewpoint of this paper is that the emergence of futuristic clothing is not just a passive reaction to popular culture, but based on the strong desire of nation states to achieve political and economic progress, especially as the strong demand of the late comer to surpass the first country. Futuristic clothing participates directly in real struggles as part of a social movement. By going beyond the formal analysis theory, we can try to have a deeper understanding of the significance of futuristic clothing that cannot be ignored in the whole futuristic movement, and to emphasize that clothing plays a direct role in the process of promoting social movements.

Author keywords

futuristic clothing; Italy; World War I; history of design

Introduction

In Nietzsche's essay, On the Advantage and Disadvantages of History for Life, he thought that history and culture present the painful thought, you or I might merely be an epigone, [1]or, as Harold Bloom called a copy or a replica. [2] However, Nietzsche also gives us a new possible path, if we make inspired and creative use of history, we

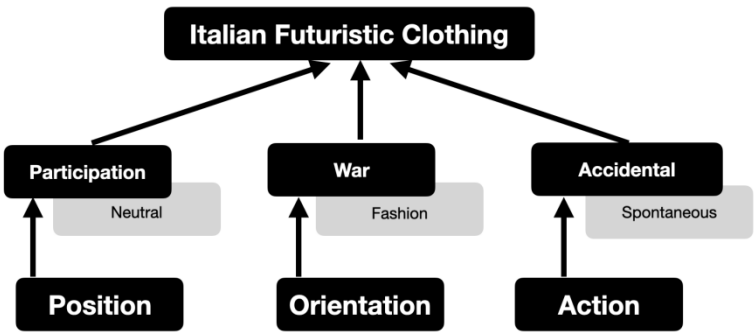

Figure 1. Three sets of contradictions influenced the emergence of futuristic clothing

can triumph over it by fashioning new metaphors that cast us as uniquely interesting, fully autonomous self-creations[3]. In the recognition of the emergence of clothing design style, usually is believed to be depending on collectivization inspiration. Fashion become the update of traditional, to some extent, it just follows the history. For example, the futuristic clothing style in the 1960s emerged in the context of the space competition, it is a stylish interpretation of astronaut attire. However, the emergence of Italian futuristic clothing in the beginning of the 20th century gave a case of innovation of tradition and became a completely independent self-creation. What is the difference between Italian futuristic clothing and the futuristic style in the 1960s? Is it just a vassal of the futuristic art movement? Why can it achieve a complete design innovation? This paper will examine the historical significance of Italian futuristic clothing by analyzing three sets of contradictions.

Participation or Neutral: the position dilemma of futuristic clothing

It is no accident that futuristic clothing was born in Italy in the early 20th century. In the usual historical writing, apparently, the futuristic clothing is subordinate to the futuristic movement, and the clothing is only one of the media of conveying ideas. Furthermore, futuristic clothing reflects the increasingly vigorous belligerent psychology of Italy in the 20th century, which is influenced by external historical reasons and internal ideological traditions. Futurists try to construct the national identity of Italy, an emerging country, with the revolution in clothing.

Why did Italy have such a strong demand for cultural community construction at the beginning of the 20th century? The problem goes back to Italy's latecomer status since 1860, and the accumulation of nearly half a century of war threats: major external threats from France and Austro-Hungarian Empire, failed wars and diplomacy, corrupt government makes the parliamentary authority plummeted, and the people's national sentiment is missing. The whole Italian society in a weak powerlessness and desire for the miracle. This weak and radical national character profoundly influenced the development path of Italy. Its weakness lies in its failure to launch a real national revolution like Britain in the 17th century, France in the 18th century and Germany in the 19th century, and the people in various regions of the peninsula stubbornly adhere to local traditions. Its radicalization was brewing in the vicious trade competition with France at the end of the 19th century. The Italian economy was seriously declining. In addition, the corrupt political system led to the loss of a large amount of funds from the banking industry. The social and economic problems caused the riots of workers and farmers.[4]

Finally, in the beginning of the twentieth century, the hope of an Italian miracle appeared in the economic field, especially the textile industry and the automobile industry. The former is the cornerstone of Italy 's manufacturing industry, and the latter is the symbol of Italy 's entry into economic modernization. At the same time, Italy was in a dilemma in the whirlpool of political struggles among European countries before World War I. As we can learn from A history of Italy, 1871-1915 by the Italian historian Benedetto Croce, Italy's relations with the other Central Powers were jeopardized. Italy's national rights are not respected by this alliance. The ally Austro-Hungarian has always wanted to usurp Italy 's independence and freedom of action, but Italy's strong ties with Germany and France's tactics against Italy on various national interest issues made it hard for Italy to easily break away from Central Powers.[5] The complex attitude of allies and enemies to Italy disturbed the ideological camp in Italy, and the positive development of domestic economy provided enough confidence for Italian radical tendencies. The choice to participate in the war or remain neutral constituted the position dilemma of the emergence of Italian futuristic clothing.

In this context, futuristic clothing finally chose to support war. It was born not only under the influence of industry and commerce, or no means unreasonable greed or morbid fantasies of war, but from the Italian society is facing ideological war. Futuristic clothing embodies the urgent desire to establish a strong independent nation state.

Therefore, the design of Italian futuristic clothing was fundamentally different from that of the 1960s by virtue of its historical specificity.

Fashion or War: the two orientations of futuristic clothing

There are three versions of the original futurist clothing declaration, and it can be seen from these three versions that futuristic clothing faces two orientations towards the fashion industry or the war propaganda. The first version was the manuscript Le vetement masculin futuriste, written by Giacomo Balla between February and March 1914, published in French on May 20 of that year, before World War I broke out.

Why would an Italian write a declaration in French to create a new national clothing? This should be attributed to the European fashion industry in the early 20th century. At that time, France and Britain were the two cores of European fashion, especially Paris, which was regarded as the representative of modern, elegant and fashion. Therefore, in the early decades of the twentieth century, some Italian fashion company used French-sounding labels on clothing to give their clothing production the legal status of Houte Couture, creating a delicate atmosphere for customers eager for couture in Paris[6]. In other words, in the beginning of the 20th century, Italian fashion needs to attach to French fashion discourse development. The futuristic clothing designed by Barra is more like the agent of French-centered European fashion in Italy.

The first French edition of the FUTURIST MANIFESTO OF MEN'S CLOTHING declaration by Filippo Tommaso Marinetti in Paris[7]. On August 2,1914, France ordered full mobilization of troops to participate in World War I, to August 4, in addition to Italy remains neutral, Germany, Britain and other major European countries in accordance to the covenant announced to join the war. In this context, Marinetti changed Barra's French version into an Italian propaganda document urging Italy to enter the war[8]. Firstly, Marinetti change the title, on September 11,1914, the second edition of the futuristic clothing manifesto was renamed IL VESTITO ANTINEUTRALE Manifesto futurista. Antineutral emphasized the futuristic clothing against tradition, but also targeted the indecisive, timid, and neutral Italian authorities. The second is the color rearrangement. Marinetti rearranged Barra's original manuscript, changing the black and yellow, which originally represented the Habsburg dynasty of Austria-Hungary, to the red, white, blue and green of the Italian and French flags, reflecting the futurists' intention



Figure 2. Comparison of the Second and Third Editions of the Futuristic Clothing Manifesto

for Italy to overthrow the Central Powers and join the Entente Powers. Moreover, Marinetti added the words of war, such as "Tutta la gioventu italiana riconoscera in noi, che li portiamo, le sue viventi bandiere futuriste per la nostra grande guerra, necessa-ria,URGENTE."[9]

Since then, the manifesto has been reprinted in this Italian version. However, in the third edition reprinted in December 1914, the clothing design of the front page was changed from Marinetti 's design to Francesco Cangiullo's design. It can be seen that it was in response to the serata that took place at the University of Rome Law School in December. This was a movement that used clothing as a weapon to inwardly impact the cultural leadership of the neutral forces. The reason why Cangiullo was placed in a prominent position was that it was at this time that he proposed to Marinetti that they should wear the futuristic clothing recently proposed by Barra's manifesto futurista to appear in the university. This is the first time that futuristic clothing has appeared, and has achieved more impressive results than in previous serata. Futuristic clothing not only honors war and revolution, but also applies the anarchist concept of "innovative violence" through futuristic clothing. It is no longer just a vassal of European fashion centered on France, but a force that truly promotes the evolution of history.

Spontaneous or Accidental: the principle of action of futuristic clothing

The emergence of Italian futuristic clothing, embodies a face of exception, because it is not produced in the fashion enterprise design studio, but really to intervene in the struggle of real life, however, the pioneering struggle in real life, at the time tend to be seen as naive crazy, rather than mature words.

As Gian Pietro Lucini wrote in a letter to Marinetti, "What genre should not be created, because of the needs of the collective, the genre is natural. They are some organisms produced by art in a certain period of time."[10] In Lucini 's view, the tendency of futurism to destroy past traditions is out of anger at the insurmountable peaks of art. "Do you know why they make us angry so that we want to destroy them? This is because we have shamefully become so small and pitiful people in the face of these grand ideas, noble beauty, civic courage and true patriotism." What Lucini represents is the traditional linear historical development thinking, which is limited to the debate on the advantages and disadvantages of the aesthetic style schools at that time. Therefore, his judgment is difficult to break through the limitations of the times. He believes that people can't do destroy all the aesthetic law, although often find new things, but it does not mean that after many new things, no longer meet the "loud and vulgar taste, with unbearable pain and hide snobbery to rough instead of noble pleasure."

Futuristic art is regarded by Lucini as a loud and vulgar taste, and of course it also includes futuristic clothing, which should be produced spontaneously, according to the needs of the collective. However, in this World War I, which Croce calls "provided by the hidden logic of history and provided by fate," the emergence of futuristic clothing was indeed out of collective need, but it was by no means what Lucini thought could occur naturally. It can be seen from the writing of the futuristic clothing manifesto that it was an occasional design under clear principles of action. Barra follows a strict dichotomy to highlight the revolution of futuristic clothing, integrating the exaggerated and repetitive grammatical structure of futuristic literature, and forms a rational logical framework in a syllogistic narrative way. At first, he pointed out the simplification tendency of clothing that existed in the early 20th century and attributed it to adapting to modern needs. At this time, Barra had jumped out of the cycle of style changes in classical style or Oriental style, and discussed the change of clothing under the new demands generated by the social and historical development. Then, Barra used seven "must" to clearly point out the enemies of futuristic clothing from six aspects of clothing form, materials, patterns, cutting, decoration, and wearing scenes, while specifically describing the form of futuristic clothing. After a long paragraph of narration, Barra listed the clothing forms opposed and advocated by the futuristic clothing again with all of adjectives. These adjectives can be divided into several categories, one is the adjectives related to modern technology,



Figure 3. Possible French manuscript of Giacomo Barra's manifesto-futurista

Including Flying, Illuminating, Phosphorescent, Lit by electric lamps; The second is emotional, Including Shocking, Joyful, Loving; Third, in line with the theme of the war, Including Aggressive, Violent, Unitonal, Persuasive; Finally, the formal requirement, Repeated emphasis Multi tonal, Polychrome. Finally, Barra looked optimistically about the spread of futuristic clothing.

In fact, the pioneering design for the future happens to need the strong desire of futurism for a new life. It not only puts the task of praising the survival of the times in front of itself, but also needs to rewrite daily life with a pure romanticism, express the revolutionary desire for other individual life forms and community organizations, and reach what Nietzsche said to build a new metaphor to defeat the historical tradition, maintain people 's loyalty to the future, and finally came up to what Richard Rorty said "get out from under inherited contingencies and make . . . [our] own contingencies."[11]

Conclusion

The emergence of Italian futuristic clothing was a courageous act of history, going beyond the boundaries of fashion style and becoming part of the social movement, carrying the ambition of the rise of the Italian nation-state. In the face of the dilemma of war and neutrality, futuristic clothing chose to firmly support the war and become the weapon to incite the war, highlighting the desire to establish a strong independent country; futuristic clothing has experienced profound changes in the design concept, from following fashion to war propaganda. War oriented has made futuristic clothing a unique historical phenomenon; the emergence of futuristic clothing is a response to the social and historical development at that time, is an active exploration of the times, represents a new design concept, challenging the traditional aesthetic concept, and shows the belief and desire for the future. Italian futuristic clothing is not only a part of fashion, but also a powerful response to history, a witness to the rise of the Italian nation-state, and a symbol of the Italian national spirit. Through the above three sets of contradictions, we revisiting the design of futuristic clothing, and further realize that the future-oriented pioneering design is based on the desire for political and economic development of the nation-state, which is the external embodiment of the concept of internalization of state, technology and personality. This paper re-evaluates the historical value of Italian futuristic clothing in the early 20th century, and finds that the change of clothing design is deeply involved in social action and plays an indelible role in promoting the development of history.

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Historical Reproduction under Image Narration: Taking the Design of Exercise Chart Cultural and Creative Products as an Example

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Abstract

The purpose is to explore the development of cultural and creative products guided by image narrative plot, using the exercise chart of the West Han Ma Wang Dui as the material. The method starts with the narrative plot of the exercise chart and explores the implicit discourse of the image from both internal and external levels. Extracting the two layers of intention in the narrative of the exercise chart from the direction of implicit discourse. Establish the development motivation of cultural and creative products by analogizing the design vision with this intention. Set a basic model for creative expansion in response to motivation, and develop a series of exercise chart cultural and creative products based on this model. Conclusion: The Mawangdui exercise chart is a narrative image that combines external body presentation with internal mental imagery. Behind the narrative plot lies the basic intention of guiding the development of cultural and creative products, including the metaphorical expression of human body functions and the unity of Taoist concepts. The visualization of intentions expands the space for the development of exercise chart cultural and creative products. The exercise chart cultural and creative products developed from a narrative perspective have rigorous logic and can achieve the integration of objects and images through the operation of creative formulas. The cultural and creative products developed from this perspective not only provide exciting visual presentation, but also have functional discourse that interacts with the audience.

Author keywords

Exercise chart cultural and creative products; narrative plot; narrative intention; narrative creativity

Introduction

Narration is an explanatory activity that accompanies human survival. In the 1960s, the establishment of modern narratology spread its research results throughout the literary and artistic theory field, and thereafter, narrative gradually separated from text and expanded in the visual dimension[1]. This dimension of narrative emphasizes visualization, emphasizing the visible way of describing things themselves and the process of events. Due to its extensive media, image narrative has also been widely applied in the art field in recent years, with cultural and creative product design being one of them. The images in cultural and creative products are different from texts, and have synchronicity and non-linear characteristics in narrative techniques. This process needs to focus on the encoding and decoding of image information, and it is crucial to introduce relevant theories such as reception aesthetics and hermeneutics during the interpretation process[2]. The intervention of narrative in design first emerged in the field of architectural design, and in recent years, many scholars have attempted to incorporate narrative into the design of cultural and creative products, and have achieved certain results. The current

intervention of narrative in cultural and creative products is mainly through semantic communication, rhetorical expression, and form creation. With the rise of the consumption wave, narrative consumption has gradually taken priority over design dominance[3], and this model emphasizes interaction with participants more. From expected limitation to openness and diversity, it has become a trend for narrative to balance attention to the audience. Based on this, this study will use guide maps as image materials to explore cultural and creative design from this narrative perspective.

1 The Narrative History of the Exercise Chart

1.1 Historical Overview of Exercise Chart

The exercise chart was originally a meticulous and colorful figure guide practice pattern, unearthed in 1973 from the Western Han Tomb No.3 in Mawangdui, Changsha. After the excavation, the picture was incomplete and disorderly compared to the author. The entire image is about 53 centimeters high and 10 centimeters long. After expert restoration, a total of 44 characters were identified, with portraits ranging in height from 9-12 centimeters and arranged in 4 rows, with 11 characters in each row. Each image is painted in meticulous style, with black lines outlining the outline and then filled with vermilion or cyan colors. Among them, there are characters of all



Figure.1 Exercise chart restoration map location identification table

ages, including men and women, with different forms of characters and unique costumes. The characters are accompanied by text annotations as inscriptions, and after restoration, there are 31 recognizable inscriptions. The 44 individuals depicted in the image are isolated and disconnected from each other. There are various opinions on the narrative order, and most scholars agree with the order from the first line to the fourth line, from top to bottom, and from right to left. From the perspective of narrative history, most characters mainly engage

in unarmed movements, with a few accompanied by instruments such as long sticks and discs. From the facial dynamics of the characters, the mouth is often accompanied by varying degrees of opening and closing, and the range of movement of the limbs suggests respiratory movement. As can be seen from Figure 1 (the picture is drawn by the author), are the hairstyles of the characters mostly straight, with a few being headscarves and hats; The characters are mostly dressed in blue jackets, with a few wearing red robes. From the images of characters with bare upper body, shorts, and bare feet, it can be seen that the exercise technique had already been involved in various social classes at that time. The excavation of the exercise chart fills the gap in the narrative images of the Qin and Han health movement, and has high research value.

1.2 A fitness chart driven by external limbs

The characters' body postures in the exercise chart are vastly different, reflecting the different ways in which people understood the world from the way ancient people handled their bodies. Modern scholars have proposed that the process of human body discipline is also a dual shaping process of human nature and the world. People often express their intentions by shaping their own body, such as the common bow movement in Tibetan dance, which shows humility towards serfdom status[4]. In traditional Chinese healthcare concepts, the two forces of yin and yang play a game against each other, resulting in a cross disciplinary approach of external physical exercise and internal mental care. From the perspective of explicit body movements, image narratives can be divided into four categories: first, unarmed movements; second, auxiliary training of plates, sticks, and balls; third, in situ movements of luck breathing; and fourth, cultivation of concentrated and focused thoughts. The external manifestation of its limbs can be mainly divided into two types of pathways: one is the biomimetic movements that mimic the mantis, bear meridians, and kite back; The second is the classic surgical method for treating specific parts[5], as shown in Table 1. The guiding diagram pioneered the use of body language narrative diagrams, providing reference for the emergence of later generations such as the Five Birds Playing Diagram, the Muscle Changing Classic Diagram, and the Qi Taking and Disease Removing Diagram. Driven by external limbs, the narrative history of the guide map also tends to adopt a trend of preaching through external forces, similar to the folk use of talismans to express communication with heaven. As an influential fitness map at that time,

Tabel.1 Relationship between product and service

Serial Number	Category	Image Display	Approach
Type A	Unarmed exercise		Imitate biomimetic movements of animals such as mantis, bear scriptures, and kite backs
Type B	Auxiliary training of plates, sticks, and balls		Classic surgical procedures for treating specific areas
Type C	The in-place movement of luck tuna		Imitate biomimetic movements of animals such as mantis, bear scriptures, and kite backs
Type D	The cultivation of concentrated and composed thoughts		Classic surgical procedures for treating specific areas

the guidance map was not limited to serving a single individual. The guide map is written in the form of social group images, spreading from individual to group. Local gentry presented their therapeutic effects with their own reputation, and their achievements were then widely spread among the social audience through word of mouth.

1.3 Health preservation techniques that focus on inner spiritual care

Ancient health science emphasized both internal and external cultivation, and the cultivation of internal cultivation can solidify the foundation. The external manifestations of exercise chart vary, but they all have the effect of strengthening internal practice. The narrative of external limbs focuses on "nourishing the body", while the application of internal techniques focuses on "nourishing the mind". The narration of internal exercises is mainly achieved through the method of internal observation. Neiguan, also known as "Neiguan", emphasizes the closed eye view, using the shapes of the five internal organs as storage containers, and mapping the resulting image into the mind through processing and transformation[6]. To achieve this state, one needs to enter a state of concentration and tranquility, during which one often places one's thoughts on the imaginary reality or a specific object, in order to establish a connection between humans and heaven. This approach emphasizes communication by keeping the natural principles within the body and observing oneself through meditation to achieve inner vision. The interpretation of health care by ancient people has never been about the body itself, but rather the unity of body and mind[7]. In the records of Chinese health preservation historical materials, the exercise chart is the most frequently used image in the bibliography. Therefore, the study of specific narrative backgrounds cannot be separated from Chinese culture, especially religious culture. Among them, Taoism has the greatest impact on internal narrative history. In the eyes of Taoism, the human body is a microcosm under the universe, thus establishing a connection with the natural world[8]. Taoism believes in the existence of a divine world that corresponds to the natural world, and therefore continuously explores ways to cultivate immortals. In order to cultivate immortals, one not only needs to accumulate good deeds and virtues, but also needs to attach importance to their own cultivation.

2 The narrative intention of exercise chart cultural and creative products

2.1 Metaphorical expression of organism vision

The narrative history of the exercise chart, as explained in the previous text, mainly unfolds from two dimensions: on the one hand, it involves the use of physical elements on the outside of the body, and on the other hand, it involves the inner recovery of the spirit. It is precisely through the collaboration of physical and psychological dimensions that the exercise chart, as a map of ancient life regulation, possesses profound cultural connotations. The rise of cultural and creative industries in the current society has sparked a wave of assigning value to traditional culture, and many excellent cultural achievements in the nation have been redefined. As the object of cultural and creative product design, exercise chart also have new significance today. In today's society, material life is abundant, and people's lifestyles have changed under the high intensity of life rhythm. A narrative about the vision of a healthy life has been re mentioned. Coincidentally, the newly renovated Hunan Provincial Museum reopened in 2017, and I was fortunate enough to join the cultural and creative product design team of the new museum. Under this opportunity, the team used the guide map of the new museum's cultural relics as the material and intervened in product design from a narrative perspective. The team attempts to introduce the narrative history of ancient people's lives and health to generate reflections on the current way of life. At the beginning of design, the first step is to explore the narrative intention of the product, which is also an explanation of the product design purpose. After clarifying this issue, specific design motivations can be proposed, which can be used as a framework for design to avoid falling into the misconception of "surface decoration", as shown in Figure 2 (the image is self drawn by the author).

The design focus of exercise chart cultural and creative products from the perspective of image narrative lies in the reproduction of history. If the images in the product are interpreted in a fragmented or fragmented manner, its connotation will not be truly understood. In this situation, consumers will only view it as a remnant of history. The images in cultural and creative products are not simply superficial, and the composition of the images should include the way humans understand traditional culture. Therefore, in the image narrative of exercise chart cultural and creative products, the correlation between culture and daily needs should be demonstrated. Behind these numerous demands, there are two intentions that need to be emphasized, the first being the metaphorical expression of the organism's vision. Traditional Chinese culture has a conservative characteristic, emphasizing that "parents who are physically and emotionally influenced" rarely conduct in-depth exploration at the level of human anatomy[9]. The objective analysis of meridians and acupoints is naturally impossible for the realization of the body's vision of longevity. The metaphorical image of emphasizing "qi" in the guide image is expected to be expressed as the character's body becomes apparent[10]. People pray to establish a connection with heaven from the moving images of characters in order to obtain the path of immortality.

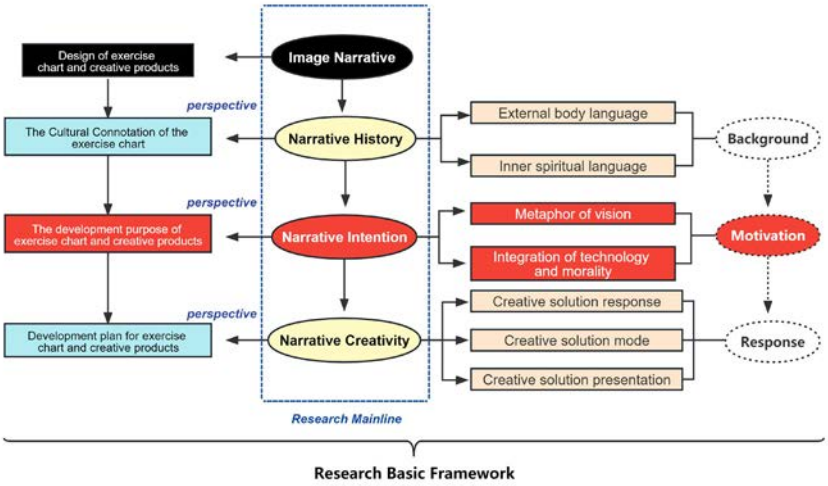


Figure.2 The research position of narrative intention

2.2 The integration and unification of technology and dao

At present, with the rapid development of social science and technology, the iteration of fresh products has objectively raised consumers' purchasing expectations. Products that meet basic usage needs have become increasingly limited in sales. Therefore, in the current era, enhancing the intangible value of products through cultural valuation has become an effective channel for expanding the market. For guided graphic and creative products, incorporating life technology as a fundamental way to reflect the path of prolonging life effectively achieves the unity of product design and philosophy[11], as shown in Figure 3 (the image is self drawn by the author). Exercise chart cultural and creative products will be designed as a collection space based on the laws of human physiology, pathology, and the operation of true qi in accordance with the life technology of traditional Chinese medicine, and continuously metaphorically use images to nourish life through visualization, secularization, and exploration. The way of nourishing life is divided into two aspects, namely the cultivation of the mind towards the body and the cultivation of the body towards life[12]. The external image technique of the exercise chart belongs to the explicit expression of life technology, but it is superficial under the Taoist concept of "imitating nature". In the narrative intention of the product, regardless of the carrier, material, or structure used, the goal is to pursue an eternal and unchanging vision - the integration and unity of technology and Dao.

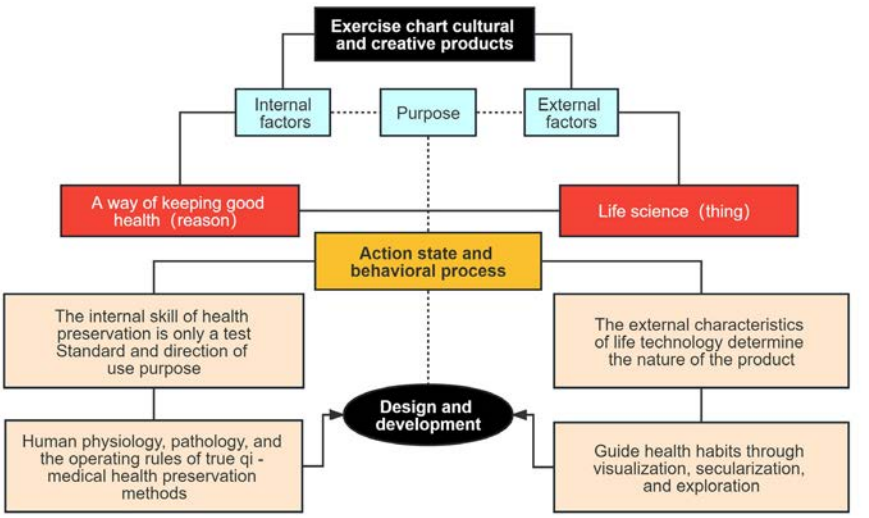


Figure.3 The dual path of technology and path integration

2.3 Proposing design motivation

According to the previous analysis, the narrative intention of exercise chart cultural and creative products is to convey two layers of information to consumers, including the desire for survival based on the ancient ancestors' vision of longevity, and the desire for discourse communication through the material carrier of the product to achieve the path of heaven. This series of cultural and creative products, as a communication medium between people and events, possess cultural value above practical value. The generation of this value is guided by narrative history and aimed at narrative intention. In order to fully tap into the potential of the product, it is necessary to establish an association between the product and the daily landscape. Based on this, the team will start from the three processes of narrative purpose, narrative transformation, and narrative externalization, and propose questions based on the key links in each process to list the issues that need to be paid attention to in the product design process, as shown in Table 2.

Tabel.2 Product development motivation list

Serial	Design motivation	Problem display	Goal vision
A	Body narrative performance	How to accurately convey the external body form language in the exercise chart through image narration?	Narrative purpose
A	Narrative expression of faith	How to accurately convey the inherent health preservation beliefs in the exercise chart through image narration?	Narrative purpose
B	Narrative creation extraction	How to extract image creation from exercise chart and creative products toreflect discourse that is suitable for narrative?	Narrative transformation
B	Narrative context shaping	How to shape the image context in exercise chart and creative products to demonstrate features that align with narrative?	Narrative transformation
B	Narrative emotional connection	How to connect the emotional connection of images in exercise chart and creative products to generate a construction that is connected with narrative?	Narrative transformation
B	Extracting narrative elements	How to extract the image elements in the exercise chart cultural and creative products to deduce the same communication as the narrative?	Narrative transformation
C	Product narrative positioning	How to combine the form of exercise chart cultural and creative products with image narrative to reflect the designer's positioning?	Narrative externalization
C	Product narrative craftsmanship	How to combine the concept of exercise chart cultural and creative products with image narrative to reflect the ingenuity of designers?	Narrative externalization
C	Product narrative expectations	How to combine the value of exercise chart and creative products with image narrative to meet consumer expectations?	Narrative externalization
C	Product narrative experience	How to combine the functions of exercise chart cultural and creative products with image narrative to meet the consumer experience?	Narrative externalization

3 Narrative creativity of exercise chart cultural and creative products

3.1 Creative solution response

The proposal of design motivation describes the appearance of exercise chart cultural and creative products, and precise response to problems is an important path to provide design solutions. Under the operation of the above three dimensions, the thinking of product design gradually becomes clear. Among them, the narrative purpose determines the image core in the exercise chart; The transformation of narrative determines the different emphasis on the combination of image creativity and narrative; Narrative externalization determines the effective way of combining images with products. The three dimensions are nested together to form the response method of creative solutions, and the following answers are expanded from the three dimensions.

1.Response to narrative purpose: Among the 44 characters in the exercise chart, their shapes are different, and different body language corresponds to corresponding image information. In understanding the body, it is necessary to minimize the interference of relevant visual elements to the greatest extent possible. In image reconstruction, the team reorganized the characters in the group and divided them into four categories based on their wearing characteristics: straight train dark robe (25 people), straight train brown robe (8 people), straight train crimson robe (3 people), and shirtless robe (8 people). In order to make it easier to distinguish, the colors of 44 characters were subjected to high contrast processing, resulting in 25 dark characters and 19 light characters (brown, magenta, and shirtless), with a ratio of 1.3:1 between dark and light characters. By unifying the processing of interfering colors, the body features of the characters are amplified. In the redrawing of the characters, the missing lines in the original version are redrawn, and the conceptual language in the body form is preserved to the fullest extent possible.

2.Response to narrative transformation:After image processing, the characters are divided into two categories in color classification: dark and light, with a ratio approaching 1:1. In the image transformation, the team extracts dark and light colors to form a combination to create rhythm. In order to create a sense of symmetry and balance, the depth and depth of the character form can be adjusted according to the team's subjective consciousness, and appropriately scaled according to the screen needs. In order to shape a discourse context based on the concept of health and wellness, it is necessary to fully utilize the composite discourse of groups and the distinct stance of individuals in the processing of character images. The former focuses on expressing the collective consciousness in traditional national cultural concepts, while the latter focuses on expressing individuals' determination to pursue their comprehensive development. These two parallel emotional stances serve both the cluster and the individual, achieving comprehensive development between humans and society. At present, the extraction and transformation of image elements represents the team's understanding of the aesthetic of the times. In the formal expression of modern design, the modeling language based on points, lines, and surfaces is more common[13]. Making good use of these basic elements according to local conditions can not only plan the layout, but also fully explore character shapes.

3. Response to Narrative Explicitness: The product, as the material carrier of image narrative, is the final stage of design implementation. The key to the smooth implementation of a product lies in its ability to respond reasonably to consumer demands. For consumers, the positioning of exercise chart cultural and creative products belongs to the category of cultural and museum tourism souvenirs. The target audience of the service is a group of tourists who love traditional culture and are eager to convey health wishes. This feature puts forward requirements for the visual, fast, and concrete narrative of the product. For consumers, excellent cultural and creative products need value for money and can gain motivation from the stimulation of product services. As a cultural and creative product, consumer motivation depends on the way culture is expressed. It is particularly important for consumers to understand the narrative discourse of the product and gain emotional resonance.

Therefore, the design of products should always prioritize the individual needs of people, followed by their fundamental function of serving daily life.

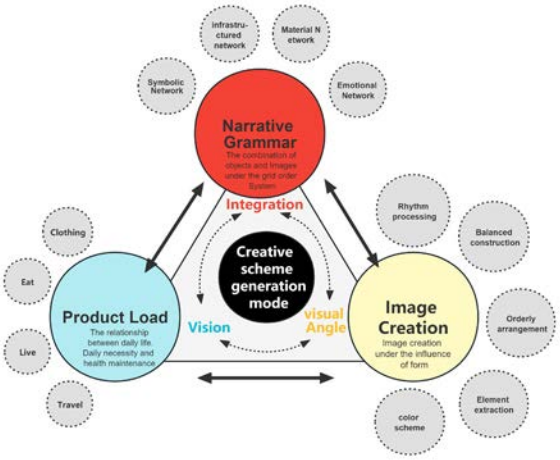


Figure.4 Basic model of creative solutions

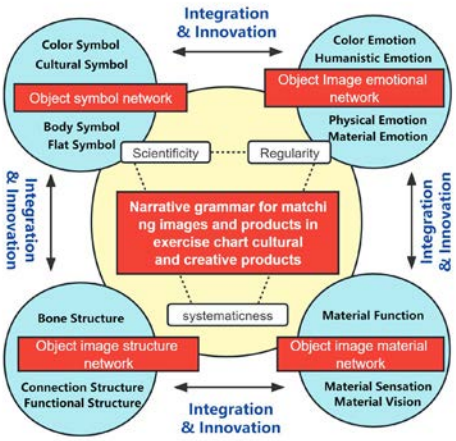


Figure 5. The four dimensions of narrative grammar

3.2 Creative solution mode

After responding to the above three links, the design stance of the exercise chart cultural and creative product has become clear. The team attempts to infer deep creative patterns from their own cognitive perspective, starting from the narrative picture of daily health. After comprehensive screening of various variable elements, the deduction mode of creativity is summarized into three dimensions: image creation, product load, and narrative grammar. The basic framework of creative scheme design has been constructed through the step-by-step progression of image dimension, product dimension, and narrative dimension[14], as shown in Figure 4 (the image is self drawn by the author). The dimensions of image creation mainly include the processing of rhythm (order, disorder), the creation of balance (symmetry, balance), the arrangement of order (contrast, harmony), the extraction of elements (points, lines, surfaces), and the blending of colors. The product load dimension mainly uses analogical association method to diverge in the form of theme action concept carrier, such as the path of health preservation illness rain umbrella. Under this association method, the product load closely revolves around the theme and is inspired by daily clothing, food, and housing behavior, which is associated with items such as coasters, clocks, mouse pads, porcelain plates, phone cases, etc. The narrative grammar dimension mainly involves the combination of images and carriers. In order to facilitate the planning team to use the grid order system to balance the various elements in the form of images and cultural and creative products[15], an image order system is established from four dimensions: object symbol network, object structurenetwork, object material network, and object emotion network. This is used to respond to the specific performance of products in different changing forms, as shown in Figure 5 (the image is self drawn by the author). Based on this, images are processed in different narrative grammars to generate corresponding semantics for the product, as shown in Table 3.

3.3 Presentation of creative products

The presentation of creative products is the final stage of implementing the concept of the exercise chart, which

Tabel.3 Semantic expression of creative patterns

Serial	Image creation	Product load	Narrative grammar	Semantics
1.	Formation of group images in exercise chart	Ruler	Material network	The scale of controlling health preservation behavior in daily routines.
2.	Formation of group images in exercise chart	Canvas bag	Infrastructured network	Pay attention to cultivating health habits in daily shopping.
3.	Single body shaping of exercise chart	Porcelain plate	Symbolic network	Emphasize the cultivation of health habits in daily diet.
4.	Formation of group images in exercise chart	Umbrella	Emotional network	Maintain reverence for natural phenomena during meteorological changes.
5.	Formation of group images in exercise chart	Mug	Infrastructured network	Emphasize the cultivation of health habits in daily drinking water..
6.	Formation of group images in exercise chart	Timepiece	Emotional network	Maintain a sense of wellness throughout daily routines.
7.	Formation of group images in exercise chart	Mouse pad	Infrastructured network	Emphasize the cultivation of health habits in online work.
8.	Formation of group images in exercise chart	Phone case	Infrastructured network	Pay attention to cultivating health habits during mobile phone use.
9.	Single body shaping of exercise chart	Coaster	Symbolic network	Emphasize the cultivation of health habits in daily work.
10.	Formation of group images in exercise chart	Paper tape	Symbolic network	Emphasize the cultivation of health habits in daily research.

is the process of transforming concepts into entities under the guidance of creative modes. In the practical stage, images have different emphasis on the creation method, product load, and narrative grammar, and there are also individual products that have cross influences in the creative presentation of the three stages. But overall, image creation focuses on formal expression; The product load focuses on practical value; Narrative grammar emphasizes the combination of objects and images. We now list the series of cultural and creative products designed by our team, and focus on describing how the three links play a role in product presentation through

Tabel.4 Case analysis of creative products

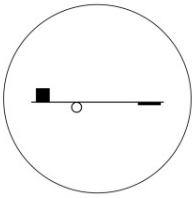
Serial	Product name	Design description
1.	Exercise chart mug	According to the principle of form, balance and rhythm are deliberately created in the process of image creation. Adjust the size proportion of the characters in the molding of balance to create visual symmetry. In the shaping of rhythm, a pattern of matching dark and light colored characters is used to create a visual contrast between strength and weakness. By processing the network structure, the characters are arranged in three sections, and the circular geometric elements are combined with the cup body through hot stamping, playing a prominent strengthening role.

Image creation	Narrative grammar	Product load
		

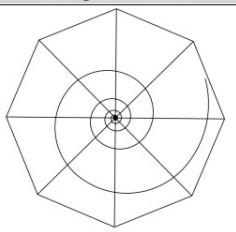
Serial	Product name	Design description
2.	Exercise chart clock	According to the principle of form, balance and rhythm are deliberately created in the process of image creation. Adjust the size proportion of the characters in the molding of balance to create visual symmetry. In the shaping of rhythm, a pattern of matching dark and light colored characters is used to create a visual contrast between strength and weakness. By circular processing, the character group images are evenly distributed on the dial, and an emotional network symbolizing the passage of time is created through the overlapping of numbers and people. The addition of rectangular lines around the character enhances the movement of the limbs.

Image creation	Narrative grammar	Product load
		

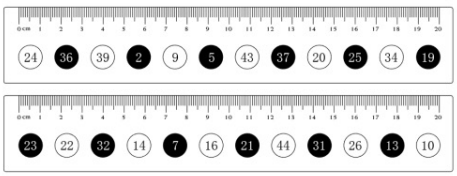
Serial	Product name	Design description
3.	Exercise chart porcelain plate	According to the principle of formal sense, dynamic balance is created during the image creation process by changing the force distance. Using the external body language of a single character (identification numbers 30, 16, 8, 30) to shape a symbolic network, deepening the theme through the game between the portrait and the text. The use of long-distance line segments not only divides the image but also adds a sense of modernity.

Image creation	Narrative grammar	Product load
		 1.
 2.	 3.	 4.

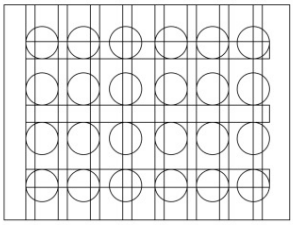
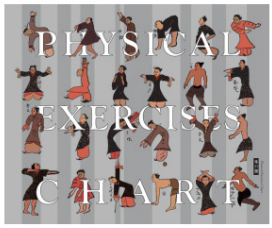
Serial	Product name	Design description
4.	Exercise chart umbrella	According to the principle of formal sense, in the process of image creation, equal triangular space is divided by segmenting regular octagons. Adopting a combination of depth and depth to create momentum in each triangular space. Based on the production process of the product, the group images need to be fully distributed in a triangular space to avoid misalignment during umbrella stitching. The construction of emotional networks not only organizes the order of characters, but also constructs the relationship between nature and healthy living habits.

Image creation	Narrative grammar	Product load
		

Serial	Product name	Design description
5.	Exercise chart variable ruler	According to the principle of formal sense, the group figures are divided into two layers and arranged horizontally in the image creation process. The ruler is made of unique PVC variable material, which is lightweight and easy to fold. Match characters in different flat networks according to the similarity of external body language. Stratified processing of characters to generate continuous changes in body movements from different perspectives. Attempt to simulate the temporal features of the guidance map through the expression of changing images, and reflect time changes in the interaction between humans and objects.

Image creation	Narrative grammar	Product load
		

Serial	Product name	Design description
6.	Exercise chart mouse pad	According to the principle of formal sense, the group figures are divided into four layers and arranged horizontally in the image creation process. Divide a rectangular space with equal modulus based on the structural network within the regular rectangular space of the mouse pad. Another third of the width is taken as the spacing, and the group image characters are arranged in a depth alternating order on the spatial network, and the text element Physical Exercise chart is taken to intersperse with the group image of the characters.

Image creation	Narrative grammar	Product load
		

specific cases, as shown in Table 4.

The design of guided graphic cultural and creative products from the perspective of image narrative goes beyond these. Due to the similarity between image creation methods and narrative grammar, the remaining products will no longer be explained one by one, and only the results will be listed.

Tabel.5 Other Results of Creative Product Case

a.Exercise chart coaster	b.Exercise chart mouse pad II	c.Exercise chart clock II
		
d.Exercise chart phone case	**e.Exercise chart phone case II**	**f.Exercise chart badge**
		

4 Conclusion

Image narrative is a commonly used presentation method in current design practice, and it has broad application space in information integration and visualization methods. Image narrative has a unique development prospect in the field of cultural and creative product design, which is related to the intuitive way cultural and creative products work and the diverse media of action. This study takes the representative body language and health care contained in the exercise chart itself as the narrative motivation, expands the goal vision in different functional contexts, and establishes narrative rules through products closely related to daily life. Under this opportunity, my team designed a product entity that can respond to consumers' daily confusion, and relied on the platform of the Hunan Provincial Museum to land and sell the product. The Chinese culture is vast and profound, and the narrative discourse involved in this study is not sufficient to comprehensively summarize the profound cultural connotations of the exercise chart. In the actual sales process of the product, there is also a situation where the discourse context and consumption context cannot be the same frequency. This issue will be re examined in future design processes. During this period, it is hoped that there will be innovative and profound discourse of the times to be excavated, so that exercise chart cultural and creative products have excellent artistic and cultural value at the same time.

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The Significance of Urban Code for the Protection and Renewal of Traditional Streets and Communities in Xi'an

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Abstract

Against the background of protecting our memory of history in urban development of China, and the ongoing large-scale renovation and renewal of traditional streets and communities in the city of Xi'an, this article discusses the importance of the mining, discovery, protection, and inheritance of urban code to the protective construction and development of Xi'an's traditional streets and communities. The research generates significant practical guiding values for the current urban construction of Xi'an, and can work as a reference for the design and problems of development programs of similar types in other cities. Through the research methods of literature review, Mapping and questionnaires, this article demonstrates that the research on and support from urban code play an irreplaceable role in the protection and renewal of Xi'an's traditional streets and communities.

Author keywords

Urban Code; Xi'an; Traditional streets and communities; Protection and Renewal of Urban cultural relics

Introduction

Traditional urban streets and communities of China and issues with their preservation and development have always been highly regarded by the leaders of the Communist Party of China and the central government[1]. In recent years, with the accelerated overall development of Xi'an, capital city of Shanxi province, the transformation and renovation of traditional streets and communities here have become all the more important, especially in light of the 14th National Games held in the province. And to do so, it requires appropriate and effective approaches that are both scientific and aesthetically pleasing. The author has been committed to studying the "hidden" forces that contribute to the the presentation of visual image of the city, using Mapping as a methodological basis. This article aims to uncover these hidden forces or landscapes, which are also called urban code, within the city that ultimately help maintain the city's external appearance, so as to fundamentally resolve the key construction issues that traditional urban streets and communities face in their renovation and development.

Urban Code

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1. urban ecological restoration, and to continue the urban context..". On November 2, 2019, during an inspection in Shanghai, President Xi Jinping said, "we should properly handle the relationship between protection and development, pay attention to the continuation of urban historical context, respect and treat old buildings in the city like 'elderly people', and preserve the historical and cultural memory of the city."

Urban Code refers to the hidden driving and shaping forces behind the visible city landscape and scenarios, including the daily doings and habits of individual city dwellers at a micro level or the historical and cultural structures at the macro level. Therefore, the visual form of a city represents the external expression of its urban code, which in turn constitutes the internal cause and foundation of this visual form. It is like Italo Calvino's description in Le città Invisibili (Invisible Cities), where he states: the city of Leesa is for sure the saddest city...yet it contains a happy version of itself, full of constant joys and merry, one being visible and the other invisible, mutually reflecting and interacting with each other through connections, comparisons, and cross-references[2]. This excerpt describes a reality rather than fictional. For example, in Xi'an, the Muslim women's headscarves sold in the "Huimin Street" (Muslim Quarter) are for the pilgrims who come a long way to buy for their loved ones back home. For this reason, all headscarf shops are located near the mosques rather than on the bustling Beiyuanmen commercial street (figure 1); Additionally, as shown in figure 2, differing from the white, blue,and green hues of other Muslim communities, the predominant color of the Huimin Street is a distinct "Huiqing" color (a kind of

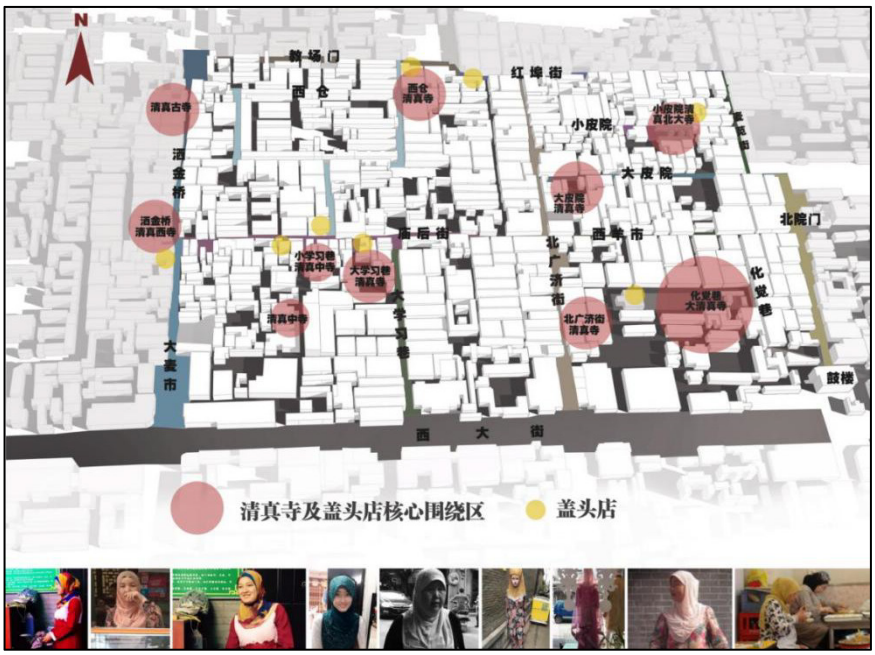

Figure 1. Mapping urban code of Xi’ an Huifang headscarf, photographed by the author. All headscarf shops are located near the mosques rather than on the bustling Beiyuanmen commercial street, because they are sold for the pilgrims who come a long way to buy for their loved ones back home. Headscarf shops located near the mosques then represent a hidden urban code here in Xi’ an Huifang.

blue) that dyes the signage, tableware, architectural decorations, clothing, headscarves, and food packaging throughout the street. Most importantly, it marks the boundary between the simple white and blue residential spaces of the entire Huimin Street area and the rich green, gold, and blue commercial spaces facing the external

2. "Even in the sorrowful city of Leesa, there is an invisible thread that connects one life to another, tightening, and then loosening in an instant, swiftly sketching out new patterns between the two moving points. In this way, this unfortunate city constantly embraces a happy city within itself, and even she herself is unaware of her own existence." Excerpt from Invisible City by Italo Calvino.

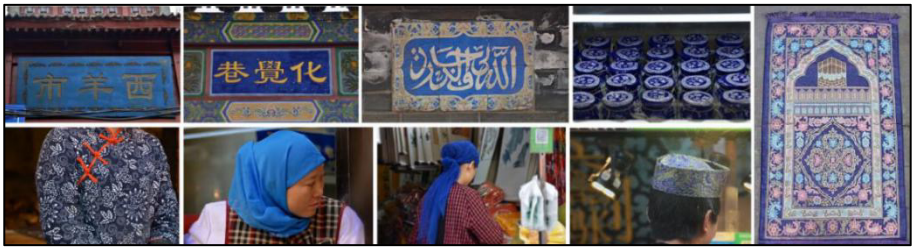

Figure 2. Mapping the urban code of Huiqing color in Huifang, credit to Hao Yu, Hao Xueli, Zhang Yiyue and the author

The Huiqing color in Huifang marks the boundary between the simple white and blue residential spaces of the entire Huimin Street area and the rich green, gold, and blue commercial spaces facing the external world, making Huiqing color an additional boundary.

world, making Huiqing color an additional boundary (figure 2). As shown in figure 3, there are 11 steamer-filling-cake (Zenggao) stalls in Huimin Street, with 8 of them used by elderly women who earn a living from selling these cakes. The remaining two stalls, namely Elder Sun's stall at the entrance of Beiyuanmen and the stall run by a



Figure 3. Mapping the urban code of Zenggao cake stalls in Huifang, made by author

The 11 Zenggao cake stalls in Huifang, Xi'an and the three typical representatives among them showcase the hidden micro-business system within the city. They have both commonalities and particularities, serving as the livelihood of the grandmothers and also as a micro-cultural landscape of Huifang. No matter how small-scale their business is, they are the codes and genes that cannot be taken away from Huifang.

couple in the Xiyang Market. These 11 stalls have different strategies of time, location, management, business, and neighborhood relationship, and hence form various soft and hard conditions that combine to create flexible boundaries at multiple levels (figure 3). Figure 4 shows the following: the price tag shows that the small barber shops in the traditional communities of Xiamaling in Xi'an charge one yuan higher for shaving mens' head than regular short hair cut. The reason is that this area surrounds Wolong Temple, and the monks there make the business of shaving bald heads prosperous. Additionally, the Xiamaling area of Xi'an is a seemingly ordinary, quiet, and plain street called Kaitong Alley. Hidden beneath this quite external exterior is a micro-economic system of physical stores and online food delivery. At the southern end of this Alley lies the breakfast shop called Spicy Soup, which serves as a morning spot for food delivery drivers, while their indoor public rest space is at the northern end called Kaitong Hotel. In the middle section, there is an open space that serves as an outdoor resting area for these delivery person. On the northern end, there is Kudai Noodles, where the delivery persons have their lunch. In addition to these, there are other food processing shops like Mr. Rice Encounter, Good Wife Chicken and Rice, Delicious Home-style Dishes, and Hot Pot King. Some of these shops accept orders online through platforms such as Meituan and provide centralized delivery of ingredients and supplies. They form a complete online and

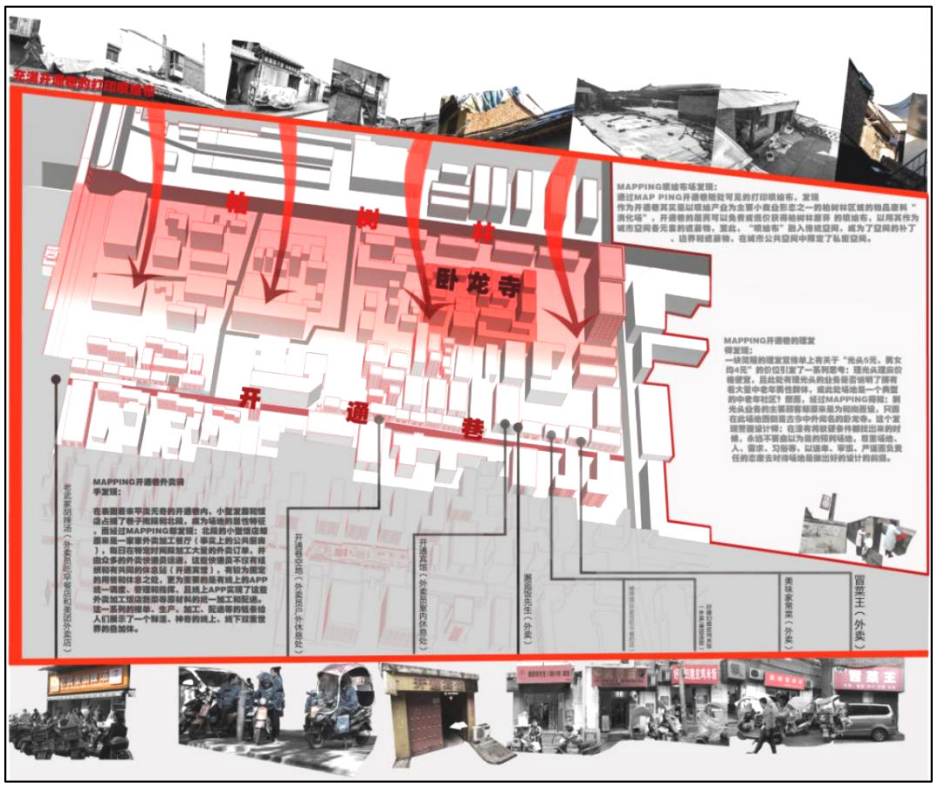

Figure 4. Mapping the urban code of the communities of barbers, food delivers and in Kaitong Alley,made by author.

The pricing set by the wandering barbers in Kaitong Alley reveals the connection between Wolong Temple and this alley; the printed cloth spread throughout the Kaitong Alley reveals the relationship between the poplar forest and the Kaitong Alley; several food delivery shops at the north end of the Kaitong Alley reveal a superimposed online, offline micro-food-delivery world, while the Kaitong Alley is spaces for rest, meals, work, etc. and home for the delivery personnel.

offline integrated food delivery micro-system (figure 4). These examples vividly illustrate the universally present dual layers of the visible and invisible sides of Xi'an.

In my mapping research, I discovered many more such examples. These real examples evidence how the top-down urban systems of construction, representation and entity are actually used by citizens from the bottom up, and how these elements are connected to the dwellers in urban space. These invisible yet real connections are what have been termed the urban code. Therefore we see a profound relationship between urban representation and urban code: the urban representational system is the exterior, and the urban code is the soul. Some scholars have observed in their studies that the urban code does not disappear with the disruptive changes in the urban representation system during a certain period of time, because the urban code is the daily life system of people. Everyone is an expert in their own life and as long as they exist and the hidden social relationships and cultural structures remain unchanged, the urban code will not disappear.

In addition, research on urban code is of greater significance for older cities, traditional streets and communities, as these long-history urban spaces have taken in the activities, habits, lives, customs of many generations of individual city dwellers over the course of time. The longer the time, the connections between people, between people and objects, and even culture become more stable, so will be the spatial spirit, cultural structure, social connections, as well as the material and non-material connections. In this way, the urban code becomes more certain and clear, and cannot be ignored. Therefore, the hidden landscape of urban code helps preserve past history and memories of the city, supports and shapes the current growth and running of the city, and the future developmental direction and trends of the city. These are the values and significance of conducting research on urban code.

Issues with protecting traditional streets and communities of Xi'an in the context of development

Xi'an is the former capital of 13 ancient Chinese dynasties, hence features long history and rich cultural heritages. Its traditional streets and communities have been developed and expanded from where Xi'an in the dynasties of Tang and Ming once lied and the scale they once possessed. These traditional streets and communities occupy the most important urban airspace in terms of culture, history, area, and location, covering a large area of about 5.2 square kilometers. Developing this area is sensitive and highly concerned, and is made all the more significant because it relates to issues with the historical and cultural inheritance of the city. The renovation and transformation of traditional streets and communities have been put top on the agenda and relevant large-scale projects are being quickly launched, but in the process many obvious problems seem to be unavoidable. How to abandon the idea of city construction all in similar style? And how to develop a balance that promotes city development yet keeps the urban historical heritages through adopting appropriate approaches and methods are the questions that must be answered and sought for practical and scientific solutions today. And neglecting the discovery, excavation, protection, and inheritance of urban code is a fundamental reason for existing problems.

Updating the design of city is to rejuvenate its traditional streets and communities from the inside out. But if the update disregards urban codes, the new design would not be carried out within a comprehensive system (Org-ware) that is interconnected by culture, history, customs, individuals, groups, etc., that is, the kind of design based on the urban code, and hence cannot achieve the essence, principles, and standards of design update. If this happens, "the old" (traditional streets and communities) cannot gain new life after a kind of true integration, nor can it continue to make the urban code keep growing be acting as a driving force for shaping external visual representations. As a result, most updated designs that ignore urban code remain superficial or shallow in functionality. Moreover, because the new design and the designed objects do not truly exist within an organic system, they eventually become a waste of resources due to users' inevitable abandonment after being tested

over time.

Theoretically, city design update is to ensure the continuation of the spirit and urban genes of places of historical, cultural, and memorial values. It is not purely for the sake of "updating" and certainly not for destruction. In reality though, due to the ignorance of the existence of urban code, most updated designs have become construction projects that disrupt dwellers' existing ways of life. Facing seemingly "chaotic" places, designers, builders, and managers find it difficult to stay calm in order to figure out the connections between "software" and "hardware" and the various systems in these sites. As a result, they resort to "one-size-fits-all" or disruptive, rapid cleaning methods, and after labeling historical sites as "shantytowns" they completely level them down. One such instance is the Xi'an Sanxue Street renovation project, which began in 2019, and it became a highly publicized news event after large-scale demolitions in traditional historical neighborhoods that occurred after October 2020. The demolition of the historical residence, the Li Family Courtyard, made this project a sensational social issue, and similar events, I suggest should be highly valued by the academic, industry, and government sectors. Objectively speaking, demolition to some degree is inevitable for the updating of traditional streets and communities. But before this, protection should be the top priority and a thorough assessment and classification of existing cultural relics and valuable items should be conducted. All actions should be done within limits, and all measures should respect the connections of the sites' software and hardware systems and be implemented gradually and cautiously after careful decision-making.

Ignoring the discovery and use of urban code will make it difficult to carry out and achieve genuine in-site design in urban renewal. The "site" in in-site design does not only refer to the visible system of urban visual form, but also include the invisible urban code. If the design is only based on one of the two systems, the design theme and functional positioning will be one-sided, and it will be impossible to achieve the integration of form and soul in urban renewal and development. Design based solely on the urban visual form will inevitably be superficial and purely formal, while design based solely on urban code will not achieve the realization of urban renewal, because all the problems, changes, and transformations in the city must be returned to the spatial-temporal relationships based on material, entity, visual, and occupation with the city as the point of reference. However, the current situation of urban renewal design in China and other countries is characterized by excessive focus on the surface level of urban visual form transformation, while neglecting the existence and role of urban codes. As a result, it further exacerbates the superficiality and formalism of the design.

Ignoring or destroying the urban code will result in the disruption of the internal and external connections between the city (partially or whole) and its surrounding environment, causing significant damage and loopholes in the visual form and internal logical structure of the city. Cities accumulate and change over time, because of which they become a remarkable organism with overlapping external forms and hidden codes. But If its parts are thoughtlessly excavated, eradicated, or relocated, it will inevitably cause great damage. As a result, reassembling and restoring the multidimensional aspects of material and non-material, visual form and code will be made more difficult. Therefore, the city should be regarded as a living organism with flesh and blood, energy, and a past, present, and future, and should be protected both internally and externally. In the process of development, it should be approached with more patience, respected with more humility, and cherished with more gentleness and goodwill for all historical elements and elements that should be updated. This will allow for a better integration of the new and old organisms, achieving a complete city and healthy growth.

In short, for traditional streets and communities, ignoring the existence of urban codes has serious drawbacks and consequences. It requires the attention of academia, industry, managers, and the general public.

The importance of urban code research

The above analysis reveals the importance of urban code research for the transformation and renovation processes of traditional streets and communities in Xi'an:

Xi'an is a world-renowned ancient capital with a history of urban development and succession spanning 3,079 years. It therefore possesses stable urban genes and urban code. One thing is the explicit visual form of urban genes: the relationship between urban location selection and the surrounding natural landscape, the overall layout and spatial form rooted in the old city area, and the formerly Imperial City founded on the Tianfang system, the hierarchy and system of roads, the traditional and accumulated forms of buildings and architectural clusters, the water system and vegetation system within the city, etc.. The other thing is the urban code that plays an important role independently within the urban genes: the behaviors, habits, customs, culture, social relationships and structures that are accumulated, inherited, and transformed from top to bottom and from bottom to top in different times and space, and their extensive connections with the urban visual form. They all have a solid foundation that is difficult to shake and not subject to disruptive changes due to historical and temporal transformations. Of course, this goal cannot be achieved through the means and methods that are traditionally adopted, nor can it be done quickly like a rushed project seeking short-term benefits. Instead, we shall approach each step with the same level of care and meticulousness as protecting unearthed cultural relics. But, the current approach to the transformation of Sanxue Street, as mentioned above, violates the principle of protection in the process of the transformation of the ancient Xi'an and should hence be carefully reconsidered and adjusted before a gradual re- implementation. Taking this as an example, relevant parties should further understand and clarify the important connections between protection, transformation, renewal, inheritance, and development involved in decision-making and acting of the construction and development of traditional streets and communities in Xi'an.

The urban code of Xi'an is a comprehensive entity that is layered in multiple dimensions, multiple time periods, and multiple histories. The urban code that is enacted by the people from the bottom up - their daily lives, behaviors, customs, and cultural systems - silently infiltrates and spreads, making it one of the main shaping forces of Xi'an. Within the streets and communities that inherit the urban spatial boundaries and patterns in history, the physical living system planned and designed by the government and designers is performed daily as a kind of theater or improvisation by the people's daily use, adjustment, utilization, and changes in relation to this living system. This then forms two overlapping states of the visible (urban visual form) and the invisible (urban code and hidden scenery) of the city. Therefore, the transformation and renewal of traditional streets and communities in Xi'an must take into account both the urban code (the soul) and the urban visual system (the form). If the city lacks the tracing and discovery, as well as research of urban code, it will inevitably result in the difficulty of determining the design positioning in the overall system that actually combines the internal and external aspects. It will also keep the subsequent design stages from being able to be carried out in a reasonable and moderate manner. More importantly, it will lead to unsatisfactory experiences and effects in the later usage stage, resulting in multiple wastages of resources. The result of doing so will inevitably lead to the superficial transformation and renewal of traditional streets and communities in Xi'an, causing a division between content and form.

As typified by this article, research on the urban code of Xi'an from the bottom up and the research experience and output will generate significant implications that support the transformation and renewal of traditional streets and communities in Xi'an, enabling them to achieve a true in-site design that combines both substance and form. Such support can ensure that all aspects related to the micro-design upgrade of traditional streets and communities in Xi'an are considered from "within" the urban system. This article unfolds within the network and two-way reference system of internal and external structures. In a five-year study, the author found that

Mapping is one of the best ways to search for and explore the urban code. With its in-site nature and ability to observe subtle details, Mapping not only meets the need to explore and search for the urban code from within, but also allows the software, hardware within the Qrg-ware systems that it discovers to manifest the entire network composed of the urban code and the urban visual form. Based on this comprehensive network, the design positioning, presentation, and intervention are more like acupuncture-based urban design methods that allocate resources and solve key problems, while maintaining the memory, spirit, and genetic characteristics of the flowing and linear urban space in a healthy manner.

Conclusion

In summary, the bottom-up research on and support from urban code in Xi'an play an irreplaceable role in achieving the micro-updating and transformation design of traditional streets and communities in Xi'an, as well as the protective inheritance and development of memories, culture, and genes of these sites.

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Analysis on the development and evolution of stone reliefs in Qin, Han and Tang Dynasties and its influence on modern society

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Abstract

This article mainly studies the stone relief art in the three periods of Qin, Han and Tang Dynasties in the history of China. Firstly, the development characteristics of stone reliefs in Qin, Han and Tang dynasties are expounded through the materials, production technology and the history, culture and life form behind them. Then, by analyzing the representative works of three periods, the differences of theme, composition and decoration techniques of stone reliefs in different periods are demonstrated by examples. Finally, through the application scene of the artistic characteristics of stone reliefs in modern society, this paper demonstrates with examples and discusses the great possibility that this ancient art form of stone reliefs will glow with new vitality and vitality in modern society.

Qin, Han and Tang Dynasties is one of the most splendid periods in China's history, during which many splendid arts and crafts cultures were born. As stone relief is a decorative art combining painting and sculpture, it is also a display art with rich connotations. Its decorative patterns, contents, composition, etc. have laid a certain foundation for the exhibition environment design of later generations, and also played a role of reference and reference. To a certain extent, it can reflect the life outlook and the flavor of the times in different periods. Therefore, this paper takes the stone reliefs in Qin, Han and Tang dynasties as the research object, and comprehensively analyzes the materials, production techniques, history, literature and life forms of stone reliefs in different periods.

Author keywords

Stone reliefs; decorative techniques; modeling language; murals

Inheritance and Development of Stone Relief in Qin, Han and Tang Dynasties

Stone reliefs are different from brick reliefs, which are mainly used in tomb buildings. Stone reliefs, on the other hand, are widely used. They can be used not only in tombs, but also in ancestral temples, sacrifices and temples. They are works of art carved on stone. Descriptions of stone reliefs can be found in many architectural literature works in China, such as Building Method, Stone Road and Notes on Water Classics. From the current archaeological excavations and the above literature research, the stone reliefs with certain decorative and aesthetic value can be traced back to the end of the Warring States at the earliest, and then developed and evolved in the Qin Dynasty, reaching its peak in the Han Dynasty, and gradually declined in the Tang Dynasty, and were gradually replaced by other arts and crafts.

Stone reliefs in the Qin Dynasty are mainly scattered perspective, which are very full and have strong decoration in the decorative picture. At the same time, they are mainly realistic in technique, taking into account the overall

mood and emotional expression. In terms of carving techniques, there are negative line carving, flat carving with reduced ground, etc., and they do not seek detailed description, but pursue overall verve, giving people a rough and simple visual sense. The carving techniques and decorative contents of Han Dynasty stone reliefs are very similar to those of Qin Dynasty stone reliefs. In the early Han dynasty, the style of stone reliefs inherited the artistic style of Qin dynasty, but influenced by the wind of heavy burial, the main styles of stone reliefs in Han dynasty were to pray to God and worship Buddha, lead souls to heaven and summon souls. There are also more focus perspective composition methods in painting methods, and they are more realistic in expression techniques. The stone reliefs in the Han Dynasty use the linear division method, and the vertical, bending and length of the line are used to delineate the scope in space. Compared with the stone reliefs in the Qin Dynasty, the stone reliefs in the whole show a sense of grandeur and magnificence.

After the Three Kingdoms, the Jin Dynasty and the Sui Dynasty, the stone reliefs in the Tang Dynasty have changed significantly from those in the Han Dynasty in subject matter, composition, techniques and so on. Stone reliefs in the Tang dynasty began to show auspicious patterns and the life scenes of the tomb owner, but there was a lot less content of praying to God and worshiping Buddha. In the composition, the stone reliefs in the Tang Dynasty are more big and small, and people and buildings are vividly represented, and the 1 ： 1 replica is made as much as possible. In techniques, the stone reliefs in the Han Dynasty mostly use knives instead of pens or engraves in a positive way, or engraves in a negative way, or a combination of both, and there is also a form of relief, or a combination of relief and carving. Tang Dynasty stone reliefs not only retained this style, but also integrated the dignity and simplicity of the Northern and Southern Dynasties, forming a combination of masculinity and femininity.

The author thinks that compared with the three dynasties of Qin, Han and Tang, there is a strong sense of formal beauty in the patterns of stone reliefs in Han Dynasty. Its decorative patterns are different from the simple techniques of Qin Dynasty and the grandiose decorative techniques of stone reliefs in Tang Dynasty. It pays more attention to the reasonable control of the whole picture, the coordinated use of male and female engraved lines, and makes artistic creation in a free and romantic way in form. And unlike the Tang Dynasty, which paid too much attention to the characterization of characters, the stone reliefs in the Han Dynasty reflected a harmonious and symbiotic view of nature, which was the most authentic and simple aesthetic expression and emotional display of the creators in the Han Dynasty. Judging from the stone reliefs unearthed in three dynasties, the most influential content is modern clothing design; The most decorative influence is the modern display environment design; Modern sculpture design has the deepest influence on its carving techniques; Its composition has the deepest influence on modern visual design. In my opinion, there are many cultures and arts that modern design can learn from stone reliefs. From the perspective of exhibition design, there are many similarities between the two design cultures. For example, they all need to pay attention to the psychological feelings of the audience; Need to show the integrity of information transmission; All need the ups and downs of the audience's emotions; For the choice of display items, etc., if a display designer has a certain ability to learn and understand the art and culture of stone relief, it will be of great guiding significance and practical help to his own design ability.

Analysis of representative works of stone reliefs in Qin, Han and Tang Dynasties

In 1974, when the site of Qin Chengyang official was excavated on Beiluo, Niuniu Village, 15 kilometers east of Xianyang City, a large number of murals were found on the wall of the building site. After textual research, this batch of cultural relics was made when Qin Xiaogong moved its capital to Xianyang and built Xianyang Palace. It is mainly treated with coarse grass mud, chaff mud and lime mud, and then painted on the rammed earth wall with mineral pigments such as cinnabar and greenstone. In the decorative content, there are figures, vehicles,

buildings, animals, plants, gods and so on, which are the earliest murals discovered so far. Among them, "Sima Tu" was designated as a national treasure by the state. In the mural, four horses run side by side. Although the weathering is serious, many tiny decorative patterns can be seen from the picture, which not only makes the picture more vivid, but also intuitively conveys the living conditions of the upper class people at that time. Its appearance filled the blank of painting materials in Qin dynasty in China, and it also became one of the earliest representative works in the history of stone relief.



Figure 1. Sima Tu

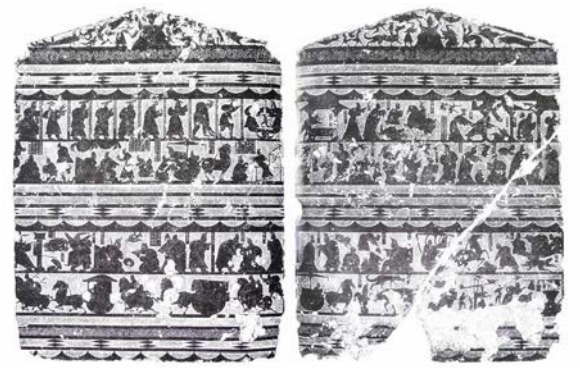

Figure 2. Relief stone sculptures in Wu's Hall

Stone relief in Han Dynasty is the most representative one in these three dynasties. Mr. Lu Xun once commented on the art of stone carving in the Han Dynasty: "The stone carving of the Han people is profound and heroic." As shown in Figure 2 "Relief stone sculptures in Wu's Hall", the picture is divided into five layers. The first layer is the fairy world: the image of the Queen Mother of the West, with feathers and animals on both sides; The second layer is the sages and emperors: Fuxi Nuwa and the three emperors and five emperors; The third layer is the story of characters: the story of Zeng Shen's filial mother; The fourth layer is the historical story of Jing Ke's loyalty to the king of Qin. The fifth floor is the daily life: the travel map of horses and chariots. The stone carving of Wuliangci is a whole stone carved with parallel lines after the background is removed from the surface, and all kinds of carving contents are carved in the form of plane bas-relief and intaglio lines. The plane modeling language of stone reliefs in Han Dynasty has a profound influence on the innovation and creation of arts and crafts in later generations. The lines, space, shape, focus perspective, techniques of positive and negative engraving, and imagery form it shows have had many influences on clothing, lacquerware, decorative patterns and ceramics, and provided many favorable supports for subsequent artistic creation.

Different from the previous tomb layout, the Tang Dynasty stone reliefs began to be distributed in a large number of tombs, patios, tunnels, tombs and so on. The common themes in the tomb are Qinglong, White Tiger, ceremonial ceremonies of chariots and horses, halberds, ladies and celestial phenomena. During the prosperous and middle Tang Dynasty, tomb murals were no longer popular, and themes such as Qinglong and White Tiger declined, and were gradually replaced by music and dance banquets, male and female attendants, four gods, characters under trees and so on. In the late Tang Dynasty, there were fewer and fewer tomb murals, and the forms were gradually simple. There were many popular themes such as six-screen figures, flower-and-bird paintings, cloud cranes, zodiac, home, music and dance. The representative work of Tang Dynasty stone reliefs is "Ling of Princess Yongtai", which is one of the 17 buried tombs in Ganling. The owner of the tomb is the only princess whose tomb is called "Ling" in the history of China, and the size of the tomb is equal to that of the emperor. The headstone is a wooden-imitation palace-style tomb, with images of ladies, guards, flowers and birds engraved inside and

outside. Among them, the images of ladies are exquisite, with cherry mouth augmentation, beautiful and slender, giving people a sense of softness, elegance, serenity and leisure. The carving technique of the image has reached the peak of the stone carving technique, and the whole picture is completed by the line engraving technique, with smooth and free lines, which is the best line engraving portrait of China in ancient times.



Figure 3 Tomb of Princess Yongtai

Analysis of Application Scenarios of Stone Relief in Modern Society

Stone reliefs were mostly used in space design in ancient times, and they inherited this application scene in modern society. Because of its decorative and artistic nature, it has been widely used in the field of modern architectural decoration. In public spaces such as hotels, guesthouses and offices, many stone reliefs can be seen as wall decoration, which can greatly improve the cultural atmosphere and space quality. Thousands of years ago, the ancients highly simplified and condensed some patterns in daily life or fairy tales. It was not just pure imitation, but a kind of refinement of shapes and the integration of rich imagination to create. At present, many decorative patterns in China come from the West, and many designers and artists blindly imitate and misappropriate elements in modern western art, which will directly lose the individuality of our national art. In this case, of course, we should not arbitrarily reject foreign design culture. On the one hand, we need to rationally accept the advantages of western modern design, on the other hand, we should inherit the excellent creative techniques and decorative features of China traditional culture. Through this creative concept, we can show the nationality and regionality of China, and also show a certain modern design language, so that it has new characteristics of the times. For example, in modern decoration, Zhongjing Guild Hall in Henan uses the scroll-leaf text and Chinese herbal medicine in the stone relief as wall decoration to show the ancient Chinese medicine culture. The faç ade of Queli Guest House in Qufu is designed with a sheep pattern representing good luck and happiness and an auxiliary title ring to ward off evil spirits and pray for blessings.

Because of the characteristics of the stone relief material, the stone relief works are not limited to the two-dimensional surface, forming a different muscle mechanism from other works of art. Whether it is foreign or domestic works, texture language gives viewers a sense of excitement in perception. At present, many artistic works are created by stone reliefs, which can convey the author's inner feelings through texture. When the texture and texture of a work of art are integrated with the spirit to be expressed by the artist, it goes beyond the material attribute in the material sense. At present, many decorative paintings in China have learned the sense of texture in stone reliefs, and on this basis, they have expanded the expression techniques of various materials. Due to the endless stream of new materials and media in modern life, modern materials and modern design concepts, many artists have begun to try to turn semi-three-dimensional decoration into three-dimensional decoration, and to form installation art by fully integrating modern aesthetic consciousness and manual production technology. This new art brings people visual and psychological enjoyment with the help of ceramics, fiber textiles, metals, plastics and other materials. The continuous enrichment of this media form is also a kind of enrichment and innovation of stone relief art in the new era.

In addition, stone reliefs can also be integrated with other art categories, science and technology fields, cultural industries and so on. In the fields of digital art, film and television production, game design, etc., stories in stone

reliefs can be used as scripts for creation, and elements and styles of stone reliefs can also be integrated into modern entertainment and cultural industries; In the field of science and technology, we can use advanced technical means to digitally transform and reproduce the stone reliefs, on the one hand, to make up for the incompleteness of the stone reliefs due to years, on the other hand, to spread the stone reliefs culture; In the field of education, we can carry out historical and cultural education and art popularization activities for young people.

Conclusion

The stone relief art in the Qin, Han and Tang dynasties is the peak of Chinese history. Its appearance has a profound impact on the development of aesthetic value, plastic arts, seal cutting and plastic arts in contemporary and later generations. Its auspicious patterns, folk life, fairy tales, painting art and Taoist gods are one of the art forms that can best represent the traditional culture of China. By analyzing the stone relief works of the ancients, we should not blindly inherit the culture of the ancients, but also dare to innovate the works boldly and give our works the connotation of the times and humanistic value. We should not only innovate to some extent, but also be complacent. Take the exhibition design as an example. Although its design concept was put forward earlier in foreign countries, it was widely used in various life scenes by ancient people in China thousands of years ago. Therefore, it is necessary to absorb beneficial factors from the profound Chinese traditional culture, follow the objective reality of modern artistic creation as a whole, and inject the excellent traditional culture of China and the emotional expression of its own emotions.

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Evolution of Urban and Rural Planning in the UK Based on Plague and Cholera Prevention and Control, and Its Implications for Lessons in Rural Planning in China

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Abstract

In the midst of ongoing major public health concerns, enhancing urban and rural governance capacities to ensure public health security has garnered significant attention. In history, the United Kingdom confronted infectious diseases such as plague and cholera by establishing a triad of governance principles: legality, human-centeredness, and systematic planning. Through a series of effective measures including stringent isolation protocols, refined urban spatial planning, improved sanitation facilities, the formulation and continual updates of relevant legal frameworks, the creation of health-conscious living environments, and the cultivation of health-oriented lifestyles among residents, the UK not only managed to quell severe epidemics of its time but also cultivated an advanced urban governance system that addressed the prevalent "urban malaise" of that era.

However, in the face of public health crises, rural governance has often suffered from issues like delayed responsiveness, weak actions, and inadequate planning. By revisiting the historical evolution of urban and rural design in the UK, valuable insights can be gleaned for future endeavors, including the establishment of well-conceived rural spatial planning, the enhancement of urban governance regulations, and the cultivation of healthy lifestyles. These effective preventive and control measures can bolster multifaceted coordination, service management capabilities, and preparedness for unforeseen events within rural areas. As such, these initiatives can facilitate China's rural regions in a composed manner to augment and refine their comprehensive governance capabilities. In this way, historical design lessons become a pivotal tool in the realm of urban and rural planning.

Author keywords

Design History; Urban and Rural Planning; Epidemic Prevention and Control Design; Rural Revitalization

Introduction

Facing the most significant unexpected public health crisis since the founding of the People's Republic of China, the COVID-19 pandemic has rapidly spread with extensive infections and unprecedented prevention and control challenges, greatly impacting both production and daily life in the country. The concentration effect of large cities

has intensified the difficulty of controlling mobile populations due to the considerable number of inhabitants and the compact urban spaces. This challenge is particularly pronounced as enterprises and institutions resume operations, with the latent risk of infections and the potential uncontrollability of outbreaks. Urban and spatial planning, integral to the urban environmental governance system, plays a pivotal role not only in the routine urban environmental management framework but also in the ongoing pandemic response. Moreover, it constitutes a crucial component of China's ecological civilization and the "Beautiful China" initiative (Zhong, 2020).

Consequently, enhancing the present public health management system, refining urban functionalities and health-oriented environments that prove effective in epidemic prevention and control, and elevating national urban governance standards, are pressing tasks within China's contemporary governance and political landscape (Xi, 2020).

Being among the earliest practitioners of urban planning globally (Tang, 2000), the United Kingdom has navigated outbreaks of plagues and cholera since the 15th to 17th centuries. The country has amassed valuable experiences in combating epidemics, establishing urban public health systems, and modernizing urban governance through the evolution from communal health systems to perfected urban planning paradigms.

Given China's unique context of high population density and pronounced urban agglomeration, the challenge of epidemic prevention and control echoes the historical "urban malaise" witnessed during the UK's past outbreaks. Thus, borrowing from Britain's successful post-epidemic shift from establishing public health systems to refining urban planning, China should further enhance urban infrastructure, supplement legal provisions pertinent to epidemic management, advocate health-oriented resident lifestyles, and bolster urban governance standards. Amid the backdrop of contemporary Chinese socialism and the emergence of new scenarios characterized by economic transformation and innovative social governance, proactive measures for long-term effective urban governance are vital.

The Three Key Urban Governance Principles in Plague Prevention and Control in the United Kingdom

From the 15th to the 17th century, the United Kingdom's efforts to prevent and control the plague were characterized by three core urban governance principles: human-centered governance, rule of law governance, and systematic governance. During this period, the city of London, one of the most severely affected cities in Europe during outbreaks between 1499 and 1665, experienced significant plague epidemics (Wang, 2005). Historical records indicate that in 1499, a plague outbreak led to the death of thirty thousand people in London, accounting for approximately half of the city's population at that time. In 1563, another plague epidemic claimed the lives of one-fourth of the urban population. In 1664, within five days, 60% of the city's population perished, with death rates reaching the peak of 8,000 to 10,000 people weekly (Elliott, 2001). This epidemic induced fear among the populace, bringing all urban activities to a halt (Xu, 2013). As the nation formed into a unified state and royal authority strengthened, the UK introduced a series of urban spatial planning policies tailored to plague prevention. These measures gradually forged a comprehensive urban governance ideology, playing a pivotal role in the control of plague epidemics and fostering effective urban management outcomes.

Firstly, the principle of human-centered governance was evident in the establishment of facilities for accommodating mobile populations. The UK implemented a principal strategy of managing the epidemic by providing urban accommodation for transient populations, thereby curbing the spread of contagion at its source and reflecting the essence of human-centered governance.

During the 16th century, rapid population growth and urbanization in the UK gave rise to an influx of vagrants and paupers, referred to as "strolling poor," due to factors such as enclosures, dissolution of monasteries, agricultural

failures, and price revolutions (Yi, 2001). These individuals became hosts for the spread of the plague during epidemics. However, due to the fear of plague, residents were hesitant to offer assistance or shelter to these strolling poor, and some even intentionally contributed to disease transmission out of spite, thus undermining the effectiveness of quarantine efforts. To address this issue, in 1572, the UK initiated a nationwide "poor rate" levy to establish relief funds for aiding vagrants and strolling paupers affected by sudden disasters such as plagues and famines. This event marked the formal establishment of the UK's social security system (Gao, 2005). In 1576, the government used these funds to establish "reformation houses" in cities, offering opportunities for able-bodied vagrants to engage in sanitation-related tasks such as street cleaning, waste disposal, and sewage management. Additionally, "poorhouses" were planned and constructed in specific areas to accommodate impoverished individuals incapable of work, effectively controlling sources of plague transmission. Thus, by enhancing urban infrastructure planning, the UK resolved the long-standing problem of vagrancy that had plagued society due to epidemics.

Secondly, rule of law governance was rigorously emphasized in the UK's approach to urban governance. To prevent the further spread of the epidemic, the UK government drew upon neighboring countries' experiences in epidemic control and implemented policies such as "death certificates, control of funeral timing, appointment of prosecutors, and household isolation" (Walter, 1989). These measures effectively curbed the epidemic through strict isolation protocols, and between 1587 and 1665, stringent isolation measures became a prominent feature of the UK's epidemic policies (Chen, 2007). In 1583, the government introduced the "Ordinance for the Charitable Assistance and Arrangement of Infected Patients," which advocated home isolation as an effective measure. In 1604, parliament enacted a law that deemed individuals leaving quarantine areas without authorization guilty of vagrancy, leading to punishment, including death in severe cases. The management of incoming travelers was also strictly regulated, with directives for all visitors, lodgers, and guests to leave affected areas. London residents were prohibited from hosting individuals with plague, and violating this regulation resulted in their isolation similar to plague patients (Weinreb, 1984). These measures demonstrated robust urban governance capabilities and a determination to enforce rule of law, severing person-to-person transmission and promptly halting urban epidemic crises. Despite the underdeveloped medical technology of the time, which prevented a comprehensive understanding of viruses, stringent isolation measures were adopted to prevent epidemic virus transmission under limited conditions. The implementation of robust isolation, coupled with various means of controlling population movement, reflected the UK's strong urban management capacity and rule of law governance. It effectively curtailed person-to-person transmission, provided essential time for government interventions, and laid a foundation for later advancements in urban public health and governance.

Thirdly, the principle of systematic governance encompassed efforts to establish urban sanitation systems. Building upon the foundation of human-centered and rule of law governance, the UK government began addressing urban environmental issues and systematically managing urban sanitation. Relevant regulations were enacted to ensure the smooth operation of the city in similar events. In 1665, the Lord Mayor of London issued the "Rules for the Purifying of the Streets and the Preservation of Sweet Air," stipulating that streets should be kept clean, households should be responsible for cleaning the streets in front of their homes, and scavengers should remove daily garbage from doorsteps. This initiative laid the groundwork for centralizing waste collection through practices like "dispersed collection followed by centralized disposal." Furthermore, the guidelines dictated that waste piles should be kept away from the city and public roads, and excrement from sewers and underground tombs should not be disposed of in the vicinity of the city. These regulations led to cleaner streets during epidemics and highlighted the role of gardens as the "green lungs" of the city. A city is a complex system with various components and issues, and urban governance is an integrated process that treats the city as a relatively

stable yet continually open system. From isolating residents and addressing the needs of vagrants to improving urban sanitation comprehensively, the UK combined government intervention, public health efforts, and citizens' interests, embodying the essence of systematic governance.

In the 16th century, while combating the plague, the UK government progressively established strict isolation measures, national relief facilities, and public health regulations, laying the groundwork for the rudimentary form of a modern urban public health system. By advancing urban spatial governance during this era, the UK transformed its backward public health image in Europe. The rigorous isolation policies set an example for many countries to follow. Simultaneously, the principles of rule of law governance, human-centered governance, and systematic management laid a theoretical foundation for the formulation of normative urban spatial planning and essential urban environmental governance system orders.

The Emergence of Urban Planning System in the United Kingdom for Cholera Control

While the United Kingdom demonstrated commendable governance principles in combating epidemics, a comprehensive urban planning system had not yet been established. During the 19th century, the UK experienced four cholera outbreaks (1831-1832, 1848-1849, 1853-1854, 1866). Driven by industrialization and commercialization, migration from agricultural areas to industrial zones occurred, resulting in the transformation of small towns into large cities and the development of urban clusters. The rapid pace of development, high urbanization rates, and disorderly urban growth characterized the British urban landscape. However, urban infrastructure such as sanitation facilities, road systems, and drainage systems did not keep pace with the rapid population growth. This led to an increase in vagrancy, housing shortages, lack of public health facilities, and severe environmental pollution, among other issues. Consequently, the British government began to recognize the significance and necessity of urban planning, giving rise to the early semblance of urban planning centered on public health.

Phase 1: Highlighting the Disconnect Between Urban Planning and Real-life Conditions in the Context of Cholera Epidemics During the Industrial Revolution.

Starting from the late 18th century, the acceleration of the industrial revolution expedited the urbanization process in the UK. This transformation brought significant changes to the urban living environment, leading to the emergence of concentrated areas of laborers. However, the lack of synchronization between urban planning and the evolving needs of both production and daily life resulted in deteriorating public health conditions and living environments. The absence of separation between production and residential areas and the deplorable living conditions of workers further exacerbated the situation. Inadequate water supply, sewage systems, and waste disposal methods failed to meet the demands of urban life, causing severe pollution in rivers. Public lands were encroached upon, and workers were forced to engage in "intolerable" leisure activities, contributing to the rapid spread and dissemination of cholera epidemics.

In the autumn of 1831, cholera emerged in Sunderland, UK, spreading from urban centers to remote rural areas. Its high transmissibility and mortality rates induced a state of "cholera panic" within society. A doctor from Worcestershire County described the situation: "All streets are filled with dying people, patients, and corpses... The entire city is silent, with only the jarring sound of funeral bells drifting through the air" (Wohl, 1983). In his work, Mingay stated, "The English countryside and cottages have long suffered from disease and misery" (Mingay, 2002). Outraged community residents resorted to arson and looting as a release for their frustration, reflecting the society's descent into chaos.

During this time, most British urban architectural layouts were disorderly, providing a breeding ground for infectious and epidemic diseases. To meet economic development goals and increase residents' work efficiency,

industrial buildings and residential areas intertwined haphazardly. The absence of urban planning resulted in irrational architectural layouts, which worsened due to an influx of laborers. According to Peter Gaskell's statistics, in 1833, Manchester had 20,000 residents living in damp, poorly ventilated basements with polluted air. The air was thick with smoke from nearby factories, and the streets were filled with puddles and heaps of waste, vomit, and garbage, emitting a foul odor (Gaskell, 1833). The mingling of high-pollution factories like silk mills, iron

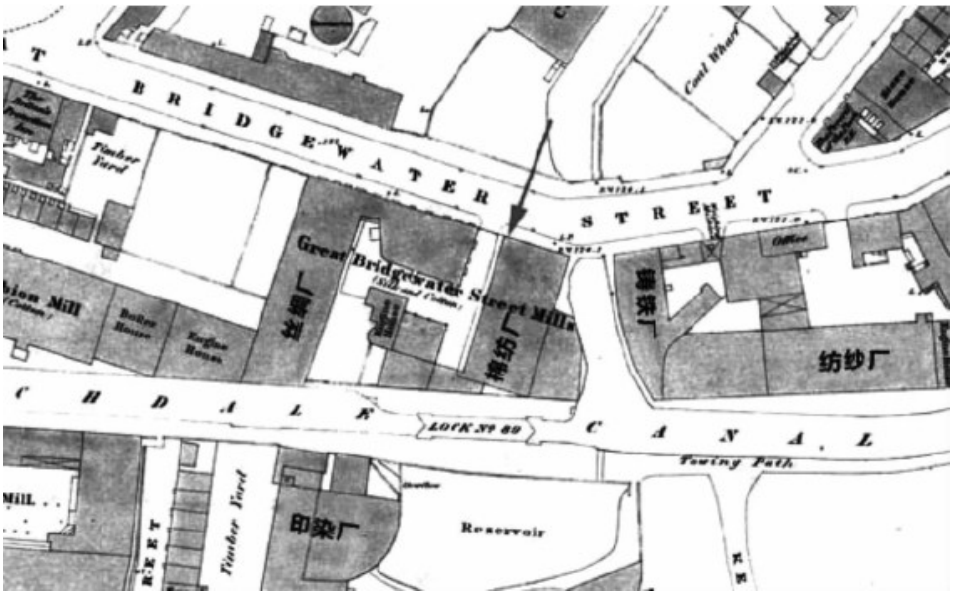

Figure 1. A chaotic arrangement of buildings in the Bridgewater neighbourhood of Manchester, England.

Source：http://manchesterhistory.net/machester/tour6/eversheds.html.

foundries, textile mills, and printing houses with residential areas exacerbated the deplorable living conditions for lower-class residents in industrial cities (Figure 1). These overcrowded, damp, poorly ventilated environments provided a breeding ground for infectious and epidemic diseases.

In the context of the British urban environment during the 19th century, a lack of sewage and water pipelines, along with inadequate drainage systems, contributed to the deterioration of urban hygiene conditions. This unfavorable situation led to the rapid spread of epidemic outbreaks across major cities in the United Kingdom. In areas like the industrial hub of Birmingham, the districts of Bordesley and Deritend saw open drainage ditches become ideal conduits for disease transmission. For instance, Hadley Road even allowed toilet waste to be piled up alongside the road, resulting in contamination of underground drinking water as rainwater seeped into the ground. In London, a significant portion of urban residents relied on the heavily industrialized Thames River as their source of drinking water. Consequently, by 1831, rivers including the Thames, Humber, Tyne, Ness, Trent, and Clyde had all become carriers of cholera bacteria, leading to a death toll of thirty thousand individuals (Murphy, 2001).

During that period, cities like Manchester showcased primitive drainage systems where streets formed deep grooves, causing sewage, garbage, and filth to flow within. Even cities with inadequate water supply and drainage systems were eventually plagued by cholera outbreaks.

The absence of public spaces in these cities contributed to residents adopting unhealthy lifestyles. The Industrial Revolution led to numerous factories, streets, and residences encroaching upon previously common lands, leaving cities devoid of green spaces and causing urban dwellers to rarely, if ever, engage in outdoor activities.

Coupled with the high pressures of strenuous work, these factors forced workers to seek relaxation in crowded gambling establishments, brothels, and taverns. This lifestyle, alongside compromised immunity, resulted in poor physical health. Edwin Chadwick's report indicated that in 1840, the average life expectancy of workers in Manchester and Leeds was a mere 17 and 19 years, respectively. Moreover, the cholera death rate among them had surged to 35.2% (Chadwick, 1965).

The second phase marked a pivotal shift in British urban governance, with the government prioritizing cholera prevention and control. The outbreak of the second cholera epidemic in 1848 catalyzed this transformation, redirecting city management from an economic focus to hygiene and disease control. The introduction of the "Public Health Act" prompted governmental intervention in urban spatial planning, heralding the true onset of British urban planning. This legislation encompassed comprehensive improvements in streets, architectural design, and public spaces, broadening the scope of urban hygiene management.

In response to these challenges, British authorities implemented rational planning for sewage and drainage systems, resulting in a positive transformation of urban landscapes. Urban administrators oversaw the construction, paving, widening, cleaning, and lighting of all streets. Birmingham divided the city into four districts, assigning five street sweeping machines and nine water sprinklers to each district for maintaining cleanliness. The city also mandated that new streets incorporate pre-designed drainage and sewage pipelines, showcasing a proactive approach to road planning. Birmingham's city council acquired large tracts of land, transforming them into sewage treatment facilities, a notable example being the construction of a large-scale treatment facility along the River Tame. Under Charles Adderley's enthusiastic support, this initiative rendered 70% of the city's waste manageable, leading to a clearer riverbed.

Urban areas initiated reasonable housing plans, effectively improving living conditions and the urban environment. In Manchester, existing housing areas were revamped to include flush toilets and sewage pipelines, while underground dwellings were prohibited. In London, by 1847, around 30,000 residents across 170 parishes had adopted flush toilets in newly constructed homes, replacing outdated cesspits. By 1853, approximately 10% of London's residents were connected to piped sewage systems. Manchester introduced its first housing regulations in 1876, specifying criteria such as dwelling size, specifications, and window area. These regulations ensured that each new residence featured an independent backyard and prohibited back-to-back housing construction, thereby facilitating ventilation and green spaces between buildings.

These efforts, driven by the need to create healthy living environments, culminated in effective urban planning strategies to combat the spread of cholera. Planners introduced urban public spaces that enriched residents' recreational environments. With a focus on improving public health and raising residents' physical well-being, the government invested in establishing parks. These green spaces, often situated near residential and industrial areas, played a crucial role in purifying the urban air. Equipped with fitness equipment and activity spaces, these parks strengthened workers' immunity and significantly enhanced their health. Calthorpe Park, Birmingham's first official park, opened in 1857, attracting nearly one million visitors in its first year, promoting healthier lifestyles for residents.

Utilizing public health legislation, the British government actively transformed the urban environment, resulting in an overall enhancement of the urban landscape and a notable improvement in citizens' quality of life and health. Post-1866, cholera began to recede in the UK, with instances becoming almost non-existent. The success of these efforts demonstrated that innovative urban planning and governance were pivotal components in controlling and preventing the spread of cholera.

The third phase witnessed the establishment of a comprehensive urban planning regulatory framework against the backdrop of epidemic control efforts. Over the centuries, the British government evolved its urban

planning practices to address cholera outbreaks and enforce effective governance based on legal principles. Initially focused on sanitation measures, the regulations expanded to encompass housing and environmental transformation. These regulations not only aimed to control disease but also improved various service functions within urban spaces.

Beginning as efforts to address public health and environmental concerns, the early regulations transitioned to comprehensive city planning in the period between 1909 and 1932. The "Housing, Town Planning, etc. Acts" of 1909 emphasized the importance of convenience and livability alongside public health, with the 1919 revision introducing the concept of regional planning. This allowed multiple government bodies to collaboratively formulate urban planning schemes, resulting in more rational, diverse, and scientific urban layouts. The legislation also stipulated specific zoning for different types of buildings, including dedicated industrial areas to segregate industrial and residential zones. The transformation saw private land ownership becoming part of a comprehensive approach, ensuring a balanced urban layout. The "Ministry of Health Act" of the same year established the Ministry of Health to oversee all town planning issues, tightly integrating health and planning. This shift marked the transition from passive disease control to proactive, guiding urban governance, establishing urban planning as a vital foundation for epidemic prevention and control.

Lastly, the transformation from current-state-based urban planning to visionary top-level design unfolded in the late 20th century with the "Town and Country Planning Act" of 1932, which remains in effect today. The Act replaced previous regulations and introduced a new urban planning system. This legislation notably extended to undeveloped land, setting aside areas for future urban development and highlighting the importance of health in planning prerequisites. The Act also reintroduced the clause that required Health Ministry approval for planning proposals, making health a fundamental precondition for urban planning. Additionally, the "Town and Country Planning Act" of 1990, which is still relevant, ensured forest, road, and tree protection, further enhancing the green environment.

In conclusion, the British government's response to cholera outbreaks led to a transformation of urban planning and governance, significantly improving the quality of life and health of citizens. These efforts, evolving through different phases, underscore the importance of proactive and comprehensive urban planning for effective epidemic control.

Examining the Evolution and Implementation of Urban Planning Laws in the United Kingdom: The British government, in its early efforts toward urban sanitation governance, established comprehensive legislation, fostering an all-encompassing improvement of urban infrastructure. These initiatives provided a strong groundwork for instituting a city planning framework. To combat outbreaks of diseases like cholera more effectively, specific strategies were proposed to address issues of housing, drainage, and road infrastructure prevalent at the time. These measures laid a robust foundation for the formulation of proper urban planning laws. An illustrative case is Saltaire, an industrial new town developed between 1850 and 1876. Notably, Saltaire featured well-equipped amenities, high sanitation standards, a rational layout, and a pleasant environment. The inclusion of sizable town public green spaces, alongside the well-arranged housing and comprehensive health and safety facilities (as depicted in Figure 2), embodied the principles of people-centric urban governance and planning. These endeavors not only contained the spread of cholera and similar epidemics but also addressed pressing concerns surrounding living, working, and sanitation conditions. Saltaire became a model for other British cities during that era.

The British government, acknowledging the crucial role of urban planning in epidemic control, enacted the Housing and Town Planning Act of 1932. This legislation included provisions for planning undeveloped areas, strategically distancing industrial zones from residential areas. This spatial strategy aimed at fostering favorable



Figure 2. Plan of Tersall, Yorkshire, England, 1850.

Source：http://www.saltairevillage.info/yz_saltaire_map.html.

living environments. In 2016, as British cities grappled with challenges stemming from "urban ailments" that affected economic, social, and environmental aspects, the government issued a comprehensive planning White Paper. With the contemporary inclination of British residents toward suburban and rural living, leading to urban housing vacancies and deteriorating sanitary conditions in city centers, the White Paper introduced policy changes. These changes encompassed the recycling of urban land, enhancing urban architecture and planning, and altering taxation policies. These policy interventions attracted affluent families back to cities and significantly improved sanitary governance in the heart of major British cities.

Phase Four: Transitioning from Cholera Prevention to "Urban Ailment" Management. The recurrent cholera outbreaks prompted social reforms and enhancements in public health management. This eventually led to the incorporation of urban parks and green spaces, facilitating more systematic urban development. The hygiene concerns faced by British cities were emblematic of the "urban ailment" that emerged as cities reached a certain developmental stage (Li, G., 2003). Since the initiation of the British urbanization process in 1775, urban governance practices have been continuously refined and renewed. Early efforts to enhance urban hygiene primarily revolved around designing city functions to tackle epidemic prevention and control (Krapfen, 1975). As urban planning evolved over time, regulations and policies began to influence urban governance philosophies, architectural environments, and residents' living conditions. This shift gradually moved the focus from managing epidemics to fostering long-term urban stability.

During the exploration of urban governance processes, the UK birthed influential planning concepts through its endeavors against epidemics. Robert Owen (1771-1858) proposed the concept of an "ideal city" in response to disorderly urban layouts. He advocated for a central area dominated by service-oriented buildings such as schools, cafeterias, meeting halls, libraries, and city halls. These structures were surrounded by residential, lodging, and hospital buildings, encircled by gardens, factories, and farmland. This approach effectively addressed overcrowding and promoted urban greening, contributing to an enhanced urban environment.

In 1800, Owen established the "New Harmony Village" in Scotland's New Lanark, reshaping the urban social

structure and pioneering urban governance reforms. In 1839, Edwin Chadwick introduced comprehensive plans to tackle cholera-ridden cities, which included improved poor laws, public health initiatives, urban services, water supply, drainage, and sewage treatment. Chadwick's advocacy led to the passage of the "Public Health Act." Ebenezer Howard introduced the "Garden City" concept in 1898, advocating for the fusion of rural and urban development to counteract environmental degradation resulting from migratory populations. This idea took shape in Letchworth, located 55 kilometers from London, sparking the British urban planning movement. Patrick Geddes adopted a top-level design approach to urban governance, strengthening the connection between cities and suburbs. Geddes segmented different adjacent cities into "urban agglomerations," elevating urban hygiene governance to the level of regional planning. His approach integrated city governance within the broader context of socio-economic transformations, earning him recognition as the "founder of Western regional planning thought."

In addressing the "urban ailment," the UK placed emphasis on designing healthy living environments. After the introduction of the 1932 Town and Country Planning Act, British architectural design prioritized ventilation and lighting, resulting in the creation of healthier living environments. The practice of ventilating rooms by opening windows was adopted by British residents as a method to combat diseases and maintain health during the early stages of modernization. Despite challenges posed by diseases like lung disease, smallpox, and foot-and-mouth disease in the wake of the Industrial Revolution, maintaining fresh air became a primary method for British residents to combat epidemics, leading to the emergence of new housing design concepts. The 1957 British Housing Construction Act stipulated a daylight illumination rate of 0.2% for sunlight exposure. This law required all living spaces and kitchens to have adequate ventilation conditions. Moreover, window areas were not to be less than 1/12 of the living area. Bedrooms were recommended to be located on the second floor to facilitate air circulation and eliminate miasma. With the advancement of indoor ventilation equipment in British urban architecture, the latter half of the 20th century witnessed significant improvements in indoor air pollution



Figure 3. The suburbs of London pay great attention to ventilation and personal green space.
Source：http://blog.sina.com.cn/s/blog_983d8e3e0102vkcq.html.

control. The 1990 Urban Planning Act mandated the establishment of public green spaces in residential areas, ensuring that each household had its designated green space. As a result, many British cities adopted a low-density residential development pattern, as depicted in Figure 3.

The impact of plague and cholera outbreaks led to a rapid evolution of the British population's understanding of healthy living practices, thanks to their strenuous efforts in combating epidemics. This ultimately culminated in the development of robust habits that favored prevention over control of disease. On one hand, the government played a pivotal role in establishing a comprehensive national health system during its urban governance endeavors.

Medical facilities in the UK covered a significant portion of urban areas, ensuring access to medical services even for the unemployed and those unable to work. Statistics indicate that public hospitals in the UK boast around 500,000 beds, with an average of 8 physicians and 9 beds per thousand people. Approximately 1 million people in England alone serve the national health system, rendering it one of the most extensive medical institutions in the UK (Hu, 2016). During the 2012 London Olympics, the National Health Service was showcased as one of the country's symbolic representations on the global stage, highlighting the UK's effective medical safeguards under the umbrella of urban governance.

Concurrently, the rational layout planning of cities cultivated favorable health habits among residents. The construction of public green spaces, jogging tracks, and waterfront platforms encouraged Britons to participate in a wide range of fitness activities after work. Activities like walking dogs on lawns, soccer matches, and swimming sessions provided spaces for people to engage in activities they enjoyed. In 2016, the UK boasted a per capita green space of 0.04 hectares, with cities like London, Cambridge, York, Glasgow, Manchester, and Liverpool achieving green coverage rates of over 40% (Fu, 2008). These green areas provided buffering spaces against epidemics and helped mitigate the rapid spread of viruses in densely populated urban areas. The synergy between green and healthy spaces and residents' health-conscious lifestyles created a positive cycle, thereby enhancing the society's comprehensive ability to withstand infectious diseases and improving urban resilience in the process.

Urban planning and governance have taken humanity from ignorance to knowledge, from superficial understanding to comprehensive depth. The UK, being the pioneer of industrialization and urbanization, embarked on a difficult journey of exploration, bereft of lessons from other countries' urban construction experiences. The nation paid a heavy price in terms of urban pollution, deteriorating living environments, recurring epidemics leading to loss of lives, economic setbacks, and more.

Amidst the agony and hardships, the search for autonomy led doctors, scientists, and sociologists to gradually realize the interplay between living environments, health, urban layouts, and facilities in safeguarding residents' well-being and enhancing epidemic prevention. This understanding gave rise to a self-sustaining knowledge system and structure known as "urban planning." Driven by various societal forces, active changes in planning ideologies, meticulous revisions of laws and regulations, timely and effective adjustments in urban layout, scale, and location, as well as the implementation of urban planning pilot projects, emerged. The UK's cities, molded by the trials of epidemics, birthed a resilient, scientifically sound, and sustainable urban governance system. As they concluded their battle against epidemics, they also contributed to mitigating the "urban ailments" afflicting the country.

Reflections and Lessons from Rural Governance in Contemporary China

In the context of the COVID-19 pandemic, reflecting on and drawing lessons from rural governance in contemporary China is crucial for enhancing future preparedness and response strategies. Through studying

historical experiences and successful practices from countries like the UK, China can improve its rural governance to effectively address public health emergencies and enhance the quality of life for its citizens.

The UK's response to past epidemics, such as the bubonic plague and cholera outbreaks, underscores the importance of continually updating urban governance concepts, refining legal norms, enhancing public health systems, and optimizing urban and rural planning. These efforts have resulted in efficient social governance capabilities, high living standards, and quality living environments. While the UK has achieved remarkable success in urban governance, it's essential to recognize that there is no one-size-fits-all solution for pandemic prevention and control. Constant adaptation, adherence to correct principles, and scientifically effective protective measures are essential for ensuring foolproof safeguards.

China should avoid both dismissing the UK's historical achievements due to its current challenges and disregarding its own accomplishments. Instead, China can integrate valuable insights from the UK's experiences into its urban planning and governance, extracting the essence while discarding the shortcomings. This approach will comprehensively elevate China's ability to handle sudden public health crises. This not only applies to studying UK experiences but also to surpassing them in the context of our pandemic response practices.

The primary purpose of urban governance is to create a favorable living environment for residents and provide space for pandemic defense. The key to future urban governance lies not only in tactical lessons but also in preparing for future epidemics proactively. By integrating public spaces with urban areas appropriately and establishing an effective urban spatial system for preventing and responding to emergencies, overall urban resilience can be enhanced. China can adopt UK-like strategies of continuous legal and planning updates to adapt to varying pandemic scenarios over time, thereby enhancing governance capabilities for precise epidemic prevention.

While China's socialist system has proved advantageous in unifying commands and resources during public health emergencies, there's room for improvement in rural governance. Due to the dual nature of urban and rural development and the resultant challenges, rural areas require better facilities and strategies for handling emergencies. To address these gaps, China can learn from the UK's experiences and modernize rural planning, fostering a healthy rural landscape, and promoting healthy living concepts. These steps will establish a solid foundation for creating livable and prosperous rural communities.

Enhancing Urban Public Health and Tailoring City Planning

China can draw inspiration from the UK's continuous updates to urban health laws. Strengthening disaster reduction and management planning based on local conditions is crucial. Establishing a comprehensive disaster medical facility system with standardized equipment and clear roles is imperative. Annual assessments of potential outbreak areas, real-time updates to pandemic-related regulations, and strict law enforcement are essential. Adhering to legal measures and progressing within the framework of the rule of law will enhance China's epidemic control capabilities.

Optimizing Urban Public Green Spaces

Learning from the UK's approach of abundant public green spaces, China can integrate city greenery with natural elements like mountains, waters, forests, and fields. Ecological corridors and ventilation pathways can be established. Prioritizing vegetation native to different zones, encouraging natural planting, and selecting plants with virus-resistant properties can improve green space aesthetics and disease resilience, ultimately boosting overall biodiversity.

Prioritizing Building Lighting and Ventilation for Healthy Communities

Taking cues from the UK's emphasis on lighting, ventilation, and private greening, China should optimize architectural design for natural ventilation, especially in large cities. In medium and small cities, low-density construction and increased per capita green space are essential. Fostering community organizations and respecting their role in social governance is paramount. Deepening reform in these areas will require substantial effort but is essential for long-term transformation.

Embracing Cultural Change and Preparing for the Future

China can adopt the UK's lesson of practicing good habits, like opening windows for ventilation, as part of building a civilized, healthy, and environmentally friendly lifestyle. Learning from global experiences while adapting them to China's population size, urbanization pace, and specific challenges will be the key to effective urban governance, especially in confronting pandemic threats.

Conclusion

This paper delves into the urban governance experiences of the UK during plague and cholera outbreaks, highlighting the reasons behind their success, the development of early urban planning systems, and analyzing their shortcomings during the COVID-19 pandemic. It underscores the significance of adapting governance principles to emerging threats and aligning them with China's unique demographic and urban challenges. By learning from the UK and other international experiences, China can further enhance its urban governance strategies, improve public health readiness, and ensure a higher quality of life for its citizens.

15th-17th Century: Gradual Development of Urban Public Health and Planning in Response to Bubonic Plague

During the 15th to 17th centuries, the UK progressively refined the embryonic forms of urban public health systems and city planning, driven by the necessity to control and prevent the outbreak of bubonic plague. By embracing the principles of human-centeredness, legality, and systematic governance, the UK established a robust urban public health system. This system provided effective measures and methods for the essential infrastructure construction, environmental spatial arrangements, and legal regulations necessary for epidemic prevention and control within urban planning.

18th Century: Cholera Outbreak and Further Urban Planning Improvements

In the 18th century, when confronted with a cholera epidemic, the UK continued to enhance its urban planning system, leading to the containment and partial eradication of the "urban disease" phenomenon. During the cholera outbreak, the focus shifted from perfecting the urban public health system to a comprehensive advancement of the urban planning system. This included initiatives such as street improvements, enhancing living and recreational environments, and establishing comprehensive urban planning regulations. Recognizing the underlying issues in urban public health, the UK addressed the concept of the "urban disease" that arises during a certain stage of urban development. This led to the formation of a far-reaching series of urban planning ideas, emphasizing the design of human habitats and nurturing a healthy lifestyle concept. This transition marked a progression from epidemic control towards sustained urban development and stability.

21st Century: Neglecting Early Warning Mechanisms Leads to Failure

In the 21st century, the UK's neglect of early warning mechanisms and response capabilities during the COVID-19 pandemic serves as the primary reason for its setbacks. It highlights that there is no one-size-fits-all approach to

epidemic prevention and control. Advanced urban planning concepts must be accompanied by rapid responses, immediate isolation measures, and agile operational strategies to ensure prevention takes precedence over control. Establishing effective early warning mechanisms becomes indispensable to combat the sudden spread and escalation of major global health crises.

Learning from the UK: Improving China's Urban Governance and Public Health Preparedness

China, in studying advanced epidemic prevention and control concepts from the UK, should consider its large population. This entails enhancing early warning mechanisms for significant urban health emergencies and continuously updating urban governance principles. China's approach should encompass enhancing emergency response capabilities, refining legal frameworks for urban governance, keeping strategies up-to-date, centering governance around the people, promoting and shaping healthy lifestyles, and comprehensively elevating urban resilience. By focusing on the challenges of the ongoing pandemic battle, China can develop a poised and effective response strategy for future epidemics and public health crises. This is a fundamental solution to the "urban disease" challenge posed by the country's dense population and high urbanization rate.

Addressing the existing disparities between various levels of urban governance systems in cities of different scales will require meticulous data collection, research analysis, and continuous refinement. This will facilitate China's efforts to harmonize its public health endeavors and urban planning and construction, optimizing the capacity to respond to unexpected events. In the context of China's new era, journey, and objectives in urban-rural integration, this process will ultimately guide the nation toward a more effective fusion and optimization of these essential elements.

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The Evolution of the Dress Styles of Noble Ladies-in-Waiting under the Influence of Foreign Cultures from Tang Tomb Murals

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Abstract

The Tang Dynasty was a prosperous period for feudal society in China, during which foreign minority cultures were introduced to the Central Plains and blended with traditional Han costumes, generating a unique style of clothing for noble women in the Tang Dynasty. The thesis analyses and summarizes the influence of socio-political ideology changes and foreign perspectives on aristocratic fashion and women's clothing at various stages of the Tang Dynasty. The clothing of Tang Dynasty women reflects their love that transcends national boundaries by embracing an inclusive and tolerant mindset towards foreign cultures. Therefore, this exploration will inspire us to fosters the exchange and integration of international costume design with a more open and receptive attitude.

Author Keywords

Bird-Watching and Cicada-Catching; Music and Dance; Four Ladies-in-Waiting; Costume Comparison.

Introduction

The Tang Dynasty stood as an epitome of prosperity in China's feudal society. The capital Chang'an blossomed into a thriving international metropolis, facilitating rich intercultural exchanges, and the close exchanges among various ethnic groups shaped the formation and subsequent development of the material culture of the Tang Dynasty. At the onset of the Tang Dynasty, confrontations with various ethnic minorities in the northwest resulted in fewer cultural exchanges with the outside world. However, during the Tang Dynasty, the interactions between the Central Plains and the surrounding ethnic minorities became more frequent. Such fusion of foreign ethnic cultures with the traditional culture of the Central Plains had a profound impact on the formation of the Tang Dynasty's dress styles.

The Dress Style of Tang Dynasty Noble Ladies-in-Waiting under the Influence of Foreign Cultures

The formation and evolution of Tang Dynasty women's dress styles were influenced by foreign cultural, which is a crucial aspect that cannot be overlooked. During the early period of the Tang Dynasty, as interactions among different ethnic groups deepened, a noticeable intensification of colors of dresses for ethnic minority women appeared. However, after the An Lushan Rebellion in the middle period of the Tang Dynasty, the resentment towards the invading ethnic minorities appeared. As a result, there was a gradual rise in de-Huification. Women ceased wearing narrow-sleeved Ru, and the slender waist, previously embodied in Hu Dress, gave way to the wide waist[1]. During this period they created a policy that also catered to the people's desire for a peaceful life. Consequently, luxury gained popularity in the society, with the clothing style of the era shifting towards opulence.

Noble women's clothing became loose, and the tradition of women's clothing in the Central Plains with wide clothes and big sleeves was restored.

These changes in social trends are visually depicted in tomb murals. By analyzing the costume characteristics in the tomb murals of the Tang Dynasty, we can gain insight into the popular trend of costumes at that time.[2]The changes in attitudes towards foreign cultures, shaped by the times and cultural environments in which they lived, are also reflected in the clothing styles of the characters depicted in the tomb murals of different periods of the Tang Dynasty.

Analysis of Noble Ladies-in-Waiting's Clothing in Tomb Murals of Different Periods of Tang Dynasty

The thesis mainly takes the typical images of ladies-in-waiting themes in tomb murals of different stages of the Tang Dynasty as examples, and analyzes the clothing characteristics of the ladies-in-waiting in the murals in detail, so as to explore the changes in the clothing styles of the noble ladies-in-waiting in different socio-cultural backgrounds.

Costumes of Ladies-in-Waiting in the Early Tang Dynasty

In the early Tang Dynasty, there was limited contact between the Central Plains and the neighboring ethnic minorities, so the traditional Han Chinese Ru skirt was the dominant dress of the women during this period. The tomb of Princess Xincheng contains a large number of murals depicting ladies-in-waiting, showing the cultural characteristics of women's costumes from the early Tang Dynasty to the early period of the flourishing Tang Dynasty.



Figure 1. Candlestick-Holding Lady-in-Waiting in the Tomb of Princess Xincheng of the Tang Dynasty.

Painted on the west wall of the fourth cave of Princess Xincheng's tomb, there is a mural known as the "Candlestick-Holding Lady-in-Waiting" (see Fig. 1), which depicts the daily life of Tang Emperor Taizong's court during the reign of Zhenguan, with two ladies-in-waiting looking at each other, a lady-in-waiting with a high bun on the left side looking back with her arms raised, while the lady-in-waiting on the right side holding a candlestick. The left one is wearing a narrow-sleeved Ru and cyan skirt. Her jacket has brown half-arm sleeves and a dark green scarf. The style of her Ru skirt is more fitted, resembling a small-sleeved short jacket. The long skirt reaches up to her chest. This clothing ensemble represents a combination of Han Chinese and ethnic minority garments, showcasing a typical women's fashion style from the early Tang Dynasty. The lady-in-waiting on the right side with the candle in her hand imitates the male style of dress: round neck, double-breasted characteristic, small sleeves, flower-like and light brown brocade robe.

The costumes of the lady-in-waiting in the Candlestick-Holding Lady-in-Waiting do not reflect much of the influence of exotic cultures and basically retain the costume traditions inherited from the Sui dynasty. From this period onwards, the culture of the Hu people gradually entered the Central Plains, and its influence was reflected in the costumes of the Tang Dynasty.

Tang Dynasty Ladies-in-waiting Costumes after the Introduction of Hu Dress

During the Kaiyuan era, when the Tang Dynasty had a cultural collision and fusion with foreign nomadic peoples, the Hu Dress was introduced into the Central Plains and became very popular (see Figure 2). Women's Hu Dress gained popularity through its resemblance to the styles of Persia and the Western regions. These garments



Figure 2. Hu Dress with Upturned Collars, Double-Breasted Characteristic of the Sui and Tang Dynasties(Left picture)



Figure 3. Bird-Feeding Lady-in-Waiting on the East Wall of the Back Room of Wei Hao's Tomb in the Tang Dynasty(Right picture)

featured upturned collars, double-breasted characteristics, brocade trims, and narrow sleeves, exuding an unmistakably exotic ethnic flair. Hu Dress originated from the nomadic people in the northwestern region, more suitable for horse riding. Following the introduction of Hu Dress to the Central Plains, many of women in the Central Plains wore boots and belts. The mural painting of the tomb of Wei Hao, the governor of Yangzhou, depicts a lady-in-waiting wearing a turban on the head and collared Hu Dress (see Figure 3).

The tomb mural paintings of Prince Zhanghuai, Li Xian, (654-684 A.D.) are one of the best-preserved and richest tomb mural paintings of the Tang Dynasty that have been discovered so far. The mural paintings of ladies-in-waiting in the tomb of Prince Zhanghuai fully reflect the habits and typical dress style of ladies-in-waiting during the Tang Dynasty by offering the life scenes of palace ladies-in-waiting.

Ladies-in-Waiting' Costumes of the Flourishing Tang Dynasty

The Bird-Watching and Cicada-Catching (see Figure 4), painted on the west wall of the front room, depicts the three courtesans on a garden tour. This artwork not only vividly reproduces the leisurely life of the ladies-in-waiting in the garden during the Tang Dynasty, but also provides an authentic glimpse into the way of dress and aesthetic concepts of the ladies-in-waiting. All three ladies-in-waiting are dressed in vibrant and colorful costumes. Among the three ladies-in-waiting, the first on the left side wears a narrow-sleeved round-necked shirt with double-breasted characteristics, and a long green skirt is tied at her waist. She drapes a red scarf over her shoulder. Her right hand reaches up to caress a golden hairpin. She gazes up at the birds. The second one in the middle is dressed in male attire, wearing a round-necked yellow robe and yellow pants. Her feet are adorned with green pointed soft shoes, and she wears a waist belt. Her left hand is slightly raised. She is about to use her right hand to catch a cicada on the tree trunk. On the right side, the dress of the third one resembles that of the first on the left. She wears a yellow narrow-sleeved upper Ru and a coordinating yellow skirt. Her hands are clasped in a light gray scarf, as if lost in thought[3].



Figure 4. Bird-Watching and Cicada-Catching on the West Wall of the Front Room of the Tomb of Prince Zhanghuai in the Tang Dynasty



Figure 5. East Wall Mural of Scene of Music and Dance in the Tomb of Han Xiu in the Tang Dynasty

Absorption of the Dress Styles of the Neighbouring Ethnic Minorities by the Dresses of the Ladies-in-Waiting of the Central Plains in the Flourishing Tang Dynasty

As depicted in this work, the costumes of the time were influenced by the nomadic culture of the minority groups in the western regions. The original clothing of the Central Plains was wider, while Hu Dress was tighter and more fitted. In prosperous Tang, women were more inclined to wear Hu Dress. In the Bird-Watching and Cicada-Catching, it can be seen that the mural of the lady-in-waiting clothing, is with the western minority style of narrow sleeves.

Han Xiu's Tomb in the Tang Dynasty: Scene of Music and Dance (see Figure 5) is another representative image of ladies-in-waiting in the tomb murals of the flourishing Tang Dynasty. This mural not only provides us with an understanding of the western region's music and dance performances during the prosperous Tang Dynasty but also showcases the dress style of noble ladies-in-waiting during that era.

The dress of the women in the "Scene of Music and Dance" is representative of the women's clothing of the Tang Dynasty, with Rus upper and skirts lower, and the wide pendulum hanging to the ground. They loved to wear long skirts with a belt across the chest, sometimes decorated with chic patterns. In order to facilitate movement and labor in daily life, the costumes were designed to be very loose and comfortable.

The Fading of Ethnic Minority Styles in the Costumes of Ladies-in-Waiting in the Mid- to Late Tang Dynasty

Combined with the era in which Prince Zhanghuai, Li Xian, and Han Xiu lived, the Bird-Watching and Cicada-Catching and the Scene of Music and Dance were both created during the Tang dynasty before the An Lushan Rebellion. During the Tang dynasty, Hu Dress had become the main fashionable style of dress for the noble ladies-in-waiting, which was a manifestation of the full integration of the cultures of the western regions with the culture of the Central Plains.

The mural paintings of the ladies-in-waiting in the tomb of Princess Tang'an originated from the Middle Tang Dynasty and the costume culture of the tomb was that of the ruling dynasty of that time. In contrast, the mural paintings of ladies-in-waiting in the tomb of Princess Tang'an originated from the Middle Tang Dynasty after the An Lushan Rebellion, and the dress culture in her tomb is a typical representative of the period when the rulers of that time had extravagant banquets and amusements in order to make peace.

The lady-in-waiting in the tomb of Princess Tang'an (Figure 6) wears a long skirt with large sleeves with double-breasted characteristic, the skirt reaching the ground, a long scarf over her shoulder, a belt reaching her chest, and her hands clasped in front of her chest, making her look very plump. By the late Tang Dynasty, the trend of wearing loose and voluminous clothing became even more prominent. The long skirts worn by women in the tomb of Zhao Yigong couple (829 AD) were looser compared to those of the Middle Tang Dynasty, serving as an accurate depiction of the clothing of women in the late Tang Dynasty.



Figure 6. The Ladies-in-Waiting on the East Wall of the Tomb of Princess Tang'an of the Tang Dynasty(Left picture)



Figure 7. The Four Ladies-in-Waiting on the East Wall of the Tomb of Zhao Yigong Couple of the Tang Dynasty(Right picture)

Among the mural paintings of noble ladies-in-waiting of the late Tang Dynasty tombs, the depiction of ladies-in-waiting in the tomb of Zhao Yigong couple (Figure 7) is the most famous one, where four exquisitely dressed noble ladies-in-waiting are shown holding various objects while attending to their duties.

Among the two ladies-in-waiting in the forefront, the first one from the right is dressed in a colorful right lapel double-breasted robe with a tube top underneath. She wears a floor-length skirt that is fastened with a belt tied in a knot at the front.She holds a basin in her hands. The second one carries a porcelain tray while sporting a high bun hairstyle.double-breasted shirt with a large-sleeved design adorned with a floral diamond pattern. Underneath, she wears a yellow floral collar that is paired with a fitted bodice skirt. The skirt extends down to the ground. One of another two stands in front of a large fan adorned with bird and flower patterns, with her body partially concealed by the two ladies-in-waiting in front. The other lady-in-waiting wears a red double-breasted shirt with wide sleeves. Underneath, she wears a round-collared undershirt with floral lace, along with a yellow skirt tied with flowing ribbons. The ribbons are scattered with reddish-brown floral patterns.

In the picture of the four ladies-in-waiting in the tomb of Zhao Yigong couple, except for the first lady-in-waiting on the right side of the front row who is wearing a robe, the other three are wearing low-cut, floor-length Ru skirt, with a wide-sleeved shirt, which was a common dress worn by noble women after the Middle Tang Dynasty. Compared with the Bird-Watching and Cicada-Catching and Scene of Music and Dance of the flourishing Tang Dynasty and the Middle Tang Dynasties, the women in the four ladies-in-waiting of Zhao Yigong couple's tomb appear more luxurious, demonstrating the ruler's "extravagant feasts and excursions" during the Late Tang Dynasty. From the point of view of clothing, the Zhao Yigong couple's tomb murals in the ladies-in-waiting dress are much wider. The Ru skirt hangs to the ground. Even the men's robes on the first lady-in-waiting on the right side look incredibly loose and fat. After the An Lushan Rebellion, the emperor introduced the "rule of literature" in order to maintain the stability of the country, and at the same time, the rulers also advocated a clothing style that was lavish and luxurious for the sake of enjoyment, resulting in wider skirts for the robes.

In the middle and late Tang dynasties after the An Lushan Rebellion, the clothing styles of the northwest minorities were gradually excluded from the mainstream clothing styles. Noble women's costumes became wider, and the tops changed from narrow sleeves to wide sleeves, reverting back to the original style of the Central Chinese Ru skirt.

By the Five Dynasties and Ten Kingdoms, this extravagant style of dress was largely continued, [4]was further changed. In the picture of the lady-in-waiting in the west ear chamber of the tomb of Wang Chuizhi, the Beipingguo Festival Minister during the Five Dynasties and Ten Kingdoms period (see Fig. 8),the women's costumes,although retaining.

the characteristics of the Middle and Late Tang dynasties with long skirts and floors, have changed from wide clothes and big sleeves back to narrow-sleeved and short Ru, showing the epochal characteristics of the transition to the costumes of the Song Dynasty.



Figure 8. Five Dynasties: Court Ladies-in-Waiting in the West Ear Chamber of Wang Chuzhi's Tomb

Conclusion

From the mural images of ladies-in-waiting in different periods of the Tang Dynasty, it can be seen that the change of the dress style of the ladies-in-waiting of the Tang Dynasty was largely influenced by foreign cultures, especially the cultures of the ethnic minorities from the Western regions. These murals, which have been handed down to the present day, not only have artistic value, but also become a model of ancient dress culture under the influence of foreign cultures, which not only intuitively reflects the dress styles of each period, but also provides a new way of analyzing the interaction between the dress cultures of different ethnic groups.

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Narratives of Love

爱的阐释

The classic paradigm of ideal human settlement: the narrative mechanism of the traditional "eight sceneries" culture

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Abstract

"Eight sceneries" is a historical and cultural phenomenon with Chinese local characteristics. "Eight sceneries" originally refers to a collection of eight scenic spots in a certain area organized according to a certain logic, such as "Eight sceneries of Xiaoxiang", "Eight sceneries of Luoyang" and "Eight sceneries of Yanjing" "Eight Scenic Spots of Guanzhong" and so on. However, with the widespread spread of the "eight sceneries" culture, the "eight" in "eight sceneries" is actually just a virtual reference to quantity. "Eight sceneries" gradually evolved into a general term for a group of scenes, such as "Ten Scenes of the West Lake" and "Forty-eight sceneries of Jinling" etc. all belong to the Eight Scenery Culture. In ancient China, starting from the concept of "whole environment" for human settlements, the "Trinity" construction strategy was adopted, and a number of key points were incorporated into a meaningful collection. The "Eight sceneries" culture is exactly this meaningful "landscape collection" , which still has great application value in modern times.

Author keywords

"eight sceneries"; narrative mechanism; landscape; human settlement

The cultural origin of the "Eight Scenes"

In the pre-Qin period, the "Bagua" thought in the "Book of Changes" created the ancient Chinese concept of "Eight Directions" and formed the "Eight Systems" of the emperor, which symbolized the privilege and majesty of the emperor, to show his control and dominance over all directions in the world. In the Han Dynasty, "eight" had a very close connection with directions, seasons, weather and even Taiwan. A large number of phenomena named after "eight" are derived from traditional culture, which are directly or indirectly related to time, space and people. Buddhism also has a cultural mechanism of worshiping the "eight", that is, a self-centered religious consciousness that pervades all directions. "Eight sceneries" first appeared in the "Eight Scenery Gods" in the Taoist "Huang Ting Nei Jing Jing" during the Wei and Jin Dynasties. The so-called "Eight sceneries" have dual meanings including spatial orientation and color of light. Among them, "eight" indicates the spatial orientation, and "Eight sceneries" indicates the spatial orientation. "Scene" reflects the light and color in different directions. Taoism pays attention to the close relationship between the survival of life and the external environment, so that the "Eight Scenes" are closely integrated with the location, season, time and people, and gradually transformed into aesthetic objects. This plays an important role in extending the "Eight sceneries" to landscape culture.

The Wei, Jin, Southern and Northern Dynasties were the initial development stage of the "Eight Views" culture. Most of the objects of the "Eight sceneries" are landscapes and pastoral scenes, and the poems and paintings

accompanying them also describe and chant the landscapes and pastoral scenery, and these are the true nature of the "Eight Sceneries Culture". From the perspective of visual aesthetic culture, the widespread spread of the word "Eight Scenes" began with Song Di's "Eight Sceneries of Xiaoxiang" in the Song Dynasty. Since the inception of the "Eight Scenic Spots of Xiaoxiang", some places have begun to imitate and select the "Eight Scenic Spots", and literati have also sang poems and paintings, which has become a temporary flourishing. During the Southern Song Dynasty, with the rise of local chronicle culture, the "Eight Scenic Spots" became widely circulated, with a complete system that integrated literature, geography, painting, aesthetics, etc. into it to form a unique landscape culture. During the Ming and Qing dynasties, many local chronicles included the local "Eight Scenery Pictures" at the beginning of the volume, and some included "Eight Scenery Poems" or descriptions of the "Eight Scenery" under the categories of "forms," "historic sites," "scenery," and "art and literature." The culture of "Eight Scenic Spots" is becoming increasingly generalized.

Narrative mechanism of "Eight Sceneries" culture

First, the reason why the "Eight Sceneries" culture originating from the "Eight Sceneries of Xiaoxiang" is classic lies in the value beliefs and narrative logic implicit in the landscape combination, which is mainly reflected in the landscape experience and narrative mechanism. Landscape experience is embodied in the process of condensing various external scenes into a profound impression. It gives the impressionized landscape image a literary name and continuously explains it, and finally it is widely accepted and resonates. Classical landscape is a refined object extracted by the subject in the process of appreciating the objective world scene. This process is realized through the formation of a stable cognitive metaphorical association between human emotions and the objective scene.

Secondly, the "Eight Sceneries" cleverly organized and connected locations, places, scenery, seasons, time, encounters, and emotions through group scenes, which aroused long-lasting resonance among contemporaries and later generations of scholars. The spatial pattern of the "Eight Scenic Spots" is closely related to the natural environment and humanistic background, and is reflected in the ordering, density distribution, location characteristics, and temporal laws of the eight sceneries, as well as the local population and economy, administrative divisions, landscape patterns, spatial forms, and regional culture. , in the relationship between aesthetic preferences. Traditional local chronicles refer to the eight scenic spots as "land spirits", which also highlights the integration and interaction of "mountains, rivers, objects and people". The popularization of the "Eight Scenic Spots" has caused people to develop "landscape consciousness" in urban construction, which plays an important role in the maintenance and creation of local traditional scenery.

Third, the "Eight Sceneries" are landscapes closely related to mountains, water, lakes, forests, etc. In addition, the Eight Sceneries also include organisms, structures, production and life; the "Eight Sceneries" are rich in skyscapes, waterscapes, living landscapes, and gas The "Eight Sceneries" are also rich in rich temporal scenery changes such as the four seasons of the year and the four seasons of the day. The Eight Sceneries are a reflection of the ideal living environment of "beautiful mountains and clear waters". Their time, orientation, shape, composition, etc. all express the overall view and balance consciousness of Eastern people. The "Eight Scenic Spots" are generally based on ecological environment, natural geography, landmark buildings, aesthetic taste, social life, political orientation and other factors. The "Eight Sceneries" have local characteristics. Although they all depict pavilions, pavilions, mountains, rivers, clouds, rocks, and allusions and legends, different locations, different perspectives, different cultural connotations, and different styles and levels of literati lead to differences in the "Eight Sceneries" in different places. There are certain embellishments in the "Eight Sceneries" culture, but most of them are emotional expressions based on understanding the natural and cultural scenery within

the territory. The representativeness and special significance of each scene increases people's view of their hometown, so it is of great importance. aesthetic and educational value.

Fourth, the literary naming of the "Eight Scenic Spots" is an integral part of the overall cultural image of the landscape, and its language quality profoundly affects the humanistic temperament of the local public cultural system. The naming of "Eight Scenes" generally consists of four characters. The first two characters usually refer to location, and the last two characters refer to time or seasonal natural phenomena. The two characters are juxtaposed to form a combined scene, such as "Mountain City Qinglan" in "Eight Scenes of Xiaoxiang" "Mountain City" and "Mountain City" are each a scene. When the two are combined, they form a comprehensive scene. There are also "Eight Scenes" whose names are mainly based on subject and predicate phrases, showing the beauty of the scenery and the charm of humanity. For example, "Jade Spring Hanging Rainbow" and "Western Mountain Qingxue" in "Eight Scenes of Yanjing" depict the beauty of mountains and rivers, while "Jintai" "Sunset" and "Jimen Smoke Tree" refer to historical allusions. Under the mechanism of "time", the "Eight Scenes" composition has undergone a transformation of "from scene to entry". Looking at the "Eight Scenes" with "time", people first easily think of the linear time of enjoying the scenery.

The narrative logic followed by the "Eight Sceneries" sequence is multi-faceted. The scenery composition technique includes various sequential sequences such as spatial orientation, poetic counterpoint, painting counterpoint relationship, and importance. The number of scenic spots is generally determined by numbers, but overall It reflects the ancients' pursuit of an ideal living environment.

The paradigm formed by the "Eight Sceneries" culture

The "Eight Sceneries" composition integrates human settlements into the natural environment, and then combines them into a unified visually continuous "scenery" according to a certain narrative logic, thus establishing the overall spatial pattern and landscape order of the human settlement environment. The "Eight Scenes" culture has important geographical, historical, literary and aesthetic values, and it is also a reflection of the confidence of pan-East Asian landscape culture. The "Eight Scenes" have roughly two development lines in the formation process: First, the paradigm of first creating the scene and then the pictures and texts. , that is, the eight sceneries were chosen and named by the local governor based on the characteristics of the local living environment, combined with urban construction and political performance propaganda; the second is the paradigm of pictures and texts first, and then the scene is completed, that is, the eight sceneries were refined and named by literati painters after refining and naming the real scenes. The literati and officials participated in selecting or constructing real scenes. Both lines have their own advantages, the former is superior in efficiency, and the latter is superior in refinement. The two paradigms merged with each other, eventually leading to the formation of the "Eight Scenic Spots" culture in various places.

The modern value of the "Eight Sceneries" culture

In the construction of the human settlement environment, the ancestors gradually formed a settlement model in which the king resides in the world and controls the country and the country, and formed the basis for governing the world in compliance with the seasons. This made the number "eight" as the number of the land, Directly or indirectly connected with time, space, platform and even social governance. Taoism and Taoism focus on the close relationship between the survival of life and the external environment, so that the "eight realms" and "eight sceneries" are closely integrated with the location, season, time and people. The emergence of the word "eight sceneries" can be used as the dividing point between the origin and the budding stage. In modern landscape design, it is necessary to respect the objective natural conditions of the region, protect and respect the

original natural environment to the greatest extent, and develop and build an ecological environment in which man and nature coexist harmoniously according to local conditions. The creation and expression of the spatial artistic conception of the "Eight Sceneries" has high aesthetic value, but the appreciation and evaluation of this appreciation value requires a certain threshold of literary literacy. However, after it is given historical connotation and literary color, it is widely praised and recognized by the public. Knowing that, the landscape entity has formed its own unique artistic atmosphere, and therefore has special value and significance. For example, the "Jianghan Chaozong" among the Ten Scenes of Hanyang has unique aesthetic value. When people mention the scenery here, they will naturally form an association of respecting nature and commemorating the sages, and it has a unique artistic conception.

Conclusion

As a cultural phenomenon, "eight sceneries" has its own unique meaning. In the new era, the "Eight Scenic Spots" culture has both inheritance and innovation. In the process of realizing rural revitalization in our country, it will surely show great cultural and tourism value. Due to the rich number of Eight Scenic Spots in Chinese local chronicles, and there are still many Eight Scenic Spots in places that have not been excavated and studied, research in this area has shown strong development momentum in recent years. It is no time to wait for the protection and utilization of the cultural relics of the "Eight Scenic Spots". Regardless of whether the protection of the "Eight Scenic Spots" adopts the perspective of ancient appearance and new sceneries, the introduction of the old and the new, or the absolute protection point of view, it is a useful attempt to inherit and continue the culture of the Eight Scenic Spots in the contemporary era. The "eight sceneries" will change over time, and local attachment, social inertia, cultural inheritance, etc. have a blessing effect on the continuation of the eight sceneries. This is how the eight sceneries in history have dynamically evolved and developed, and the cohesion, theme re-creation, and The self-renewal characteristic is an important reason for its strong vitality.

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A Comprehensive Literature Review on Urban Regeneration Based on Healthy Landscape Framework

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Abstract

The accelerated urbanization process triggered a series of public health problems like environmental pollution, high incidence of non-communicable diseases, etc. It has led to changes in people's behavioral needs and social management patterns, further exacerbating public health problems in urban environmental renewal. This paper utilizes the core database of Web of Science to examine the concept of a "healthy cities." Based on the concept of healthy city, the definition and causes of health are further analyzed. The study investigates the current state of knowledge networks and identifies the research's hot trends, focusing on the intersection of four related fields: sociology, ecology, building physics, and design practice cases. The research explores effective approaches, distinctive features, and spatial elements of urban renewal design for public health across three dimensions: enhancing social environmental factors, promoting public mental health, and cultivating individual health behavior patterns. Ultimately, by extracting the elements and characteristics of public health's influence on urban environmental regeneration and integrating the interconnections between urban public health elements and urban environmental regeneration, a framework for urban environmental regeneration design is formulated. This framework aims to meet the health requirements of the population and achieve sustainable development.

Author keywords

public health, urban environment, regeneration design

Introduction

In the context of urban construction shifting from rapid urbanization period to the stock enhancement period, how to create an urban environment conducive to public health has become an organic component of sustainable urban habitation development. By 2050, 68% of the world's population will live in urban areas (World Health Organization [WHO], 2021). The expansion and development of urban environments have led to a series

of habitation problems, changes in the daily behavior patterns of urban residents, challenges to public mental health brought about by the post-pandemic era, and increasingly prominent public health hazards in urban environments. Modern urban planning originates from urban health problems and it’ s made for creation of urban health (Hailong, 2020).

This study aims to systematically review the concepts of 'public health' and 'urban environmental renewal', use knowledge mapping to analyze the network relations and hotspot trends of key words. Additionally, we will categorize, summarize, and critically evaluate relevant literature based on variations in research focus. The ultimate goal is to provide guidance for the development of a framework for urban environmental renewal from a public health perspective.

Concept definition and development overview

Public health

The concept of health originated in the field of health care. Development modes for people's perception of the term "health" can be summarized as followed: the traditional medical model before the 1940s, the ideological transformation model from the 1940s to the 1970s, and the bio-psycho-social medical model after the 1970s. In 1948, the WHO first defined the three dimensions of health: health represents the unity of "physical health, mental health and social health". Social and environmental factors fundamentally impact the overall health level of society, and determine people's life behavior patterns (Chun et al., 2022; Xiji et al., 2022; Webster et al., 2021).

In the 1980s, the concept of "healthy cities" was formed on basis of the "New Public Health Movement", the Ottawa Charter and the strategic idea of "Health for All". The exploration of healthy city can be basically divided into two directions: first, the health impacts of the built environment; and second, urban design and planning strategies based on "healthy city projects" (Battisti, 2020). The WHO proposed the official concept of "healthy cities" in 1984: "Healthy city should be city where the natural and social environment is continuously developed and expanded, and where social resources are continuously expanded so that people can support each other in enjoying life and realizing their full potential" (Marciniak et al., 2014).

Urban regeneration

Urban environment regeneration is the investment of public or private money to improve the appearance, infrastructure, and economy of an area. It is made to address inequities in public health. It involves two aspects: first, the transformation of objective entities (hardware such as buildings); second, the transformation and continuation of various spatial, ecological, cultural, and recreational environments, including the retention and renewal of neighborhood social network structures, psychological stereotypes, and emotional attachments. Urban regeneration can be divided into redevelopment, rehabilitation and conservation. Urban regeneration is becoming a vital part of city planning and town planning.

The model was constructed with reference to the implementation theory of urban regeneration proposed by the world bank (2011), and then the model was transferred to the context of the design framework for urban regeneration. The theoretical model is divided into four phases: scoping, planning, financing, and implementation (Figure 1). And the thinking about the design framework for urban regeneration related to public health will focus on the design action: planning phase. A sound and effective planning framework for the urban environment will protect the health and welfare of urban residents.

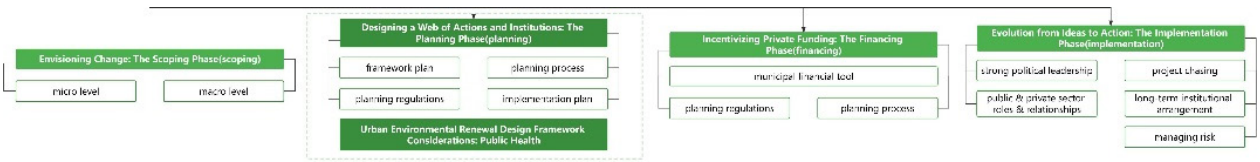


Figure 1. Model of urban regeneration implementation.

Under the constraint of urban resources and environment, the biggest urban problem is that the simple shaping of material space cannot meet the needs of people’s usage behaviors. It can be seen from the comparison of characteristics of urban renaissance in foreign countries, and the features of urban regeneration in China that, China is in the stage of transition from urban regeneration to urban renaissance. The existing stock planning, urban double repair (repair of ecology, and repair of cities) and other conceptual policies put forward new demands for the current urban environment; the introduction of concepts such as park city, healthy China and nationwide fitness shows that thinking about public health has become an indispensable part of China’s development.

Data sources and basic data analysis

To understand the overview of relevant foreign research in recent years, literature search was made with "public health" and "urban regeneration" as the core subject terms and keywords in the core database of Web of Science during the period 2000-2023. 130 English articles after screening and deletion were retained. The first empirical research literature under the theme was published in 2000 in Policy and Politics, which explored regeneration strategies and patterns of local service provision in Scotland (Foley et al., 2000). Subsequently, the number of articles published in this area has increased significantly since 2013.

In the econometric analysis (Figure 2), in addition to public health and urban regeneration as direct search terms, built environment and health had the highest co-occurrence frequencies. Mental health and health inequality are the most frequent health-related terms, indicating the attention to health in the context of urban regeneration. The research is conducted with focus on green space, ecosystem service, community garden and other branches. The related application research mainly focuses on impact, policy, benefit, intervention, design and accessibility. The central nodes of the network (mediated centrality > 0. 1) are important research themes and play a key role in connecting different research hotspots; they include community (0. 31), neighborhood (0. 23), environment (0. 22), context (0. 22), city (0. 17), people (0. 13) and association (0. 15), etc.

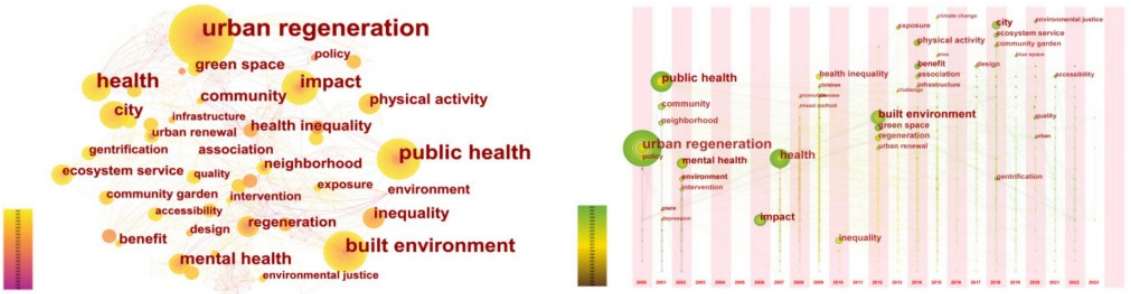


Figure 2. (a) Co-occurence map of keywords-public health and urban regeneration;
(b) public health and urban regeneration Timezone.

According to the keyword timezone (Figure 2), it becomes apparent that the research can be categorised into three phases. These include an initial exploration period from 2000-2002, a relatively stagnant phase from 2003-2006, and a subsequent phase of further research since 2006. The research focus has evolved from initial policy studies, mixed research, and urban renewal to encompass community gardens, benefits, attention to Black and minority ethnic groups, and, more recently, hot topics including ecosystem services, environmental justice, psychological well-being, health impact assessments, urban agriculture, and circular economy.

Research hotspots and trends

CiteSpace clustering generated a total of 14 items (Figure 3), the chart Silhouette =0.767>0.3, and the clustering is significant; Modularity Q=0.794>0.7, and clustering confidence is high. After screening, the 14 clusters of public health and urban regeneration can be grouped into four related fields of cross-sectional research to be explored: sociology, ecology, building physics, and design research with practical projects as the example.

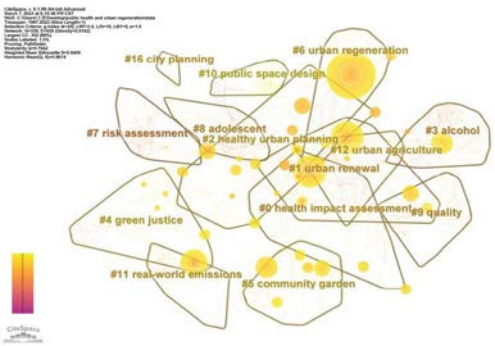


Figure 3. Clustering chart of public health and urban regeneration.

The intersection of public health and sociology

The structure of urban spaces has the potential to impact the well-being of residents, and rejuvenating abandoned areas can create opportunities for exercise, mental health treatment and socialisation (HyunYoung et al., 2021). Nationally-led programmes for environmental regeneration aim to improve the physical environment, tackling spatial and socio-economic inequalities. For example, the national program "Active Living by Design" by the RWJF Foundation in the United States; the "Programa Quiero mi Barrio" in for Chilian poor communities; and the historical examples of social housing in Rome such as the "INA-Casa Plan"; and the "Health China 2030" strategic plan released in China, promote the construction of a healthy China and improve people’ s health (Kraft et al., 2012; Squires, 2023; Capotorti et al., 2019).

Research on the impact of environmental renewal and community revitalization on residents' physical, psychological, and social health encompasses various aspects, including the physical environment, social milieu, safety conditions, and the regeneration of vacant housing (López- Contreras et al., 2021; Mui et al., 2022). Based on the above plan, Kearns et al. (2019) transformed the theory of health determinants into a 'physical environment, services, economic, social, and socio-psychological' residential environment renewal framework. They assessed variations in the mental and physical health of populations, affirming that the outcomes of residential area renewal initiatives positively guide psychological well-being. Concurrently, research findings exhibit variations over different times and stages, revealing that the urban environmental renewal process may disrupt key elements of the relationship between individuals and their surroundings. O'Neill et al. (2023), in their exploration of urban rights and potential mechanisms of psychological bias, discovered that renewal projects

prioritizing economic objectives often come at the expense of social well-being. Existing research has employed various methodologies, including multi-level logistic regression models, longitudinal quasi-experimental designs, and interpretive phenomenology, to compare assessments of the benefits of environmental renewal on social psychological health (Jongeneel-Grimen et al., 2021; Nygaard et al., 2023; Ruijsbroek et al., 2022; Lomas et al., 2021). Three overarching themes have emerged concerning the relationship between urban renewal, place attachment, and public psychological well-being: 'Physiological Control, ' 'Social and Community Relationships, ' and 'Perceptions and Definitions of Place. ' These themes encompass aspects such as physical health, social isolation, and community cohesion. Furthermore, in response to societal phenomena like population aging, Agost-Felip et al. (2021), utilizing the Delphi method, identified indicators for specific environments, focusing on the unique needs of populations within public open spaces. Consequently, the realization of a healthy society can be summarized in two directions: comprehensive planning of urban environmental spaces addressing urgent health improvement needs based on health assessments, and a shift towards promoting feedback regulation of physical activity, targeting non-material aspects of psychological well-being.

Intersection of public health and ecology

Blue-greenspaces

Blue-green spaces are a core component of sustainable concepts, and spatial renewal is influenced by socio-economic contexts and environmental drivers. Europe has taken the lead in introducing the "Blue Health" project, aiming to quantify the impact of interventions in aquatic environments and their surroundings maximize health benefits (Grellier et al., 2017). Existing research indicates that when strategies for renewing blue spaces are discussed as public health interventions, they bring about a threefold impact on public health: changes in health-related behaviors, alterations in the urban health environment, and modifications in public health policies (Brückner et al., 2022). Blue health encompasses phenomena such as water body degradation, with regions like the Nile Delta waterways experiencing degradation due to factors like economic transformation, rapid urban expansion, and the growth of informal settlements. Fouad et al. (2022), by addressing water budget deficits and safeguarding Ecosystem Services (ESs), engaged in landscape planning for natural heritage and areas around water bodies.

Green spaces within urban areas serve as therapeutic environments. They create a sense of natural, cultural, social, spatial, and species diversity, as well as tranquility (Pérez et al., 2020). Research on green spaces has been centered around ecosystem services and Nature-based Solutions (NbS). The development of ecosystem services helps uncover the potential synergy between the natural and economic values of green spaces. Building upon this, Caprioli et al. (2021) explore the role of green spaces in enhancing overall spatial quality and providing multidimensional benefits. Currently, there exists an uneven distribution of urban green spaces, leading to concepts of green equity or green justice. These concepts often assess the exposure to green spaces based on administrative units as environmental regions but tend to overlook smaller-scale green spaces that residents more frequently encounter, such as community gardens (Kou et al., 2019). Consequently, under the influence of multiple physical environmental factors, the concept of green justice has expanded to address derivative issues within a social context (Sousa et al., 2018). Scholars have proposed community green fairness metrics, considering factors like form, visibility, and accessibility, based on people's exposure to green spaces in everyday social and recreational activities. These metrics assess green space data for small-scale community greenspaces, surrounding large parks, and street-level imagery types (Zhang et al., 2021). Nature-based solutions are widely applied in inclusive spatial planning and social development, such as the implementation of conditions for urban

walking, sidewalk construction initiatives, and along blue-space areas (Xiang et al., 2022). In a case study within densely populated areas of Seoul, South Korea, the correlation between nature-based solutions and aesthetic, social, and environmental characteristics has been demonstrated (Shafray et al., 2017). The increase of green spaces contributes to the prevention of diseases such as diabetes and obesity among both young people and the elderly, and even reduces children's blood lead levels (Sinnett et al., 2022).

Sustainable development in response to climate change

As urban environmental renewal progresses towards ecological transformation, scholars have shifted their focus towards the significance of public space systems and microclimates. Their aim is to assist decision-making in urban environmental renewal, ensuring safe spaces for residents and enhancing microclimate stability. The aforementioned NbS have proven effective in environmental protection and addressing climate change (Sauer et al., 2019). For example, Cremonini et al. (2020) employed the 'Comprehensive Guide for Urban Hydro-Meteorological, Climate, and Environmental Services' as a methodological framework to introduce Green Infrastructure (GI) in highly arid regions. Nardino et al. (2021) conducted an analysis of urban microclimates using fluid dynamics models, taking into account the relationship between temperature variations and surface features, vegetation coverage, building density, and aspect ratios. They correlated changes in air temperature with physiologically equivalent temperature, categorizing residents' physiological well-being. Caprari et al. (2019) established social climate morphological profiles based on the urban structure and climate of the Rome community.

Intersection of public health and ecology

In the built environment, interventions in towns and cities, from macroscopic perspectives of healthy city building and healthy urban design, to mesoscopic scales of environmental design, pro-nature design, and healthy community design, and to microscopic scales of health care construction, residential housing, workplace healthy building, and indoor element creation, and interior elements on human behavior activities that enhance both the building environment and social cohesion. Key factors include 'identity, characteristics, image, importance, and achievement' (Ros-García et al., 2022). Scholars have also explored the relationship between the building environment and public health by considering environmental and individual factors such as temperature, heat index, relative humidity, average wind speed, and more (Moore et al., 2018; Gao et al., 2020). The influence of the building environment on psychological well-being and quality of life remains an area for further elaboration. Additionally, the case of edible GI in the Campania region of Italy offers possibilities for sustainable networks that compose urban and agricultural spaces (Russo et al., 2020). GI has the potential to guide urban development via the provision of a framework for economic growth and nature conservation. such as green building techniques, photovoltaic energy facilities, or green roof systems, particularly in the realms of biodiversity and ecosystem services (Semeraro et al., 2017; Teotónio et al., 2018).

Public health exploration with a practice project as an example

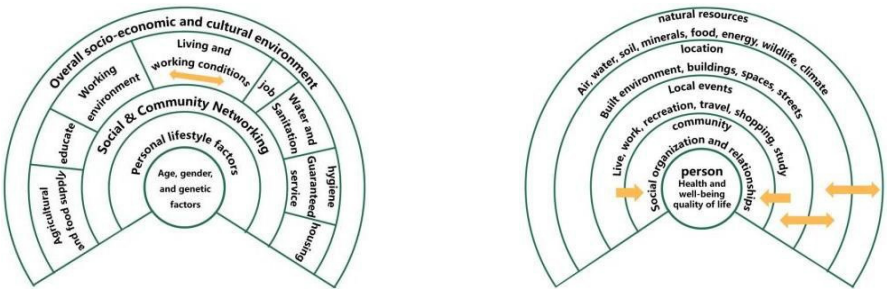
Studies with practical examples focus on health perception and assessment of small open and public spaces. At a macro level, this encompasses aspects like green communities, blue-green spaces, trail systems, public squares, and garden architecture. On a micro scale, it involves urban buildings and landscape features. In terms of analytical methods, addressing concerns regarding environmental inclusivity, safety, and vulnerability often involves the utilization of methods such as soundscape analysis, semantic segmentation, and GIS. These methodologies are employed to dissect the impact pathways of environmental resilience and perceptual patterns

on urban health planning (Herranz-Pascual et al., 2022; D ’ Onofrio et al., 2022). For example, in the study by Lyu et al. (2022), spatial data and perceptual assessments of coastal streets were employed to construct regression models. These models unveiled the influence of spatial parameters on public perception, categorizing coastal streets into three distinct types: open streets, mixed streets, and biophilic streets.

Previous research has delved into the complexities of environmental justice and spatial inequality within public spaces (Cao et al., 2022; Rusciano et al., 2022; Wang et al., 2022). Through an environmental justice lens, these studies have revealed potential mechanisms underlying the influence of public spaces on daily life. For example, highlighting the pivotal role of community and parks in fostering sustainability (Fang et al., 2021; Hunter et al., 2021).

Design framework concept for urban regeneration

Based on the results of the above literature review, the benefits brought by urban regeneration to public health can be summarized into three main aspects: improving social environment elements, promoting public mental health, and fostering individual health behavior patterns. The design process of urban regeneration can be made with reference to the model of health determinants proposed by Dahlgren and Whitehead and the reconstructed WHO model of the health impact circle of human habitation (Figure 4) (Whitehead et al., 1991; Barton et al., 2004). Several urban spatial elements have been shown to play a supportive role at the level of each health impact pathway.



(a) (b)

Figure 4. (a) Health determinants; (b) Human habitation "circle" factors impacting health.

The spatial form is based on the coordinated co-progression of urban clusters, small towns and new rural communities. Since the core of urban regeneration lies in the urbanization of people, the urban regeneration design framework can be positioned as an urban regeneration process featuring the connotation of people’s livelihood, sustainable and high-quality development. Firstly, active interventions are taken in the urban environment to guarantee the health of the urban system and ensure the health of urban residents. Proactive interventions are implemented concerning spatial elements and human activity behaviors, encompassing aspects such as land use, spatial morphology, road traffic, environmental greenery, and spaces development. Secondly, the design idea of active guidance is adopted for the three categories of influence paths, is taken to realize health risk avoidance, reasonable distribution of health resources and healthy lifestyle guidance. Finally, a joint multidisciplinary research mechanism involving community participation, health impact assessment, and policy support is established, and ensure the positive development of urban regeneration, achieve regional coordinated urban-rural integration, interactive industrial upgrading and low-carbon transformation, ecological civilization and intensive efficiency, as well as promote the harmonious and healthy development of the public and urban space (Figure 7).

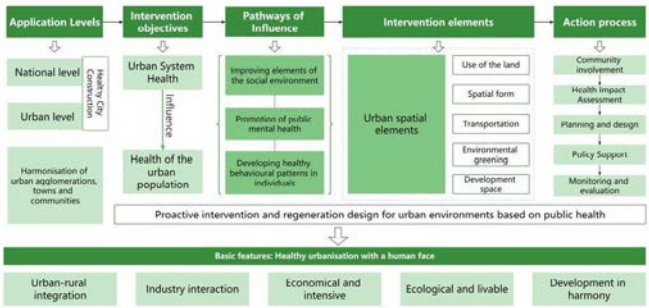


Figure 5. Design process of proactive intervention and renewal of urban environment based on public health.

Based on the four levels of town environment, street, community, and building, 16 features and 23 types of elements are obtained (Figure 6). In the context of China’s new urbanization, the design guiding elements of healthy urban environment and towns mainly focus on environmental management, sustainable and safe transportation, and public infrastructure, etc. The characteristics of land use, spatial form, road traffic, environmental greening and development space are basically determined. The four conceptual levels of healthy urban environment, healthy streets, healthy communities and green buildings are divided into three health impact paths. To sum up, there are intertwined or focused impact factors, and the realization of health goals depends on the integrated design of various characteristic elements in the urban environmental space (Jing et al., 2020; Yan et al., 2020; Yang et al., 2021; Yafei et al., 2022).

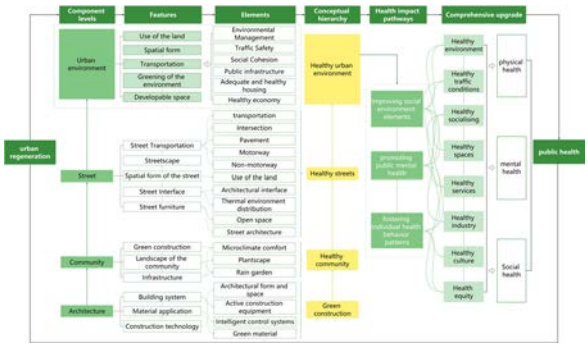


Figure 6. Design framework of urban regeneration based on public health.

Conclusion and discussion

Future vision of urban regeneration design based on public health

Expansion of the domain dimension and increase of empirical research

Future research on the design of environmental regeneration in towns and cities could expand the field from an aggregated research perspective, such as environmental behaviour. Currently, environmental behavior science focus on the combination of environmental optimization of human behavior and human recognition technology. For example, used of human gesture recognition technology and computer vision monitoring technology, environmental behavior data of urban residents, which can be used to understand urban residents’ use and perception of the urban environment and identify problems and opportunities in the urban area, can be collected and analyzed (Yan et al., 2017; Yan et al., 2022). The use of environmental behavioral approaches will promote behavioral understanding of urban residents’ interactions with the urban environment.

Addition of diachronic experiments

The benefits of urban environmental renewal on public health lack robust supporting evidence due to limitations in the study area, timeframe, and research methods. Currently, there is a lack of longitudinal data from long-term observations in research methods and data acquisition, most were focused on the repeated cross-section data. At present, contradictions exist in the impact results of some urban regeneration processes under different paths. Capturing the health environmental factors of the network of potential variables is the main challenge in the assessment of urban interventions. In the future research on urban spatial element renewal, the relationship between urban renewal elements and health environmental factors can be elucidated in terms of the research depth; the continuity can be emphasized in terms of the research time dimension; the changes of the health environmental factors can be monitored based on the actual cases for urban regeneration; and the monitoring and evaluation mechanism can be established to capture the complex system nature of urban regeneration.

Guidance for urban regeneration design based on public health

In this research, with the actual demand for healthy urban regeneration design as a guide, the main specific elements related to the enhancement of public health are summarized based on three health impact paths: improving social environment elements, promoting public mental health and cultivating individual health behavior patterns, thus a framework system for the research on urban regeneration design based on public health is initially established. This dynamic result still needs more empirical studies for continuous improvement in the future. In the subsequent research, attention will continue to be paid to the systematic review and meta analysis of empirical research, so as to provide practical guidance for the design of urban regeneration.

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User Design: A Future-Proof Design Strategy

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Abstract

This thesis introduces the concept of "user design" as a reflection of a future design trend. In practice, "user design" can be categorized into four modes based on the level of user involvement in the design process: 1) user participation in design (designer-led design), 2) user-led design (designer-assisted design), 3) user-designer co-design, and 4) user-designer merger (user-designer merged into one). As a professional term in the design industry, "user design" holds academic significance in the following aspects: 1) It takes the concept of "user-centered" design to the extreme, aiming to achieve the ideal state of harmony between humans and nature. 2) User design emphasizes the importance of practice in fostering design innovation, and has dynamic mechanism of design. 3) User design uses the application terminal as a benchmark to evaluate designers' innovation abilities and classify their areas of expertise, thus having methodological significance. 4) User design embodies traditional Chinese wisdom and characteristics.

Author keywords

Design, User Design, Product Design, Niche Markets

The Concept and Origin of User Design

With the continuous progress of science and technology, and the increasing production efficiency, the power and status of consumers or users in the market have been consolidated and strengthened. In the 21st century, the design concept of "user-centered" is generally acknowledged in the design industry. "User experience design," "user research design," "user system design," "user interface design," and "user participation design" have become increasingly popular terms in the design field. This indicates the widespread implementation and emphasis on the concept of "user-centeredness." This concept, "User-centered," clearly captures the essence of design. The purpose of design is to address the needs of the user. Those who can better fulfill these needs would gain favor and a competitive advantage in the market, resulting in higher returns.

The origin of the term "user design" has undergone an evolutionary process. It was initially introduced as "co-operation design" in Scandinavia during the 1970s. (Shang, 2016) The concept aimed to encourage managers to listen to the public and involve them in decision-making processes. By the 1980s, this idea was applied to the field of design, allowing users to contribute to product development and gain insights into their needs. This approach became known as participatory design. Afterwards, products designed with user input gained popularity and attracted more customers in the market. Furthermore, under the influence of "open innovation," the involvement of customers in product design has gained further recognition. With the popularization of the Internet, user

participation in design has opened the door to technological convenience, and the degree of involvement of users in design has deepened. In recent years, the Internet has witnessed the emergence of products that are completely designed by customers, put into production and sold online. A new term has evolved to refer to this design phenomenon: "user design". Other terms with similar semantics include "user experience design", "open-source design", "co-innovation with users", etc., indicating that user design has begun to be subdivided and diversified. "User design" can be roughly categorized into four modes according to the degree of user participation in design: 1) user participation in design (designer-led design), 2) user-led design (designer-assisted design), 3) user-designer co-design, and 4) user-designer merger (user-designer merged into one). The first three models have already appeared, while the fourth model represents the most rudimentary form, characterized by homemade and self-use. It is also the most ideal mode that will appear in the future, and will become a trend of future design. Naturally, user design has certain boundary conditions and exhibits distinct advantages in niche markets such as long-tail markets, personalized products, and specialized markets with specific requirements.

User Design, the Future Trend of Design

User design is beginning to take shape in practice. In 2005, LEGO introduced the "User Coordinated Production Plan-LEGO Factory." Lego aims to create a web-based virtual system that allows users to download Lego design software, design their own toy models and upload them to the Lego website. A week later, users will receive a physical model of their design. At the same time, the user-designed product will be sold on Lego's website, and if the model sells well online, Lego will increase the production and promotion of it, and the users who created it will receive generous royalties.

The famous coffee brand Starbucks has also established its own creative community (My Starbucks Idea) on its website, which collects user designs and ideas. Starbucks will then develop the excellent design into a real product, and this constant flow of user ideas and designs has brought Starbucks a great deal of revenue.

Threadless is an American company specializing in selling user-designed T-shirts, which will be hung in the network user community to receive votes and comments from other consumers. Those designs with more favorable comments and votes will be put into production and sold online, and the designers will receive medals, prizes, and their names are printed on the logo of each T-shirt. Traditional design manufacturers, such as MUJI, have also launched user-designed products, and sold them under the "user-designed" label as selling points.

Sogou, a domestic company, developed an input method that quickly collected and developed tens of thousands of skins through user participation in the design. Through the online platform, they are shared with all users, which can satisfy the interests and preferences of different users and drive the promotion of the product. At the same time, Sogou has named its cell thesaurus, which contains a wide range of industry-specific lexicons. These include music vocabulary, biology vocabulary, trending internet slang, ancient poems and famous quotes, stocks and funds, legends, martial arts, Hainan’ s legend of the fairyland, idioms and sayings, and more. In total, there are over twelve thousand entries, thanks to the collective contributions of users. If only by the power of Sogou itself, it is very difficult to build this scale of massive thesaurus so quickly.

The above examples show that there are several cases of user design, one is that the user puts forward the design idea (points) or proposal (drawings), the manufacturer to complete the design. Second, the manufacturer or designer comes up with a framework structure, the user according to their own needs to design or expand the product, that is, open-source design. At present, user design is quietly becoming a design current and trend, more and more companies are beginning to accept user participation in the design, or through user feedback to improve their designs, or develop personalized products from the users.

Selection and Training of User Designers

Selecting designers among users

Choice surpasses effort, and organizations would possess a natural advantage over professional designers when selecting user-centric designers directly. However, what kind of users should be chosen? According to Mr. Li Leshan from Xi'an Jiaotong University, users can be classified into four categories based on their knowledge and familiarity with the product: occasional users, novice users, skilled users, and expert users. "Among these, expert users possess ten key characteristics: 1) proficient product usage; 2) ability to compare similar products; 3) ease in integrating new knowledge into their existing knowledge structure; 4) a minimum of ten years of professional experience; 5) extensive experience and superior skills in product usage; 6) knowledge of relevant historical aspects such as product design and technological development; 7) awareness of product trends; 8) a broad knowledge or thought chain, enabling them to provide abundant relevant information on any given topic; 9) capability to propose improvements or innovations, often employing simple methods to solve complex problems; and 10) possessing global, planning, and evaluation abilities. It is important to note that ‘being highly educated, famous, holding high titles, or occupying high positions does not automatically make one an expert.’ From the aforementioned description, it is evident that expert users possess innate design capabilities. These three competencies are the key difference between non-expert users and skilled and casual users." (Li, 2007, p. 78) And he specifically noted that "Highly educated does not equal expert, celebrity does not equal expert, and high title and high position does not equal expert." (Li, 2007, p. 78) From the above description, we can see that the expert user is already a natural designer. They already have the basic qualities that a designer should have, which are: 1) in-depth research on users, 2) very familiar with the application of the product, and 3) have a deep experience of using the product.

Developing designers with user characteristics

User designers should have the following three basic user characteristics.

In-depth research on users

In-depth research on users is a prerequisite for designers to do a good job. User research is commonly known as "user profiling", which generally includes defining users and gaining insights into them. So, who can do a better job of user research? First of all, it is the users themselves, including user groups. Because only oneself understands oneself best. Secondly, users study users, which is better than professional designers or professional research teams. Users have a natural advantage.

Be very familiar with the application scenario of the product

Any product should be placed in a specific environment and situation to use. Only by familiarizing with and respecting the usage scenario of a product can the usability of the product be given and the usage function of the product be fulfilled. The usability of a product depends on the user, the task and the environment. It is meaningless to talk about the usability of a product in isolation from the specific environment and situation. If a product is waterproof, then that product can be used in, on, and around water. Conversely, if you design a product that can be used in, on, and around water, then you must design a product that is waterproof and water repellent. The ability of the product to adapt to the environment and scenarios should be taken into account in the initial design. Why countries have to build space labs, deep sea labs, laboratories in Antarctica, they are all in order to study the extreme environment, simulate the extreme scenarios, to provide a basis for product design.

The profound experience of using the product

The deep experience of product use is the user experience. Nowadays, the concept of "user-centered" is to design centering on user experience. Product appearance, interface, performance, materials, technology, form, etc. will be transformed into experience when they come to users. It is the user experience that determines whether the design is successful or not. Therefore, having a direct and profound user experience will play a key role in improving product quality. After all, the user experience obtained through survey research is indirect experience, which cannot be compared with direct user experience, and its reliability and validity are also slightly lower. In addition, the direct and profound user experience makes the "pain points", "difficulties" and "blocking points" of the product clearer and more accurate. It is only when problems are found that they can be solved. Therefore, direct user experience is irreplaceable by indirect user research, which is more vivid, accurate and profound.

Design is the designer's second specialty

Design belongs to the cross-disciplinary, designers must have their own first professional, as the basis for cross with other disciplines. Without their own specialty, they can't cross with other disciplines, and they can't become designers. There is no way to design without your own specialty and research object. Because design is not a castle in the air, and it is not a fantasy. General users have their own professional specialties and hobbies, so it is theoretically feasible for design to become their second profession. What's more, design is a kind of ability that everyone has, and if the expert user with rich practical experience is trained to become a designer, his design ability will be very powerful, just like a tiger with wings.

The Academic Significance of the Concept of "User Design"

Expressing the integration of designers and users (clients) to achieve the ideal state of design in theory.

User design embodies the concept of "user-centered" design taken to its utmost extreme. The pinnacle of "user-centered" design is user design, which strives to achieve the most ideal state of harmonious coexistence between humans and nature. While user design is still on the rise, it signifies the direction in which design is evolving. Although there is a long journey ahead, with continuous effort, we will gradually approach our destination. The introduction of this concept breaks down the barriers between designers and users, and holds great methodological significance in design.

User design emphasizes the practical application as the driving force behind design innovation, and it operates on a dynamic mechanism.

User design emphasizes that designers are first and foremost users and have "user characteristics". It does not advocate designing from scratch, nor does it advocate designing based on creativity without foundation. We believe that knowledge starts with practice, and practice makes perfect. Besides "standing on the shoulders of those who have gone before us", we also should have rich experience as a solid foundation for design. "User-centeredness" entails not only about observing, researching and understanding users, but also about integrating with them. By obtaining more vivid and direct information and experiences "from the user, for the user," we can generate the momentum for design innovation. As the saying goes, "Generals are forged in the heat of battle."

Using the application terminal as a standard for evaluating designers' innovation capabilities and classifying their expertise holds significant methodological value.

1. Designers with user characteristics have more advantages in innovation ability.
2. Nowadays, designers are usually divided by their specialties, disciplines and research directions. The proposal

of user design provides a new perspective theoretically, which is to perceive design from the user's point of view. Taking the application terminal as the criterion to divide the design expertise, this makes the target customers, research objects and goals more refreshing and clearer. Based on the application terminal standard, designers can be classified into various specialized areas such as male sports shoe design, female underwear design, travel vehicle design, cross-country vehicle design, mountaineering sports equipment design, diving sports equipment design, field camping equipment design, cycling protective equipment design, special props design, soya bean products processing equipment design, dental cleaning products design, generator design and so on. This subdivision of design allows for a concise and clear delineation of each designer's unique artistry.

"User design" embodies traditional Chinese wisdom.

1."User design" advocates the integration of users and designers, reflecting the Chinese philosophical concept of unity between man and nature.

2. Originally, design focused on designers as the main subjects, with users being the objects of service. However, as *Laozi* said, "The opposite of a great truth is also true." By reversing this approach and putting users at the forefront, unexpected effects can be achieved, which is also known as reverse thinking.

3. This concept aligns with traditional Chinese wisdom such as "Shennong tasting a hundred herbs," "Years of illness make a skilled doctor," "Practice makes perfect," and "Mastery lies beyond theory." "Shennong tasting a hundred herbs" emphasizes the primacy of practical experience; "Years of illness make a skilled doctor" highlights the importance of experience; "Practice makes perfect" emphasizes the role of practice in driving innovation; and "Mastery lies beyond theory" underscores the interdisciplinary nature of design discipline. Classic examples of high-end user design in Chinese history, such as the Xuande furnace, Jiangnan gardens, and Ming-style furniture, are the results of these principles.

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A study of color narrative in *Superfluous Things*

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Abstract

Today, The Book of *Superfluous Things* is regarded as a book of design. If we grasp it as a whole, the book of *Superfluous Things* unfolds a complete narrative. In Annals of *Superfluous Things*, the literati is the narrative protagonist; The text structure of *Superfluous Things* Annals is the narrative plot; In the narrative of *Superfluous Things*, color runs through the whole time, and develops the narrative content centered on the narrative protagonist: the literati temporarily leave the court, and have a visual form argument different from the five colors of the court ritual system; Due to the strategy of distinguishing common taste, literati oppose fashion and splendor in color, and advocate antiquity and simplicity; Not only that, "*Superfluous Things*" narrated that the spirit of the narrative protagonist's pursuit of "pure and elegant plain color" has the meaning of returning to nature, which is close to "Tao", which is the physical and mental cultivation of the narrative protagonist, and the cultural ideal of the literati living in leisure.

Author keywords

Colors; Narration; *Superfluous Things*

The *Superfluous Things* is today regarded as a book of design, but when grasped as a whole, the *Superfluous Things* unfolds a complete narrative.

"*Superfluous Things*" means useless things, the author named "*Superfluous Things*", the opening chapter clearly indicates that this book is not to teach people to understand the practical things, but to focus on beyond the practical and embodies the spiritual needs of the "useless things". Wen Zhenheng as a representative of the late Ming literati, through the "*Superfluous Things* " on the leisure life of the literati launched a narrative, the literati is the protagonist of the narrative. Narrative of how to set up the courtyard literary room, tea burning incense, stroking the qin and flowers. In order to enhance the taste of life and cultivate the interest of life. In the narrative of useless things, the literati always act as the protagonist of the narrative.

The textual structure of " *Superfluous Things* " is the plot of the narrative, " *Superfluous Things* " is a book of twelve volumes, divided into room, flowers and trees, water and stone, birds and fish, painting and calligraphy, a few couches, utensils, clothing, boats and vehicles, location, fruits and vegetables, tea, twelve parts. Twelve volumes of content, from the whole to the local, the first volume of the "hut" to discuss the literati living in the overall hut, followed by the flowers and trees that can reflect the literati living to the display of gold and stone calligraphy and painting, to reach a climax, and then landed on the details of the life of the incense, tea, to form a narrative plot direction.

In the narrative of *Superfluous Things* , colors are used throughout, and through the narrative of colors, it

recounts the ideal leisure life of the late Ming literati. The following three aspects unfold the content of the color narrative of the late Ming literati.

Taking a break from the court

The narrative of "*Superfluous Things*" begins with the arrangement of one's body and mind in idleness. Regardless of whether the literati served or did not serve, the literati's life of idleness meant a temporary departure from the court, and the difference between the color and the court was especially reflected in the traditional set of colors of the literati.

Before discussing the traditional colors of the literati, let's first introduce the color of the court. The so-called courtroom colors are a set of officially prescribed ritual colors. In the ritual system, everything in the universe, including colors, is a systematic whole, and everything in the world has the attributes of yin and yang, and the five elements and five colors have always been used as the official orthodox color system, and on every occasion in the ritual system, the colors are designed to conform to the order of the ritual system. In ancient Chinese society, the ritual system is retained in the "Rites of Passage", "Zhouli", "Rites of Passage" as the basis of the Confucian canon, has been continued, dominated by the official orthodox color system, even to the Ming and Qing dynasties is still this.

The official court rituals were recorded in the official history, such as the "public opinion and clothing" documents, which were very detailed, including both the royal rituals and civil prohibitions. For example, it is recorded in the Ming Huidian:

The prohibition of utensils: Hongwu twenty-six years set ..... Six to nine products, wine note, wine marigold silver, the rest are porcelain, lacquer. Wooden vessels were not allowed to use vermilion and gold, gold, carved with dragons and phoenixes .....

Heirloom "chu jing ru bi tu" depicting the Ming emperor out of the capital to visit the mausoleum of the court scroll. It is divided into two parts, namely, the picture of the Emperor's departure from Beijing and the picture of his entry into the palace. It depicts the emperor, escorted by palace guards, riding out of the capital, making a grand trip to the Thirteen Tombs on the outskirts of the capital to pay homage to his ancestors, and then returning to Beijing by boat. The costumes of the figures in the painting, the carriages and horses, and the flags still continue the five-color system of ritual.

Literati must abide by this system of ceremonial colors when they are in the courtroom. However, when the scholars withdrew from the court or when the literati were in the wilderness, they did not have to abide by this set of ritual rules. In the narrative of *Superfluous Things*, the author Wen Zhenheng believed that clothing, food, housing, and transportation must be in plain and elegant colors, rather than expensive and colorful.

In the "*Superfluous Things* " Volume I "room," the book opened the chapter, first put forward the color content of the literati living room, do not have to pursue the high luxury, exalted colorful, where they live must be "elegant and clean, room and beautiful", "*Superfluous Things - room*".

I can not perch on the rock and stop the valley, after the trail of the garden, and mixed market place, we must be elegant and clean door, room and beautiful, pavilion with open mind, lounge has a ghost of the people. If you are not extravagant soil and wood, still Dan chalk, really the same shackles Fan Threshold only.

Worn clothing should also be elegant clothes, rather than colorful clothes, "*Superfluous Things* - clothing". Clothing system, must be with the time, my class can not wear a quail with a cable, but also improperly decorated with jade pendant beads, we must be summer kudzu, winter fur, was dressed elegantly, living in the city with

the style of Confucianism, into the mountains and forests with the image of seclusion, if they are dyed with five colors, decorative multi-color, and the son of the copper mountains and gold caves, wasteful and beautiful, but also the poet Charming the purpose of the clothes?

Literati used to furnish the artifacts strive for simplicity and purity, rather than the popular preference for the complexity of the carving and decoration, splendor and gaudy, "*Superfluous Things* - Ware".Today's people do not have a wide range of knowledge, but also used to see the fashion of the times, so that the elegant and common people can not distinguish, and more specializing in gorgeous, the eye can not recognize the ancient, the windows and cases, no rhyme and reason, and the extravagant statement of furnishings, did not dare to be lightly allowed also.

Temporary departure from the court, the literati return to their own homes, also means temporary departure from the ritual atmosphere of the reverence for color, temporary departure from the complexity of the ritual order, in the "*Superfluous Things*" color narrative, the ideal residence is pure and elegant, do not expensive colorful, do not want to be gaudy.

Separation of identities

In the color narrative of the "*Superfluous Things*", the literati's preference for plain and elegant colors is also strategic, it is strategic, because the literati's color preference as "separation", reflecting their own class characteristics, separated from other classes.

The so-called "compartmentalization", from the French scholar Pierre Bourdieu's "compartmentalization" theory, i.e., the role played by differences in maintaining social and cultural hierarchies. Under the compartmentalization of cultural differences, everyone is likely to be superior to someone, which explains why those at the top of the hierarchy are indeed superior to everyone else. Color preference was reflected in tangible artifacts, and artifacts representing color preference became symbols of status and taste.

During the Late Ming period, with the development of the commodity economy and the affluence of the society, exchanging wealth for cultural status was the consensus of those who were attached to the culture. Any rich merchant, wealthier or handyman in the society could freely buy the artifacts symbolizing the literati's taste, according to the Songjiang literati Fan Lian's "copy of the cloud according to the eye":

It is strange, such as soap fast occasionally get to live, that is, the whole of a small rest, decorated with wooden boards, court storage pots of fish and flowers, inside the fine table Buddha dust, called "study", do not know the soap fast read what books also!

Fan Lian's era, and "long things" produced by the age of roughly similar, Songjiang is located in today's Shanghai, is also an important gathering area of Jiangnan literati. The study was the exclusive property of the literati, and the study was also regarded as a symbol of the literati's identity. Appealing to the elegant generation has a "study" form, disguised as a literati, on the surface, can easily complete the transformation to the social elite class. Therefore, after the end of the Ming Dynasty, the study is also known as the crowd of people at home optional extra things. After the Ming Dynasty, there was a widespread circulation of the book "Home Essentials", which is similar to the household encyclopedia of the compendium, is divided into eight categories: family rituals, for training, governance of life, to raise, tend to avoid, food, arts, clean lessons. The contents talk about etiquette, health care, agriculture, animal husbandry, nourishment, avoidance, brewing, food and drink, painting and calligraphy, chess and entertainment, and so on. The contents of the book include how to set up a study, which shows that all social classes at that time were eager to have a study. Just as Coleridge's "The Anxiety of Things": the study, which was the most cherished place of all cultural practices for the gentry and a highly ritualized place, has now become an optional extra in the most despised soaps.

For the vulgar generation of vulgarity, the literati can not help but abhor, the above "called" study ", but do not know soap fast read what books also! Expresses the sentiment of extreme disdain for vulgarity and elegance. Shen Chunze "*Superfluous Things*- preface" in the point of the book "*Superfluous Things*" the purpose of writing:

..... I am afraid of the Wu people's hearts and hands change day by day, such as the son of the cloud, a small leisure long things, the future has a goblet of unknowable, chatting with this article to guard against.

In the commodity economy developed in the late Ming society, in order to prevent the social vulgar generation across this partition, the literati deliberately emphasize the taste of artifacts, especially color preference, to achieve the purpose of identity partition. In the narrative of *Superfluous Things*, the literati advocate a way of color preference, separating the characteristics of the literati from the hobbies of the social commoners, and eventually forming the characteristics of the literati's color preference.

First, antiquity and fashion.The reason why fashion is popular is because it is preferred by the general public. Fashionable things are always new, like new and hate the old for people's common sense. Contrary to the popularity of the good, Wen Zhenheng opposed to the secular fashion, that the world's things have elegant and secular points, the secular fashion for the vulgar. The *Superfluous Things* - utensils ":" people today do not have a wide range of knowledge, but also accustomed to see the fashion of the times, so that the elegant and vulgar indistinguishable. In the words of the literati, "vulgar" is often the most detestable disease. As the literati idol Su Dongpo cloud: "people thin can still fat, Shi vulgar can not be healed." "Ancient" in the vision of the literati, not only in appearance, but also in which the connotation of the precipitation of history and culture, deliberately do old and natural old, is obviously not the same. Literati advocate color preference on the old, for the living room houses, the late Yuan literati Tao Zongyi: "Vermilion Mansion called the Huayu can be, called the ancient not." For the instrument in the literary room piano, Wen Zhenheng said, the piano for the ancient musical instruments, although it can not be played, but also to prepare a, hanging on the wall. For the color of the piano, he advocated the old for the expensive. The *Superfluous Things*- apparatus ".

To the ancient zither over the years both long, the lacquer light recedes, grain such as plum blossoms, dull as ebony, play the sound is not heavy for the expensive.

Literati advocate of the old, in the community also caused great repercussions. Since the middle of the 16th century, "good old" from a personal preference, a potential privileged cultural activities, transformed into an important consumer behavior to maintain the status of the gentry. In the late Ming and Qing dynasties, if you do not do a "good old man", in the circle of the gentry is unacceptable.

Second, simple and gorgeous.

Splendid with a stronger visual impact, enough to please the eye, from the practical and utilitarian point of view, can be seen in the labor and cost, the secular people often love the splendid things.

Late Ming literati color preferences tend to pay more attention to simple things, "*Superfluous Things*- utensils": more specializing in gorgeous, the eye can not recognize the ancient, windows and cases, no rhyme and reason, and the extravagant statement of the furnishings, did not dare to lightly allow. In the view of the literati, gorgeous things, often lack of flavor, at a glance, it is difficult to have a plain and simple elegance. For example, made of white jade seal mud box, was a very good material, but the craftsmen at the time of the extreme carving of the work, the seal mud box up and down the carving of rolling chi dragons. Wen Zhenheng commented:

Nearly do the body even cover rolling chi dragon white jade seal pool, although exquisite work, but not the product.

Time-consuming and labor-intensive white jade seal pool, although enough to attract secular people, but not as high as the taste of the simple. Advocated by the literati, Suzhou in the late Ming period, the production of the literary room, such as the head of the Qing play, a few cases, beds and couches, nearly all of the rosewood, rosewood for the Shang, but also simple and not the carving.

The color preference of the literati for separating the common people tended to be plain and old-fashioned, while opposing fashion and splendor, which was specifically manifested in the gardens and utensils related to daily life. Suzhou Museum permanent "*Superfluous Things*", embodies the late Ming literati's aesthetic taste.



"*Superfluous Things Studyroom*", Suzhou Museum (Photo by Pan Wenxie)

Cultural Ideals

In the color narrative of "*Superfluous Things*", the literati's preference for "elegant and plain colors" is not only in the visual form to separate from the common taste, but also in the spiritual content of the color. "Elegant and plain colors" has the meaning of returning to simplicity, close to the "Tao", is the protagonist of the narrative of the physical and mental cultivation of the place, hosted the cultural ideals of the literati living in leisure.

From the Wei and Jin dynasties to the Yuan and Ming dynasties, the literati gradually formed a complementary lifestyle of Confucianism and Taoism, entering the court as "Confucianism" and returning to their homes as "Taoism". The literati searched for a life orientation that pursued spiritual transcendence and freedom of spirit, advocating to follow nature and to be in tune with the nature of things, and they sought spiritual transcendence from the realization and understanding of heaven and earth and nature. In the narrative of *Superfluous Things*, the garden where the literati lived has a special meaning, which fulfills the possibility of the literati's "Confucianism" and "Taoism": on the one hand, the literati, in the midst of their life in the court, created gardens with natural characteristics as their own seclusion, where they cultivated their body and mind, and where they could live in peace and harmony, and where they could live in peace. On the one hand, the literati, in the midst of the courtroom life, created a garden with natural characteristics as their hermitage, where they cultivated their body and mind, sent their love to the landscape, and achieved the ideal of "Tao"; on the other hand, they did not have to be far away from the courtroom and the bustling city, and accomplished the ideal of "Confucianism" that the literati "learnt from excellence", as in the Song Dynasty. On the other hand, he did not have to stay away from the imperial court and the bustling city to fulfill the Confucian ideal of the literati "to learn and to serve", as recorded in Su Shi's "Record of the Garden Pavilion of the Zhangs in Lingbi" in the Song Dynasty:

As Su Shi of the Song Dynasty wrote in his "Record of the Garden Pavilion of the Zhang Clan in Lingbi", his

descendants, when they opened the door and went out to work, stepped step by step above the city and the court; when they closed the door and went back to their hometowns, they looked down on the mountains and forests.

In terms of cultural ideals, as early as in the Wei and Jin Dynasties, the literati looked for the basis of their ideas in classical texts such as *Laozi*, *Zhuangzi* and Zhouyi, seeking a more profound source of existence than the "yin and yang" of the Han Dynasty. In their understanding of the Tao, the source of the universe, they explicitly rejected the yin, yang, and five elements as the source of all things, and emphasized that there is nothing that is more fundamental than the yin, yang, and five elements. During the Wei and Jin Dynasties, Xiang Xiu and Guo Xiang commented on "Zhuangzi - Zhi Beiyou":

Who is the one who gets the first thing? I take yin and yang as the first thing, and yin and yang is the so-called thing. Who is the first yin and yang? I take nature as the first, and nature is the self of things. I to the Tao as the first carry on, and to the Tao and even no also. Since there is no more, but also for the first? Then who is the first thing? And there are still things, no already, the natural nature of the Ming things, not there to make it also.

The general meaning of this passage is: the first thing may be yin and yang, but yin and yang is still a thing, the first thing may be nature, but nature itself is natural, if the source of all is the "supreme way", and the "supreme way" is the "supreme nothing", and the "supreme way" is the "supreme nothing". If the source of everything is the "supreme Tao", and the "supreme Tao" is the "supreme nothing", then "nothing" is the source of all things. According to Taoism, the essence of existence of all things is "nothing", and only "nothing" is the basis of everything. On this basis, the literati understanding of "nothing" has a threefold meaning, in the color pointing to the negation of the five colors, advocating light and elegant colors:

First, the nature of "nothing" is natural, negating the five colors.

Laozi: "five colors make the eyes blind, five sounds make the ears deaf, five flavors make the population cool, gallop and hunt make the heart crazy."" Wang Bi note: "Sharp, difference is also lost, lost the use of the mouth, so it is said to be sharp. The ears, eyes, mouth, heart, all follow their nature, not to follow the life, but to hurt nature, so it is deaf, blind, cool, crazy." In the Wei and Jin metaphysician Wang Bi's understanding, the use of color needs to comply with the nature of nature, excessive color instead of the natural nature of the eyes to watch.

"Five colors make the eyes blind," is "five colors" viewing did not follow the natural nature of viewing, but instead hurt nature, resulting in "blindness", and therefore also the negation of the Therefore, the "five colors" are negated.

Secondly, "nothing" is not absence, but a white background color.

"Nothing" is beyond words and images, nameless and invisible, but it is the "nothing" that can nurture all things in heaven and earth. As Tang Yutong "Wei Jin metaphysics flow of different briefly" pointed out: this "nothing" to the body, said "nothing", not the "nothing" of the "nothing". Because it is the fullness of the Tao, beyond words and images, nameless and invisible. Round square from the shape, and this invisible. In the understanding of "Tao" after the Wei and Jin dynasties, "nothing" is beyond words and images, nameless and invisible, but it is the "nothing" that can nurture all things in heaven and earth.

As far as color is concerned, plain white is the basis for the presentation of color, and color can only be presented on a plain white background.

Third, "nothing" is the source, the source of color is "black".

Laozi: "Everything under the sun is born in the existence, there is born in the absence." Wang Bi note: "All things under heaven, are born in the presence, the beginning of the presence, in the absence of the original, will want to have all, will be against the absence." Wang Bi's meaning is: the preservation of all tangible things requires the preservation of the root of all things, and the root of all things is "nothing". The five colors are the representatives

of many colors, if the five colors in the fundamental "nothing", the five colors of "nothing" point to where?

Ancient Chinese people had a different understanding of "black" from that of modern people. In the understanding of the ancients, "black" is to see the five colors before the visual color, that is, the five colors of "nothing" of the place.

"Black" oracle bone for  ,Jinwen for  , the mainstream view that the "black" character is the original meaning of the fire smoked into the color. Among them to Xu Shen's theory as a representative: "Shuowen - black": "black, the color of fire smoked also. It comes out from Yan. , the ancient character cong." Judging from the usage of the word "black" in the oracle bones, Mr. Yu Shenwu believes that "black" refers to the color of the animal's fur, and to the day-blindness of the darkness of the sun. The term "day blindness" refers to the darkness of daytime, and the ancients used the word "black" to describe this visual sensation. When the universe was in chaos, it was black. The Ch'u Pali Shu A depicts the primordial world as follows:

Dreaming and dreaming and inking, and dying and chaptering and pilgrimage. Every (obscure) water? ,Wind and Rain is on .....

The ancients believed that when the universe was not yet open, the world was blinded by obscurity and chaos, the world of Hundun, what the eyes can see can only be the day blindness before the dawn of the day, darkness. At the beginning of the emergence of the five colors, as in the case of day-blindness before dawn, it was the state of "blackness". Therefore, "black" is the source of the five colors, the state of color "nothing", which contains the five colors that will soon appear, and the literati regarded black as a revered color.

In the idle life of "Tao", the literati understood "nothing" as the source of all things, and denied the five colors in the color expression, and revered plain and black. In the color narrative of "Long Story", the denial of the five colors and the reverence for plain colors and black can be summarized as "elegant and plain colors".

The color preference of "elegant and plain" became the color characteristics of the literati garden. Powder walls and tiles, native wood grain, black and gray tiles composed of literati garden architecture "elegant" clean colors. Plain is the main tone, the main tone, there will be a little embellishment of the color, the formation of elegant and not monotonous color characteristics. Wen Zhenheng "*Superfluous Things - room hut*" emphasizes the door ring to "ancient green butterfly animal face, or the genus of the sky chicken Taotie, nailed to the top of the best, not with purple copper or iron, such as the old casting can also be used, yellow and white copper can not be used"; railings are "the top of the top of the persimmon, Zhu ornaments, in the vase with lotus leaves, green decorative "; the wall is "to get the wood such as beans for the nan and so on, gorgeous and elegant, not even with plain dye, or gold paint can also be". Not only in the residential garden, in the use of artifacts, can also literati "elegant color" preference.

In the *Superfluous Things* in the color narrative, "elegant color" is not only a taste proposition, from the root, embodies the literati on the "way" of understanding, but also the literati living in the cultural ideal. *Superfluous Things* - room hut - theory.

In a word, it is appropriate to make the image according to the formula, and it would be better to be ancient, simple, and frugal than vulgar, and it is also the nature of clean and elegance, which is not to be discussed by those who are forced to make explanations.

Conclusion

The *Superfluous Things* has been treated as a classic text of Chinese traditional design, carrying the spirit and taste of Chinese traditional design. In the color narrative of "*Superfluous Things* ", the protagonist of the narrative

is temporarily separated from the court, and has a different visual form from the court rituals of the five-color proposition; for the purpose of the separation strategy of vulgar taste, the literati are opposed to fashion and splendor in color, and advocate the antiquity and simplicity; not only that, the "*Superfluous Things* " describes the spirit of the protagonist's quest for the narrative, and the "elegant and plain" has the meaning of returning to the basics, which is close to the spirit and taste of Chinese traditional design. The "elegant and plain color" has the meaning of returning to the truth, which is close to the "Tao", and it is the place where the protagonist of the narrative cultivates his body and mind, which is the cultural ideal of the literati living in leisure.

Discussion on the Folk Custom Narrative Design of Ancestral Halls in Southeastern Hubei from the Perspective of Rural Revitalization

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Abstract

With the continuous advancement of urbanization, rural labor forces have begun to emigrate, and the cultural communication field has gradually fragmented. The issue of "people" has become an important issue in rural revitalization. Rural construction must not only pay attention to the living environment, but also focus on the cohesion of ideas. Nostalgia is the starting point for the revitalization of rural culture. Traditional culture such as clan, etiquette and customs are the spiritual sustenance of the villagers. Ancestral halls have a special historical and cultural background and have a special meaning in the hearts of the people. The extremely high status is a symbol of the local economic level and a representative of folk culture. On the basis of the repair, protection and rational utilization of the ancestral hall, it can be transformed into a publicity and display center by taking advantage of folk narratives, expanding art forms to display cultural connotations, enhancing villagers' sense of cultural identity and happiness, and injecting energy into rural revitalization.

Author keywords

Rural construction, Southeast Hubei ancestral hall, Folk custom, Narrative

The origin, development and continuation of ancestral halls

Ancestral hall is the ancestral hall of the clan. Clan is an important part of the traditional Chinese social structure. It uses the blood relationship of the same surname as a bond to maintain the relationship between clan members and form the internal cohesion of the clan. Clan, as a social organization, was born in the Yin and Shang Dynasties and further developed in the Ming and Qing Dynasties. Clan became commoner, and ordinary people could build ancestral halls and compile family trees. As the tribes multiplied, ancestral halls began to be built specifically. The construction of ancestral halls was an important symbol of clan organization. The ancestral halls had practical functions and functions. They were places for discussion, gathering, moral education, and dispute resolution. They were a reflection of reverence for nature and respect for ancestors.

The southeastern Hubei region was defined as "On the borders between the two kingdoms Wu and Chu" in ancient times, and is a regional culture based on the Chu culture and the exchange between the Central Plains and Huizhou culture. The ancestral halls in Southeast Hubei were influenced by geographic factors and the cultural migration of immigrants from Jiangxi and Hubei, which affected the development and evolution of rural settlements and gradually formed the three-tier structure of "ancestral halls - branch ancestral halls -

family ancestral halls". The change of dynasties brought about the culture of the Central Plains, people's beliefs changed, and sacrificial activities became one of the characteristics of folk activities, as well as the architectural decorations of the ancestral halls show the characteristics of farming culture, patriarchal culture, ritual culture, mapping the harmonious coexistence of man and nature, which is a concentrated manifestation of the Chinese worldview, outlook on life, and values. At present, the relatively well-preserved and concentrated clan temples in Southeast Hubei are mainly distributed in Daye City, Yangxin County, Tongshan County, Tongcheng County and other areas, which are also the preferred areas for large-scale migration movements in the Ming and Qing Dynasties. The protection and inheritance methods of the space of clan temples in Southeast Hubei are mainly three ways: cultural relics protection (see Figure 1), new construction or reconstruction of places (see Figure 2-3), and revitalization of existing resources, which are combined with aesthetic and humanistic values for space repair and protection, preserving architectural patterns, folk activities and other forms of expression, correctly dealing with the relationship between inheritance and innovation, and promoting the inheritance and preservation of folk cultures.



Figure 1. Tan Clan Ancestral Hall



Figure 2-3. Xiong's ancestral hall and its interior

Folklore Narrative and Cultural Inheritance of Clan Ancestral Halls in Southeastern Hubei

The basic concept of narrative is to tell stories about local culture. The form of narrative is a coherent form of expression and a state of human life. The entry of narratology into the field of academic research can be traced back to the late 1960s. The research objects are mainly literary works. There are two main periods in Western narratology, namely the classical narratology and the post-classical narratology periods. Both of them focus on the study of the time dimension, but ignores the importance of spatial dimensions. However, Roman Ingarden believed that time and space were inseparable. Until the 1980s, narratology research gradually shifted from the time dimension to the spatial dimension. Since the 1970s, Chinese scholars have carried out research on folk narratives and explored propositions such as folk narratives and folk narratives. Focusing on rural folk narratives, ancestral halls are representatives of folk culture. Folk culture is a custom formed over thousands of years. Folk

narratives are mainly produced by the combination of three forms of language narratives, ritual narratives and image narratives together. Inheriting the excellent traditional culture of Southeastern Hubei, the ancestral hall serves as a carrier of nostalgia and uses folk narrative forms to transform it into a publicity window, exhibition center and rural cultural exchange platform to meet the needs of development in the new era and promote the inheritance and development of rural historical and cultural memory.

Constructing and reshaping clan cultural symbols with the help of linguistic narratives

The unused space of ancestral halls is used to tell folk stories, myths and legends, and other linguistic narratives to disseminate local culture and knowledge.

Social spaces have been set up in accordance with the needs of the elderly and children left behind in villages, as well as those who have returned to their hometowns to start their own businesses. For example, ancestral halls are transformed into cultural halls, where various activities such as family traditions, policy propaganda, skills training and opera performances are carried out on a daily basis, so that the cultural halls can be formed into convenient settlement stations, allowing people to live and work in peace and contentment while passing on Chinese virtues and serving economic development. Idle space is transformed into a new space for entrepreneurship and innovation, a platform for cultural imprints is built, the cultural connotation of nostalgic emotions is excavated, the promotion of legendary stories and rural celebrities is increased, and symbolic landscape architecture is gradually formed.

In-depth excavation and revitalization of the stock of resources, the formation of special tourism cultural symbols and resources. The traditional festival of Daye City in Southeast Hubei has a history of more than 1, 000 years, and the festival has a unique emotion for the local people. In the legend, in order to remember the lord of the earth, the local people have the custom of making the seal poi, which is used to worship the lord of the earth, and the mould of the poi has the patterns of flowers and animals on it, and the legend says that if you eat the seal poi, the current year will be smooth and prosperous. Soil master will be held in Guiwan Liu ancestral temple, tour of the village schedule in accordance with the prescribed order of implementation, held folk dances, art creation and evaluation activities, attracted a lot of neighbouring tourists to participate in the local development of cultural tourism to provide historical and cultural resources.

The creation of a clan folklore museum and a season of events with the help of ritual act narratives

Tapping into ritual narrative forms such as festival celebrations and folk rituals, a sense of cultural identity is regained through ritual behaviour narratives.

In the countryside, "catching up with the market" is a folk custom in which people exchange goods at an agreed time, which varies from township to township and from time to time, and is a product of thousands of years of farming culture in China. Expanding the space of the ancestral hall according to local conditions, using the patio inside the ancestral hall for lighting (see Figure 4-5), controlling the width of the interior, and setting up shops and shops or free stalls, the village market provides a place for the crops produced by the townspeople to survive by promoting spatial reproduction through the space, the participants, and the practice of the activities and values together. By holding seasonal exhibition activity seasons and food bazaars, organizing diversified activities such as garden parties, continuing the traditional custom of catching up with the bazaar, and combining agricultural specialties and animal husbandry industries with special features in the countryside of Southeast Hubei, such as Dushan sweet corn and Chaoshan tea oil, to formulate brand IP , launching brand activities such as seasonal health recipes and food design festivals to experience rural regional culture.



Figure 4-5. The patio

Xiaotong Fei pointed out in "From the Soil-The Foundations of Chinese Society" that Chinese society is rural. As a symbol of the village spirit, the ancestral hall is a base for the display and teaching of folk customs. Folk customs display the lifestyle of villagers. The Bailong Festival Lantern Festival in Yanji Town, Ezhou City is an intangible heritage of China. According to records, the ancestors of the Yan family immigrated from Jiangxi to Yanji Town. The Yan family took the lead in holding an ancestor worship ceremony and making large-scale dragon lanterns to worship the dragon. After more than 400 years of inheritance and develop. Every year from the first day of the first lunar month to the eighteenth day of the first lunar month of the Chinese New Year, surrounding villages will meet up and the Bailong Festival team will parade in the surrounding villages. The process of making dragon lanterns is complicated, including carpenters, sewing workers, paper makers and other folk craftsmen. As the Ezhou Folk Culture Museum, Yan's Ancestral Hall sets up art workshop experience courses and cruise check-in points based on the Bailong Festival to attract tourists and promote the inheritance of intangible handicrafts and the development of rural culture.

Expanding the artistic expression of the image of the ancestral temple with the help of the narrative value of the image

Through ancestral portraits, architectural patterns, tattoos and other image narrative forms, the unique historical value of images is analyzed, and memory culture exhibition halls are constructed or improved to strengthen identity and enhance ethnic cohesion.

Ancestor portraits are derivatives of ancestor worship ceremonies, reflecting people's living beliefs and spirituality, and genealogy is also an important and precious material, recording the origin of the family and the trajectory of migration, but also includes family training, reproduction, marriage, poetry, etc. , with the help of graphic materials to set up different thematic exhibition halls, exhibition halls as an educational base, the opening of the vernacular Lecture Theatre, so that the participants will be inculcated to awaken a sense of belonging within the countryside to drive the revitalization of the countryside.

Compiling genealogies is a powerful way to strengthen cohesion, promoting the connection between people and people, and people and families, through continuous information and tracing the roots of the past. Genealogies contain many excellent traditional cultures, such as filial piety and respect for parents, neighbourly harmony, thrift and hard work, etc. , which influence the thoughts and behaviours of individuals, and have the value of moral edification and rural governance. With the rapid development of the times, genealogical repair needs to be modernized, intelligentized and digitized, and while inheriting the previous genealogy, it should also reflect the new characteristics of the times, such as changes in the format of preparation, content of inclusion, printing and packaging, etc. , so as to record and pass on the family's history, culture and values, and to help the clansmen understand their roots.

The architectural decoration of the ancestral hall in southeastern Hubei has profound aesthetic and humanistic values and carries national sentiments. Its themes include character stories, religious beliefs, natural scenery, and other contents, as well as geometric patterns, flowers, animals and other pattern decorations, all of which express the symbolism of the villagers' aspirations for a better life. Relying on the unique ecological and natural conditions and cultural deposits, it creates university research workstations, provides villages with development directions such as brand creation, village planning, rural governance and cultural tourism, and helps revitalize villages to carry out study trips and practical activities, and carries out work on tattoo collation, tattoo topography and design and reconstruction in workshops, and presents narratives in interactions.

Conclusion

In the construction of beautiful villages, not only are many aspects of economic and livelihood development involved, but rural culture and folklore are also an important part of it. Restorative renovation of ancestral halls has been carried out, drawing on tradition to revitalize internal vitality. On the one hand, it respects the will of villagers, mobilizes their participation, and promotes their spontaneous construction of their hometowns; on the other hand, it protects the farming cultural heritage, digs deep into the excellent humanistic spirit and ethical norms, and gives play to the role of moral edification to realize a good way of social governance in the countryside. Nostalgia is people's memory of their homes and folk skills, further excavating the existing folk cultural resources in the countryside, developing the rural cultural and creative industries, constantly carrying out creative transformation and giving connotations to the new era.

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Revitalization and Renewal of Historical Buildings : a Spatial Narration Perspective

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Abstract

Many historical structures are still at risk of being disregarded, demolished, or rebuilt because of a lack of spatial experience and cultural identity. Combines spatial narrative with the activation and renewal of historical buildings to analyze and summarize the characteristics of a spatial narrative of historical buildings, as well as the narrative eight expressions of historical buildings, including function, form, space, pathways, materials, details, scene, and atmosphere. We propose three fundamental principles for crafting narratives within historical architectural spaces: maintaining authenticity and continuity, balancing readability with perceptibility, and prioritizing integrity alongside adaptability. We aim to offer designers and the general public a fresh perspective and deeper comprehension of historic buildings, ultimately advocating for sustainable development.

Author keywords

spatial narrative; historical buildings; Revitalization; renewal

Introduction

Urban renewal has transitioned from incremental to stock as a result of the continuous development of society, and in response to the new social status quo, regeneration and remodeling have become the dominant themes. In the past, there appeared to be an adversarial relationship between old and new buildings, and ancient buildings were viewed as anachronistic urban structures. As people have come to value historical structures, however, the concept of protection, scope of protection, and protection methods have progressively improved, and the design approach of reuse has gradually applied to a broader range of social issues. People are progressively realizing that the overprotection of historic buildings undermines their viability and that many historic buildings are at risk of being neglected, demolished, or replaced due to their incapability to have a more significant public impact. Moreover, visitors do not acquire a profound historical memory and cultural infection after their visit, hindering the sustainable development of historic structures. As nonrenewable resources, historic buildings have distinct cultural and historical value and contain many cultural and historical information. Spatial narratives will provide a fresh perspective to view those and establish the relationship between people and space.

Historical architectural spatial narrative

Narrative can be realized as a process of communicating information through the use of language or some different mediums as a form of expression. Narratology arose in France in the late 1960s and was extensively used

in literature, cinema, music, and art in the 1980s. As a design method, the historical architectural space narrative concentrates not only on the material transformation of space but also on the non-material affective experience of individuals in the space.

Spaces are not only tangible entities but also full of meanings and stories influenced by history, culture, and the daily lives of their inhabitants (Norberg-Schulz, 2019). When we are in a space, the sensory experience of architecture is essential (Pallasmaa, 2012). The dimensions of the human experience of physical space include geographical, sensory, social, and interpersonal(Lentini & Decortis,2010). Cities, like buildings, are spatial structures, but at a large scale, a legible city, with its neighborhoods, landmarks, or roadways, should be readily recognizable and comprise full shape(Lynch, 1984). Historic locations have rich narratives that can be interpreted through landscapes that offer new interpretations of place, enhancing a sense of place and belonging (Khorasgani et al., 2023). Architecture is designed as a spatial narrative that can mediate the human understanding of the universe, humans, and architecture. The geometry and arrangement of buildings interact with the visual experience to produce meaning in the built environment (Psarra, 2009).

The characteristics of spatial narrative of historical buildings

Historical buildings carry cultural and social life in a certain period. Furthermore, some are crucial witnesses to societal change and progress. The spatial narrative of historical buildings is summarized as follows:

Dynamics of time and space

The architectural spatial narrative is a process of open participation, transforming the architectural environment into a type of organic activity space rather than a static place. When people stroll and appreciate these buildings, their sight will track the movement, accompanied by the experience of the spatial sequence and the passage of time; thus, in this process, the building, from a static entity, is transformed into a dynamic spatiotemporal body.

Narrative of daily life

Architecture, as spatial spaces, show traces of people's former lives. However, the spatial narrative of historical architecture consists of not only the narration of past events but also daily behavior, communication, and the interpretation of current events. It is the immaterial life events that constitute the content of the architectural spatial experience.

Symbolism of elements

Historic buildings are not only a combination of practicality and aesthetics but also the embodiment of culture, history, and social values. They can trigger memories and associations from the building to minor architectural elements. These metaphors are reflected in the design elements, materials, colors, and other aspects of architecture, conveying deeper layers of cultural and historical information.

Persistence of culture

As a part of the city's collective memory, historic buildings have the enduring qualities of history and culture. The functional forms of historical buildings may change as society develops, but their historical value will increase as time passes. It is a non-renewable resource that can reflect the historical and cultural features of real historical time to a certain extent.

Spatial Narrative Expressions of Historic Buildings

Architectural function and form

Reusing historical buildings is the transformation of current structures from the past to the present, and the old building space often loses its original function. As a result of the demand for new functions, architects must reorganize the old space. The primary focus of reuse will be balancing preserving the original structure's integrity

and continuity with adding the building's new functions and requirements.

The Neuws Museum in Berlin, built in 1841, was severely damaged during World War II in 1939, and David Chipperfield was commissioned to repair it in 1997. The building's most iconic central stairway was destroyed in an air strike. The bombardment also destroyed some famous frescoes, the Egyptian-themed atrium, and the large dome at the south end. Chippendale recreated the staircase initially designed by Friedrich August Stiller using concrete materials, basically unchanged in form. However, this was not a simplistic imitation but a clever use of new materials presented in a highly refined and summarized form. The architectural railings were replaced with marble, and the gripping areas were machine-polished to improve the touch feel.

Architectural space and paths

From the exterior to the interior of a building, the organization of the architectural path provides a clue to the spatial narrative. Architects consciously employ interweaving, juxtaposition, and dispersion strategies to arrange various spaces, thus creating architectural spatial narratives logically.The narrative fabric of architectural space can be divided into linear or non-linear. Linear narratives typically include a beginning, development, climax, and ending. This strategy is commonly employed in exhibition spaces, where visitors are guided through various immersive narrative spatial experiences. However, as subjects within the space, individuals can choose distinct paths. Therefore, multiple individuals can choose numerous spatial narrative experiences independently at any moment. Multiple narrative routes contribute to a diverse narrative experience, resulting in a non-linear narrative. In the Museo di Castelvecchio, designed by Carlo Scarpa, the Museum itself is also on exhibit in addition to the exhibitions displayed within the building. There are three paths within the Museum, one of which runs directly between the east and west structures. Another way begins at the Castle drawbridge, passes through the Castle's public gardens, and ends at the Museum's entrance, which is located in the Castle's outdoor space, where Scarpa has utilized several changes and dead-ends to allow the visitor to view the Museum from a variety of angles. There is also a path through the interior of the Museum that connects the buildings on the east and west sides of the bridge via transitions between indoor and outdoor stairs, staircases, and galleries.

Architectural materials and details

Color and material play a crucial part in architecture, and their combination with architectural space can enhance the spatial experience of architectural narrative. Colors can influence human perception, and various colors trigger distinct emotions in individuals. As the first new building on Berlin's Museum Island in nearly a century, James Simon Galerie chose a white color that contrasts with its surroundings to emphasize the contrast between the old and the new and to serve as an iconic addition to the facilities and functions of the surrounding old museums.

In addition, various materials, such as stone, stainless steel, and wood, show distinct properties. Using a single material can create a sense of unity and harmony, resulting in a more pure and straightforward form. When two distinct materials are juxtaposed, contrast and variation are produced, which improves the architectural layers and narrative. The Kolumba Museum, designed by Swiss architect Peter Zumthor, is located on the former site of the Kolumba Church. Originally a Gothic cathedral, it was destroyed by bombing during World War II. 1973 discovered Roman, Gothic, and Neolithic artifacts beneath this church. The architect wrapped all architectural remnants in one building. The exterior of the building comprises white-gray brickwork, a material that starkly contrasts with the color of the original structure. The juxtaposition of the two materials on the walls adjacent to the roadways on the south and west sides of the city resembles a work of art composed of stones from different periods.

Architectural Scenes and Atmosphere

The atmosphere of an architectural space is created by factors such as light, sound, and structures. Light is the

most effective at regulating emotions and the most immediate of all sensory experiences. The variation of light enhances the building's spatial experience. In Museo di Castelvecchio, Carlo Scarpa uses refraction, diffused reflection, and other techniques to connect light and architectural spaces and sculptures. These signals also function as guides for the viewers.

The first floor of the Kolumba Museum building, designed by Peter Zumthor, is the historical heritage exhibit. The hall is faintly illuminated with only a few hanging lamps, and light passes into the interior through the cracks in the brickwork. Individuals traverse the path as if they were directly experiencing archaeological digs. In addition to illumination, the designer has installed sound devices that enable visitors to hear doves. These sounds contribute to the total tranquility of the space.

The National Museum of Roman Art in Mérida was built on the ruins of an ancient Roman city. Architect Rafael Moneo believed the best way to coexist with the ruins was to construct the new structure using the same Roman building techniques. Therefore, Moneo adapted the Roman arch architectural construction method. These continuous arches formed a tall and orderly guide, accompanied by soft natural light, creating an extraordinarily solemn and dignified spiritual space. Moneo also extracted and recombined elements of classical Roman architecture, such as temples, theaters, and elevated aqueducts, to evoke memories of Rome.

Principles of spatial narrative of historical buildings

Authenticity and continuity

The spatial narrative of historical buildings needs to be rooted in history and tradition. On the one hand, it involves respecting the authenticity of historical architecture, which is not about imitation, restoration, or reconstruction but rather about understanding and honoring them and then seeking change and innovation. On the other hand, the development and evolution of architecture are based on past forms, spaces, technologies, and arts, resulting in a sense of continuity. Carlo Scarpa often used the method of contrasting the old and the new in his renovation. He did not use many of the same materials as the original building to achieve a unified style. Still, he used different materials to distinguish them, respecting the initial historical establishment and retaining its characteristics.

Readability and perceptibility

Based on narrative theory, architecture is viewed as readable, and this readability relies on the perception of architectural space. Architecture is not an isolated entity. It is closely connected to history, culture, cities, and the natural environment. The organization of various elements forms the foundation for spatial legibility and perceptibility. Historic buildings are not just nostalgic memories but part of an ongoing evolution. They place a greater emphasis on the interaction between people, architecture, and the environment. This interactivity allows visitors to gain emotional experiences from the buildings and establish connections with historical architecture.

Integrity and adaptability

In the 1950s and 1960s, numerous nations initiated large-scale modern urban renewal projects to clear up communities in older cities. Numerous historical architectural remnants were destroyed as a result of urban renewal. In the context of the economic recession in the 1970s, the reuse of historic buildings received government support, and many old district renovation projects emerged, which significantly promoted the economic and social development of traditional neighborhoods, such as Boston Quincy Market, Manhattan South Street Harbour, Sydney Rocks, and others.

Looking back on history, the preservation and utilization of historic buildings have progressively expanded from preserving individual structures to protecting complete historic districts and even urban areas. The revitalization and renewal of historic structures include not only the preservation of buildings but also the protection of space,

layout, landscape, and the surrounding environment. Increasingly, the reuse of historic buildings emphasizes their harmonious integration with the surrounding environment and their continuity and unity within the urban space. The revitalization of historic structures has also become an essential means of preserving the historical memory of a city, enhancing urban functions, boosting urban vitality, and fostering the revitalization of historic towns.

Conclusions

Historic buildings are the witnesses of the city's history and culture. With the development of the times, architects not only need to convey the cultural and historical value of such buildings but, more importantly, to make them truly "alive" so that the city's historical buildings can be revitalized to achieve sustainable development. At the same time, the revitalization and renewal of historic buildings is not only a kind of material, spatial transformation, but also pays more attention to people's non-material emotional experience in the space.

Exploring the revitalization and renewal of historic buildings based on the theory of spatial narrative is an effective way to enhance the 'authenticity and continuity,' 'readability and perceptibility,' and 'integrity and adaptability' of the spatial design of historic buildings. Using historical buildings as narrative containers, the form, space, and materials of the buildings are transformed into narrative media, which jointly construct and convey the narrative content and establish the connection between people and space. These elements come together to show the unique charm of historic buildings.

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"Reconfiguration·Activation" —The Ages-Oriented Design Of The Future Living Space

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Abstract

This With the advent of the post -epidemic era, there are a lot of great changes with people's working model, which means the environment of the intensive work before will gradually be eliminated by people. For example, people can earn a living from home offices, do online shopping, and receive online education, and etc. So it is undoubtedly difficult for them to deal with complex and diverse social problems in traditional living models. Living space plays an more important role in connecting people of all ages than ever, and the cultural nature, ecology, and artistic sense of which should also be paid more attention.

Author keywords

Authors' choice; Modularity; Living space; The ages-oriented design

Introduction

With the surge of the stock era, cities are facing a dynamic game between different fields, and the construction of future living space is based on the new approach of the renovation of old residential areas, which is common all over the country. While solving the original problems of the living space, a functional reconstruction and perfect reorganization are carried out to realize the activation of the space, so that it can more comprehensively meet the life needs and spiritual needs of different people. By getting out of the thinking limitations, we could study and judge the future of living space with new ideas and perspectives, and then create one that is intelligent, green, ecological, harmonious, humanistic, convenient and safe.

When we talk about old communities, we usually mention aging, which is a common problem in old communities. The exploration of the aging design of living spaces in old communities has now reached a certain level and is relatively complete. The design model proposed in this article discusses the space to break through the limitations of focusing only on the elderly as a single group. On the basis of adhering to aging, we should pay more attention to intergenerational integration, increase the compatibility consideration of the needs of children and middle generations, and focus on considering the differentiated needs of community residents caused by changes in the age structure and family structure of the community, so that the elderly can live in their original home. While aging in care, you can also feel the continued vitality of the community. The living models in the design include youth apartments, senior apartments, family apartment distribution patterns and a continuously

variable modular system within the apartments. On the basis of meeting the living space for each age, it reduces the use of the living environment by relatively vulnerable groups in the family. Difficulty, eliminate the barriers to use in daily life for this group of people, improve their participation in life, form a state of participation and interaction among all family members at the action level and spiritual level, and achieve harmony between people and their homes.

Diversification,interactivity, and sustainability

The design of residential space is a combination of "diversity, interactivity, and sustainability". The residents are original residents, merchants, tenants, elderly people, young people, etc. The family structure it faces is a full type of family structure from young families to elderly families, meeting the needs of all ages. In terms of housing types, it is generally divided into youth areas and elderly areas, and the two major areas are subdivided according to different age characteristics and needs, Having the characteristics of diversity; Secondly, each residential space is interconnected, forming a shared space in a small area. Different entertainment and interaction facilities are set up according to different age groups, and shared areas are also available for different ages. This achieves differentiation and unity between the same age group and different age groups, while increasing the commercial scope of youth life and alleviating the pessimistic and lost emotions of the elderly. Finally, the sustainability of residential space is mainly manifested in several aspects: latent variability, comprehensive sharing, and lifelong continuity. The family living space timely meets the various new living needs of family members, and the diversity and variability of indoor space can not only save real-time space, but also endow the space with multiple functions, thereby achieving the goal of meeting the living needs of two or more generations of people in the indoor space, and achieving the sustainable optimization goal of housing.

Modular design of living space

The four-story residential space design is a cycle, composed of two symmetrical "L"s, divided into two large units for young people and senior citizens. Each unit is composed of six identical blocks and is designed according to different age groups. Sky greenery surrounds the entire building, connecting a leisure platform and two activity spaces every four floors, fully embodying the concept of community sharing. Forming a four-layer cycle pattern that can be reproduced infinitely. The residential living space is divided into two major modules - the youth module and the elderly module. On the basis of satisfying the living space for each age, it also takes into account the diverse needs of family members. The types of units in different modules are also subdivided. Making the living space open to all ages also provides opportunities for close interaction between elderly residents and young residents, making up for the shortcomings of a single form of living in the community.

Youth module

The youth are an active group in society. Ideologically, young people have their own unique ideas and need social recognition of their beliefs and personalities. Therefore, residential design can be summarized into three principles: personalization, fun, and intelligence. However, there are uncertainties in the housing of young people. Some are on the rise in their jobs and do not earn much money, so they need to get a flatshare in the city; some have successful careers but do not get married yet, and they have requirements for the quality of life; some are young couples or already have children. What they need is a house that not only meets the needs of young people, but is also suitable for children to live in. So the entire youth module is divided into three types of apartments: youth apartments, bachelor apartments, and youth families.

The youth apartment is targeted at office workers who are just starting out in their careers and have an average

financial base. The area is not large, but the space is precisely designed to be composite, breaking the clear division of traditional living space and allowing the functions of different spaces to overlap and integrate with each other in order to maximize space and improve usage. Bachelor apartments are aimed at young people with a certain economic foundation. This type of young people have sentiment and requirements for quality of life. Therefore, the space adopts a smart home technology system to improve space convenience and look classy. In addition to the basic space settings, the functional layout also adds personalized layout such as courtyard, bar counter and art installation. In the design of young families, the beautiful vision of "sleeping upstairs and eating downstairs" is achieved, and a local second floor is established in the space. The separation allows young couples to get rare comfort from the tedious work while the children rest in the room. Not only the current living needs are considered, but also sufficient space for children's growth to achieve the unity of the needs of young couples and children.

Elderly module

In the elderly module, it is roughly divided into three types of apartments according to the different needs of the elderly of different ages: elderly apartments, caring apartments, and elderly families. In this module, the residents are middle-aged and elderly people, and the entire space is designed with the elderly in mind. People are the first priority, adhering to the principles of barrier-free, safe and aging-friendly. The apartment for the elderly is composed of two suites with shared leisure space which is suitable for the elderly with mobility. The caring apartment is prepared for the elderly without mobility, equipped with special accompanying facilities, barrier-free design and smart home technology system. Elderly families are elderly people who live with their children and increase family activity space; when designing traffic flow lines in the elderly module, emphasis is given to the barrier-free design of stairs, elevators and corridors, and a complete residential guide system is set up and color distinctions are made in special areas to facilitate the identification of the elderly. The space is personalized according to the needs of different residents, but the overall proportion of the space needs to avoid flat space which causes psychological discomfort for the elderly.

Conclusion

Through the conceptual design of future living space, we try to build a community living mode in a beautiful and utopian way. With the all-age design and residents’ life reconstruction, we also form a caring, sharing, inclusive and friendly living space. What’s more, we express the humanistic care and love of the space, shorten the distance between people, and create a perfect integration of the elderly and young people by functional narratives of different spaces.

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Design Narration and Research in the Decoration of Traditional Dwellings in Southeast Hubei Province

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Abstract

Architectural decoration is a very important part of building construction, which contains rich cultural content. There are a large number of traditional Ming and Qing Dynasty residential communities in Southeast Hubei, where the construction materials are mainly wood, stone and brick, and the carved decorative patterns on such buildings are diversified in subject matter and quantity. On the basis of field investigation of traditional villages and residential buildings in Yangxin County, a thousand-year-old county in Southeast Hubei, as well as the collection and generalization of actual measurements, literature and oral data, this paper selects the Kanjiatang Architectural Complex of Yangxin as a representative to organize and analyze the data of traditional residential decorations of the Southeast Hubei region in terms of narrative content, narrative structure, etc., and to expound on the spiritual and cultural connotations and ideological representations behind them.

Author keywords

Southeast Hubei Folk Dwellings; Architectural Decoration; Design Narrative

1.Introduction Decorations and Narrative Texts of Traditional Folk Dwellings in Southeast Hubei Province

The adornment in a building comprehensively reflects the characteristics of the building which can be said to be the essence of the house. The architectural decoration of the traditional village houses in Yangxin, which is covered between the vast and boundless mountains and waters of Southeast Hubei, is an important part of the residential buildings in Hubei, and both the rich families and the ordinary people will decorate their houses and buildings either in a complicated or simple way. Compared with the surrounding residential buildings in southeast Hubei, the architectural decoration of Yangxin folk houses is not as rich and exquisite as that in southern Anhui and northern Jiangxi, but the architectural decoration is still indispensable in the traditional village dwellings. Narratology was introduced to architecture in the 1980s, which refers to the literary narrative method to analyze architectural space, and explore the correlation between the spatial structure, elemental attributes, and semantic order of architecture, as well as its cultural connotations. Narratology was introduced to architecture in the 1980s, which refers to the literary narrative method to analyze architectural space, and explore the correlation between the spatial structure, elemental attributes, and semantic order of architecture, as well as its cultural connotations. A complete narrative consists of three main parts: the narrator, the narrative text, and the receiver. The narrator has multiple subjectivities. The receiver is mostly the user or the experiencer of the building, and the one perceives the cultural implication of the building in reading the architectural text.

2 .Narrative Exploration of Architectural Decoration--Taking Kanjiatang in Yangxin as an Example

2.1 Overview of the Narrator

Kanjiatang Ancient Village is located in Xiayong Village, Paishi Town, Yangxin County. Winding along the mountain highway in Paishi Town, and looking down from the top of the mountain, you will find such a simple and elegant architectural complex hidden at the foot of the mountain. To the north, there is a central mountain and a sitting mountain as a barrier, surrounded by two mountains, "Azura Dargon" and "White Tiger," on the left and right. In front of it, there is a river winding through, and in front of the water, there is a table mountain echoing the scenery. The site is located in the center of the mountains and water, with good fields and lush forests. There are two springs in the village, and the spring water winds around the village and passes through the old houses, meeting the needs of daily life. It is said in feng shui that "if there is a mountain spring flowing in front of the house, if it has a sweet taste, color and smell, does not dry up or overflow at any time of the year, and is cool in summer and warm in winter, then it is a good spring, and it is the main source of wealth and longevity". The rivers in this area are in line with the Feng Shui model of water selection. The site is located in the center of the mountains and water, with good fields and lush forests. There are two springs in the village, and the springs wind around the village and merge in front of the old house, meeting the needs of people's daily life. It is said in feng shui that "if there is a mountain spring flowing in front of the house, if it has a sweet taste, color and smell, does not dry up or overflow at any time of the year, and is cool in summer and warm in winter,then it is a good spring, and it is the main source of wealth and longevity". The rivers in this area are in line with the Feng Shui model of water selection.

2.2 Interpretation of Kanjatang Narrative Vocabulary Allegory

(1) Narrative Line 1 - Textual Straightforwardness

In the region of Southeast Hubei, the decoration of building entrances is very characteristic, which is expressed in the plaque and decoration of the door cap. There is a puddle in front of the big house of the Li family in Kanjiatang. When you look up, you can see the main gate with a green stone doorframe with the words "Pan Gu Qing Feng" on it, which means "indifferent to fame and fortune, and clean and honest family". The other two gates are slightly smaller, with the eight Chinese letters "Chong Yan Yu Xiu and Mi Ping Jin Xiu" written on them respectively. These eight words depict the building's surrounding environment, meaning that the ancient dwelling is on the valley and in the fields. Behind the house there are a lot of strange stone bamboo forests, a paradise in the world. After entering the main door of the ancient dwelling, you will see a stone plaque engraved with the words "Wang Long Lu Dong", which refers to the academy in ancient times, and the ancestors of the Li Clan expected their descendants to study hard and prosper their own family.

(2) Narrative Line 2 -- physical representation

It is also a common way to directly use animals, plants, utensils, and other physical objects in residential architectural decoration; these physical objects' symbolic meaning and extended meaning can be used to express emotions. For example, the lion, deer, crane, magpie, and other animals are often used as decorative themes, expressing a variety of themes; Lion Rolling Embroidery, Crane deer with spring, Magpie Ascending Plum Blossom, and others; Plants are used more than animals in decoration, such as pine, cypress, peach, plum, bamboo, plum, orchid, lotus, and others, the combination between them expresses a variety of meanings, such as the combination of pine, bamboo, and plum called " Three Friends in Cold Weather, "the combination of plum, orchid, bamboo, and chrysanthemum called "four gentlemen" and so on; Other utensils such as Qin, chess, calligraphy and painting, Bagua Furnace, More children wishing bottles and furniture can be combined to form a meaningful decorative picture.

In the Kan Jiatang Li Jia big house, there is a delicate wood carving decorated in the fitting room of a stage. Decorative patterns are dragon, phoenix, Kylin, cat, cattle and sheep, elephant, fish, and others, which contain a variety of meanings. Fish has the meaning of "may you always get more than you wish for, "fish giving birth" means " more children and grandchildren," Pisces implies abundance, prosperity "meaning; Kylin means "lucky son"; Most of these wood carvings are ubiquitous domestic animals, such as cattle, sheep, and others. When the Li family built the house, they expected the whole family to harvest every year, so the choice of decorative themes was mainly based on animals and plants.

(3) Narrative line 3 -- abstract pattern

It is also a common way of expression to make artistic processing of things in life and abstract them into pattern forms, and the original meaning of things is taken over or transformed by new pattern forms. For example, the image of various plants is often abstract as patterns used in architectural decoration, such as fish scales, coins, wishful, and other abstract patterns. These abstract patterns, through the process of artistic re-creation, often make their meaning and their aesthetic significance heavier.

The partition pane at the entrance of the main door of Li's big house is transformed from the abstract pattern of coins, and the door and window pattern are integrated with the interior decoration, which can be seen as a whole. Two main construction methods are used in Li's big house: plate door and partition door. Plate door has a robust preventive function and is primarily used in the government's front door. Many kinds of partitions, delicate and beautiful production, are primarily used for indoor and outdoor houses. The types of Windows are more diverse. In Li's big house, the common ones are straight edge Windows, simple pattern Windows, and cumbersome flower Windows.

(4) Narrative Line 4 -- painting under the eaves

Traditional residential houses also have their own unique architectural culture inheritance genes. As the decorative details of the traditional houses in southeast Hubei Province, the rational decorative parts and clever composition, rich theme expression, clever decorative patterns, regular color combination, and artistic conception charm, rigorous drawing steps and techniques are important factors to reflect the regional culture of the traditional houses in southeast Hubei Province. The decoration of traditional residential houses in southeast Hubei generally pays attention to the economic and aesthetic painting under the Ebeling, which reflects the aesthetic pursuit of the people in the house decoration and the rational choice of adapting to local conditions.

The traditional residential eaves painting in southeast Hubei mainly uses five colors: blue, red, white, black, and yellow. The painting under the eaves of the Li family courtyard is mainly based on auspicious patterns with black and white as the primary color, and the combination of ink and watercolor painting is the secondary decoration. The color is attached to the shape of the decorative graphics and is unified in the division area of the composition and modeling line. Black and white colors combine the relationship between the picture and the bottom, and a small number of elegant colors render and embellish the part. It has the characteristics of traditional Chinese ink painting of "using ink to show color, using color to help ink, blending ink and ink," highlighting the cultural connotation of the architecture of Jiangxi and Anhui. For example, the ink painting under the eaves of residential houses in Yangxin County is elegant and divided into three levels in overlapping. They draw the ruyi pattern, bat moire pattern, plum, orchid, bamboo, and chrysanthemum from top to bottom in the Chizi frame. The contrast between the black-and-white picture and the bottom is very sharp. The pine and cypress in the Wanhe green pine picture on the wall and eaves are tall and graceful, presenting the light beauty of an excellent ink blend and producing a simple and elegant artistic conception charm between black and white.

3.Conclusion

When people appreciate decoration, they are often attracted by its gorgeous appearance, and few people understand the meaning of multiple decorations. This paper compares architectural decoration to the vocabulary of narrative text to understand and convey its spiritual connotation. The study of residential building decoration in southeast Hubei should constantly adapt to the development of today's society. With narrative text as the entry point and cultural context, this paper studies architectural decoration to fully excavate the connotation of architectural decoration and bring users deeper feelings.We should pay attention to the traditional architectural decoration left over from history, carry forward its guiding significance for the protection and development of today's social culture, and provide new ideas and methods for studying traditional architectural decoration in the future.



Figure 1: Aerial view of the Li family house



Figure 2: Environment of the Li Family House site



Figure 3: Doorway Text Decoration



Figure 4: Wood carving physical decoration



Figure 5: Abstract pane decoration

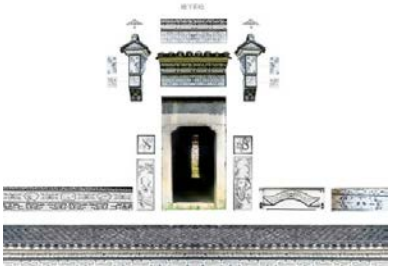

Figure 6: Painted decoration under eaves

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The Narrative Expression of Regional Culture in Rural Complex Design in Jingyang Town, Jianshi County

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Abstract

At present, China’ s villages are facing the crisis of disintegration of traditional villages，and the concept of "homogenization" to rural construction has resulted in the cultural distortion of "all the villages are the same". Based on this, it is urgent to strengthen the inheritance of rural cultural values and rebuild the memory of traditional villages. Taking Jingyang Town as an example, this paper takes the development of rural culture as the starting point, attempts to effectively deconstruct the characteristics of regional culture from the perspective of narratology, and explores what kind of forms should be adopted to reflect the narrative design of rural complex. At the same time, it is hoped that the theme of "narratives of love" will be integrated into the design, and serve the people with design.

Author keywords

Regional culture; narrative; rural complex; Jingyang Town

Introduction

In recent years, based on the implementation of China's rural revitalization strategy and the upsurge of rural complex construction, rural public space is facing great challenges, and the inheritance of folk culture has gradually exposed many problems. Narrative design refers to artistic design and creation based on narratology theory.(Zhang, 1988) It takes narrative as the theme to explore the possibility of design, and expresses the connotation and significance of design works to audience in the form of storytelling. (Wu, 2003) Therefore, the author integrates narrative thinking into the design of rural complex in Jingyang Town to stimulate the spark of regional cultural elements and modern development, to build emotional resonance between people and design, and to convey the spiritual connotation of regional culture.

The relationship between narrative design and regional cultural symbols

Symbols carry meanings and are indispensable part of narrative works. Narrative design carries regional cultural symbols which are externalized through narrative design. As early as the 1950s, the Ulm School of Design introduced semiotics into product design. Narrative design is based on design symbols, and consists of three elements: narrator, narrative works and receiver. Designers play the role of narrator, create design symbols, and express narrative works with functions, forms and materials to convey "the content of stories", see Figure1.

It aims to build a bridge of communication and exchange, and arouse the audience's feelings, memories and associations, and then form a perception and understanding of historical features, humanistic spirit and self-experience.

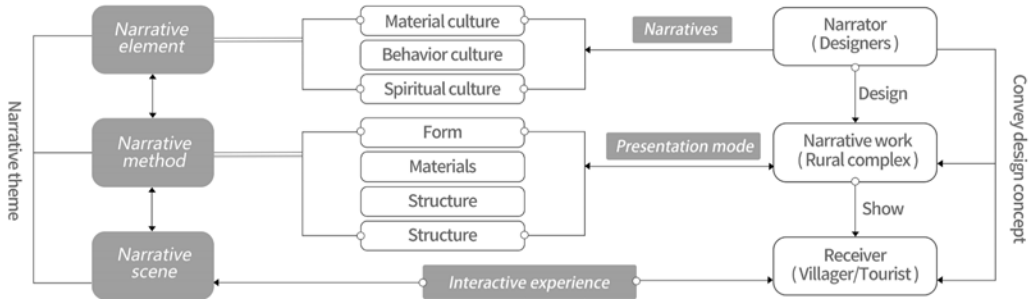

Figure 1. the construture of narrative design.

The narrative design elements of regional cultural symbols

Narrative design is a design method that integrates many fators such as design object, purpose and limitation in a narrative way, including redefinning the connection and position between factors to havec innovative design.(Zheng, 2014) In the long-term development of Jingyang Town, the rural public space in this area has accumulated rich regional culture. Through the field investigation, the author found that many of Jingyang' s regional cultural symbols are recognizable, research-oriented and different. Thus ,it means that Jingyang Town is an independent thing that carries stories. It can summarize three categories, namely, material cultural narrative elements, behavioral cultural narrative elements and spiritual cultural narrative elements, see Figure 2.

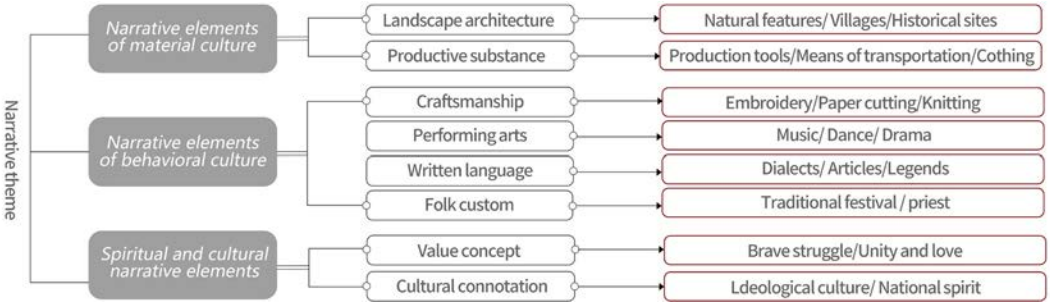

Figure 2. the abstract of regional cultural symbol.

The Narrative Demonstration of Regional Cultural Symbols in the Design of Jingyang Town Rural Complex

Describing Regional Symbols through Architectural Form

Symbols, the means by which humans understand objects, serve as carriers of human memory. It is through symbols that people can engage in activities such as communication and dissemination. Regional culture, on the other hand, represents the symbolic social expression of a specific social group or individual's memory. Therefore, the initial design of the Jingyang Town Rural Complex incorporates elements from the Tujia ethnic group's regional folk song Dragon Boat Tune abstracting the form of the "dragon". It cleverly echoes the element of the "clear river" and achieves a developmental and dialectical unity. Finally, through dynamic natural curves, the architectural form appears like a dynamic landscape painting from the exterior.

Narrating the Genius Loci through Regional Building Materials

Although the Suzhou Museum designed by Mr. Ieoh Ming Pei is a modern commemorative building, it has preserved many traditional symbols and elements, exuding a unique Jiangnan cultural atmosphere. At this point, it is not just a simple "architectural design" but rather an organic integration of the material applicability and decoration under the premise of inheriting local features, and expressing its cultural symbols. Therefore, this project uses locally abundant tortoise-shell bamboo as the main material for roofs and interiors. Its strong plasticity, ease of installation, and lightweight volume contribute to the overall visual system, see Figure 3. In the combination and weaving of bamboo, techniques such as "twisting" extracted from local Jingyang regional bamboo weaving are used to achieve multiple experiences in terms of functionality, aesthetics, and emotions, see Figure 4.



Figure 3.Model of Jingyang Town Rural Complex.

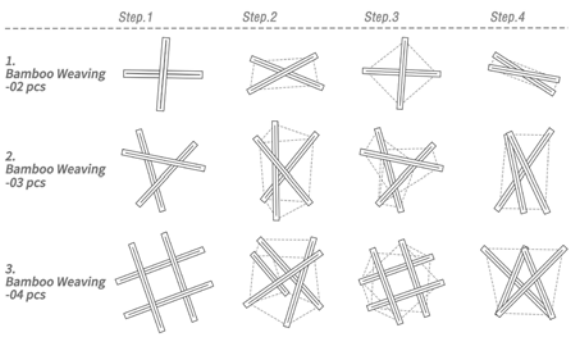

Figure 4, Bamboo weaving process.

Demonstrating Regional Connections through Traditional Tujia Structures

Narrating architectural spatial structures requires the direct participation of users and experiential interests through interaction, which should be applied to the design of modern rural spaces. Currently, in the construction process of the Jingyang Town Rural Complex, the construction form of "stilted houses" from traditional Tujia regional architecture will be reproduced, combining traditional ethnic structures with modern structures to adapt to the site's topographical requirements. This gives the entire rural complex a sense of spatial beauty. Since the site is a waterside slope, the building blocks are extended outward to ensure the rhythm of the architectural form and provide a shade for people, creating a cooling and shading environment. This allows the residents of the rural area to live in bamboo houses with a sense of coming home, enhancing the recognizability of the architectural structure and the overall architectural appearance.

Showing the Natural Foundation through Landscape Nodes

Frank Lloyd Wright advocates in the An Organic Architecture that architectural elements should be extracted from and integrated into the environment (Rattenbury, 2004). Therefore, architectural forms should not be viewed in isolation; instead, architecture and landscape should be seen as a whole. In the design of the rural complex, architecture is regarded as a continuation of the natural landscape, giving it a landscape corridor that connects the mountainous terrain and mitigates the architectural height difference. By using this landscape corridor, the overall integrity and connectivity of the landscape on both sides of the riverbank are enhanced, maintaining its "momentum" and strengthening its "form" extension, allowing tourists and villagers to freely move inside and outside the buildings, aided by the terrain and slopes, see Figure 5.



Figure 5. Jingyang Town Rural Complex Design Illustration.

Conclusion

This paper has summarized and synthesized the regional culture of Jingyang Town, Jianshi County, Enshi City, Hubei Province from the perspective of regional cultural space reconstruction, combining narrative design to construct a rural complex design that integrates "space-experience-emotion". This not only provides a practical case for the integration of regional culture in rural complex design but also offers a valuable reference for the development of traditional villages across China.

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Vision, Body, and Movement: A Narrative Study of the Corridor Space in Traditional Chinese Gardens

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Abstract

Narratology first appeared in the study of literature and film structure. With the maturity of architectural phenomenology theory, the "narrative" of space has become an important approach to studying the relationship between architecture and the subject. The knowledge, emotions, and intentions of traditional Chinese classical garden designers are greatly reflected, often forming spatial relationships with natural and architectural elements. This article starts from the perspective of "narrative" and explores the relationship between the subject's vision, physical movement, perception, and behavior to explore the connection and influence of the physical space of traditional gardens on the experiential activities of tourists. Using the theories of behavior, space, vision, and plot in film studies, analyze the "narrative" ontological value brought by the garden hall corridor space to experiential activities, and construct the context and significance of the spirit of traditional garden space places.

Author keywords

space narrative; traditional garden space; spatial experience; Perception; physical act

Introduction

"Narrative "was first applied as a design method in architectural design in the early 1980s. Bernard Tschumi combined spatial experience, place time dimensions, and interdisciplinary concepts into the design of architecture, landscape, and urban spaces. Qu mi understood the activities of different characters in the space as continuously occurring fragmented and interrelated storylines, By expanding a specific event to connect various spatial nodes, architecture, like movies, can introduce form, function, and narrative 'events', becoming an art of time and space. Wu Duan believes that architectural space constructs our perception and cognition through such diversity and narrative, and it is integrated with our perception and thinking as a scene. (Wu Duan, 2021) Studying the perception of space and analyzing its significance has also become a way to study the ontology of architectural space. Architectural phenomenologist Sigfried Giedion proposed the concept of "space time" as the core element of architecture.(Sigfried Giedion, 2014) Norbert Schulz's theory of place spirit focuses on the perception of people and the environment, (Norbert Schulz, 2010)and Medeau-Ponty focuses on architectural space and physical movement, perception The relationship between behaviors.(Medeau-Ponty, 1945)The physical architectural space can analyze the connection and influence between three-dimensional space and people from visual dimensions, motion dimensions, and perceptual dimensions.

Mr. Tong Jun is one of the pioneers of modern Chinese garden theory research. In his "Garden Theory", he pointed out that "the intention of garden design in the East is to simulate nature through the hills and valleys

of Lin Ting, and to approach the illusion". (Tong Jun, 1973) "Illusion" is the purpose of narrative experience in garden space. Lu Shaoming believes that while constructing material space, it is necessary to construct the deep semantics of space, and the core characteristics of narrative are logicality and literariness. (Lu Shaoming, 2010) In the 1930s and 1950s, architects such as Liu Dunzhen and Tong Jun conducted surveying and mapping research on classical gardens, which led to the introduction of the spatial concept of modern architecture into the study of traditional garden art. Since the Tang and Song dynasties, the construction of literati gardens has been aimed at catering to the emotions, tastes, experiences, and knowledge of the literati class, condensing their yearning for mountains, rivers, and valleys, secluding from the mountains and forests, and staying away from the secular world. Therefore, it is not enough to study traditional gardens solely from the perspective of traditional rational architecture. It is necessary to start with the knowledge, emotions, and intentions of the gardeners, and study the literary connotations and aesthetic feelings conveyed by traditional gardens through the narrative significance conveyed by the interior space.

1.The Interest of "Visuality" and "Perception"

The narrative nature of Chinese garden landscapes first appeared in the fifth century AD. During the Wei and Jin dynasties, the aristocratic families regarded garden construction as a way to "embody the Tao" and "clarify the ambiguous image", and integrated their cultural literacy and aesthetic taste into the garden. Since its emergence, traditional Chinese gardens have determined to be different from Western natural landscape gardens, with the aim of combining dynamic and static tourism, integrating the knowledge, emotions, and intentions of the gardener, forming an aesthetic image of "viewing the big while the small". Mr. Chen Congzhou believes in his book "Shuo Yuan" that gardens can be divided into "dynamic observation" and "static observation". "What is static observation? It is a viewing point in the garden that allows visitors to stop more, and dynamic observation requires a longer sightseeing route." Small gardens mainly focus on static observation, supplemented by dynamic observation, while large gardens mainly focus on dynamic observation, supplemented by static observation.

The architectural space inside gardens often serves the main purpose of gathering literati, living, and receiving visitors, but another important function is to guide the itinerary of the garden. The "hall" and "hall" are often the main buildings of the entire park, such as the "Yuanxiang Hall" in the Humble Administrator's Garden and the "Five Peaks Immortal Hall" in the Lingering Garden. The "corridor" has a strong spatial guidance in gardens, which can both meander and be staggered in height. For example, the double corridor of Canglang Pavilion connects the internal and external spaces, connecting the main residential buildings such as "Mingdao Hall" and "Qingxiang Hall", as well as the external spaces of "Mianshui Pavilion" and "Fish Watching Place", and can also vary in height with the ups and downs of the mountain. [Figure 1] The architectural space in traditional gardens is "timeless, endless" and a "flowing space" that integrates time and space. The visual experience of "stillness" and "movement" occurs within the flowing architectural space, and "stillness" is also a part of movement. Scenic spots are ingeniously designed stopping spaces by gardeners, often composed of architectural spaces such as halls, pavilions, pavilions, pavilions, and pavilions.



Figure 1. Analysis of the Visual and Motion Route of Canglang Pavilion Architecture Space

The beauty of gardens lies in how to skillfully use the "scenery". The scenery is divided into internal and external scenes, and the external scenes often use borrowed scenery, while the internal scenes combine the scenery, frame scenery, and infiltration to connect the mountain and forest scenery with human vision. The garden is based on scenery, and the scenery is different from the garden. All visual and perceptual perception experiences within the garden are based on "scenery", and architectural space is the main carrier for connecting vision and perception. Zhang Yonghe believes that "... if the architecture of the Lingyuan Garden is described as spatial, it ignores the way space is recognized: movement. Perhaps it is more accurate to say that the Lingyuan Garden is a building of experience. The experience of time and space..." Although the Lingyuan Garden has undergone several changes in spatial pattern in history, the layout of the current reserved space from the entrance north to the "Qingfengchi Pavilion" and west to the "Mingse Tower" combines dynamic and static, alternating light and dark. At "Gu Mu Jiao Ke", there are two tourist routes: one leads from "Qu Xi Lou" - "Xi Lou" - "Wu Feng Xian Guan" to the living area of the garden owner, and the other leads from "Lvyin" - "Mingse Lou" - "Han Bi Shan Fang" to the central mountain forest landscape area. The front space is an enclosed space, with flower windows installed on the wall facing the central mountain forest landscape, allowing the "scenery" to be visually connected to people through the windows on the wall in advance.

In addition to visual perception, human perception of architecture and space can also increase the sense of experience through hearing, touch, and taste. Zhou Ling believes that architecture can more comprehensively reflect human perception and reflect the significance of phenomenology, and the body plays a significant role in architectural phenomenology. Visual experience is the first way to appreciate gardens, while other dimensions of perception enrich the spatiotemporal experience of gardens. Light, sound, temperature, and smell can render the garden space into an "emotional" space.

2.Director of Physical Movement Behavior as a Spatial Narrative

Film art often uses "space" as a form of ontology to convey the story plot and render emotions. "Space" is also a material carrier for the relationship between movie characters and subjects in continuous film shots. Space often plays the following roles in movies: (1) Different plots occur in the same space, such as in director Hou Xiaoxian's

"TheCityofSadness", which uses the same spatial background of the Lin family's restaurant to suggest the instability of the Lin family by reducing the number of daily diners. (2) Space reflects the emotions and emotions of the subject, such as Yang Dechang's use of indoor space in "AOneandaTwo" and "TaipeiStory" to combine light, layout, and character positioning to reflect the emotions of contradiction, unease, and anxiety within the subject. (3) The physical encounter between multiple subjects in the space, as depicted in Wong Kar wai's "IntheMood forLove", uses corners and narrow stairs to arrange the encounter between the male and female protagonists while walking, reflecting the change in their relationship from unfamiliar to familiar through spatial relationships. [Figure 3]



Figure 2. The Role of Space in the Narrative Plot of a Film

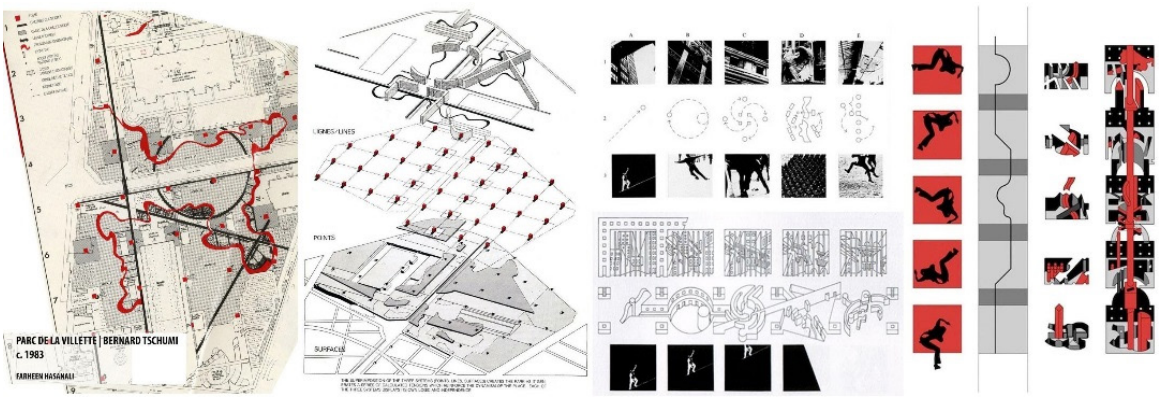

Figure 3. schematic diagram of the floor plan of Paris Lavillet Park designed by Bernard Tschumi

Lu Shaoming believes in traditional Chinese gardens that "... designers arrange the display of objects/scenes in material space through narrative methods, and visitors perceive the relationship between material space and narrative themes through the spatial relationship of objects/scenes, constructing the potential meaning of objects and places in spatial and visual relationships." Narrative space refers to a material spatial entity that conveys narrative functions, And spatial narrative is a dynamic behavior, which refers to the use of physical space as a way of narrating the story, and the two are different.

2.1 The cinematic nature of garden space

The narrative of architectural space can express the physical and perceptual perception of one or more appreciative subjects within the physical material space like a movie. In the layout of Villette Park, Bernard Chumi

did not design a fixed sightseeing route, but rather each subject received a different individual experience. After the Ming and Qing dynasties, traditional Chinese gardens deviated from the natural garden characteristics of the Tang and Song dynasties, which were sparse and simple, and instead moved towards high-density, with the meticulous architectural space becoming the characteristic of gardens. The various shaped flower windows and leaking windows on the left wall of Suzhou Lingering Garden connect the central mountain forest scenery with the main body visually. This kind of vision cannot provide a panoramic view of the mountain and forest scenery, but as the body moves forward, the continuous window leakage prompts the subject to appreciate visual images such as "Haopu Pavilion", "Hanbi Mountain House", and "Xiaopenglai" from different angles. These images can form a complete picture of the mountain and forest scenery in the mind. Cinematic nature can be seen as the "ontological attribute" of garden architectural space here, where the visual, perceptual, and physical guidance of the space prompts the subject to focus on a linear continuous experience.

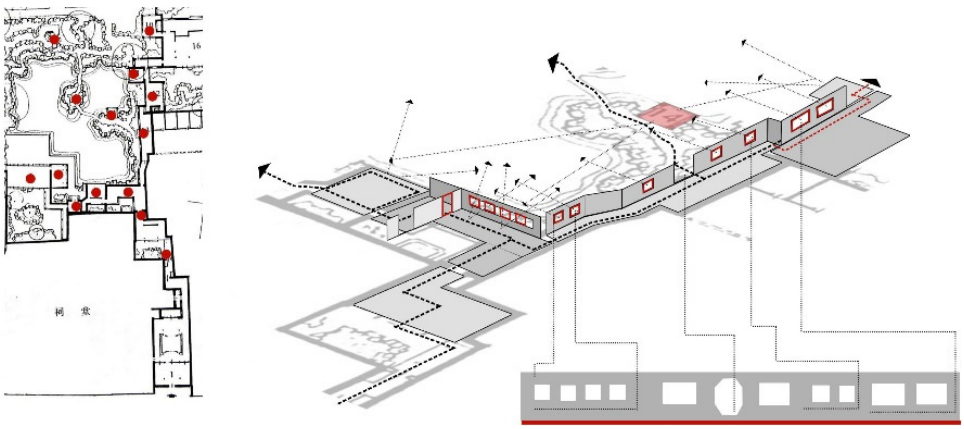

Figure 4.The activity flow and visual schematic of the central architectural hall corridor space in front of the Lingering Garden

2.2 Physical Movement and Perception in Garden Space

Ming Dynasty Ji Cheng wrote in "Yuanye": "By borrowing scenery, the most important thing in the forest garden... However, the charm of the material situation, the focus of the eyes and the heart, seems to be in the beginning of the pen, and the description of the common people is complete."The space of a garden is not only about individual body wandering, but also focuses on the integration of emotions and imagination. The mountains, paths, and plants in the garden can also form interrelated spatial clues. Like the "Bayin Creek" in Wuxi Jichang Garden, the gardener creates a visual image of forest, spring, and ravines, and also introduces perceptual elements such as sound, light, and terrain.

2.3 Main body interaction within the garden space

The architectural space inside the garden not only serves as a material carrier for connecting places, but also serves as an area for subject interaction. More behaviors and interesting stories between people occur in the architectural space. There are ways to create a place environment between garden buildings, such as setting the scenery, height, and shading, and the main body standing in the building is influenced by the architectural space, thus forming the interaction between the main bodies of the places. The corridor system in the Humble Administrator's Garden not only connects important buildings, but also forms a transitional, high-low, and primary form with the relationship between the places, creating an interesting interactive experience for the subject.

Conclusion

From an epistemological perspective, traditional Chinese gardens have long been analyzed based on architectural theories. Starting from the older generation of architects such as Liu Dunzhen and Tong Jun, architectural surveying and spatial theory have become the primary means of studying gardens. Tong Jun once said, "Without flowers, plants, and trees, a garden becomes a garden." In recent years, spatial topology and phenomenology have also been introduced into the study of gardens. It seems that scholars have equated "architecture" with "gardens", while neglecting the visual, perceptual, story, physical movement, and spatial experiential connections of gardens. In the preface of "Southeast Garden Villa", Wang Shu believes that the garden "just for pleasure" should be regarded as a constantly changing and living material entity, in order to understand the emotional significance behind literati garden space across time and space.

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Research on the application of regional culture into urban renewal from the perspective of spatial narrative

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Abstract

From the perspective of spatial narrative, this paper explores the application of regional culture into urban renewal, emphasizes the spatial elements of narrative, the continuation of time and regional expression, selects domestic and foreign characteristic case studies, and discusses the application value of spatial narrative in urban development from both theoretical and practical aspects. Create places and Spaces with narrative to continue the historical context of the city, seek ways to protect and inherit the regional scenes of the city, so as to promote the emotional resonance between people and the city, and provide a new era exploration path for urban renewal.

Author keywords

spatial narrative ; regional culture ; cultural context ; urban renewal

Introduction

The large-scale demolition and construction under the rapid process of the city has weakened the connection between the urban texture and the continuation of the context. Many buildings and landscapes with regional characteristics are facing a lack of vitality in the process of urban renewal, and are gradually consumed by the torrent of time. The texture of traditional Chinese cities presents a state of fragmentation, distortion and heterogeneity. It is no longer a balanced texture with continuity and balance. Instead, it is replaced by standardized and homogeneous architecture and space design. This situation not only loses the diversity and regionality of the city, but also leads to the ambiguity of regional culture and the fracture of the historical context of the city. In this context, spatial narrative is considered to be a powerful tool and research method. It can continue the timeliness through the narrative function, suture the breaking point between the old city and the new city, and repair the cultural context of the city.

The correlation between spatial narrative and regional culture

The concept and elements of spatial narrative

The origin of narratology comes from Aristotle.With the post-modern trend of thought and structuralism, narratology began to communicate interdisciplinary and completed the spatial turn at the end of the 20 th century. Spatial narrative uses space to express the practical activities in narrative narrative, and uses space as a carrier to show narrative behavior. The two elements of time and space in the spatial narrative are a unified whole. The narrative in the architectural field actually solidifies the experience of time, behavior and movement into a spatial expression[1].The narrative space has three elements: narrator, medium and receiver.

The narrator gives the main line of spatial narrative through the media, so that the receiver can complete the benign interaction in the visit. Narrative space has four elements: the first is the theme, through the form of space design to convey the core concept; the second is the plot, which clarifies the goals and conflicts, and answers the conflicts and problems designed in the story line with a reasonable ending as the climax and turning point; increase the diversity of space to create a medium, the narrator through the media for information reception and reconstruction, to achieve benign expression and creation, return to the design itself, to enhance the sense of spatial hierarchy.

The characteristics and significance of regional culture

Regional culture carries the historical inheritance and memory protection of a city, and is a measure of urban development and progress. Regional culture can activate the source force and promote the prosperity of cultural industry and creative economy, and it is of great significance and value to integrate regional culture into urban renewal. Regional cultural architecture is a regional architecture that undertakes the function of public education, is the crystallization and carrier of culture in a homogeneous region, is the record of The Times and history, and is an important place for the public to acquire knowledge and culture, with dual characteristics of regional and cultural[2]. The origin and development of regional culture are complex and diversified, which are influenced by many factors such as geography, history, humanity and society. It is not only the expression of the identity of residents in a specific region, but also the result of the joint efforts and creation of various social groups, reflecting the interaction and common experience of people and the environment.

The interaction between spatial narrative and regional culture

Regional architecture is the epitome of urban history, and its protection and restoration is the most direct and effective way to protect urban culture and seek urban context, among which the representative theories include dynamic protection theory, urban organic renewal theory, urban media contact theory, etc.[3]. As one of the evidences of historical narration, regional cultural architecture not only accommodates a complex historical structure, but is more spatial than the historical narration recorded in words. It expresses and disseminates regional culture through spatial narration, and expresses the story and memory of regional culture through multiple elements. Regional culture influences the development direction and image shaping of the city through spatial narration, and can also stimulate the innovation and inheritance of regional culture and update the image of regional culture. Therefore, the combination of spatial narrative and regional culture in urban renewal has important application value.

Analysis of the application of regional culture based on spatial narrative theory Through the design of layout, architectural form and sequence, the narrative space presents the meaning and value of regional culture to the audience in a specific and intuitive way. There are five kinds of narrative spatial order: narrative, flashback, episodic narration, broken narration and jump narration, which create narrative experience through different layout and sequence. At home and abroad, there are different cognition on the use of spatial narrative. Eastern aesthetics advocates the Oriental thought of the unity of heaven and man, and emphasizes the perception of situation and the resonance of emotion. The West advocates cognitive thinking, humanistic care, and rational practical design carried by material space.

Spatial narrative

Spatial narrative refers to the construction of spatial scenes, which gradually unfolds in a continuous and orderly space. Sequence and coherence are its core characteristics, emphasizing the interactive relationship

between space and narrative. Palaces and religious Spaces typically use spatial narrative techniques, with halls, courtyards, corridors and domes all on the main axis, and the layout and spatial sequence of the entire building are designed to present the cultural heritage and narrative experience of the building in a logical and coherent way. For example, the layout of the Forbidden City in China is symmetrically arranged along the central axis, and the organic combination of courtyards and buildings forms a layered spatial structure that creates an orderly narrative experience and shows the majesty of the palace and the steadiness of power.

This design approach also helps guide participants to better understand and appreciate art works, while highlighting the integration and interaction of architecture and art.

Spatial flashback

Spatial flashback refers to advance the important space scenes that can reflect the architectural narrative theme to the front of the narrative plot line, create spatial suspense, and increase the shock and attraction of the space. The facade of the Sagrada Familia designed by Antoni Gaudi shows a gradual tightening and decreasing form from the bottom to the top, which makes the top structure more slender and delicate than the bottom structure. After entering the interior of the building, you can see tall columns and curved vaults, and the space gradually Narrows and Narrows from the bottom to the top. The key space with spatial tension and shock is presented in front of the experiencers at the beginning of the building, so that the receiver has a feeling of climbing upward against the force of gravity, and the emotion of experiencing constantly changes with the scaling of the space.

Spatial interjection

The concept of spatial episodic theory was first put forward by French literary theorist Jean Porte, who defined spatial episodic theory as a narrative method that interleaved, interleaved and interleaved different spatial elements, scenes or environments, breaking through the boundaries of traditional linear narrative and simultaneously leaping and interleaved to show multiple plots of stories. Suzhou gardens usually adopt the technique of spatial interjection: scattered scenic spots form spatial interjection by means of separation, perspective, reflection and other design means. Metaphorical and symbolic Spaces embody the Oriental narrative to walk in the garden. Walls and hidden Spaces experience different views and emotions in a non-linear way. The way of cross-jumping creates a unique narrative experience, which triggers them to think and interpret space and plot more deeply.

Spatial disarticulation

Spatial discontinuity introduces discontinuity, fault or discontinuity into the space to make the story plot full of drama and mystery, or separates the continuous space scene into two broken Spaces to create a sense of breaking through the traditional linear flow. The wall next to Tadao Ando's Church of the Water enclocles and blocks the space, and the trees close together create a relatively narrow path. The path has certain guidance and suggestion, and the path is suddenly opened through the way of turning, and the narrow and broad form a conflict. Similarly, another of his works, the Himeji Museum of Literature, uses a abruptly ending aerial gallery to incorporate natural landscapes into the building's interior Spaces, inspiring conflicting psychological associations. The application of spatial narration in spatial sequence can create plot conflicts, sublimate the theme of spatial narration, and stimulate the audience 's curiosity and desire to explore.

Spatial jump description

The space jump narration guides the visitors' experience emotion and also switches constantly with the jump of

the space scene. Spatial flashback can also refer to the "memory" of architecture, triggering people's memories through architectural elements based on memory and experience. As a classic representative of Wuhan 's Lifen architecture, Xian 'anfang has been transformed and improved for several years and has become a ' new business card ' of Hankou 's historical area. The internal roads of Xian 'anfang are Y-shaped, and the interpenetration of large and small alleys has formed a staggered layout. As a combination of Shikumen architecture carrying a hundred years of history and the trend of the times, it injects multiple artistic and cultural plates to show a more complex and diverse urban life form. Through the combination of unique architectural and artistic installations, emotions form a spatial jump with the line of sight. The collision of old and new cultures allows visitors to shuttle back and forth between the ups and downs of a hundred years ago and the innovation of the new era.

Strategies and ating regional culture into urban renewal

Design principles and value

The design of integrating regional culture into narrative space embodies the collision between traditional architectural style and modern design, adapts to the development of modern design context in an appropriate way, and explores a reasonable way to prevent the disappearance of national art. Adhering to the ecological principle of coexistence between man and nature[4], through the continuous superposition of memory, thought and emotion, the meaning construction is re-constructed. The reappearance scene is the correlation between the material environment and the scene in memory. Based on the modern design and social function requirements, the spatial sequence and function of regional culture are re-combed from the perspective of spatial narrative. On the basis of inheriting regional culture, regeneration and innovation can better understand and appreciate the value and significance of regional culture. Following the historical elements in regional culture and the art form of architecture, the narrative features precipitated after the baptism of time are divided into four aspects: historical features, media features, artistic features and humanistic leisure features[5]. On this basis, the multi-level social and cultural connotation of narrative space is created. Through the implantation of the event theme and plot and the creation of narrative context, the restoration design of the regional cultural space with important value is carried out. The wisdom is created for the integration of the parts that fall behind The Times, the new space is shaped, and the humanistic care is jointly created to continue the regional cultural spirit and historical context. Complete the development of the traditional living state in the real sense[6].

Apply strategies and methods

Spatial narration lies in the concept of human behavior and consciousness, considering the sequence of space and the relationship between primary and secondary, and using different spatial designs as the carrier. Taking the urban scale as the boundary, the application strategy is developed through three levels: the macro level involves the overall presentation of the urban background; The middle level focuses on the interweaving of cultural elements inside the city; The micro level focuses on the integration of individual experience and urban culture. In 1990, the concept of "landscape city" proposed by Qian Xuesen contains the traditional Chinese view of natural landscape and the philosophical view of the unity of nature and man. Mountain, water, city and literature are the core of "landscape city", and the exploration of integrating narrative techniques in traditional landscape art into the design of "landscape city" is a process of combining and selecting its essence[7]. Middle-view level: Wu Liangyong searched for the lost Oriental traditional wisdom in the History of Human Settlements in China, and concluded that the basis of human settlements planning and design lies in the concept, soil, layout, construction, and landscape[8], so that it can shine a new light in the construction of human settlements in urban renewal. At the micro level, take Wuhan as an example, the ecological concept of "showing off the mountain" is in line with

the logic of the narrative link, and the snake mountain once wrapped in buildings reproduces the magnificent scenery of "turtle and snake locking the great river", reshaping the natural characteristics of the region and forming a blue-green landscape ecology.

The narrator should combine the planning policy, excavate the cultural context, set the narrative structure skillfully, and improve the form of urban renewal and artistic integration. For example, the urban night scene lighting causes a lot of light pollution, the color of the natural environment is occupied by the industrial color, and the color application in the construction field is chaotic, which makes the urban color homogeneity. The ancient city of Rome with orange yellow and orange red as the main color retains the afterglow of the ancient Roman Empire; Xuzhou, China, takes "Longteng yellow" and "green jade green" as the two representative colors of the city, extending the cultural context, covering green mountains and clear waters. The art uses the design method of spatial narration to integrate regional culture into urban renewal. From the three aspects of space structure, style shaping and artistic conception creation, it uses modern thinking methods to translate the ancient people's cognition and attitude towards harmonious living between man and nature in traditional Chinese landscape art, and explores the urban environment with national cultural characteristics.

Conclusion

Narrative Space Narrative Space narrative is not just about telling stories, but through design and planning, translating past memories, history and culture into visible and tangible spatial elements. By giving space a narrative dimension, we can establish a link between the past and the present, between people and the environment in the city. Create a narrative place and space in the city, excavate regional culture and spatial characteristics, integrate narrative language, improve the coherence and integrity of urban development, create design elements such as conflict, contradiction, exaggeration, suspense and imagination, and display narrative nodes to guide the audience to experience and continue historical memory. The purpose of the study is to explore useful theoretical and practical guidance for urban planning and cultural protection, to explore the value and significance of creating space by using the characteristics of spatial narrative, to reshape the regional culture of the city, to improve the management mechanism, to strengthen the public 's identity and sense of belonging, to inherit the local development of characteristic cities and to explore new strategies for the coordinated development of innovation.

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A Study on the Renewal Strategies of Tujia Bazaars in Ethnic Areas

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Abstract

With the rapid development of the social economy, the Tujia bazaar is facing unprecedented challenges, and the study takes the Tujia bazaar in ethnic areas as the object. The study takes the Tujia bazaar in ethnic areas as the object. By sorting out the generative logic and diversified causes of the bazaar. Relying on fieldwork and typology, we classify Tujia bazaars into three categories: modern, integrated, and traditional, and carry out a multidimensional analysis of Tujia bazaars in ethnic areas from the macro level: covering the ecological environment, the living environment, and the economic environment. Based on this in-depth analysis of the advantages and dilemmas of the bazaar, a new model of Tujia bazaar based on resource advantages, oriented by cultural heritage and based on regional folklore is proposed, aiming at the protection and inheritance of the Tujia culture and at the same time, realizing the economic prosperity and modernization of the bazaar, and opening up a new way of thinking about the sustainable development of the Tujia bazaar in the ethnic areas.

Author keywords

Ethnic areas; Tujia bazaar; Classification construction; Renewal strategy

Introduction

The concept of "bazaar" can be traced back to the ancient primitive period, "Zhou Yi", "in the middle of the day for the countryside bazaar, to the people of the world, gather the world's goods, trading and retreat, each gets what they want". After thousands of years of development and change, the Tujia people have bred many countryside fairs, which, as a place of local material exchange and crowd gathering, carry the unique functions of ethnic exchange and folklore activities. In addition, under the comprehensive effects of economy, geography, culture, and history, the bazaar has gradually formed the cultural compatibility, economic intercommunication and integration, and emotional memory of the place, which is an important object to recognize the rural development of the Tujia people. However, with the rapid advance of "urbanization" and rapid socio-economic development, the Tujia market is facing the challenges of the times, exposing the characteristics of "homogenization" and "marginalization". Gradually replaced by a thousand modern commercial spaces. With this comes the loss of folk culture and the passing of common national memories.General Secretary Xi Jinping put forward in the report of the 20th National Congress: "comprehensively build a socialist modernized country, the most arduous and burdensome task is still in the countryside, and solidly promote the revitalization of rural industries, talents, culture, ecology and organization"as an important exploration in the development process of China. The bazaar in ethnic areas carries unique economic, social, political, and cultural functions, which is the key to promoting the development of regional villages and the basis of rural economic development, the

inevitable choice in the context of the times. Based on this, this paper will explore a bazaar economy to build the basis of the commonwealth, bazaar innovation to promote the development of industrial prosperity, and bazaar culture to cast the national consciousness of the Tujia bazaar.

1.The Generative Logic of Tujia Bazaars in Ethnic Areas

1.1 Ethnic migration: conditions for the creation of bazaars

The generation of the bazaar is in the process of ethnic migration, with people, materials, and culture as the core subject-object basis, and its content is based on the lifestyle, ethnic relations, and historical and cultural contexts formed by the spread. Influenced by a combination of multiple factors, the bazaar is driven by morphological changes and cultural pluralism.

On the one hand, in the development of the Tujia bazaar, ethnic migration and exchanges acted as an important driving force. It made the single bazaar closely connected with other regions, broke through the limitation of geographic space, established contact with the outside, and absorbed more diversified cultures. Since the evolution of culture is closely related to the change of habitat, the bazaar takes on a new form as it adapts to the new living environment. On the other hand, the rules of trade operation in Tujia bazaars also play a key role, and historically, the frequent migration of people and the inclusive cultural system in Southwest Eurasia have facilitated the interactive development of bazaars.The progressive population migration makes the Tujia bazaar play an important role in the development of the local society.

1.2 Ethnic exchanges: the generative dynamics of the bazaar

The bazaar is a multi-level platform for communication and interaction, covering a wide range of economic, cultural, social, psychological, and emotional areas. Such interaction not only facilitates the circulation of goods and culture but also stabilizes the social order, making the bazaar a vibrant place.

Economic exchange is one of the most basic functions of the bazaar. Through the circulation and exchange of materials, people's spiritual and cultural life can be supported. Historically, the Silk Road and the Tea and Horse Road connected different regions and nationalitie[[]]. brought various commodities, and promoted the prosperity of the bazaar. The bazaar is also a place for the exchange of living habits, which is also influenced by specific material conditions. The circulation of goods from different regions not only provided the necessities of life but also shaped local lifestyles and folklore. Traded goods played a key role in meeting the needs of local people and promoted the transmission and development of related traditional skills. The intermingling of cultures also played an important role in the bazaar. Trade flows brought immigrants and caravans from different regions to the bazaar, facilitating the collision and fusion of different cultures. This cultural fusion is a process of conscious choice and adaptation that becomes part of local knowledge.

The formation of bazaar culture requires the integration of material and cultural factors in the practice of life. As a platform for economic exchange, it must meet people's basic production and living needs. The development of bazaar folklore is driven by the use of cultural integration, reflecting the characteristics of the bazaar in adapting to the spatial and temporal structure of economic exchanges.

2.Classification construction and development of Tujia bazaar discernment

2.1 Classification and multidimensional study of Tujia bazaars

The bazaar is the most characteristic existence in rural society with an irreplaceable social integration function, which is both an organic whole and an extremely complex system. Therefore, the research on the Tujia rural bazaar needs to be all-round and multi-level, utilizing the existing natural foundation and settlement formations and other elements of the Tujia region, and rationally configuring the core elements to activate the Tujia bazaar and building a new type of sustainable bazaar, so that it can drive itself to form internal and external cycles.

Using the field survey method to investigate the different levels of development presented by the Tujia bazaars in ethnic areas due to historical development, geographic conditions, and other factors, the bazaars are categorized into three types according to the typology: (1) Modern-type countryside bazaars. The bazaar meets the needs of modern society and has a high level of management. (2) Integrated rural market. The bazaar has both traditional features and modern management, but the development is still in a state of dependence and retains part of the traditional culture. (3) Traditional Village Markets. The bazaar retains historical and cultural features, and folk culture is well protected, but generally lacks modernized spatial management.

Due to the complex spatial environment of Tujia bazaar, it is analyzed from multi-dimension, combing the key points in the content of Tujia bazaar, categorizing and integrating the researches from different perspectives, forming the measurements of the elements of nature, settlement, industry and culture, and the three parts from the macro level as the target elements of the Tujia bazaar: the ecological environment, the living environment, and the economic environment. The ecological environment dimension includes: natural ecology, geographic features, and resource types; the living environment dimension includes: material culture and non-material culture; and the economic environment dimension includes: economic conditions and industry distribution. A comprehensive analysis relying on the above three dimensions is conducive to the realization of the reference standards for the sustainable development of Tujia bazaars, so as to provide differentiated protection and inheritance, optimization and transformation renewal strategies for the problems existing in different types of Tujia bazaars.

2.2 Strengths and Dilemmas of Diversified Tujia Bazaars

The ecological environment of modern-type bazaars is at an intermediate level, with relative trends in the living and economic environments. Although the unified planning of policies and a favorable geographic environment provide potential for the development of bazaars, the folk culture and physical space of some bazaars are gradually disappearing as modernization continues. The study found that these bazaars are no longer just a place for trading agricultural products and transferring surplus and shortages, but have been transformed to a greater extent into "mobile shopping malls" for the sale of external commodities to the countryside. The impact of modernization has led to the enhancement of internal and external links between the bazaars, the diversification of commodity trading methods, and the rapid development of tertiary and new industries, which have provided a basis for the modernization and transformation of the bazaars. The rapid development of the tertiary industry and new industries provided the basis for the modernization and transformation of the market. However, the invasion of multiculturalism and modern capital, the popularization of Internet e-commerce, and the emergence of new business models have had a great impact on the traditional bazaar space, local folklore, and special crafts. The rapid rise of supermarkets, shopping centers, and other commercial bodies has led to the abandonment of market spaces and the gradual decline of folk culture. Government management has become the dominant force, with spatial planning leading the way and foreign capital intervening rapidly, gradually replacing the long-established rural bazaars.

The living and economic environments of the integration type of bazaars are at a medium level, while the ecological environment is relatively more prominent. Relying on the advantages of the ecological environment and appropriate policy planning, this type of bazaar has driven the development of the more disadvantaged living environment and economic environment. The advantages of these bazaars are reflected in their good ecological environment, rich humanistic tourism resources, and the fact that the traditional streets, landscapes, and buildings in the bazaars have changed from the old to the new, meeting the needs of modernization, making them suitable for the development of "eco-tourism", which attracts tourists to the bazaars to search for their nostalgia and to experience the peaceful and beautiful countryside scenery. However, due to the lack of understanding of the unique value of the traditional market space, the formation of "standardized" modern construction and similar style of the "new market". At the same time, the irrational planning of bazaars has transformed the core function of the original space for commerce and trade.

The ecological environment of the traditional type of bazaar is at a medium level, with a relative trend in the living and economic environments. This type of bazaar has limited internal and external economic trade due to its geomorphology, transportation, and location, but it has been able to continue its social culture and folk customs. The socialization function of this kind of bazaar is outstanding, forming the "bazaar culture circle"[[]] with Hubei ethnic areas as the core and the social culture and interaction in the bazaar can be continued, and its development influences the production and life of the villagers and the exchange and dissemination of the ethnic cultures, which is the epitome of the "diversified and integrated pattern" of the ethnic cultures. The development of the bazaar affects the production and life of the villagers and the exchange and dissemination of ethnic cultures, epitomizing the "pluralistic and integrated pattern" of ethnic culture. However, due to the low population density, relatively backward economic development, traditional thinking restricts people's actions, local villagers are difficult to completely detach from the land to survive, the skill level is generally not high, hindering large-scale, specialized production, the level of economic development declined, and a large number of people go out to work to meet the needs of life, the bazaar is gradually showing the phenomenon of "emptying the buildings". The phenomenon of "empty buildings" has gradually emerged.

3.Renewal Strategies for the New Tujia Bazaar

With the continuous development of society, the face of the countryside has undergone a great transformation, and the bazaar, as a place in the countryside with both traditional cultural heritage and modernized society, economy, and culture, is still facing many outstanding problems under the impact of the wave of development in the new era. In today's increasingly diversified consumption mode, the traditional bazaar will inevitably go into decline, for the construction of a new type of rural bazaar, it should be rooted in the history and culture to shape the bazaar place in line with the style of the times. Therefore, this paper studies the renewal strategy of Tujia Bazaar in a "dynamic and vivid" way.

3.1 Diversification Path: Tujia Bazaar Based on Resource Advantages

Due to the differences in mountain and water terrain and local resources and production content, gave birth to ecological forests, tea and fruit economic forests, and anti-seasonal vegetables, such as the main characteristics of agriculture, promote the formation of local handicrafts, relying on the ecological and cultural resources of the local tourism industry, the resource advantage into a development advantage, and effectively promote the integration of the ethnic areas, the development of the great. For different types of Tujia market, corresponding

matching industrial resource advantages, empowering "digital +" "tourism +" "industry +". Among them, the integration type utilizes the natural environment and resource advantages to vigorously develop "ecotourism" and "summer vacation economy"; the traditional type relies on the characteristic agricultural industry to link the county economic network to feed the bazaar space; the modern type through the "Pendulum Dance" and "Daughter's Club"; and the modern type through the "Pendulum Dance" and "Daughter's Club". The modern type integrates "cultural experience" into the "market economy" through folk cultural activities such as the "Pendulum Dance" and "Daughters' Meeting"[[]]., realizing the following The innovative mode of "market economy + folk festival + cultural tourism" of the new Tujia market, and exploring the diversified development path oriented by resource advantages.

3.2 Modernization strategy: cultural heritage-oriented Tujia bazaar

The activation of marketplaces requires modernization by local conditions. The modernization of the bazaar space is promoted through the two complementary modes of "reconstruction" and "renewal". To address the problems of narrow space, low environmental quality, and loss of regional culture in the existing bazaar, the modern bazaar space form is translated and reproduced from the traditional Tujia wooden structure "footstools"[[]] , and different changes in the space and internal combination patterns are considered to connect with the original bazaar, providing high-quality space for the residents in the surrounding area. For the Tujia bazaars that still have historical and cultural spaces, the main focus is on protective renewal, and the wooden features of the Tujia hammock are used to renew the bazaars. Taking the bazaar culture and regional culture as the background, taking the Tujia ethnic characteristics as the spatial elements, "using the bazaar to string business, using the bazaar to bring culture"[[]], excavating the regional cultural kernel, utilizing the real historical background and material space to string the tour routes, and converting the general bazaar place into a place with educational, experiential and exhibition functions, through the implantation of functions, optimization of the landscape, and increase of supporting facilities and services. Through function implantation, landscape optimization, and the addition of supporting facilities and services, the general marketplace will be transformed into a new type of marketplace with educational, experiential, and exhibition functions.

3.3 Specialized approach to revitalization: Tujia bazaar with regional folklore as a cornerstone

The mutual collision and fusion of cultures have produced a unique regional culture, but due to the lack of awareness of the protection and discovery of folklore and traditional culture in the process of modern construction, the bazaar space has lost its existing cultural characteristics. Nowadays, the reconstruction of spatial form can be based on the main theme of local cultural contents such as production mode, local food, a national icon, etc., with historical buildings and characteristic streets as the bearing space, and shaping diversified nodes of bazaar space, localization of supporting facilities in the bazaar space, planning of cultural activities in the bazaar and updating of compound functions of the bazaar space as the specific practical methods, with the full cooperation of professionals from the fields of planning, architecture, landscape, and other environments, as well as from the fields of aesthetics and folklore. With the cooperation of planning, architecture, landscape, and other environmental fields, as well as aesthetics, folklore, and other professionals, the Tujia Bazaar has inherited its regional characteristics shaped its image and built the Tujia Bazaar as a platform for displaying its regional culture, which is a differentiated barrier from the thousands of villages and thousands of commercial bodies.

Conclusion

The complex and diverse system within the Tujia bazaar as a material carrier makes it impossible to view its

development only from an isolated perspective. On the contrary, it reflects the common problems faced by rural bazaars in many ethnic areas in the process of modernization. Therefore, the study is not only of great significance to the transformation of Tujia bazaars but also can provide a useful reference for the development of new bazaars in other ethnic regions. Through systematic analysis, it is recognized that the bazaar is not only an economic space but also a carrier of cultural inheritance, social exchange, and ecological development. While promoting the development of Tujia bazaar, we need to pay attention to the protection and inheritance of national culture, maintain local characteristics, and promote cultural integration between different nationalities. With the development of modern technology, the implantation of digital means will further enhance the management of Tujia bazaars and energize their development. Government support is also crucial to promote the prosperity of the bazaar through the establishment of a favorable policy environment and regulatory system for the development of the bazaar. As young designers nowadays, we should not limit ourselves to the original reproduction of the traditional bazaar but should carry out renewal strategies with a more dynamic mindset to better protect and pass on the Tujia bazaar and open up new paths for its sustainable development.

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Text perception effect design based on 3D urban space

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Abstract

Computer science technologies such as VR and meta-verse technology have greatly promoted the expression and types of information visualization in 3D space. As one of the conventional information visualization, text visualization has also been innovated and has made great progress. Nowadays modern information visualization results pay more attention to human perception and human-computer interaction than ever before. The psychological definition of perception is the physical information of stimuli received by the human brain through its receptors. The senses are the physical systems responsible for receiving specific physical stimuli and converting them into elector-chemical information that can be understood by the human brain. This paper uses 3D urban space as the carrier to study the design and application of text perception effect, aiming to optimize the expression of 3D urban space text visualization and improve human perception.

Author keywords

Perception; space narrative design; 3D urban space; human-computer interaction

Introduction

Information visualization has witnessed huge changes in past decades, among which using text to represent information is one of the key research topic. Text perception effect in 3D urban space can be used in many domains as industry designs, navigation systems, training systems and tutoring purposes etc to better assist the design and application of related programs. However perception itself is quite abstract and subjective. Therefore, how to use a proper method to design the perception effect for texts in 3D space is interesting and worth working.

Related work

Perception refers to the process of recognizing, interpreting, and organizing sensory information in order to understand and make sense of the world around us (Alnejem, 2023). It involves the brain receiving and processing sensory stimuli such as seeing, hearing, tasting, smelling, and touching, and then interpreting and giving meaning to these stimuli. Perception is subjective and can be influenced by various factors, including our past experiences, cultural background, beliefs, and expectations (Zhu, 2023). It plays a crucial role in our daily lives, as it helps us navigate and interact with our environment. Visual perception plays an important role in the design process of an effective visualization result (Zhong, 2020). The key point is to study and understand the human perceptual dimensions and then map data to the final visualization result in a way that

dependent perceptive variables can be separately perceived and processed (Friedhoff, 2000).
Research on human perception conducted by psychologists and neuron-scientists has advanced enormously during the past years. Text visualization is a type of data visualization. In previous years, methods to visualize 2D texts are timeline, bar chart, pie chart, flow map, histogram, flowchart, tag/word cloud, social networks, box-plot, star plot, tree-map, head-map. Figure 1 demonstrates an example of a 'word cloud'.

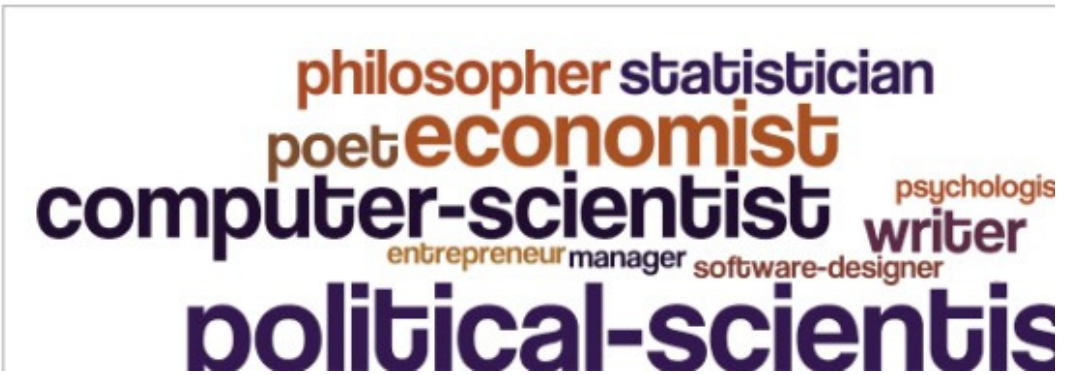

Figure 1. An example of word cloud (Nualart-Vilaplana, 2014)

We use many of these methods to represent information in our daily lives. With the development of computer science, these methods are gradually extended to 3D space. The 3D urban space serves as an environment where most human activities take place in the virtual world, therefore many works focus on the text perception design based on such 3d urban space such as the 3D-Berlin project illustrated in figure 2.



Figure 2. The 3D-berlin project (https://3d-berlin.com/en/start/, accessed 1stSeptember, 2023)

In order to realize the text visualization in 3D urban space, there are many critical problems as: How to process abundant information in 3D urban space? How to deal with the problem of displaying texts in 3D urban space? How can we improve users' experiences of interacting with text information in 3D urban space? All these contribute to the problem of how to design and optimize the perception effect of text in 3D urban space.

Perception design

Perception model

For different representation forms of information, different perceptive factors can be chosen, such as (Pan, 2013) chose different rendering styles for buildings to generate different perceptive effects of buildings. We need to choose some perceptive factors for texts so that we can differentiate them in 3D urban space. (Ware 2004) proposed a 3-stage model of perception as illustrated in figure 3 below:

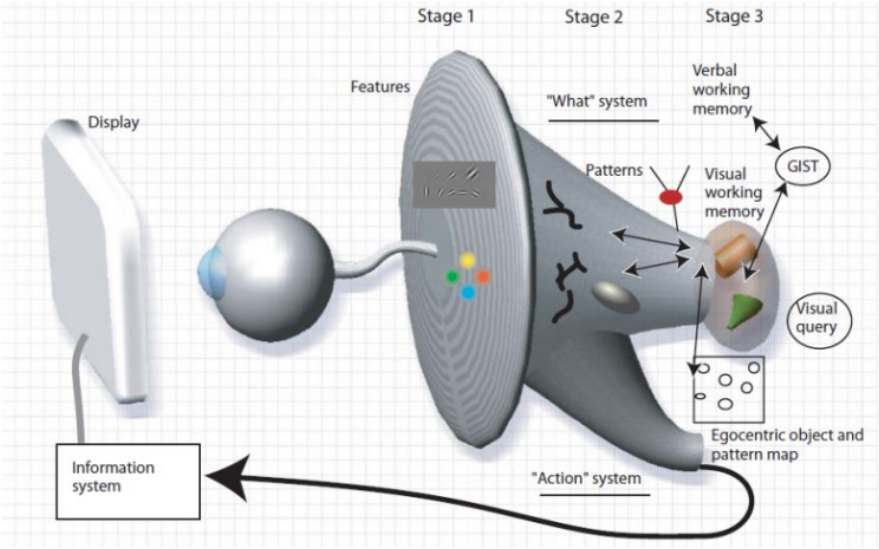

Figure 3. A 3-stage model of perception.

1) In Stage 1, information is processed in parallel without difference so as to extract basic features of the environment.
2) In Stage 2, active processes of pattern perception are conducted. The different structures of the environment are recognized and the visual scene is segmented into regions of different color, texture, and motion patterns.
3) Finally in Stage 3, the information is reduced to only a few objects held in visual working memory by active mechanisms of attention, namely the point(s) of interest, to form the basis of visual thinking.
Hence in Stage 1, extracted information is general and without individual differences. So we decide to interfere with Stage 2 to differentiate the perceptive effects of texts, namely using colors, textures or other perceptive factors to influence human-beings' perception for texts. Then (Haroz 2012) studied how the capacity limits of attention affect the effectiveness of information visualizations as illustrated below in figure 4:



Figure 4.How arrangement affects perception: find the uniquecolor block in squares design

Text perception effect design
Basically we have the text data-set and the 3D urban space as input, and the expected output result is visualization result enhanced by perception effects. What we do is the central part of perception effect design as illustrated in the work flow of text perception effect design in figure 5.

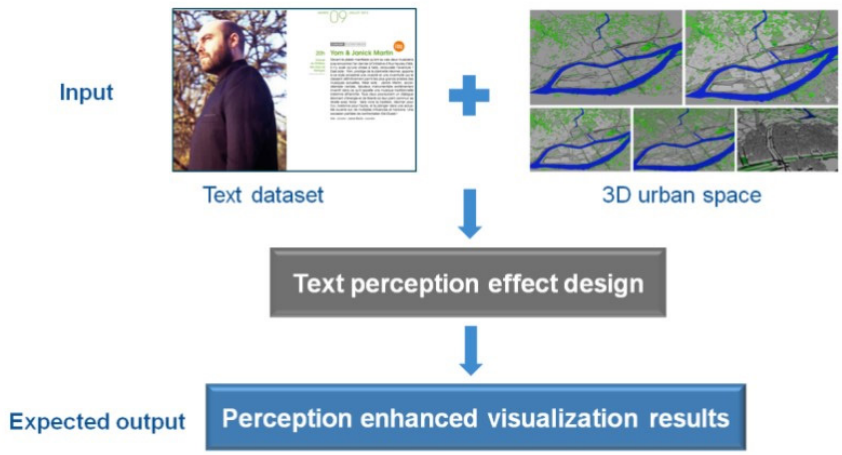

Figure 5.Workflow of text perception effect design.

Based on the 3-stage perception model above, we choose to interfere with the second stage, namely to differentiate the texts with factors such as color, size, texture etc, as (Ware 2004) summarized, the mostly-used static perceptive factors are: luminance, depth, pattern, contour, color, lightness, contrast and constancy. Based on the characteristics of text in 3D space, four perceptual factors are chosen for texts as illustrated in figure 6, namely color, size, transparency and resolution. They are selected out from other factors due to the differences in these four factors are easily distinguished by human eyes.

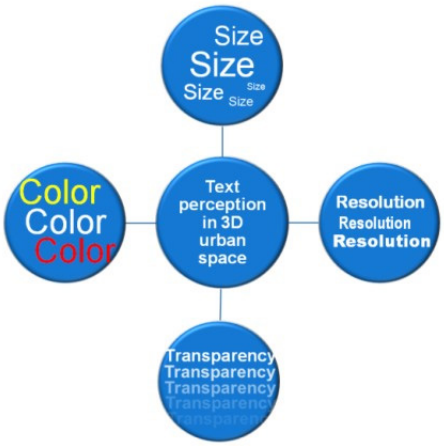

Figure 6. Four selected factors for text perception in 3D urban space.

1) Text size: here it basically means the text height displayed on the screen;
2) Text color: simply means the visual color of the text;
3) Text transparency: a factor related to text legibility, transparency of the text.
4) Text resolution: in 3D environment, visualized texts can have different resolutions, actually means the number of pixels used to display this text.

Application and use-case

After proposing the text perception workflow and factors, here we start to think about applying the workflow

and test the four factors in an experiment. In order to maintain the consistency and future optimization of our research result, we choose to use the Nantes city model in France as our 3d urban space in the use-case. And one important concept in 3d visualization is the screen space and object space as illustrated in figure 7 below:

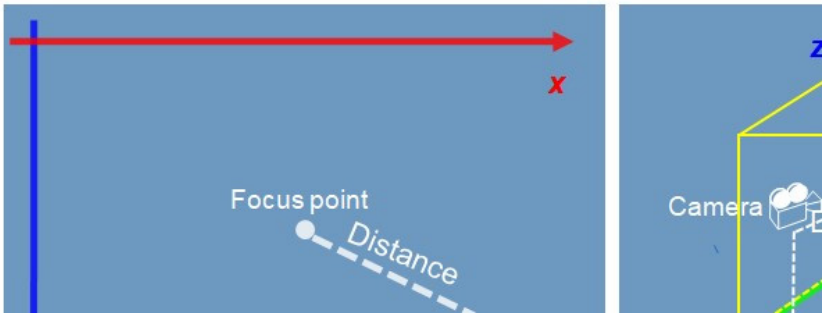

Figure 7. Screen space and object space in 3d space.

In 3D visualization results, the camera-object distance and the distance between objects on screen can be gained easily through computations, which are taken as two input variables for the perception effect, respectively as screen space distance and object space distance as listed below:

1) Screen space distance: in most cases, visualization results are projected either on computer screens or on other display equipment, which are 2D results. The distance from the text screen position to a screen focus point can be gained, the default focus point of which is the screen center.

2) Object space distance: texts are visualized in 3D urban space; therefore the distance from the text to current camera position can be computed. According to the different input of screen space distance or object space distance, we apply them on the four perceptive factors selected according to the reference standard as illustrated in figure 8, and visualize the results in the 3d urban space.

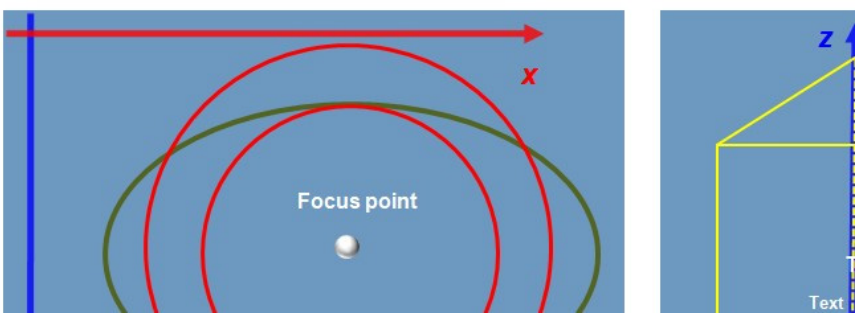

Figure 8. Perception effect reference standard in screen space and object space.

We choose the same screen space distance and object space viewpoint to conduct our test, namely the text and 3d urban space currently are both fixed and cannot be changed, and then we choose to modify the color, transparency, resolution and text size as showed below:

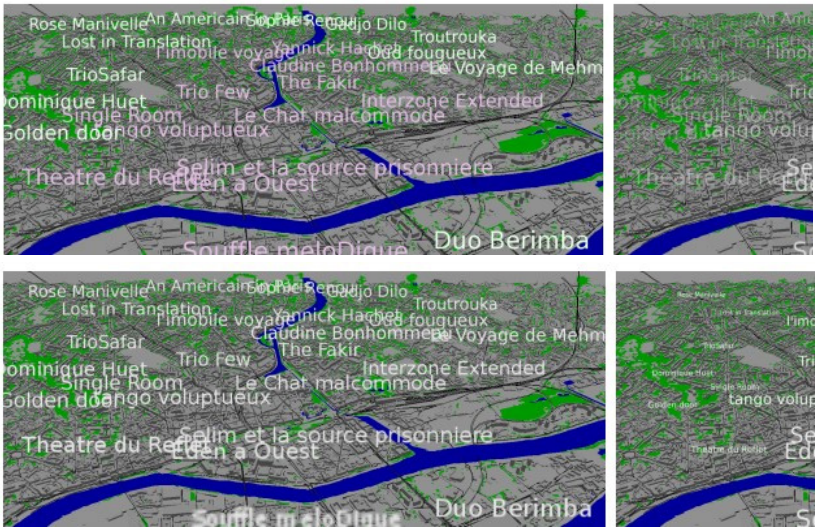

Figure 9. Color, transparency, resolution and text size separately applied in our test.

Conclusion and perspectives

Perception design is a process of creating and shaping the way how individuals perceive and interpret information, products, or experiences. The result of perception design can vary depending on the specific goals and objectives of the design process. In 3d urban space, text perception effect design can enhance user experience and satisfaction. And it also can help convey complex information or messages in a clear, concise, and engaging manner, leading to better communication and understanding among individuals or groups.

The contribution of this paper is that it successfully applied perceptive effects on texts in 3D urban space at a global view, rather than just dealing with a single text. Those perceptive effects are only applied on texts, without geometric deformations of the 3D urban space which might distract users' attention. Although we can get more perception enhanced text effects by combining perceptive factors and different input variables, still we do not know which of these functions are good and helpful to users, and we just used visual comparisons to illustrate the results. So in the future we might need to find a method to evaluate these perception results.

Acknowledgments

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Analyzing the Spatial Narrative of Monumental Architecture

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Abstract

This paper analyzes the basic elements and characteristics of architectural narratives by exploring the relationship between architecture and narrativity. Secondly, taking monumental architecture as the research object, it analyzes the role of narrativity in presenting specific historical memories, conveying social meanings and shaping collective memories. Finally, through the analysis of creative practice cases, in order to verify the textual transformation and spatial sequence construction in the memorial site.

Keywords

Monumental architecture; Architectural narratology; Spatial narrative

The universal relationship between architecture and narratology

1. The origins of narrative architecture

The reflection on "form follows function" after World War II made architectural scholars try to innovate architecture through multidisciplinary fusion in order to adapt to people's pursuit of a more diversified life. In this context, the combination with philosophy and typology formed architectural typology, etc., and the combination with literature formed narrative architecture, with Nigel Coates as the representative theorist (derived from structuralism) and Tschumi as the representative architect.

Architectural Narratology provides a new perspective on architectural design itself, and the development of Structuralism has enabled designers to focus their design ideas on the relevance of various types of information behind the building, such as the cultural information of the site, the spatial logic of the order of the building, etc., and through rational architectural construction means and spatial construction techniques, to express the information text in different narrative means. Nigel Coates, a representative of the Narrative Architecture School, once said, "Every culture counts on architecture to carry and perpetuate information, as well as to exist as a bond of life." The connotation of narrative is culture, and culture, as one of the highest pursuits of contemporary spatial design, compels designers to think about how culture can be embodied in architecture.

2. Narrative architecture Design Elements

2.1 Senses experience of space

The objects inside the space measure the scale of the space, and the architecture is the activity of people inside the space that makes the architecture established, so no matter what kind of space form is inseparable from the exploration of people. Narrative architecture is particularly representative of narrative architecture, which emphasizes the expressor, the medium and the receiver, i.e. the audience, where the expressor is often the

designer of the space, the medium is the space, and the audience is the people inside the space, but of course the three are not fixed. The most important thing for people is the five senses, which are reflected in architecture through light, smell, texture of materials, environmental sound and other interactions with people.

2.2 Spatial order

Narrative is inseparable from a certain logical framework, which in space can be translated into order, spatial guidance, and the treatment of the relationship between cover, which is most prominent in the Suzhou Garden, the leakage of scenery, borrowed scenery, shifting scenery, and other design techniques to emphasize the experience of people in the garden. Here, Chinese gardens emphasize not the storytelling as in Trajan's Forum, but people's own pure behavior, cognitive psychology and the fit of the scene.

2.3 Discourse

The starting point in the transmission process of information, i.e., the expressor, represents the domain of discourse, and in narrative spaces or monumental architecture, the discourse is often not the intention of the individual, but the pursuit of collective memory. For example, the Vietnam War Memorial designed by Lin is not rendered as a victor just because the site is located in the United States or even in Washington, D.C. Lin believes that wars have been fought since ancient times. Lin believes that war has always been sad and a scar in the history of the world, therefore, the height difference of the site creates a wound carved in the earth, and the black marble symbolizes the pain of the war. The black marble symbolizes the pain of war. At this point, the discourse field of the narrative rises from a single country to the whole of mankind.

Spatial narratives in monumental architecture

Mr. Qikang said, "The essence of monumentality is to commemorate the past and express history, and expect this expression to continue." One of the main functions of monumental architecture lies in the record and continuation of a certain culture, i.e., the process of transmitting historical information and social memories through the use of material space with a long preservation time. Thus, monumental architecture has the transcendence in time and interaction with people in space.

1. Transcendence of time

The functionality of architecture corresponds to the material needs, then the form corresponds to the spiritual needs represented by culture, religion, etc. The two are by no means separate, but more often than not one of them will be more prominent or merged into one, monumental architecture and its form has a certain transcendence and thus has a sense of mystery and is desired by people, while letting the people who are observing or being in the building enter into spiritual associations due to the isomorphism between the spiritual intention and the architectural image. The building itself has a certain transcendence and is therefore mysterious and desirable to people. At the same time, the "solid" material property of the building itself makes it have a longer preservation time than other cultural products, and the historical commemorative significance of the building itself is also the function of monumental architecture, and it is its own long-time preservation of eternity that makes the building have a spiritual transcendence.

2. Interactivity of space

Contemporary architecture emphasizes a kind of locality and presence, and narrative architecture stresses that the activities of people within the site make the building become a building, just as Tschumi’ s La Villette Park uses the regular columns of points and free curved paths to create more possibilities for the viewer to interact

with the site. At this point, the narrative within the space is not only a single linear narrative, i.e., prologue, climax, and conclusion, but can be combined with the dispersed Chinese painting style of scattering narrative, i.e., localized interactions and the scene itself has a narrative role, i.e., like in the stage of the opera a place may carry multiple stories or even a contradictory space where the outdoor scene is placed indoors.
Further, the monumental significance of monumental space lies in the interaction between people and the scene, i.e., the interaction activates people's collective memory and thus produces a monumental effect.

Individual case studies of creative practice

1. Narrative text

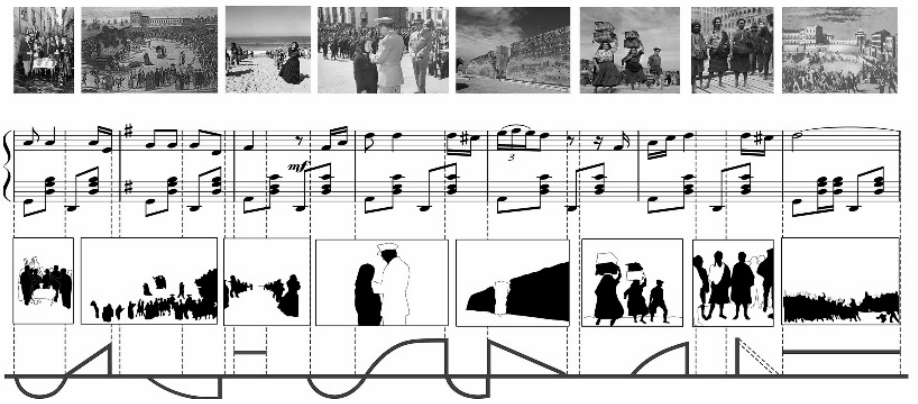
The Penafirme Convent is a place of great cultural heritage and historical significance, in a state of disrepair but with features that deserve to be fully preserved. The ruins of the monastery and the sand dunes are prominent features of this environment, and the local authorities wanted to create a monumental space with meditative functions in the vicinity of the monastery in order to echo the monastery itself. In designing the intervention for such an extraordinary environment, the design itself needs to emphasize, respect and pay homage to the site and to the surviving ruins, while providing a unique and memorable tactile and spatial sensory experience.



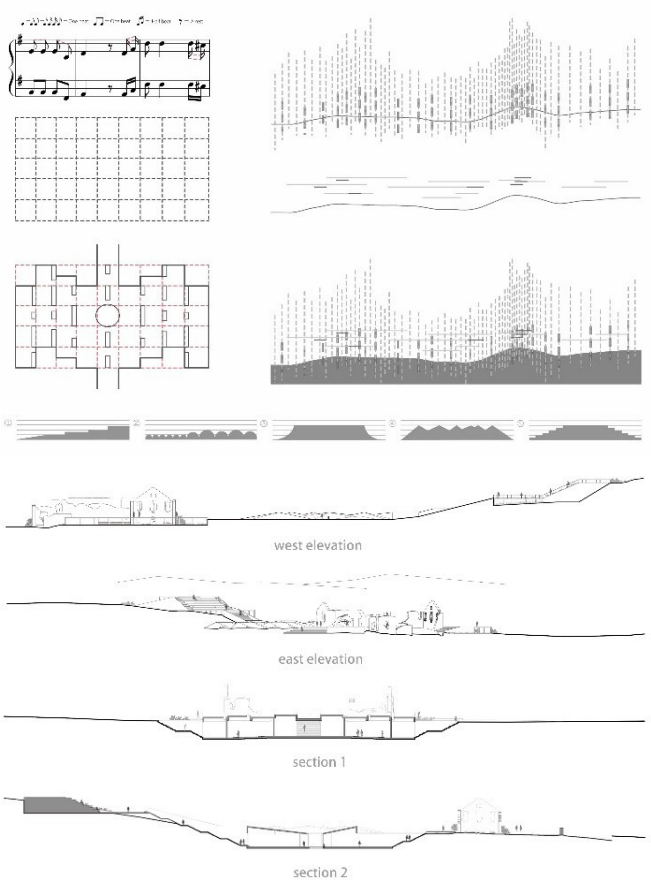

After the research, we chose the music "Symphony of Fate" which is generally recognized by the local people, the rhythm of the song and its emotional expression symbolize the positive and optimistic attitude and spirit of the local people when encountering difficulties; the rhythmic ups and downs of the song and the topography of the selected site have similarities. The design concept is built around the music, the local culture and the current situation of the site.

2. Spatial isomorphism

Based on the determination of the text, that is to say, using the music rhythm of the local destiny symphony to connect the new building and the old building emotionally, using the performance form of "invisibility" to retreat from the old building, and extending the old building in time and space, thus recreating the historical appearance of the dunes and the old building. We extracted eight typical historical events that represent the emotional value of emotions, and condensed the core keywords based on the different emotional expressions reflected by the events, so as to reasonably match the classical passages of the selected score, and to correspond to the ups and downs of the score in terms of pitch according to the changes in emotions. Regarding the combination of musical rhythm and architectural performance, the main purpose is to extract the emotional change curve through the pitch fluctuation in the score, and then develop the architectural performance with the visual form of fluctuation.



Based on the consideration of the relationship between the rhythm and the undulation of the site, the three bars of the seven-bar movement are selected as the three bars with strong emotional fluctuations, and the notes in the three bars are translated into "graphic- textual", so as to establish one-half of a beat as the basic horizontal spanning unit of the modal grid, and each line of the pentatonic score is translated as the basic vertical spanning unit of the modal grid, thus forming a basic planar grid on which the atrium of the new building, exhibition and meditation spaces are arranged in an orderly manner. A basic planar-grid is then formed on which the atrium, exhibition and meditation spaces of the new building are arranged in an orderly manner. Combined with the internal spatial requirements and the modular grid, the roof windows are arranged to achieve different spatial rhythms and effects.



Conclusion

Narrative in literature mainly consists of a literal layer of textual descriptions, a descriptive layer of textual references and intentions, and finally a sequence of events linked by a timeline. The narrative of architecture lies in the spatial layout of architecture through specific structures, materials, color sequences and other elements to convey historical, emotional and other cultural information. Monumental architecture because of its relative timelessness in time and transcendence of life makes it gain monumental significance. At the same time, commemoration itself represents the record and transmission of culture, and in this regard, monumental architecture and spatial narrative have reached a certain fit.

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Poetic expression of regional culture: Research on Display Design of Huashan New Town Station of Wuhan Metro Line 19

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Abstract

With the rapid development of urban modernisation, metro has become the preferred choice of urban transport and part of people's daily life due to its convenience, high efficiency, large capacity and other advantages. In order to avoid the crisis of urban cultural convergence, most metro spaces at home and abroad are designed by integrating the characteristics of regional cultural elements, and the metro also plays the role of urban culture promoter, carrying the transmission and continuation of regional culture.

In this paper, we will analyse the importance and expression of regional culture in metro public display space through literature method and field research method, sort out the theoretical research knowledge related to metro space, regional culture and poetic expression, and carry out the practice. It mainly explores how to integrate the regional characteristics, humanities and environmental features of Huashan New Town Station, a special station of Line 19, into the metro space through poetic forms and make it have regional cultural characteristics. The design practice of Huashan New City Metro Station is to take innovation, green as the design concept, poetic landscape as the design theme, dialogue with passengers, show an "international first- class eco-city, new urbanization demonstration area" of Huashan Eco-New City, and effectively enhance cultural confidence, promote the development and dissemination of urban culture.

keywords

regional culture; poetic expression; Wuhan Metro; Huashan Station; exhibition design.

Preface

Research background

With the rapid development of China's urban construction and economic level, all major cities have their own underground rail transit system, ushering in the era of underground rail transit. Throughout the world, all major developed countries pay attention to the urban culture and metro space art construction, the city's unique history, humanities, environment with certain artistic techniques to show passengers the unique charm and image of a city, shaping more and more vibrant underground city. After ten years of development, Wuhan has entered the world- class metro city. The development of urban rail transport should also pay more attention to its cultural charm and vitality, which can show the unique style of its region to passengers from all over the world.

Purpose and significance of the study

Firstly, the decoration design of Wuhan Metro Line 19 has stepped into the Decoration 4.0 era, which will

simultaneously meet the requirements of art, technology, function and assembly.
Secondly, as the process of urban modernisation accelerates, metros in major cities are used as public platforms to showcase urban culture. If Wuhan is to be built into a national centre city, it must take the road of revitalising cultural development.
Finally, for the underground space design, art wall design and art installation design, the artistic effect presented by different methods of expression is also very different. The expression of regional culture through the poetic approach can make the metro space design theme clear, unified style and more beautiful mood.
We need to explore the different possibilities of regional cultural public space, enrich the way of creating metro space, and provide alternative options for the design of the interior space of the characteristic station of Huashan New Town of Wuhan Metro Line 19. Through the extraction of regional culture, we can improve the recognition of the station of Huashan New City and create the publicity card of Huashan New City. The poetic expression creates a sensory experience for passengers in the metro space.

Display design for metro space

The metro, a fast, high-traffic urban rail transport, is characterised mainly by accessibility and openness. Metro space is divided into above-ground and underground space. Metro space is the carrier of urban culture, but also the derivatives of urban development and the characteristic window of urban cultural heritage exchange. Good design of metro public space can effectively ensure the continuity of underground traffic, and at the same time enhance the connection and resonance between people and metro space and urban window.

Design Requirements for Subway Space

The design of underground space contains three major requirements: scientific, systematic and humane. Firstly, scientificity includes waterproofing and fireproofing, power supply and air circulation, material selection, etc., which is required to ensure the implementability, safety and rationalisation of the use of the scheme. Secondly, the systematic requirement is to start from the whole design, systematic planning and co-ordination of functions and space, so as to make it operate efficiently and orderly. Finally, the humanistic requirements need to start from the human needs, using ergonomics to meet their activities convenient and comfortable, through the creation of environmental atmosphere and the harmonious use of colour to meet their psychological needs and aesthetic experience. On this basis, the concept of ecological and environmental protection, sustainable development, and then consider the expression of urban regional culture and design techniques. While giving life to the metro space, it makes the originally indifferent space have emotional communication with the public, and promotes the inheritance and communication of regional culture and the sustainable development of the city.

Design content of metro space

The design content of the metro space can be simply divided into two parts: graphic design and spatial design. Among them, the graphic design content includes the wall on both sides of the hall level and platform level channel, as well as the decorative art on the columns in the space, commercial billboards next to the channel, electronic screen display screen, etc.. Among them, the longest part of the passenger walking time for the channel, should be the focus of the design. Currently, with the development of the city, people's aesthetic level of improvement, the channel design form gradually diversified, often through reliefs, murals, wall decorations and other forms of expression. At the same time, the design of the metro public space can not just stay in a certain form, but more tend to integrate the city's regional culture. By depicting the city's cultural characteristics and development, the evolution of the rise and fall of history, local humanities and other thematic content, the

shape of the colour and cultural symbols of the refinement of the shape, to give passengers an accurate and deep impression of the city.

The spatial design includes the shape of the entrances and exits, the shape of the zenith installations, the materials, forms, colours and expressions of the art works, as well as the overall spatial lighting control and atmosphere control. In addition, the metro space design should also analyse people's behavioural activities and psychological needs, and give full consideration to the location of the space and the distance of the pedestrians. At the same time to urban development as the core, the rational use of new technologies, new materials, and promote urban ecological development. Metro space is a kind of cultural orientation, which can subconsciously influence passengers' thoughts. Therefore, in the design of the content and form into the mainstream of positive social ideas, in order to fully feel the artistic atmosphere of the public at the same time to give its positive value guidance.

Poetic Expression of Regional Culture in Metro Space

Overview of regional cultures

Meaning and characteristics of regional culture

The term "territory" refers to a specific area divided into a space, while "culture" is a historical phenomenon, "the competences and creations of human beings acquired in the course of social practices". The practical activities of human beings must be carried out in a certain region, therefore, culture is territorial in nature, and it is the fruit of people's practice under the linkage of certain social relations. Regional culture is the process of cultural development, under the influence of geographic environment and human characteristics, with the passage of time by, gradually formed a fixed culture. Urban regional culture is a characteristic branch of Chinese civilisation, which is the abstract and concrete expression of urban civilisation, including material civilisation, spiritual civilisation and political civilisation. It refers to the behavioural habits, folk customs, cultural phenomena and urban development formed by groups in a specific regional environment, under the factors of production, environment and culture. At present, the rapid development of global modernisation has led to an increase in the supply of material and spiritual life, and the development of cities has been tending to become more and more homogeneous, so that the inheritance of urban characteristics and culture is facing a serious crisis. In order to avoid the copy phenomenon of "one city, one side", it is necessary to promote the idea of regional cultural design.

Regional culture has the characteristics of relative stability, uniqueness and inheritance. Relative stability means that over a long period of time, regional culture does not remain unchanged, but takes the best and discards the dregs, and constantly updates and develops. Uniqueness is an indispensable feature of regional culture, and only uniqueness can show the unique material and spiritual charm of the region and enhance recognition. Since regional culture is developed on the basis of the original elements of penetration and precipitation, it has the basic characteristic of inheritance. Urban regional culture is the most valuable resource in urban development, with the role of accommodating and inheriting historical culture, reflecting the humanistic spirit, highlighting the characteristics of the city and promoting urban economic development.

As an important urban transport hub, the metro witnesses the course of urban development and is branded with urban culture. Regional culture is the inheritance and development of urban culture. Metro space is the carrier of regional culture, displaying the ecological landscape and folk history of the city. Through the extraction of regional cultural elements, artistic expression and reconstruction, the metro public space becomes the inheritor and promoter of urban culture.

Analysis and expression of regional cultural elements

The differences and similarities of regional cultures lie in the mutual penetration and influence between natural and human factors of the city, showing the development status and image of the city. The uniqueness of the design of metro public space lies in the integration of different regional cultural elements, which promotes the sublimation of metro culture and the dissemination of urban culture. Regional cultural elements can be divided into the following four points.

The first point is the element of regional characteristics. Different geographical conditions affect the way of life of the society, presenting a wealth of regional cultural representations, which is the starting point of metro space design. The second point is the element of humanistic features. Emphasis on humanistic features, the reproduction of national history, celebrities, events as well as customs as the creative material of urban metro space. The third point, characteristic symbol element. One of the sources of inspiration for modern design styles is the wide range of cultural symbols, historical stories, and humanistic customs that exist in their geographical environment. Through the use of symbols, it triggers public thinking, conveys information and achieves interpersonal communication and dialogue. The fourth point is the element of local materials. The use of locally unique and appropriate materials is one of the main expressive methods of spatial design in metro stations, enabling cultural communication to play a better role. The extraction of regional cultural elements is conducive to shaping the cultural landscape of the city and promoting the diversified development of the city.

In the metro space, the more popular forms of visual expression include murals, modern decoration, posters, animated displays, sculpture and so on.

Analysis of poetic expression

Poetic connotations

"Poetry is an important aesthetic category in classical Chinese aesthetics, which is nurtured in social life and nature, and is a beautiful and elegant element of artistic content. Poetry is an important genre and form of expression in literature, which shapes literary works through rhythmic literary language and pays attention to levelling and rhyming. Poetry is mostly narrative and lyrical. The word "poetic" first appeared in "The History of Public and Private Paintings of Zhenguan" as an idiomatic expression, and then gradually developed into a common term in aesthetics, referring to the mood of poems. The Modern Chinese Dictionary explains "poetic mood" as follows: "Poetic mood, a mood that gives people a sense of beauty as expressed in a poem."mood is the core concept of Chinese aesthetics, which refers to the rhythm of mingling and echoing of emotion and scenery, emptiness and reality reflected in a work of art, which is an abstracted, animated and vital space. Poetry can give people the pleasure of beauty, evoke the resonance of the soul, and trigger strong feelings and deep thoughts. The author understands poetic expression as the art creator consciously constructs an aesthetic realm in the work, or imagination space, which is constantly unfolding and continuing, and then produces a scenario of blended art situation - it can be quiet, subtle, unrestrained, intense, or hazy.

Regional culture is a unique main culture formed after a long period of accumulation, and its culture itself is extremely poetic. Chinese culture has a long history and has given birth to the exquisite and delicate Wu-Yue culture, the ancient and modern charm of Yanjing culture, the pragmatic and innovative Sanjin culture, and the atmospheric and exuberant Chu culture... Wuhan The Chu culture is a bright pearl in the treasure house of Chinese culture. In the long history of Chinese civilisation, Chu culture is unique. The poetic expression of regional culture needs to take into account the characteristics, colours and expressions of the reference materials, take the real existing materials as the carrier of visual presentation, incorporate their own emotions, let people have a sense of belonging in the spirit, build the regional cultural imagery of the city, and show the spiritual civilization

of the city.

Poetic Expressions

Imagery constitutes mood, and poetic meaning is expressed through mood. The traditional concept of art is that "scene" creates "emotion" and "situation" creates "meaning". The poetic expression of regional culture lies not only in the proper extraction of its regional characteristics, folk customs, cultural phenomena and urban development, but also in the deep grasp of its cultural connotation, and even more so in the integration of the natural environment, the realm of the mind and the realm of emotions. The way of poetic expression in the picture can be divided into three parts: picture intention, composition form and colour creation.

The first part is the intention of the picture. Through "looking at the image to take the meaning", the objective objects are abstracted and emotional, so as to achieve the poetic beauty of "to convey the spirit in the form". In the creation of artworks, the co-ordination of the picture with the intention can express the personality, convey the emotion, trigger the emotional resonance of the viewer while highlighting the poetic flavour of the work as well as the beauty of the form. The intention of the picture can set a clear tone for the work, so that the subsequent design of a single, integrated, poetic and far-reaching.

The second part of the composition form. Poetic composition, pay attention to the spatial rhythm of the picture, repeatedly refine and refine the spatial position of the picture operation, white space, and so on, and the structure of the picture, the layout, the main and secondary scenery between the connection and the relationship between reality and design, "point" "line" "surface" reasonable. Rational use of "points", "lines" and "surfaces", in order to achieve the exhaustion of reason. Modelling is an important means to highlight the poetic form, emphasizing the "God and form" of the charm, i.e. emphasizing the use of the basic modelling laws of painting, such as form and spirit, reality and reality, movement and static, etc., in the form of expression. Through the concrete and palpable image, it highlights the three-dimensional and diversified imagery relationship composed of points, lines and surfaces as the basic means of composition. On this basis, the rational use of plane, decorative artistic effects, deconstruction, restructuring, writing and other means of expression, in order to enhance the poetic mirror and poetic at the same time, more in line with modern aesthetics.

The third part is colour creation. Colour plays an important role in reflecting the mood of the picture, expressing the spirit of the main body and conveying the emotions of the picture. Colour creation is also a way to integrate and unify the intention, composition and shape of the picture. Poetic colouring is mostly imagery colouring. Imagery colour is the subjective treatment of the colour of the objective object through the painter, the colour of the objective object will be given a unique spiritual meaning, it is to express the mood of the picture for the purpose of reflecting the painter's emotional will, so as to trigger the viewer's emotional resonance and produce the mood association. The use of various techniques and textures in addition to the traditional way of setting colours can enhance the colour expression of the picture. The creation of colours can express the multiple connotations of modern "poetic nature", and at the same time, it also hosts the artist's thinking, personality and emotions, making the works more infectious and vital.

The use of poetic expression in metro space design

Through the analysis of the three ways of poetic expression in the picture, its derivation to the space can also be summarised as three forms of expression. Firstly, through the establishment of the theme of spatial design, the overall spatial system design is carried out. This is equivalent to the "intention" in the picture. Only to determine the theme and style of space design, in order to make the subsequent design of the natural, spatial implication of strong unity. Secondly, the layout and form design in space. Through the spatial organisation, the flow of space,

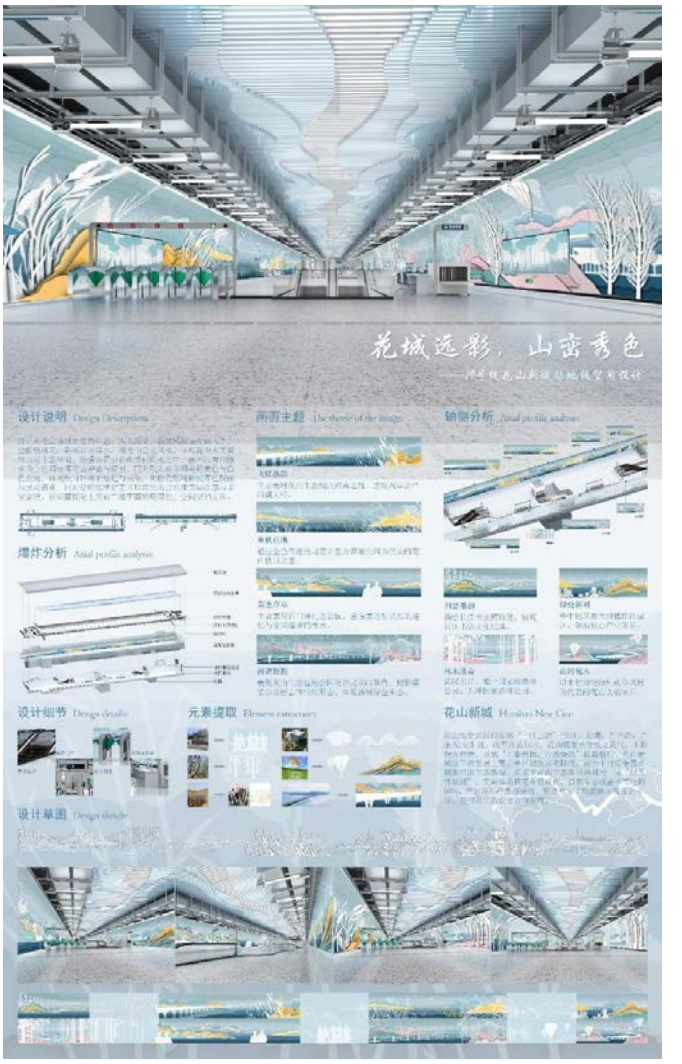
proportion and materials can create a practical and beautiful atmosphere of the sense of the environment. The structure, lines and forms of the space are relaxed and rhythmic, so as to make the design full of poetic animation and vitality, enhance the visual appeal of the station, and achieve a poetic sense of scenario integration. Finally, the creation of spatial colour and the control of lighting atmosphere is also an important expression of poetry in metro space design. Colour can set the tone of the space, and lighting can be used to create atmosphere and enhance the mood of the space. Poetic metro space design should be combined with materials to shape texture, content to express personality, colour to show the connotation, light and shadow to show the vitality, in order to make the regional culture can be expressed completely.

The Poetic Expression of Huashan Regional Culture in Subway Space

First of all, from the picture intention and spatial theme, the Metro Line 19 Huashan New City Station exhibition space design practice is intended to take innovation and green as the design concept, with "Huacheng's distant shadow, the mountains are beautiful" as the design theme, and through the poetic landscape imagery and other imagery and passengers to start a dialogue to effectively enhance the cultural self-confidence, and to promote the development and dissemination of urban culture. The design starts from the natural ecology, humanistic history and new townscape of Huashan New Town's regional culture, and is divided into eight thematic images, mainly showing the autumn scenery of Huashan New Town's green mountains, lakes and mountains, so that passengers can be immersed in Huashan's beautiful landscapes.

Secondly, it builds up the poetic composition of the picture and the shape of the objects. The design is based on the regional cultural characteristics of Huashan, from the creative elements to choose the lake, green mountains constitute the main picture, cascading gradient design is intended to highlight the illusion of the landscape level sense of reality and rich mood, so that the visual breakthrough in the limitations of the two-dimensional plane, the space is more three- dimensional. The fusion of motion and stillness, tension and relaxation is realised through changes. The white space and the weakened objects become the breath of space, letting people roam in infinite imagination, enhancing the poetic flavour of the picture, and highlighting the viewpoints of "harmony" and "symbiosis".

Finally, grasp the overall colour of the space to create. Huashan New City is a new city of ecology and science and technology, and its main colour is set to lime green, showing the spirit of Huashan and stretching, with similar colours, contrasting colours, and different. Through the imagery of colouring, incorporating brighter yellow and pink tones, reflecting the new city's unique autumn splendour and spirit and spring girl-like youthful playfulness. The top and both sides of the streamline device and line arrangement use, and both sides of the cascading picture echo, the water and the sky a colour, to create a dynamic ecological beauty of Huashan, so that the passengers are immersed in the scene. The gradient colour block layering makes the overall space soft and rich, adds a comfortable atmosphere to the space, and is intended to highlight the sincerity of the "meaning" and the depth of the "realm". The position of different objects in the picture goes beyond the surface phenomenon, in time and space, with the help of the rhythm of the rise and fall of things, to express the poetic mood, both reflecting each other and chanting alone.



Space effect of Huashan New Town Station
Photo credit: Homemade

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The "Eight Scenes" Model in Ancient Chinese Urban and Rural Environment Design and Its Modern Value

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Abstract

" The "Eight Scenes" is a kind of landscape form and cultural phenomenon with distinctive regional characteristics and stable structure formed in the process of long-term development of China's ancient society, and the "Eight Scenes" model is a design methodology integrating culture, history and aesthetics. This paper aims to explore the potential value of the "Eight Scenic Views" culture in contemporary landscape design through the exploration and combing of historical materials and comparative analyses of the aesthetic ideals and deeper interests of the "Eight Scenic Views" model in ancient Chinese urban and rural environmental design, in an attempt to seek theoretical support for the innovative construction of the modern regional landscapes. In this way, the potential value of the "Eight Scenes" culture in contemporary landscape design is explored in an attempt to seek theoretical support and guidance for the innovative construction of modern regional landscape.

Author keywords

"Eight Scenes" model; environmental design; modern value

Introduction

The "Eight Scenes" model of ancient Chinese urban and rural environmental design provides a new perspective for modern environmental design. By introducing the design thinking of "eight scenes" into modern environmental design, it can not only strengthen the connection between human and nature, human and history, but also help to create modern cities and villages with regional characteristics and cultural connotations. The introduction of this design thinking is of great significance in responding to modern people's pursuit of a high-quality living environment.

1.Origin of the Eight Views

The concept of the "Eight Views" originally originated as a Taoist term. One interpretation is that it refers to the eight main senses in the human body: the eyes, ears, nose, mouth and tongue, etc. In the Jade Clear Wuji Total Truth Wenchang Great Cave Immortal Sutra, it is mentioned that: "The Eight Scenes and the Eight Gates are the portals in the body for the entry and exit of the Divine Spirit and the Spirit of Qi." This not only indicates its physiological significance, but also reveals a deep philosophical concept that the body is the channel through which the universe interacts with the soul. In addition, "Eight Scenes" is also used to describe the landscapes corresponding to the "eight seasons" of spring, spring equinox, summer, summer solstice, autumn, autumn equinox, winter and winter solstice. Based on this concept, the "eight landscapes" of space and the "eight colours

of landscape" of colour were further developed.

In the context of non-Taoist culture, the concept of the "Eight Scenes" appears frequently in many local histories and is often used as a synonym for the "Eight Scenes" in garden design. For example, the "Eight Views of Xiaoxiang", "Eight Views of Yanjing" and "Eight Views of West Lake" are typical examples of this concept. The Eight Scenic Spots is a cultural phenomenon, which is generally believed to have come from the paintings of Song Di, a painter of the Northern Song Dynasty. Song Shen Kuo's "Dreams and Strokes - Paintings and Calligraphy" says: "Song Di, a foreign minister of the Duzhi clan, was a skilled painter, especially good at painting landscapes in the Pingyuan Mountains and Waters. His favourite works include: geese and geese falling from the flat sand, sails returning from the distant river, clear sky in the mountain city, twilight snow on the river, autumn moon in the dongting, night rain in Xiaoxiang, evening bells in the smoke temple, and sunset light in the fishermen's village, which are called the 'eight sceneries'." (Song Di, at the same time as Su Shi and Shen Kuo, made a series of works called "The Eight Scenes of Xiaoxiang", which is called "silent poetry").

The origin of the Eight Scenic Spots has always been a subject of keen discussion between Chinese and foreign scholars. Domestically, there is a preference for the "Eight Scenic Beauties of Xiaoxiang" as the origin, and there are also arguments for the "Eight Songs of Dongyang" and "Eight Scenic Beauties of Pious State" as the origin. However, most researchers in Japan, the Korean Peninsula, and Vietnam support the idea of the "Eight Views of Xiaxiang" as the starting point. When looking at the "Eight Views of Xiaoxiang" in China and the "Eight Views of Omi" in Japan, despite the differences in the specific locations they refer to, the aesthetics of the landscapes they describe are very similar, showing remarkable similarity and continuity, with a clear sense of "imported" aesthetics. Traces of "imported products" . The frequent appearance of these eight scenes in the "Eight Views" of Japan highlights the fact that the "Eight Views of Xiaoxiang" have almost reached the status of a template in the description of Japanese landscapes. Thus, based on these arguments, the origin of the "Eight Views of Xiaoxiang" has been recognised by a wide range of scholars. With the paintings by Song Di and the preface and poems by Mi Fu, the "Eight Views of Xiaoxiang" became a symbol of the spread of Chinese culture to the outside world. In particular, "Night Rain in Xiaoxiang" and "Autumn Moon in Dongting" are real landscapes, while the other names are more like regional imaginings, providing a wealth of creative space for the paintings to be created. This kind of landscape based on imagination gives greater possibilities for innovation, thus promoting the wide and deep dissemination of the culture of the "Eight Scenes of Xiaoxiang".

2. Composition of the Eight Views

The naming of each landscape in the Eight Scenic Spots series is usually composed of four words, and two words with one meaning: the first two words are generally places and locations, and the last two words are time and seasonal natural phenomena, which are juxtaposed to form a composite landscape. For example, in the "Eight Scenes of Xiaoxiang", "Pingsha and Geese Fall", "Pingsha" and "Geese Fall" are each a scene, and the two are combined to form a comprehensive scene. Together, it is a comprehensive scene - geese roosting and falling on the flat sand. However, the meaning it contains is far greater than the simple patchwork of "flat sand" and "geese falling"; it is an organic synthesis that has been greatly expanded in both depth and breadth. This kind of form and effect is the same as the process of imagery structure in ancient poems. Therefore, we say that the naming of the Eight Scenic Spots itself contains a very strong poetic meaning. Thus, it shows once again the far-reaching and extensive influence of Chinese cultural tradition on the Eight Scenes.

In addition to the four words, there are also three words in the naming of the eight scenic spots, and there are also individual two words, five words or six words. As far as genealogy is concerned, such as the "Eight Scenic Spots of Fengxi" of Qingfeng Town, Mingyue Street, Fuwu Well, Xiangudun, Horseshoe Trace, Yingji Stone, Jinao

Peak, Yongfeng Bridge, and the "Eight Scenic Spots of Wucheng" of Shandong Province, such as the Yangzao Pavilion, Weigutaitai, Yonggou Bridge, Zhongshu Hall, Yishui Pond, and Maiboubouba Terrace, are labelled with three characters, The three provinces of Zhai and Muchun Pavilion are labelled with three characters. At this time, each landscape only shows what kind of scenery there was or is, without any description of the shape and state of the scenery, and the names of the landscapes appear to be relatively plain and simple, while the poetic colours are weaker.

The eight scenic spots in the genealogy have both natural and humanistic landscapes. From the sun, moon and stars, wind and rain, thunder and lightning, mountains and rivers, flowers, plants and trees, to Buddhist temples and Taoist temples, relics of celebrities, farming, fishing and woodcutting, residential and mulberry fields and so on, where a family lives in a place of scenic beauty, history and culture, as well as the production and life at that time, are the eight views can be reflected in the object. A family is located in a place of eight scenes does not necessarily include all the local landscape, but eight scenes can be completely synonymous with the local landscape. Especially valuable is that many genealogies of the eight scenes are included in some of the local production and life scenes, such as Zhejiang "Cixi Li genealogy" in the "Xili eight scenes" of the blue villa woodcutting, GuoDu fishermen, Jiangsu Vilings, "JiangCun He genealogy" in the "eight scenes of ZhongCun "of the ling river fishing, field house spring ploughing, between the Qianlong Xin'an Luyuan" Zhan Clan "joint revision of the genealogy" Volume 1 "zheyuan Chaguan eight scenes" of the north acres of the ploughing, the Republic of China asked the zhejiang chicheng" BianTian Yu clan genealogy "Volume 4" BianTian eight scenes "of the field of the field of the wild pavilion The wild pavilion of "Bian Tian Eight Scenes" in the fourth volume of "Bian Tian Eight Scenes" in the Republic of China. The master of the scene is not necessarily a real worker, maybe just a hermit or a transit of the traveller, but the content of the performance must be linked to the scene of production and labour. This makes the landscape content of the eight scenes not only contains a deep historical background, but also accommodates the vivid real life. Some genealogies include the situation of book collection and the sound of reading in the eight scenes, such as "Wanzai Yuntou Liu's Nine Repair Genealogy", Volume 45, "Yuntou's Eight Scenes", "Chestnut Mountain Book Collection", and "Tanzhuang Xu's Genealogy", Volume 15, 13th year of the Republic of China in Wujin, Jiangsu Province, China. "Tanzhuang eight scenes" of the "three lanes of the sound of books", which fully reflects the clan's high regard for cultural education and unlimited promotion. Thus, the eight scenes in the family tree also reflect a strong cultural flavour in their content. Although the eight scenes in the genealogy are based on very specific and individual characteristics of the regional environment, the deep cultural connotations implied behind them highlight the strong influence of certain common factors of the Chinese national culture.

The eight landscapes embody, first and foremost, the concept of the unity of heaven and mankind as a whole and harmony. A certain area selected a number of landscapes, to be publicised and praised, does not mean that this place is only these kinds of landscape, or there must be so many kinds of landscape. Eight views, ten views in the number of inconsistencies with the objective reality of the situation, in fact, is still very common, many people attacked the eight views in the phenomenon of false artefacts, but also mainly for this point. However, for most people, they do not value whether there must be or only eight landscapes. It is because those who summarise and conclude the eight landscapes intend to express their appreciation of nature and the environment; and those who feel and experience the eight landscapes also want to increase their sense of affinity with the environment through this form. Therefore, it is not only reasonable but also necessary to create or fictionalise scenes that do not exist in fact. The real beauty of the scenery is actually at the foot, is waiting for people to discover, to recognise. This is as the French sculptor Rodin said: beauty lies in discovery. People should not be over-ambitious and seek farther away, thinking that the beautiful scenery must be in other places.

"The composition of the Eight Scenic Spots is deeply influenced by traditional Chinese culture, and is the selection and praise of eight scenic spots in a specific region. "The composition of the Eight Scenic Spots is a comprehensive process involving nature, culture, history, philosophy, emotion and other dimensions, which together give the Eight Scenic Spots a rich connotation and unique charm.

1) Natural attributes: Each of the eight scenic spots was first selected based on its natural scenery. These landscapes include, but are not limited to, natural elements such as mountains, rivers, water systems, vegetation, sky and seasons. For example, the majesty of mountains, the flow of water, and the abundance of vegetation are the natural basis of the Eight Scenes.

2) Historical and cultural background: Most of the Eight Scenic Spots are associated with certain historical events or cultural backgrounds. Certain scenic spots may have been the travelling places of ancient literati, who left behind a large number of poems, essays or paintings, giving the scenic spots a deep cultural heritage.

3) Philosophy and Context: "Eight Scenes" is often not only a description of natural scenery, but also contains some kind of philosophical thinking or the embodiment of the mood. Ancient literati often praised the landscape with philosophical thinking about life, the universe and nature, making the "Eight Scenes" have deeper cultural connotations.

4) Emotional experience: "Eight Scenic Spots" is also a place of emotional integration between man and nature. Different people may have different emotional experiences in the same scene. For example, "Night Rain in Xiaoxiang" not only describes Xiaoxiang in the rain, but also represents people's emotional experience of rain.

5) Regionality: The Eight Scenic Spots often have a strong regional character, representing the natural scenery and cultural characteristics of a certain region. The eight scenic spots in different regions have their own characteristics and connotations.

6) Season and time: some of the "Eight Scenes" are closely linked to specific seasons or time, such as "Summer Cuifeng", "Autumn Night Moon", etc., and this timeliness gives the "Eight Scenes" a sense of changing beauty. This temporality gives the "Eight Scenes" a sense of beauty and change.

7) Human interaction: Some of the eight scenic spots in the Eight Scenic Spots may be highlighted by human activities, such as buildings, bridges, temples, etc., which, together with the natural scenery, form the complete Eight Scenic Spots.

3. Significance of the Eight Views

3.1 Establishment of spatial field and spatial order

In the study of the Eight Views, the spatial field can be understood as a clear geographical area in which the landscape elements and characteristics are consistent. Within the structure of the Eight Scenic Spots, each scenic spot represents a unique spatial field, as its unique natural and human characteristics give it a special status within the whole. Categorised according to natural and human factors, in terms of spatial constructive elements, it can be observed that the spatial fields in the Eight Scenes are sometimes dominated by natural landscapes, such as mountains, rivers, lakes and forests, while others are shaped by human activities, such as historical monuments, temples, and villages.

Spatial order relates to the relative position of landscapes and their place in the overall structure. In the Eight Scenic Spots, there is an intrinsic order among the sites, which may be based on geographical location, historical importance or cultural value. The establishment of this order provides a clear and logical path for people to visit and understand. It is worth noting that the spatial order of the Eight Scenic Spots also has a close relationship with time. Certain landscapes may show their most striking features in certain seasons or time periods, and this connection with time adds more depth and complexity to the landscape. In addition, the interaction between

people and space also infuses the spatial field and order of the Eight Views with special significance. Based on the travelling experiences and perceptions of ancient literati, they formed a deep emotional connection with certain landscapes. This emotional bond gave the landscape a deeper meaning and supported its order in the overall space. This way of understanding and organising space not only enhances the value of cultural inheritance, but also provides modern society with a way to study and appreciate the outstanding Chinese cultural heritage in depth.

3.2 Spatial Imagination and Guided Viewing of Space

The core of spatial imagination lies in the creation of a spiritual space that transcends the actual geographical environment, so that the viewer can be immersed and enlightened both physically and mentally. In the Eight Scenes, this imagination is often expressed through poems, paintings, and other forms of art, so that the landscape is not only an immediate entity, but also includes rich cultural, historical, and emotional connotations. For example, "Night Rain in Xiaoxiang" not only describes a geographical environment, but also represents an emotional outpouring, an aesthetic experience that transcends time and space. Taking the "Evening Bells of Grottoes" in Gong County Records, the "Traces of Jiao'ao Immortality" in Jieyang County Records, and the "Red Leaves of Horiwei" in Yangqu County Records as an example, analysis reveals the following. The "Evening Bells of the Grottoes" presents a "far-reaching" spatial composition, taking the water in front of the Grotto Temple as the foreground, and placing the Grotto Temple and its magnificent mountains in the centre of the picture. As visitors pass in front of the temple, the mountains rise up in the distance, creating a famous landscape of serenity in the temple and grandeur in the mountains. Similarly, the composition of "far-reaching" is also adopted for the "Fishing Ao Immortal Trail" in the Jieyang County Records. The picture takes the river as its theme, highlighting the three-hole stone bridge over the river and the waterfront garden buildings at the bridgehead. Fishermen, tourists and pedestrians converge around the bridge, creating a vibrant waterfront scene. In "Horiwei Red Leaves" from the Yangqu County Records, the author adopts a balanced landscape layout and a "flat and distant" composition to present a vast landscape with steep mountains, fast-flowing river, and villages and temples on both sides of the river.

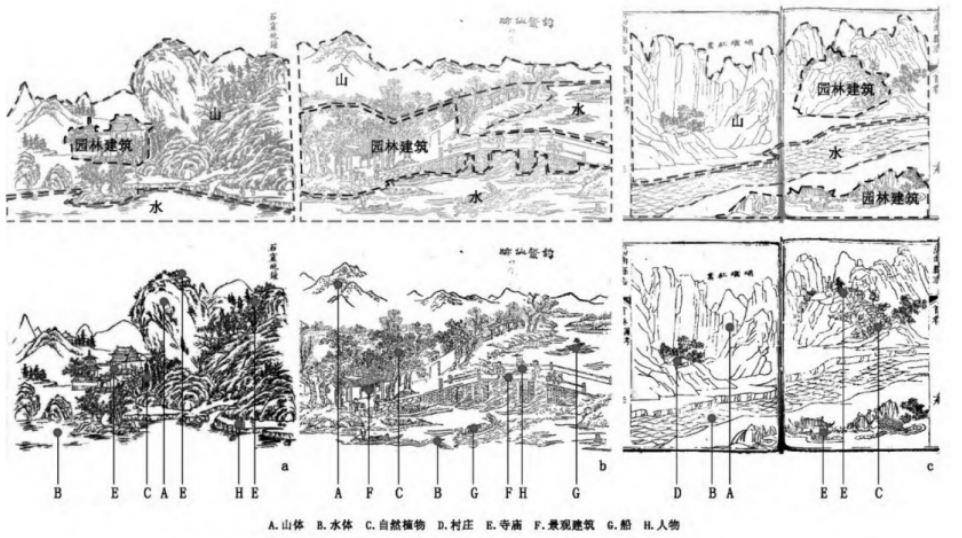

Figure 1."Evening Bells of Grottoes" in Gongxian Zhizhi, "The Signs of Fishing Ao" in Jieyangxian Zhizhi, and "Red Leaves of Horiwei" in Yangquxian Zhizhi.

The guiding of viewing space, on the other hand, is a further extension and practice of spatial imagination. It involves how to effectively guide the viewer's movement and experience in the space so that he or she can understand and feel the connotation of the space completely. This requires not only a reasonable layout and design of the space, but also an in-depth understanding of human psychology and behaviour. In the "Eight Views", the guidance of the viewing space is reflected in how to make the viewer move from one landscape to another, how to make the viewer satisfy his/her visual, auditory and tactile senses through the design, and how to make the viewer resonate with his/her soul. For example, a winding path may lead the viewer from a quiet lake to a busy marketplace, interspersed with a variety of pavilions, stone bridges and flower beds, each element designed to enhance the viewer's experience and feelings. Of course the guiding of the viewing space also needs to take into account factors such as season, time of day and climate. Different seasons and times bring different atmospheres and experiences to the space. For example, in spring, when the cherry blossoms are in full bloom, the space may be designed as a romantic garden; while in autumn, when the leaves are full of red, the space may be transformed into a peaceful forest path.

3.3 Generation of landscape imagery and environmental imagery

Landscape imagery and environmental imagery in the field of architecture, landscape architecture and environmental art are often used as the core elements to explore and express the cultural connotation, emotion and aesthetic value of space. Especially in the unique oriental cultural context of the "Eight Views", its imagery generation has a deep historical and cultural vein and philosophical reflection. As an ancient landscape concept, "Eight Scenes" firstly represents the generation of landscape imagery. These images originate from nature, history and humanities, combining elements such as landscape, scenery, people and events, forming a poetic and picturesque whole. For example, "Night Snow in Yanjing" is not only a description of snow, but also contains the historical vicissitudes, humanistic flavour and natural beauty of the ancient capital of Yanjing. Each of the Eight Scenes is a landscape story, a microcosm of time and space, and a cultural imprint.

The generation of environmental imagery involves the presentation and experience of the Eight Scenes in a specific space. This requires us not only to pay attention to the culture and emotion represented by the Eight Scenes, but also to consider how to present these images in the specific environment, so that they can form a harmonious and unified whole with the surrounding environment. This involves the comprehensive consideration and design of space, form, material, light, colour and other elements. For example, when designing an environment that represents the "rain at night in Xiaoxiang", not only do we need to consider how to express the form and dynamics of the rain, but also how to enhance the atmosphere and emotion of the rain by means of light, colour and material. At the same time, we should also consider how to form a harmonious unity with the surrounding environment, so that the landscape imagery of "Xiaoxiang night rain" is truly integrated into the entire space. It is worth noting that landscape imagery and environmental imagery do not exist in isolation, there is a mutual influence and penetration between them. A successful design of "eight scenes" should be able to accurately convey its cultural and emotional connotation, but also be able to form a harmonious unity with the surrounding environment to achieve the perfect combination of landscape and environment.

4. Contemporary revelations of the "Eight Views" model

Although the traditional spatial and visual structure of the "Eight Views" model is rooted in deep historical cultural soil, the aesthetic concepts and spatial organisational strategies it encompasses still have far-reaching influence on modern design.

1) A grasp of spatial hierarchy and rhythm. Each landscape is a distillation and reproduction of a natural phenomenon, historical event or cultural symbol, which are both connected and independent of each other,

constituting a complete spatial narrative. This grasp of spatial hierarchy and rhythm is still an important reference value in modern environmental art design, especially in large-scale public space and urban landscape design.

2) In-depth interpretation and emotional empowerment of places. Each of the "Eight Views" is not only a reproduction of physical space, but also a cohesion of emotion and culture. Through careful observation and interpretation of nature, history and humanities, they give each place a deep emotional and cultural connotation. This kind of in-depth interpretation of the place and emotional endowment, in modern environmental art design, is the key to creating places with emotions, temperature and cultural connotations.

3) Unique use of materials, techniques and forms. Although the Eight Scenes are mainly expressed through words and pictures, the keen insight and unique use of materials, techniques and forms implied behind them provide rich inspiration for modern environmental art design. For example, how to express the dynamics and emotions of landscape through different materials and techniques, and how to present the vicissitudes of history and cultural flavour through spatial organisation and layout are all issues that need to be thoroughly researched and explored in modern design.

4) Environmental art design is not only the shaping of physical space, but also the inheritance and re-creation of emotion, culture and history. In today's highly developed globalisation and technology, people's desire for places with emotion, culture and history is more urgent. Therefore, how to retain and inherit the essence of traditional culture in modern environmental art design, but also be able to meet the aesthetic and living needs of modern people, is exactly the direction to think and strive.

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Narrating from a bird’ s perspective: another possibility of space

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Abstract

Starting from the perspective of birds, this study explores an alternative dimension of space, design and beauty. By analyzing the behaviors, ecology, and adaptability of birds, we revealed their uniquely spatial perception on Earth and drawn comparisons with human perspective. This article also uses specific cases to demonstrate the inspiring innovations of the bird's perspective in urban planning, ecological protection, technological advancement and other fields, emphasizing the significance of interdisciplinary research in achieving an more sustainable and intelligent future in space design.

Keywords

Bionics design, Spatial perception, Avian perspective, Urban planning, Ecological protection

Introduction

Birds are the only surviving species on Earth within the general order of dinosaurs, and they sense and use space in unique ways. Human space concepts and design methods often remain confined within our own human-centric perspective, and ignore the perspectives of other creatures. This article aims to initiate an exploration of an alternative space paradigm, commencing with the avian perspective, and seeks to elucidate the influence of bird’ s view on spatial design and the potential implications for the future. Through an in-depth analysis of how birds perceive, ecological insights, and newest applications, this study attempt to illuminate the profound significance inherent in adopting the bird perspective.

Birds' perception of surrounding space

Visual perception:

Birds possess a variety of unique sensory modalities that allow them to survive and thrive in various spaces on Earth. In birds, approximately 50% or more of the cranial volume of the skull is occupied by the eye, whereas in humans, the eye occupies less than 5% of the skull’ s volume(Waldvogel, 1990). Alterations in the size and shape of the bird pupil can be quite extensive and much faster in bird species than in human, such as great horned owl (Bubo virginianus, King & McLelland, 1984). Unique specializations of avian visual systems include the existence of double cones, different photopigment absorption spectra, the presence of oil droplets, and an different emphasis

on the visual pathway(Cook, 2001). The American woodcock (Scolopax minor) has greatest field of vision with an astonishing horizontal visual field of 360 ° and a vertical field of vision of 180 ° (Martin, 1986). However, humans have exceptionally high acuity, surpassed only by a few predatory bird species(Caves et al, 2018). Contrary to human beings' yearning for big cities that are bright and prosperous at night, birds generally avoided urban areas and selected dark-connected skies for travel and seek migratory stopovers(Korpach et al, 2022). Recent research shows that certain bird species possess the extraordinary ability to sense infrared light beyond the spectrum visible to humans, giving them an advantage when navigating at night or in dense forests(Jones et al, 2007). Nighttime city lights are not very friendly to Caprimulgidae, causing obvious changes in their hot spots; but Falco peregrinus use nightlights to hunt migrating birds(Korpach et al, 2022). Urbanization and artificial light at night reduce the functional connectivity of bird migratory aerial habitat.

Auditory sensitivity:

Birds use sound to convey information, delineate territories, and identify conspecies (Theunissen and Shaevitz, 2006). Their auditory systems exhibit remarkable sensitivity in detecting faint sounds and discerning nuanced changes in pitch. Birds use song and other vocalizations for an array of communication tasks in the wild. Males use songs for territorial defense and mate attraction, and male–female pairs use songs for pair-bonding and cooperation(Catchpole and Slater, 2003).

Magnetic orientation:

Scientific investigations have revealed that select bird species like wheatears (Oenanthe oenanthe) and the Eurasian reed warbler (Acrocephalus scirpaceus). possess the capacity to perceive the Earth's geomagnetic field(Lohmann et al, 2022). They harness this innate ability for extensive migrations, accurately locating their intended destinations(Wiltschko and Wiltschko, 1996).

These sensory modalities enable birds to survive in diverse habitats, while also providing us with a valuable perspective on the perception of space.

Bird's-Eye Perspective in Application

Urban planning:

Integrating avian perspective into urban planning can improve the stability of urban ecosystems. For example, borrowing the nest-building skills of birds to design high-rise buildings, such as Bird's Nest, the main stadium of the 2008 Olympic Games in Beijing Olympic Park, "Cybertecture" building by James Law Cybertecture and wins the CNBC Asia Pacific Commercial Property Awards 2009.

Ecological protection:

Rethink the design of protected areas from the perspective of birds, provide more suitable habitats, and promote the protection of biological diversity. The egg-shaped Tij Observatory for the Scheelhoek Nature Reserve in Stellendam, the Netherlands by RAU Architects and Ro&Ad Architects, used natural materials to minimize their impact on the landscape when creating lookouts, and designed as a detachable device. The latest research also points out that some birds in urban areas have adapted to urban life, so measures need to be taken to protect these urban wildlife.

Technological innovation:

Studying the sensor capabilities and navigation skills of birds can provide inspiration for the development of

robots, self-driving cars and smart city systems(Bannasch, 2009; Zamberi and Hashim, 2021). The latest research results show that the navigation ability of birds is based on a complex magnetic induction system in the brain, which is of great value for the development of more advanced navigation technology.

Bionics design and future perspectives

Architectural Design:

In the field of architecture, borrowing a bird’ s perspective can drive innovative building designs. For example, swallows' nest designs inspired the concept of sky homes that could be suspended from high-rise buildings, reducing land use while providing city dwellers with spectacular views.

Urban ecology:

The migration habits of birds provide beneficial biodiversity to urban ecosystems. In this regard, research shows that parks and green spaces in cities can improve urban ecosystem connectivity and facilitate the movement of wildlife within cities by mimicking bird migration paths.

Anti-collision technology:

Birds often collide with the glass curtain walls of high-rise buildings in cities, which poses a threat to them. Recent research shows that designing glass curtain walls with special textures or coatings based on an avian perspective can reduce the risk of bird collisions.

Intelligent navigation system:

Birds use the earth's geomagnetic field to navigate during long-distance migration. This ability has inspired the development of intelligent navigation systems. The latest examples include navigation algorithms inspired by bird navigation that can help people orient and navigate in cities more accurately.

Biomonitoring:

The sounds and behaviors of birds can be used for biomonitoring. Recent research is using bird songs to monitor the health of ecosystems so that conservation measures can be taken in a more timely manner.

Ecotourism planning:

Birds are an important resource for ecotourism. Ecotourism projects have been developed based on bird migration in some areas to attract tourists to watch the spectacular migration of birds. Some nature reserves have also established observation towers for bird observation.

Ecological research:

Ecologists use the perspective of birds to study the structure and function of ecosystems. For example, researchers use mini-cameras or infrared-camera to simulate a bird's perspective to better understand biodiversity and interactions within ecosystems. These specific cases demonstrate the potential for rethinking spatial design and research through a bird’ s perspective. The unique perception and behavioral habits of birds provide innovative thinking paradigms in various fields, helping to achieve a more sustainable and intelligent future space.

In the future, we can anticipate a surge in research endeavors aimed at seamlessly integrating the bird’ s perspective into space design, thereby paving the way for a more sustainable and intelligent future in space

planning. The application of the bird perspective necessitates interdisciplinary collaboration across various domains, encompassing biology, ecology, engineering, arts and social sciences. Recent research has underscored the ecological sustainability inherent in urban areas and communities that coexist harmoniously with birds. Hence, research on bionics design holds promise in addressing the challenges posed by global urbanization.

Conclusion

Since narrating from the perspective of birds, we have not only unveiled how birds perceive and adapt to space but also compared it with the human perspective, which has opened the door to exploring new possibilities in space understanding. The avian perspective deepens our comprehension of spatial perception and provides insightful viewpoints for the development of urban planning, ecological conservation, and technological innovation.

The unique sensory modalities of birds, including vision, sound, and magnetic induction, not only demonstrate how they thrive and reproduce in various environments but also offer profound insights into spatial perception. By exploring the avian perspective, we are not just seeking inspiration; we are reevaluating the fundamental principles of spatial design. This novel viewpoint offers sustainable considerations for our urban planning, such as improving the design of high-rise buildings by drawing inspiration from birds' nesting techniques to reduce the risk of bird collisions. Simultaneously, it provides strategies for ecological conservation, such as designing natural reserves with a bird's ecological perspective to offer more suitable habitats. Moreover, birds' navigation abilities have spurred technological innovation, with potential implications in the development of robotics, autonomous vehicles, and smart city systems.

Interdisciplinary research has already commenced, integrating the avian perspective into various fields. In the future, we can anticipate more studies to regard the avian viewpoint as a valuable resource for creating a more sustainable and intelligent future in spatial design. Furthermore, recent research indicates that cities and communities living in harmony with birds are more ecologically sustainable, underscoring the role of interdisciplinary research in addressing the challenges posed by global urbanization.

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"*Jing*" in gardens: Relationship between plant-scape, garden environment, and Jiangnan literati

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Abstract

Jing[境] is the metaclass concept of Chinese landscape architecture culture. The essence of *Jing* is a multidimensional space around and interactive with the subject in traditional gardens. This paper presents a concept of ‘*Jing* of plant-scape’, and takes the gardens of Jiangnan literati’s, for example, has analyzed the correlation between the objective *Jing* and the artistic *Jing* in plantscape design, and summarized an "output, input and feedback" mode of plant-scapeconstruction and appreciation. In output process, the conception, function, and layout of plantscape are decided by the designer’s aesthetic taste and the objective conditions of the garden sites; in input process, the appreciator perceive the objective plants scenery by his aesthetic taste, religious faith, environment sensitivity and logical thinking; in feedback process, the appreciator empathizes with the landscape architect who has integrated his artistic and emotional experiences into the plant-scape design. In Jiangnan literati’s gardens, designer and appreciator are interchangeable with each other due to the fact that garden designing is a mutual activity between objects and subjects.

Author keywords

plant-scape, *Jing*; Jiangnan literati's gardens, siting, aesthetic experience

Introduction

Jing [境] is a Chinese word presently understood as the overall environment such as physical environments including topography, vegetation, building, and a plenitude of abiotic or biotic entities, while emotional environments including human perceptions is also an important part of the *Jing*. The construction and appreciation of *Jing* play a fundamental role in Chinese classical gardens, and the importance of it has been shown in much literature. For instance, S. Xiaoxianghas mentioned that there are three states of Chinese garden design: life conception, picturesque conception, and artistic conception. ‘Conception’ is another translation of *Jing*. Life conception is the integration of natural beauty and the joy of life; art conception is the pristine natural beauty imbued with artistic beauty; and mind conception is the ideal romanticism, which includes the feeling of beauty, the aspiration of beauty, the character of beauty, and the society of beauty(Sun, 2013). W. Shao-zeng has divided *Jing* into three categories: human, natural, and interactive(Wang, 2015). In Yuan ye [园冶] [Craft of Gardens](circa 1635), an old Chinese treatise on the art of garden design written by Ji Cheng during the Wanli Ear of the Ming dynasty, the author also emphasized on the forging and perception of *Jing*.

In terms of Chinese semantics, *Jing* is a word with more than ten meanings in fields of art and social

science(Gu,1995). According to Y. Rui, the meanings of *Jing* in landscape architecture could be divided into two categories: physical *Jing* and un-physical *Jing*(Yang, 2014). The former is regarded as the natural context and the latter as the cultural context. The natural context refers to the physical surroundings including numerous types of rocks, mountains, water bodies such as rivers, marshes and lakes, vegetation such as woods and groves, and man-made landscapes such as hedges, ponds, walls, verandahs, pavilions, and so on. Moreover, it also includes natural phenomena such as sound, scent, light, the moon, and clouds as an agent in garden design.

Meanwhile, the cultural context is involved with the personal aesthetic experiences, emotions, and feelings of appreciators with background of different cultures, histories, religions and social concepts. Essentially, these two aspects interacted with each other through landscape architects and appreciators during garden design and perception. A garden designer makes a certain idea about the landscape via strategies, techniques and artifice. The appreciator is inspired by landscape, and perceives all senses by comprehending with logical thought. In the chapter of ‘Siting’ [相地] in Yuan ye, Ji Cheng described the mutual relationship between the garden maker and the appreciator. (Ji, 1988) .In natural fields, the relationship between plants and environments is completely an ecological correlation, while in gardens which are man-made environments, the interactions between plants, surroundings and human-beings have both natural and cultural aspects(Wang, 2016).

Plant-scape is the view, scenery, or imagery in which the most important ingredients are plants. The purpose of this study is to describe and explore the relationship between garden environments and human-beings in the processes of constructing and appreciating plant-scapein Jiangnan literati’s gardens. We present a core conception, ‘plant-scape *Jing*’ [植 境], which is a multidimensional space around and interactive with the plant-scape and can be analyzed from two dimensions: one is the ‘objective *Jing*’, i.e. the garden’s physical environment including spatial distributions (landscaping, woods, fields, pools, and buildings), time variations (daily and seasonal changes, and weather events including rain, shine, snow, wind), and so on. The other one called ‘artistic *Jing*’ i.e. the mental condition including the aesthetic experiences and perception of literati, when they interact with plant-scape living in the garden.

Plant-scape construction with objective *Jing*

Context-oriented construction

Previously, landscape architects have conceived many plans for the plant-scape. But only those plans with a great deal of thoughts about the garden contexts show much originality. For instance, it is appropriate to have more deciduous trees in a small garden with an emphasis on spacing so as to produce an effect of wide space. However, in a large garden, a suitable number of evergreens should be added so that the visitors will not feel the emptiness. This is the principle of compensating for crowdedness by sparseness, and emptiness by concentration.

Jiangnan literati prefer to use the juxtaposition of bamboo (Bambusoideae) and phoenix-tree (Firmiana platanifolia) to express their nobleness. There is a legend saying that phoenixes only perch on phoenix-trees and only eat the seeds of bamboo. So these two kinds of plants are symbols of nobility. In Suzhou gardens, there are two sceneries of plants with the same arrangement of "bamboo—phoenix--tree". However, the patterns and layouts of these two are different because of the different characters of plant-scape objective *Jing*. ‘Seclusion-of-bamboo--phoenix-tree pavilion’[梧竹幽居] is a pavilion located on the west side of the middle lake of ‘Humble Administrators Garden’ [拙 政 园]. The environment where the pavilion is located is so open and spacious: outlooking from here, visitor could see the ‘Bei Si Tower’ [北寺塔] outside the garden. The garden designer planted bamboo (Bambusa multiplex) and phoenix-trees in clumps on the north and south side of the pavilion. Furthermore, an ancient Pterocarya stenoptera is located curvaceously in front of the pavilion. The phoenix-trees and other trees consist of the crown canopy on the east side of the middle lake, and they soften the stiff lines of

‘seclusion of bamboo--phoenix-tree pavilion’ and other surrounding buildings

Plants-appropriate construction

Plant is the fundamental element of plant-scape. In another word, plant-scape is plants with functions, symbols, metaphors, analogies and allusions that express the ideas and thoughts. The characters of plants may be presented as the plant-scape consists of plants. Having a good knowledge on the life, aesthetic, special, and cultural characters of plants is the premise and basis for plant-scape construction.

Jiangnan literati’s garden is influenced by those literati’s aesthetic conception which contains lyrical and picturesque scenes to satisfy their desires of living in hilly forests. Based on this conception, factors of natural impact (illumination, temperature, moisture, terrain, location, and slope) and humane impact (culture, convention, art, life, and cultivation) are considered in plant selection. As the author of the famous horticulture treatise Hua *Jing* , ‘the mirror of flowers’ [花镜] (1688), Chen Hao-zi, mentioned these planting methods and emphasized the "appropriation"

in the environment:

"The habits and characters of plants are inherent. For instance, some plants can adapt to the cold environment, and some to the warm environment; some plants are better for a higher place, and some are better for a lower place. Therefore, gardeners should give a full consideration to local conditions before planting trees and flowers…Peonies with an enchanting shape should be planted with bamboo and wired rocks in flower beds built of jade, and plum blossom with a pure and lofty character should be planted in bamboo caves with sparse fences or warm houses with flexural fences, and narcissus and orchids with elegant character should be set in magnetic pots with large rocks and should placed in the bedroom or the secluded studio so their fragrance can be enjoyed everyday …"(Chen, 1962)

Plant-scape appreciation and artistic *Jing*

Emotion residing in plant-scape

Under the influence of the traditional idea of ‘making images for fully expressing the meaning' 立 象 以 尽 意 and similar thinking modes, Chinese ancient artists express their feelings and embody their views by physical objectives. Liu Xi-zai who is a famous litterateur mentioned, "The spirit of mountains which cannot be described by words can be expressed by mists and clouds, and the spirit of spring can be displayed by trees and flowers."(Liu,1978). Visitors get the aesthetic



Figure 1. 'Seclusion-of-bamboo-phoenix-tree pavilion'in Humble Administrators Garden'in Su Zhou,China.



Figure 2. Shen Zhou, The Painting of Shadows of Bamboo and Phoenix-trees.

experience through perceiving, realizing, and imaging the plant-scape which embodies lyrical and picturesque scenes as well as garden owner’s thoughts and spirits. Hence, it is by enjoying the plant-scape that a person turns the objective scenery they see into the abstract imagery. Due to the diversity of aesthetic subjects, the same or similar plant-scape layouts may generate various imageries.

The generation of plant-scape imagery is through the interaction between plant-scape and human. This interaction may be explained with three aspects. The first one is that people get the primary aesthetic perceptions such as the form, color, texture, fragrance, sound, and appearance of plant-scape by watching, smelling, listening, touching and tasting. In ‘seclusion-of-bamboophoenix-tree pavilion’, the plant-scape, a pavilion is sheltered under the luxuriant phoenix-trees and Pterocarya stenoptera, and the lake bank is covered by the dense shade in summer, whereas the flowers of phoenix-trees and fallen leaves spread on the ground in autumn (Figure 1) like the painting of Shen Zhou, ‘The Painting of Shadows of Bamboo and Phoenix-trees’ [梧竹清荫图]. In the painting, a scholar is chanting poems under the shade; Bamboo are rustling in the breeze making clear sounds and are covered by the moonlight and shadows of trees, which looks like a mist (Figure 2). Through the intimacy between the trees and surroundings, people assimilate themselves into the original nature which they have been desired for a long time.

Secondly, based on the primary perceptions of the first interaction, an appreciator gets the further aesthetic cognition by some rationally ways of thinking including observation and comprehension. In Yuan ye, Ji Cheng recorded that literati of plenty of cognitions by doing the activities with plant-scape in their gardens. For instance, the cognition of season ‘intoxicating fragrance comes little by little, and flowers of the Osmanthus drop one by one’ 冉冉天香，悠悠桂子 implicates that autumn is coming. In the chapter of ‘on garden designing’ 园说 in Yuan ye, Ji Cheng discussed the method of scenery appreciation about using screens to make a distortion of feelings of space. ‘A building should be built high without any obstruction and there should be broad space in front of its windows 轩楹高爽，窗户虚临 . This way largely extend water scenery and can be included in designing, and scenes of all seasonal flower can be enjoyed without obstruction 纳千顷之汪洋，收四时之烂漫’. (Ji, 1988).

Thirdly, on the basis of the primary aesthetic perception and the senior aesthetic cognition, visitors put their ideals and life experiences into the plant-scape in front of them via dynamically associating, imaging, and analogizing to get the unique emotional experience such us national emotion, auspicious symbol, moral integrity, and filial piety. The name of ‘Seclusion-of-bamboo--phoenix-tree pavilion’ stems from a poem, ‘A Record of Yong Ning Garden’ [永宁小园即事], written by Yang Shi E：’ The phoenix-trees, bamboo, and the moon look depressed, and the autumn scenery emerges in the garden’ 萧条梧竹月，秋物映园庐 . Moreover, there is also a pair of couplets in the pavilion, ‘…cool from the breeze and light from the moon, and viewing flow water and erected mountains’ 爽借清风明借月，动观流水静观山 . In the former line, the ‘breeze’ and the ‘moon’ serve as a hint at the natural landscape which may cultivate a person’s taste and temperament. The later line uses a literary quotation from a saying of Confucius (551-479 BC) in ‘The Analects [论 语]’, ‘the wise enjoys water, the humane enjoys mountains 仁者乐水，智者乐山 , to hint a character of landscape in Confucians aesthetic and to convey the garden owner’s ideal of ‘landscape enjoyment’.

Consequently, the first interaction between plant-scape and people mainly depends on people’s image thinking, which is a physiological activity; Whereas, in the second and third interactions, it is the abstract thinking that plays an crucial role, which is mainly a psychological activity. These three aspects are ordered from generalization to individuation then to diversification.

Harmony between plant-scape and artistic Jing

As explained above, in Jiangnan literati's gardens, plant-scape is a tool to symbolize, allude, and analogize the

aesthetic ideal, emotion, and tastes of the designer. It also evokes the visitor's state of mind which includes a mass of feelings, memories, experiences, and emotions. This state of mind can reach his/her heart and sometimes recollections of what he/she feels when seeing a certain plant-scape at a special moment. Therefore, the visitor acquires an artistic experience of ‘scenery is limited but artistic conception is unlimited 景有尽而意无穷’ by integrating the scenery and the artistic *Jing* in the heart.

In general, there are four modes to make appreciators get artistic *Jing* experiences via the strategy of plant-scape design. Firstly, show their physical characters such as the form, color, texture, fragrance, and so on; Secondly, present the laws of nature including daily and seasonal changes as well as weather and phenological phenomena; Thirdly, form a certain space by a single or a clump of plants; Lastly, make a metaphor for an ideal and spirits through the cultural character of plant-scape. Each mode could make people feel different artistic *Jing*. However, in most cases, the four modes are interrelated with each other and make a sense together.

There is a pavilion named ‘a place to listen to the windblown pines’[听松风处] locating on the northeast of ‘little flying rainbow’[小沧浪] water-yard in Humble Administrators Garden. ‘Windblown pine 松风’ is a way of the anthropopathic wisdom in the traditional Chinese culture and has become a plant-scape imagery representing the recluse without a fixed dwelling but with moral pureness and loftiness. Actually, the pine trees cannot generate sounds itself, and so as the wind. But when the wind blows the leaves and twigs of the pine trees, one will enjoy the sounds of nature. The plant-scape design in ‘a place to listen to the windblown pines’ makes use of the ‘windblown pines’ symbol. Hence, a tablet with words of ‘windblown-pines pavilion’ 松风水阁 stays in the middle of the entrance of the pavilion. These words stem from an allusion to the ‘History of Southern Dynasties and the Biography of Tao Hong-*jing*’ 南史·陶弘景传 which depicts a taoist priest named Tao Hong-*jing* was keen to windblown pines and planted pine trees everywhere in his yard, and then felt happy and joyful when hearing the sound of wind blowing the trees. ‘Little flying rainbow’ water-yard is cramped with an area of only about 100 square meters. In the middle of the water-yard, there is a small pool surrounded by corridors and pavilions. Therefore, the site does not compatible with the scenery pattern of ‘the yard full of pine trees’. As a result, the garden designer planted an old pine tree（Pinusthunbergii）to the east of the pavilion. A tall and contorted Ulmus parvifolia is in concert with the pine trees to the west of the pavilion, and these trees form a canopy over the pavilion (Figure 3).



Figure 3.'A place to Listen to windblown pines' in Humble Administrators Garden'in Su Zhou, China

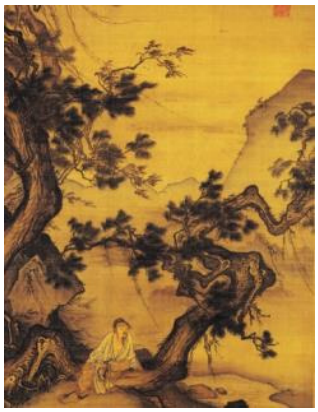

Figure 4.Ma Lin, 'Listening to Sounds of Wind Blowing Pines Tranquilly'.

This triangle composition of the scenery makes us associate it with the painting ‘Listening to Sounds of Wind Blowing Pines Tranquilly’ [静听松风图] of Ma Lin in the Southern Song Dynasty. In the paining, there are merely two old pine trees. One is tall and straight and the other is contorted and sideling; a hermit sits in the shade of these trees listening to the sounds of winds blowing pines and watching the mists and clouds in the distant mountains (Figure 4). The artistic *Jing* of the paintings is peaceful like a fairyland in the poem ‘breeze from pine grove blows the belt of clothes, and moonlight illuminate a hermit who is playing zither 松风吹解带，山月照弹琴’. Though there is only one old pine tree planted in ‘a place to listen to the windblown pines’, people calm down gradually when they are rambling into the pavilion, seeing water waves, and feeling cool breeze. The experience is like a line of Li Bai, ‘waters are against the heat of the pool, and cool breeze blows from the shade of pine trees 水退池上热，风生松下凉’. Meanwhile, a visitor reads the word on a tablet associating with a noble sentiment of Tao Hong-*jing* who was called ‘the prime minister in mountains 山中宰相’. Based on the experiences of perception, he may pay attention to the conception of the pure and lofty plant-scape and feel a condition of wonderland like the hermit in the painting.

In conclusion, the construction of artistic *Jing* in ‘a place to listen to the windblown pines’ synthesizes all the four strategical modes of the plant-scape design. The designer used the ‘windblown pines’ imagery as the conception of the plant-scape, and constituted a triangular space by pine trees and the pavilion to form a significant place. Then the texture of pine trunk, the sound of breeze blowing pine leaves, the shade of tree canopy, and the words on the tablet make appreciator recall the related allusion, poems, and paintings and acquire unique artistic experience.

Results and Conclusions

Based on the analysis of the relationship between plant-scape, garden environment, and people, we present a general mode of plant-scape design. At the first step of the method, the garden designer decides the conception, layout, and plant selection according to his own ideas, and then constitutes scenery with plants under the natural conditions of plant-scape objective *Jing*; this is an output progress. At the second step, the visitor pays attention to one or several characters of the view or scenery of plants based on their aesthetic attitudes such as the outlook, religious faith, artistic taste, environment sensitivity, and so on. At the third step, the appreciator interacts with the scenery and surroundings, getting the imagery of plants by logical thinking including perception, understand, and association; these two steps are the input progress. At the last step, the appreciator integrates the objective plants scenery and the subjective imagery of plants to generate a stable relationship which is the plant-scape artistic *Jing* actually; this is a feedback progress.

In this method, the final aesthetic product is the plant-scape artistic *Jing* which is an interaction between appreciator, plant-scape, and objective *Jing*. There are many variables in this dynamic relationship. For instance, the difference in plant-scape objective *Jing* leads to the diversity of plant-scape. The difference of different appreciators’ aesthetic attitudes makes them show different interests to different plant-scape characters; and the difference of aesthetic logical thoughts of visitors makes people get different experiences of artistic condition via the same scenery of plants.

For a long period, the connotation and employment of ‘*Jing*’ are ambiguous and cannot be interpreted distinctly in the researches of traditional Chinese culture.Zheng Yuan-xun, a close friend of Ji Cheng said that ‘when Wupi (i.e. Ji Cheng) designed his gardens, he had general rules in mind withoutfixed principles 计无否之变化，从心不从法. These words illustrate that Chinese garden designing lays emphasis on the perception and emotion experience of appreciation rather than forms and patterns. In other words, the garden designer emphasized the construction of artistic and emotional *Jing*. It is possible to explore the methods of constructing

and appreciating the *Jing* of a garden if being familiar with the relationship between appreciators' psychological activity and the variation of objective *Jing*.

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Notes

In the chapter of 'Siting' [相地] in Yuan ye, the author indicated a capacity of the site itself where a garden is to be made and how to forging condition according to the different site; in the last chapter of 'Borrowing scenery' [借景], the author described anthropogenic processes with the dynamic changes of sceneries due to the influence of the seasons and weather. See Ji Cheng(1988)

Addressing his disciples, Confucius says: 'the wise enjoy water, the humane enjoy mountains. The wise is active, the humane is quiet. The wise are happy; the humane live long lives.' 智者乐水，仁者乐山。智者动，仁者静。智者乐，仁 者 寿 . According to this tradition, scholars were asked to take an interest in nature. For more and complete explanation, see Yang, B. (1980).

About landscape condition, which could be interpreted as three levels: objective, story context and perceptive. Chinese literati are both designer and appreciator in garden making, so the three levels of landscape condition always interchange, and the meaning of it is abstract and vague. See Li, K. (2008).

Research on Innovative Methods of Landscape Based on Landscape Narrative

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Abstract

The key to design lies in innovation, but currently, research on landscape innovation is mostly focused on exploring a certain aspect of innovation or a single innovation, and lacks consideration of the overall and ontology of landscape innovation. This paper is based on the theory of mythological archetype and examines the different levels and types of landscape innovation from both the content and form of landscape narrative. Believing that innovation and inheritance are just two expressions of the same issue, both are descriptions of the degree of continuation and rebellion between new works and mythological prototypes. The final conclusion is that the innovation methods from the lowest degree to the highest degree are: pattern transplantation in narrative content, cultural continuation in narrative structure, maverick in narrative content and metamorphosis in narrative structure. The former two are less innovative and more inherited; While the latter two are more innovative and less inherited.

Author keywords

Landscape Architecture Criticism, Mythic-Archetypal Criticism, Landscape Innovation, Innovative Methods, Landscape Narrative, Mythological Archetype

Introduction

Innovation is the core of landscape design. At present, the research on landscape innovation mainly starts from two perspectives. The first is to explore the new paradigm of landscape design from a theoretical perspective (Zhu, 2013; WARE & Zhang2015), The second is to explore new measures of landscape design from the perspective of practice (Lin, 2007; Meng, 2018). However, because these studies rely on some phenomena that trigger landscape innovation, they are actually only discussing one aspect of landscape innovation, or the experience of a landscape innovation. This study will explore the "landscape innovation" itself from the perspective of landscape architecture criticism. Specifically, it takes mythological archetype theory as a method to investigate the principle and path of "landscape innovation" at the landscape narrative level.

Narration is the reorganization of more than two events. Narration is universal. On the one hand, it exists in all cultures and runs through all historical periods of mankind; On the other hand, it can be expressed in any form using any material, such as language, music, dance and landscape.(Prince, 2013) Narration consists of two parts. One is the narrative structure, that is, the way of plot organization, or grammar; The second is the narrative content, that is, events, or plots. Investigating innovation at the narrative level is to explore landscape innovation from the two aspects of narrative.

Wen Xin Diao Long · Tong Bian believes that innovation is "looking at the present to make wonders, and referring to the ancient methods"(Liu, 2018) in terms of structure and content. That is, innovation should not be based on imagination, but should be based on the original conventionality. The original conventionality is mythic archetype. Myth is a patterned narrative structure, and archetype is a typical narrative content. According to the relationship between new works and mythological archetype, this paper divides four paths of landscape innovation, and analyzes its principle.

Innovation of infinite proximity to conventionality

Transplantation of pattern in narrative content

The content level of landscape narrative includes not only the "shape, color, quality, fragrance, sound and appearance"(Gao,2012) of landscape elements themselves, but also the synchronic images composed of landscape elements through their mutual positional relationship. Pattern transplantation is the imitation of typical landscape content, such as the imitation of Roman column to Greek column, such as the imitation of landscape waterscape to "one pool and three mountains". If it can be imitated according to local conditions, it may be better than the original; If only mechanically copied, the new landscape will lose its connection with the land.

Case: Summer Palace, Russian

In 1709, in order to celebrate Russia's victory in the Northern War, Peter the great I (1721-1725) ordered the construction of a summer palace in St. Petersburg, Russia. The total area of the summer palace is 800 hectares, including 15 hectares of the upper garden and 102.5 hectares of the lower garden of the palace, and 682.5 hectares of Aleksandria garden.

At that time, France was powerful and influential, and European countries were imitating the pattern of the palace of Versailles to build the Royal Palace, in which the canal became the most prominent landscape pattern. The canal of the summer palace imitates the canal of the palace of Versailles. As the central axis of the whole landscape, it plays a role in controlling the whole landscape (**Figure 1, Figure 2**). In addition, the summer palace has also been imitated in terms of terrain, fountains, boulevards, and radial roads (**Figure 3, Figure 4**).

In general, the summer palace has adapted to local conditions. First, the summer palace uses a height difference of about 40 meters to place the palace at the highest point of the whole landscape, where the fountain opposite is the starting point of the canal, forming water flowing down the platform layer by layer. In addition, the water organ was built by height difference. Second, the canal of the summer palace fully responds to the site, designing the canal to disappear into the sea instead of mechanically copying the practice of Versailles, which further highlights the magnificent imperial power of St. Peter the great (**Figure 3, Figure 4**).

Innovation of intentionally highlighting conventionality

Cultural continuity in narrative structure

Narrative structure is also called form. The reason why landscape is landscape, not other art, is that it has the form of landscape. Liang Sicheng said, "form is the logic of organization."(Liang, 1998) The words in literature that have not been coordinated by form are just stacked drafts, not articles, and so are landscapes. If the source of cultural continuity is the old form in the cultural circle, it is a renaissance; If it is not the form in the cultural

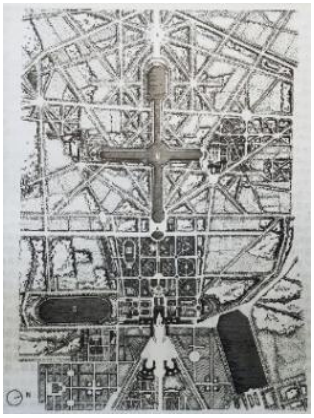

Figure 1 General layout of Versailles Palace Grand Canal is the central axis of the whole garden, controlling the whole garden (Zhu Jianning, 2013)



Figure 2 General layout of Russian Summer Palace: Grand Canal is the central axis of the whole garden, controlling the whole garden (Zhu Jianning, 2013)



Figure 3 The Palace of Versailles in France Grand Canal is the archetype of the Summer Palace (Photography by Author)



Figure 4 The Russian Summer Palace is modeled after the Palace of Versailles (Photography by Author)

circle, it is a kind of cultural grafting. In the latter condition, if the national culture is far weaker than the imported culture, the national landscape may change from then on.

Case: Kwai lik palace, Japan

Located in Kyoto, Japan, the Kwai RI palace is a royal palace. With an area of 42900 square meters, the whole landscape is a large pond garden. Built in the Edo era, the Kwai lik palace was "completed in nine years from 1617 to 1625 by Prince Zhiren and his son Prince Zhizhong, with the assistance of kohori Masahiro, the younger brother of kohori Yuanzhou."(Liu, 2005)

In the Nara era, Japan began to fully absorb Chinese culture and sent envoys to the Tang Dynasty. In the Heian era, Japan stopped sending Tang envoys, and the landscape began to be localized. However, the Japanese landscape at this time has long been influenced by the theory of Chinese Taoist immortals and the Pure Land Sect of Chinese Han Buddhism to form the style of the Heian period. Until the Edo era, the Kwai lik palace was built. Although Japan had formed a unique dry landscape at that time, the imitation of the narrative structure of Chinese landscape could still be seen in the large-scale pond garden. That is to say, the native language of Japanese landscape is mainly reflected in the content, and still presents the style of Chinese landscape in form.

It includes not only the form of landscape, but also the aesthetic taste of landscape. It can be seen from the plan that the Chinese landscape pursues the natural design method of "building pavilions in places suitable for pavilions according to the height of the foundation and the shape of the site"(Ji, 1998) (**Figure 6**). From the landscape title, we can see the concept of creating landscape for Chinese landscape to flexibly extract landscape(**Figure 5**). In particular, the countryside outside Xiaoyi Xuan was specially reclaimed by the emperor for the purpose of borrowing scenery (**Figure 7**). To sum up, the reference of Japanese landscape to Chinese landscape is not just the reference on the diagram, but the overall absorption from the method of creating landscape to the idea of creating landscape.



Figure 6 General Plan of Kwai lik palace (Liu Tingfeng, 2005)



Figure 5 The plaque of the "Shanghua Ting" in Kwai lik palace (Photography by Author)



Figure 7 The "Xiaoyi Xuan" of Kwai lik palace borrows a pastoral view from the window (Photography by Author)

Innovation of pursuing experimentation

The uniqueness of narrative content

Most Mavericks occur at the content level, because the innovation at the content level is relatively simple and effective. Historically, the evolution of content has always changed from plain to gorgeous, but at the most gorgeous extreme, it often weakens art due to lack of character. Liu Xie (465-520) said, "although it is beyond its true colors, it cannot be reverted"(Liu, 2018), which means that although gorgeous seems to be better than simple, it is "beautiful without spirit"(Liu, 2018) and can no longer be derived. "Artists tend to imitate their predecessors in a slightly more sophisticated way, thus producing a tradition of cultural aging which goes on until

some large change interrupts the process and starts it over again."(Frye, 2006b) Therefore, innovation in narrative content can either be infinitely close to conventionality, or significant changes can interrupt the continuation of this conventionality.

Case: bagel Garden

Bagel Garden was a renovation of her own homestead by Martha Schwartz (1950-) in 1979. The garden has a square plan and an area of 45 square meters.(Liao, 2005) After laying 75cm wide purple gravel on the garden floor, she placed 96 bagels on the gravel as landscape elements **(Figure 8, Figure 9**). The bagel is treated with waterproof treatment to become a device that can be stored for a long time.(Zhao, 2014) Martha Schwartz used this unusual thing as one of the landscape elements in pursuit of a rebellious experimental approach. She criticized her works and questioned the inherent landscape tradition, believing that landscapes can be built with anything and that everyone can build them.

The criticism of the donut garden is highly controversial in terms of its design itself. But it should be seen that the intention of Martha Schwartz's works is not to be within a garden, but to use it as a means of criticism to showcase her own views. Obviously, the greater the controversy and the more people pay attention, the more widely her opinions can be spread. Therefore, in this sense, her work is successful.

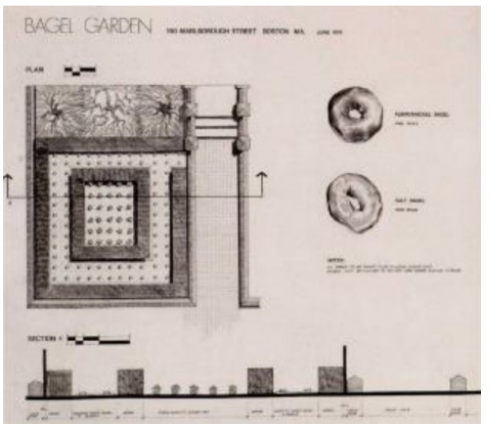

Figure 8 Plan and elevation of Bagel Garden (Zhao Jing, 2014)



Figure 9 Top view photo of Bagel Garden (Zhao Jing, 2014)

Innovation of breaks away from tradition

The Metamorphosis of narrative structure

"Metamorphosis refers to the significant changes in morphology and structure during the development of animals from embryo to adulthood, such as tadpole to frog. Mutation refers to heritable variation, especially changes caused by changes or combinations of genes and chromosomes."(Frye, 2006a) The innovation in the form of this section can be described as the completion of form, which has a history of growth; The original path in the above content is mutation, which is groundless. just as "The possession of originality cannot make an artist unconventional; it drives him further into convention, obeying the law of the art itself, which seeks constantly to reshape itself from its own depths, and which works through its geniuses for metamorphosis, as it works through minor talents for mutation" (Frye, 2006b)。

Case: zero degree nature

"Zero degree " are terms in literary criticism, which means neutral, without subjective attitude and expressionless. It is used to refer to the separation of text and author, that is, the pure text without human creativity and willpower. Here, the words "zero degree " are used to refer to the natural environment that has not been subject to artificial landscape and does not contain anyone's creation and will.

In the Anthropocene, nature is no longer a terrible "forest" and "wilderness" for man. People feel safe and happy in nature as in the "second nature" (**Figure 10**). In recent years, people are more and more keen to go to zero degree nature for various activities, such as hiking, rock climbing, mountaineering, surfing and so on (**Figure 11**). Jin Xuezhi (1933-) once mentioned that the spiritual and artistic experience of this zero degree nature has existed in China since ancient times. For example, Zhong Xing (1574-1624) in the Ming Dynasty said, "instead of enjoying the famous and beautiful gardens in the south of the Yangtze River, he regarded the natural environment in the south of the Yangtze River as a garden."(Jin, 1999) This is the expansion of the scope of the landscape, but also the redefinition of nature. This is a reconstruction from the ontology of landscape.



Figure 10 A 'National Park' with artificial scenery: Jasper National Park in Canada (Photography by Author)



Figure 11 The "Zero Degree Nature" with no artificial scenery: Lenggecuo, Sichuan (Photography by Wang Anqi)

Conclusion

In the process of landscape evolution and change, those classic landscape narratives will become the construction model of other landscapes, which should be taken as the standard for both inheritance and innovation. On the whole, innovation can be divided into two ways. One is to form differences in commonness; The other is to completely break away from orthodoxy. The former shows pattern transplantation in narrative content and cultural continuity in narrative structure; The latter is maverick in narrative content and metamorphosis in narrative structure.

Inheritance and innovation are not two diametrically opposite processes. On the contrary, they are a two-sided relationship. Inheritance must contain elements of criticism and development, and innovation must also be based on the extension of mythological archetype. Only in this way can inheritance be long-term and innovation be powerful.

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A Study on the Creation of Cultural Space in Rural Areas Along the Yangtze River Based on Spatial Narrative Theory - Taking the Xinzhou Section of the Yangtze River as an Example

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Abstract

Riverside rural villages, as an important carrier of Yangtze River culture and rural culture, their cultural spaces showcase the temporal and spatial domains of villagers' production and life, possessing extremely high historical, aesthetic, and ecological value. Based on spatial narrative theory, this paper selects riverside rural villages along the Xinzhou section of the Yangtze River as a case study. By applying spatial narrative theory and delineating, organizing, and constructing narrative texts, it reshapes the humanistic emotions between people and the river as well as between people and cities. The aim is to provide references and suggestions for the dissemination and experience of linear rural cultural spaces along the river.

Author keywords

Yangtze River culture, Spatial narrative, Narrative design, Cultural Space Creation

Introduction

The promulgation of the Yangtze River Protection Law in March 2021 marks a new chapter in the construction of rural spaces along the river. However, issues like inadequate cultural heritage protection, indiscriminate demolition, and limited utilization of historical resources persist. These issues result in a cultural disconnect, low narrative quality, and lack of community participation and vitality. This article explores reviving lost memories through spatial narrative theory, fostering emotional identification with Yangtze River culture, and stimulating rural vitality.

Overview of Spatial Narrative Theory

Narrative, the recounting of events through language or other media, conveys information about specific temporal and spatial occurrences. It encompasses the actions, processes, content, and outcomes of events. This behavior has been present throughout human history, with its earliest traces dating back around 40,000 years to primitive humans recording daily life through cave paintings. However, the definition and study of the "narrative" phenomenon came relatively late. Narratology emerged in late 20th-century France, with Tzvetan Todorov first introducing the term "Narratology" in "The Grammar of (Ten Days' Entertainment)," specifically referring to the scientific study of narrative works. By the end of the 20th century, narratology transitioned from classical to post-classical, gradually expanding its interdisciplinary and cross-media scope. Spatial narrative theory emphasizes temporal and spatial changes, aiming to restore historical texts and cultural significance to spaces, allowing

perception of cultural implications and establishment of cultural imagery and belonging. This paper seeks to address issues of cultural absence and fragmented memory in riverside rural areas by introducing spatial narrative theory.

Two Major Processes of Narrative Design

Narration involves humans telling stories and recounting events. It consists of two steps: identifying events to be narrated and giving them meaning through readable text.

To determine narrative events, meaningful events from Yangtze River villages are selected as narrative objects. Similar elements are summarized and classified to define the spatial theme. This paper combines Professor Zhang Nan's urban storytelling theory with Yangtze River culture and rural resources, identifying four narrative elements: showcasing the river's beauty, regional culture, revolutionary resistance, and significant life events.In determining narrative text, the technique of juxtaposition is more suitable for the diverse themes of the Yangtze River. By utilizing causal relationships, contrasting relationships, and parallel relationships between themes, the narrative expresses the same themes and connotations, completing the storytelling.

Case study: Narrative design of cultural space in the Xinzhou section of the Yangtze River

This article selects the cultural space of the Xinzhou section of the Yangtze River as the research object, studying 34 villages along its course, including Longkou Village, where the Daoshui River merges, Wagou Village, where Zhangdu Lake flows, and Dabu Village, where the Jushui River joins the Yangtze.

Narrative Element Sorting

The Xinzhou section of the Yangtze River possesses abundant water, village, field, and courtyard cultural landscapes, as well as a long history and culture. According to the narrative element classification method proposed earlier, these correspond to the cultural resources of the Xinzhou section of the Yangtze River, which can be further categorized into ecological elements of river villages, historical and humanistic elements, red cultural elements, and life event elements.

Ecological Elements of River Villages

The Xinzhou section of the Yangtze River has a well-developed water system, with rice fields scattered throughout and distinctive rural characteristics. Villagers engage in aquaculture, agriculture, and agricultural product processing. They have formed a unique living space layout with "front house, backyard" for efficient farming and land management.

Historical and Humanistic Elements

The historical and humanistic elements of the Xinzhou section of the Yangtze River include tangible cultural relics and intangible cultural heritage. While tangible cultural heritage is well-preserved, there is a relatively low awareness of intangible cultural heritage among villagers. Many are unfamiliar with local legends, folklore, and cultural traditions.

Table 1. Historical and Cultural Elements of the Xinzhou Section of the Yangtze River.

Type	Content	Status
Tangible culture	Longkou Sluice Bridge	Good
	Wei Wenbo's Former Residence	Good
	Monument to the Anti Japanese Base Area of Zhangdu Lake	Good
	Eastern Zhou and Han Dynasty Sites	Commonly
	Western Han Ancient Tomb Group	Commonly
	Old Site of Wulong Town	Commonly
	Old residential buildings	Poor
Intangible culture	Legend of Nine Dragons Playing with Beads	Poor
	Lion Dance	Good
	Pan's Traditional Chinese Medicine Surgery	Commonly
	Woodcarving Craftsmanship	Poor

Elements of Red Culture

The Xinzhou section of the Yangtze River was a strategic area for the Red Army during the Anti-Japanese War. It housed the first Communist Party organization in Xinzhou, the Gangxi Special Branch. It also served as a rear base for the New Fourth Army's anti-Japanese operations in Zhangdu Lake and the Crossing of the Yangtze River campaign.

Elements of Life Events

The Xinzhou section of the Yangtze River has witnessed significant events for villagers. Two milestones stand out: the 1970 Daoshui River diversion, resolving water issues, and the rise of Xinzhou in the new era. Projects like Wuhan National Aerospace Industry Base and Wuhan Xin Gang Gu Long Industrial Park have boosted the economy and villagers' lives.

Narrative Theme Creation

The narrative theme is the central idea of the "story" content, essentially a highly condensed organizational logic that extracts common features and representative meanings from individual elements as the theme. Based on a comprehensive evaluation of the four elements of the Xinzhou section of the Yangtze River, five major themes have been identified: experience the Humanity of the Yangtze River, entering the legend of Longkou, recalling the red history, reviving the spirit of pouring water, and looking forward to the important tools of a great country.

Table 2. Narrative theme and specific content.

Narrative theme	Narrative content
Experience the Humanity of the Yangtze River	The natural landscape of the Xinzhou section of the Yangtze River, intertwined with rivers and farmland, the rich cultural history, and the layout of characteristic residential buildings and courtyards.
Entering the Legend of Longkou	The Legend of Nine Dragons Playing with Beads and Local Folk Culture.
Recalling the Red History	The process of the establishment of the Gangxite branch, the story of the anti Japanese base area of the Shengdu Lake, the deeds of the Cross River Campaign, and the personal anti Japanese deeds of the revolutionary hero Wei Wenbo.
Reviving the spirit of Daoshui River	The rural culture of Longkou Sluice Bridge .
Looking ahead to the rise of the aerospace industry	The growth process of the Xinzhou from growing vegetables to becoming a high-end aerospace industry

Narrative Text Construction

This narrative text will center around the theme of "Experience the Humanity of the Yangtze River" and adopt the technique of juxtaposition to simultaneously narrate other themes. Four metaphorical and interconnected themes will ultimately lead to a central theme, allowing villagers and tourists to unfold a readable, imaginable, and perceptible historical scene.

"Experiencing the Emotions of the River," focuses on designing a riverside greenway to strengthen the connection between people, the river, and the city. The greenway incorporates diverse businesses, historical buildings, and public cultural spaces to enhance public participation and vitality.

"Entering the Legend of Longkou," revolves around the Longshan community and the mythical tale of the Nine Dragons fighting over the Pearl Mountain. This legend symbolizes Longkou's historical significance as a place of power struggles and sets the tone for Xinzhou's history.

"Recalling the Red History," highlights the heroic deeds of Communist revolutionaries in resisting the enemy and defending their homeland. It is narrated through the Zhandu Lake Anti-Japanese Base Monument and Wei Wenbo's former residence, providing a personal perspective on the red history.

"Reviving the spirit of Daoshui River," tells the story of Premier Zhou Enlai's directive to address the water diversion disaster in 1970. The construction of the Longkou Dam reflects the spirit of unity, hard work, and selfless dedication, showcasing the advanced nature of the Communist Party.

"Looking ahead to the rise of the aerospace industry", portrays the grandeur of Xinzhou's development in the 21st century. Projects like the Wuhan National Aerospace Industry Base, Aerospace Park, and the planned Gulong Industrial Park signify the city's growth and continuation of its red culture.

Narrative Context Shaping

In "The Practice of Everyday Life," Michel De Certeau argues that society is composed of social practices, and understanding these practices provides insight into a society. Life practice itself is a narrative, reflected in villagers' behaviors and the public spaces where these stories unfold. By employing situational narrative, the semantics of these dimensions can be spatially translated, allowing for the simulation and reproduction of local historical and living scenes.

Life Behavior: Villages along the river, such as Longshan Community, Gulong Village, Wagou Village, and Mayi Village, engage in various production and living activities, including vegetable planting, fishing, aquaculture, and traditional crafts. Experiential cultural and tourism projects, such as leisure fishing bases and non-heritage cultural gardens, can showcase the connection between villagers' daily lives and the Yangtze River.

Public Activity Space: Public buildings, streets, squares, and farmland form the community life and cultural scene of rural areas along the river. Improving the living environment and public spaces, such as building a village history museum in Lianhu Village or creating leisure activity squares and waterfront ecological walkways in Wagou Village and Dabu Village, enhances the narrative context and cultural experience.

Conclusion

As a vital component of Yangtze River culture, the Xinzhou section faces challenges due to accelerated urbanization, including loss of local characteristics and uneven distribution of public spaces. This article introduces spatial narrative theory and analyzes public cultural spaces in Xinzhou, identifying ecological, historical, red cultural, and life event elements. A central theme connects these elements, forming a cohesive spatial narrative imbued with cultural significance. This study provides practical ideas and methods for narrative construction in rural cultural spaces along the Yangtze River, offering theoretical support and reference value for the revitalization, planning, design, and cultural dissemination of other linear cultural heritage spaces in rural areas.

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"LuoLuoYunYunZhiJian" A Study on the Application of Narrative Thinking in Curatorial Design for Architectural Exhibitions

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Abstract

Narrative theory primarily delves into the intrinsic structural mechanisms of a text and the interrelationships among its various components. It employs specific structures to weave these elements together, giving rise to narrative qualities within a work. Narrative expression has always been a prominent aspect of artistic creation. The fusion of narrative theory and the field of design offers new perspectives and modes of thinking for design, emphasizing the depth and layers of design content. It underscores the organic integration of design elements and textual information to achieve a harmonious union of aesthetic perception, emotional experience, and cultural value.Currently, the integration of narrative theory into exhibition design remains relatively underexplored in terms of deep theoretical development. This paper, grounded in narrative theory and relevant curatorial concepts, establishes the exhibition theme "LuoLuoYunYunZhiJian." It unfolds the exhibition's main narrative thread in reverse chronological order, featuring three thematic exhibition halls: "CuiWeiDaGuan," "ChuYunMinXin," and "ShangXiaQiuSuo." The paper also explores the use of spatial symbols to represent "Jian," utilizes mortise-and-tenon wooden frameworks for booth construction, and incorporates multimedia elements in the presentation.Within these domains, the paper investigates approaches and methods for incorporating narrative elements into the design. The objective is to develop an effective narrative communication framework that captivates viewers' interest and provokes contemplation. The ultimate aim is to contribute reference-worthy cases for the development of narrative design in China's exhibition design industry.

Author keywords

Narrativity, Exhibition Design, Architectural Exhibitions

Introduction

In the ever-evolving landscape of society and culture, the aesthetic awareness and demands of the public continue to grow, with an increasing desire for elevated aesthetics. According to statistics from the Ministry of Commerce, China's exhibition industry maintains its position as the world's largest, with a total of 5,495 offline exhibitions in 2021, representing a year-on-year growth of 1.61%. Additionally, data from the National Cultural Heritage Administration indicates that there were 6,565 museums nationwide in 2022, receiving a total of 578 million visitors. This demonstrates the steady growth of China's exhibition and museum industry, as more and more individuals seek to expand their horizons, satisfy their visual aesthetics, and experience emotions through cultural engagement. Throughout history, stories have often been a potent means to stimulate people's

perceptual abilities.Narrative thinking, as a novel design mindset, subtly influences the language of designers and the way people encounter and engage with works of art. In the context of exhibition design, narrative thinking utilizes the structural rules of narrative theory and story hierarchies. It further communicates information through language elements such as space, graphics, and colors, emphasizing experiences on a spiritual and emotional level. This approach not only establishes effective communication with the audience but also deeply resonates with the audience's imagination and memory.However, within an interdisciplinary perspective, there is limited exploration of narrative design-related theories, and there is a pressing need to expand research on narrative exhibition curation methods. Therefore, this study combines theories from narrative studies and exhibition design. It takes inspiration from the philosophical relationship between the "LuoLuoDaZhe" and the "YunYunZhongSheng" as the exhibition theme. Employing a reverse chronological narrative technique, it focuses on the main narrative thread of works, ideas, and journeys, using "CuiWeiDaGuan" as the thematic exhibition hall for architectural models, "ChuYunMinXin" as the thematic exhibition hall for dialogues on architectural concepts, and "ShangXiaQiuSuo" as the thematic exhibition hall for architects' autobiographies. The exhibition format incorporates spatial symbols denoting "Jian," environmentally friendly and convenient booth construction using mortise-and-tenon wooden frameworks, and various display props such as multimedia, graphic panels, and models. The objective is to create a narrative exhibition effect that captures the interest of viewers and provokes their contemplation. Ultimately, this research aims to provide reference-worthy cases for the development of narrative design within China's exhibition design industry.

Narrative and Narrative Design

Gerald Prince, in "A Dictionary of Narratology," elucidates, "Narrative refers to the recounting of real or fictitious events and states in a sequence of temporal units." Narrative, as the most common narrative technique in literary works, organizes the development of a story with its specific structure, including elements such as characters, time, and location. Essentially, narrative is a process of information exchange, where the content of the narrative text serves as information transmitted from the communicator to the receiver.Within the realm of narratology, narrativity possesses the characteristics of narrative and has always existed in the creation and expression of art. It is widely employed across various disciplines, such as film, music, dance, architecture, and more. Through the organization and construction of each discipline's unique language, narratives with storytelling elements are formed. These narratives not only effectively convey information but also evoke deeper levels of experience and resonance. In the field of design, narrative design emerged as a result of developments in postmodernism. Narrative design incorporates narrative structure and function, enhancing the meaning and content of artistic works through the structural rules of narrative theory and story hierarchies. It also underscores the interconnectedness between design, people, and culture.

Narrative Approaches and Language in Curatorial Design

Narrative within exhibition spaces engages all the senses. In storytelling, narratives often progress through plot elements like the protagonist's character, motivations, experiences, key events, and interactions with others, connecting these elements into a cohesive storyline. The reader's emotional response is formed through textual associations and emotional resonance. However, in the context of exhibition spaces, narrative is established through the exhibition's theme to provide direction, construct the exhibition's central thread, guide its trajectory, delineate exhibition areas and themes within different halls, allocate narrative content and portions, select items for display, estimate item density, and incorporate visual and textual elements, as well as display props and multimedia, to convey the exhibit's content and outline its effects.In exhibition spaces, the visitor's experience is

shaped by the layout and distribution of the space, the visual impact of displayed items and props, the guidance provided by the exhibition's design, and the comprehensive integration of theme and content through images, text, and video. This narrative approach is characterized by its concreteness, aesthetic appeal, and experiential nature, employing the languages of space, visuals, form, philosophy, and text. It interprets the exhibition's story through firsthand experiences.

The Application of Narrative Thinking in Architectural Curation

This research is based on the exhibition "Contemporary Architecture by Architect Lu Xiaoming," which took place in September 2023. Architect Lu Xiaoming is known for his integration of architectural structures with tradition, modern technology, and the natural environment, advocating for human-centric architecture. His works are deeply rooted in Jingchu culture and are characterized by qualities such as "vitality," "grandeur," and "romanticism." The curatorial design for this architectural exhibition was part of a competitive bidding process and was hosted on the ground floor of the CITIC Tower.

The Theme of the "Vast and Diverse" Philosophical Relationship and the Reverse Chronological Main Narrative Thread

Lu Xiaoming's architectural exploration, when analyzed from the perspective of traditional culture, demonstrates a threefold elevation of the philosophical relationship between the "powerful person" and the "ordinary person." That is: the powerful person pays attention to the ordinary person, the powerful person works for the sake of the ordinary person, and the ordinary person is, in fact, the powerful person. From a Chinese values perspective, Mr. Lu Xiaoming's architectural practice encompasses exploration across three dimensions: focusing on people's livelihoods, serving the people, and ensuring the happiness of people's lives, all of which are aspects of a nation's greatness. From a professional and technical standpoint, Mr. Lu Xiaoming's works embody a triple overlay of design principles: human-centric design, design for the people, and design rooted in humanity. In the realm of "LuoLuoYunYun" (the vast and diverse), it is within this intricate tapestry that one seeks enlightenment, amidst the vastness, among the diverse multitude.

Within the constraints of available space, the exhibition is divided into three halls. The first hall, "CuiWeiDaGuan," serves as the thematic exhibition hall for architectural models. "CuiWeiDaGuan" refers to magnificent scenery or architecture, describing awe-inspiring and heart-stirring scenes that are deeply rooted in cultural heritage and historical accumulation. In this hall, Mr. Lu Xiaoming's representative architectural works are presented in the form of scaled-down physical models, sectional models of architectural structures, node models, and handwritten sketches. This presentation captivates viewers with a visually striking effect, allowing them to appreciate the beauty of architectural construction.The second hall, "ChuYunMinXin," is the thematic exhibition hall for engaging with architectural ideas. "ChuYunMinXin" signifies works deeply rooted in the Chu region, rich in Chu cultural significance, and intimately connected to the people. This hall narrates the architect's philosophy of creating for the people, delving into the traditional cultural elements behind each representative work, such as the hipped-roof design of the Hubei Theatre, explained through model comparisons and textual explanations. This helps viewers understand the stories behind the works."ShangXiaQiuSuo" is the thematic exhibition hall for the architect's autobiography. "ShangXiaQiuSuo" means continuously delving into thoughts, making efforts to explore when seeking knowledge, pursuing goals, or solving problems. In this hall, photographs of Lu Xiaoming during his academic journey, his works, and interview recordings from his years of study and exploration are displayed. This multidimensional presentation provides insight into the architect himself, bringing viewers closer to his experiences. Through this main narrative thread of works—thoughts—journey, the exhibition aims to evoke

emotional experiences of awe, understanding, and resonance, leaving a lasting impression on viewers.

Spatial Symbols of "Jian" and the Joinery of Mortise-and-Tenon Wood Frames

In Chinese traditional culture, the term "Jian" refers to space, compartments, or rooms. In the context of the three exhibition halls, a unified approach is taken in constructing spatial representations of "Jian" using mortise-and-tenon wood frame structures. These structures create rectangular spaces measuring 3m x 3m x 3m, collectively referred to as "Jian." As part of the exhibition design, sections of these spaces are constructed using 1m x 1m x 1m wooden frames. Three frames are arranged in a row along one side, and two frames are arranged along the adjacent side, forming a right angle. There are no partitions between adjacent wooden frames, with only display panels carrying information enclosing one side facing the audience. This configuration creates the appearance of segmented yet open spaces. "Jian" spaces are arranged based on spatial planning and layout, either in a sequential manner or in an interspersed fashion. The modular exhibition booths are easy to arrange and convenient to assemble and disassemble.

Image and Visual Props with Documentary Content

As the saying goes, "A picture is worth a thousand words." Images and visual content are indeed one of the most effective ways to convey a message. They have the unique ability to capture the audience's attention quickly and effectively. Beautiful visual elements enhance the appeal of the exhibition and pique the interest of the viewers. Images of architecture and structures are particularly useful for conveying complex ideas in a straightforward manner. Additionally, video interviews and documentaries can convey emotions and sentiments that words alone might struggle to express. When combined with multimedia elements such as sound and lighting, documentary content about the architect's journey can create a rich and multisensory experience, further enhancing the audience's engagement with the exhibition.

Conclusion

Narrative thinking has become a significant mode of thought in the field of design, influencing the creative language of designers and the way people perceive works of art. Narrative thinking is the process of conveying information from the communicator to the receiver, and it serves a similar purpose in exhibition design. In exhibition design, the application of narrative thinking involves conveying information through spatial arrangements, graphics, colors, and other languages. It emphasizes the spiritual and emotional experience, effectively communicates, and stimulates the imagination and memory of the audience.Within the context of the Contemporary Architecture Exhibition by Lu Xiaoming, a thematic background combining narrative theory and exhibition design theory is employed. The theme revolves around the philosophical relationship of "LuoLuo and YunYun," utilizing a reverse narrative approach. This approach is based on the architect's principles and the characteristics of his works, facilitating the establishment of the exhibition's theme, the division of exhibition areas, and the use of multimedia, graphic panels, models, and other display props. This, in turn, deepens the understanding of architecture, evokes emotional resonance, and leads to a clear narrative of the exhibition content, enabling a profound interpretation of the exhibition experience.

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Urban renewal story -- the application of narrative design in the reconstruction of old urban communities

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Abstract

How to extend the life cycle of urban buildings and improve the environment of urban communities has attracted more and more attention. Under the background that the speed of urban expansion in China is gradually slowing down, how to better carryout urban renewal and old building transformation, improve the quality of life of residents, and promote the development of urban community in culture, economy and other aspects is one of the important topics of urban renewal research. As one of the important methods of architectural design,narrative design has become the main content of the research and practice of old community reconstruction because of its difference, customizability and humanization characteristics. Exploring the access and integration of narrative design methods in urban renewal will help to generate new design techniques in urban renewal practice, enrich design tools, and stimulate more transformation ideas. This paper first reviews the correlation between narrative design and community reconstruction, analyzes the three key elements of narrative design method through theoretical analysis and practical cases, and summarizes the three main methods of narrative design method in the renewal of old communities by combining the field reconstruction project cases.

Research Background Sections

As the main scene for urban residents to continuously experience the urban environment, community plays an important role in maintaining the stability of urban residents' life and providing convenient services for them. In the field design and research of the old community reconstruction, it is found that the city is developing rapidly, and the community culture in many areas of the city begins to disappear or even completely lose. The cohesion of residents in urban communities is poor, everyone is an island, and residents lack a common communication language under the background of big culture. In this environment, designers of urban renewal should not only refer to the existing local culture, but also learn to integrate and process the existing culture, and even "embellish" the local cultural stories as the creative basis for extension,so that they can be integrated into the design of the old society transformation, which can make local residents feel both cordial and novel.

Community renewal is the reproduction and reconstruction of community scene narration

Due to its unique difference and humanization, narrative design is a design practice method that fits well

with the old urban renovation. Designers can provide different users with customized narrative content and differentiated design perspectives. In the process of reconstruction of old communities in different regions and cities, according to the background and characteristics of different regions, combined with narrative design techniques and narrative design methods, it pays attention to the place experience, scene culture and social characteristics, and makes full use of the advantages of narrative to become an effective tool for architects to carryout architectural practice. The narrative design method is used to integrate and expand the culture in the community, enrich the local cultural system, and embody the local characteristic culture in a new form through the concrete and concrete performance of the design.

The simple narrative design attaches importance to the old community environmentand user' s feelings

Simple narrative design mainly focuses on urban renewal from the perspectives of sustainable design and humanized design, focusing on people's sustainable activities as the starting point, paying attention to users ' personal feelings, and handling the relationship between architecture and environment. In the perspective of simple narrative design, designers should pay more attention to the users' basic needs for the street environment, such as the width of the street, whether the traffic is smooth, whether the sidewalk light is sufficient, and whether the natural vegetation is reasonably planted. These basic needs constitute the main frame of the narrative. Without the narrative frame, the detailed plot content cannot be continued. In addition, the emotional needs of community residents will also be included in the narrative design. In the early stage of the design, I will go to the field investigation and visit, observe the existing stories of the community, personally experience the surrounding environment of the community itself, and integrate myself into the target community, so as to truly consider the problem from the perspective of the listener. What is interesting is that in this narrative process , the identities of narrator and listener begin to change, and designers become listeners of the old environment , which is jointly created by the designers and residents of the old environment over time.

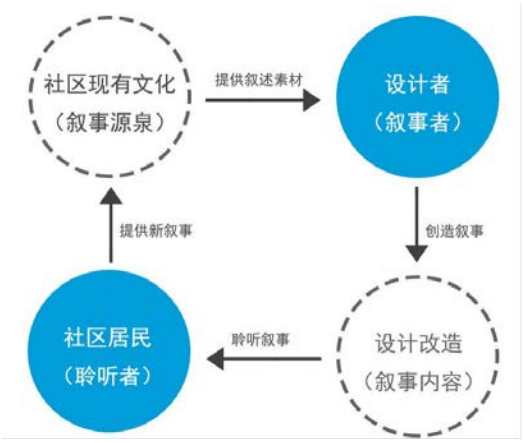

Figure 1. The Narrative cycle

The use of narrative design method to explore and describe the cultural characteristics of existing communities

The depiction of the scene with sustainable elements such as history and culture as the starting point of the design, and the concept narrative and historical narrative as the overall narrative design strategy will help the old community culture to integrate into the updated architecture. In the renovation design, it will become more and more critical to explore the local characteristic culture of the community, refine the essence of the community culture, and translate it into symbolic elements in the architecture or landscape design of the community.

The narrative environment of community architecture integrated with history and culture will not make residents feel too unfamiliar and lose the desire to get close to it. At the same time, it retains a certain freshness to attract passers-by to stop, introduce new residents, and bring new blood to the community. Especially in some rapidly expanding cities in China, where local culture is lacking in the surrounding areas, the language of design and the way of narrative can enrich the connotation of local culture, reshape the old space by means of narrative design, and create a new dynamic environment. And in the subsequent uninterrupted urban renewal, new story content can continue to be incorporated and a new narrative environment can continue to be created, so a virtuous cycle repeats.

Narrative design strategy in the real case of old community reconstruction

Through the analysis of narrative design methods, it can be seen that in the process of the integration of narrative design and urban renewal design concepts, in addition to the application of overall macro-design narrative in the overall layout, there is also a deep correlation between narrative mode and the transformation of cultural history into design expression in community transformation and other concrete design methods. The following will discuss the specific application strategies and practical methods of narrative design in the reconstruction of old communities in the case of Liujia Dayan in Yichang City, China.

Aiming at the old community environment and building renewal technology, the narrative method of street environment and node scene construction can be combined

In the reconstruction of old community, we focus on the comfort of street environment and the matching of functional community. Whether it can provide the community residents with perfect convenient supporting facilities and comfortable rest and movement nodes will become the key consideration of designers. Setting the functional nodes of the unified overall narrative space can make the basic function construction and scene construction proceed simultaneously in the transformation process, and get twice the result with half the effort.

In this regard, the designer will emphasize the beginning of community narrative and sort out the spatial path of narrative. Set the landmark gate at the intersection as the main body of the beginning of the whole story system, and separate the chaotic multi-linear narrative path of people and cars, so that each other's stories can proceed smoothly; On the left side, community signs and publicity columns are set up to strengthen the communication and integration between residents' individual narratives and community narrative subjects; It is also equipped with green plants and water features as natural environment narration, enriching the story logic level of the entire entrance and integrating the main narrative entrance of an old community space. In the beginning of the narrative, the narrative routes of people and cars are disordered, and the scattered and chaotic narrative space is separated into a coherent spatial narrative path.



Figure 2. The creation of narrative nodes and scenes

For the continuation and development of the culture and economy of the old community, the narrative methods of cultural excavation and narration can be combined

The transformation of old communities should pay attention to the inheritance and innovation of local culture and features, and the narrative design method tries to explore the deep influence of culture, economy and other factors on space by digging deeply into the community operation mode. Therefore, the construction of narrative space based on cultural and economic sustainability is an important tool for the renovation of old buildings.

It is an important method to use the community culture connotation to concretize into concrete abstract symbol form. In the transformation project of Liujia Dayan Community, the Chinese pictographic culture of "Liujia Dayan" is used as an abstract transformation and concrete expression, and the hexagonal window frame in the traditional Chinese garden is used as the main identification scheme of the community. Using the strokes of Liujia Dayan itself to do details on the hexagon, the formation of eaves and paths, meaning open the door to see the scene, complete. In the community scene where the warm is gray, the more prominent red is used as the theme color to form a bright mark in the narrative, and the traditional Chinese narrative and allegorical techniques are auspicious and good luck, which also represents warmth.

In the subsequent modification of the logo scheme, the connotation of the community cultural narrative was further refined, and a more concise and abstract community logo image was born. The overall shape selects the initial letter "L" and "J" of the "Liu Jia" pinyin of Liujia Dayan, and the two corners of the letters relatively form a geometric house with perspective expression. It can also be understood as the residents in the narrative enter the open site environment through the time path and the wall of the physical boundary from the outside. The overall shape is more concise and abstract, with abstract graphic narrative techniques combined with traditional Chinese fables, meaning the Xanadu like Liujia Dayan.



Figure 3. Community Logo Scheme 1 and Scheme 1

For the continuation and development of the culture and economy of the old community, the narrative methods of cultural excavation and narration can be combined

In the process of the transformation of Liujia Dayan commercial Street, the design method of the facade shape contour continues the design elements of the gate. Materials use warm colors to maintain the overall facade narrative tone unity. The narrative elements (multi-level concave) are extracted from the traditional building door shape, and the repeated sequence language generates the sense of facade narrative rhythm, which sets off the modern elements in ancient times and maintains the narrative unity and integration of the street facade.

In the process of scene narration of commercial blocks, the commercial facades of the old environment are disorganized, coupled with the old and narrow street ground, residents feel chaos and disorder in the colorful signboards hanging overhead, and the overall atmosphere of the street gives residents more sense of old and broken. In the renewal plan, the new facade narrative will be more practical, unified and modern language,

the exterior border of the store adopts composite materials reflecting the level of modern craftsmanship and visual effects, and the longitudinal grating and horizontal repeated arrangement produce a unified rhythm of array, transforming the entire broken and old commercial street into a dynamic and novel community narrative background, so that the community story can be actively displayed and carried out.

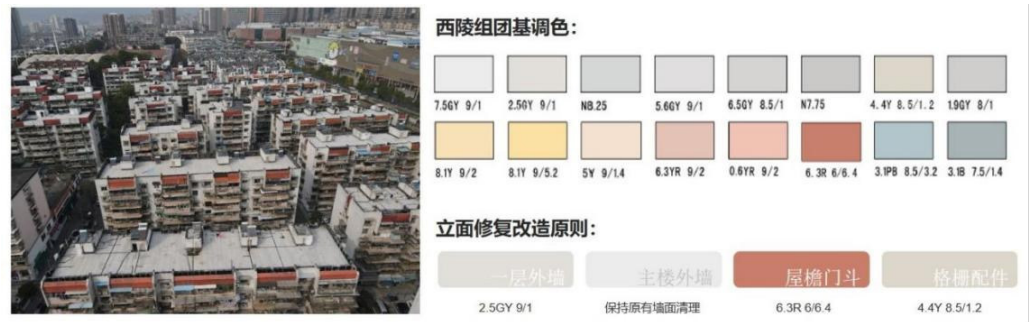

Figure 4.Facade color narrative

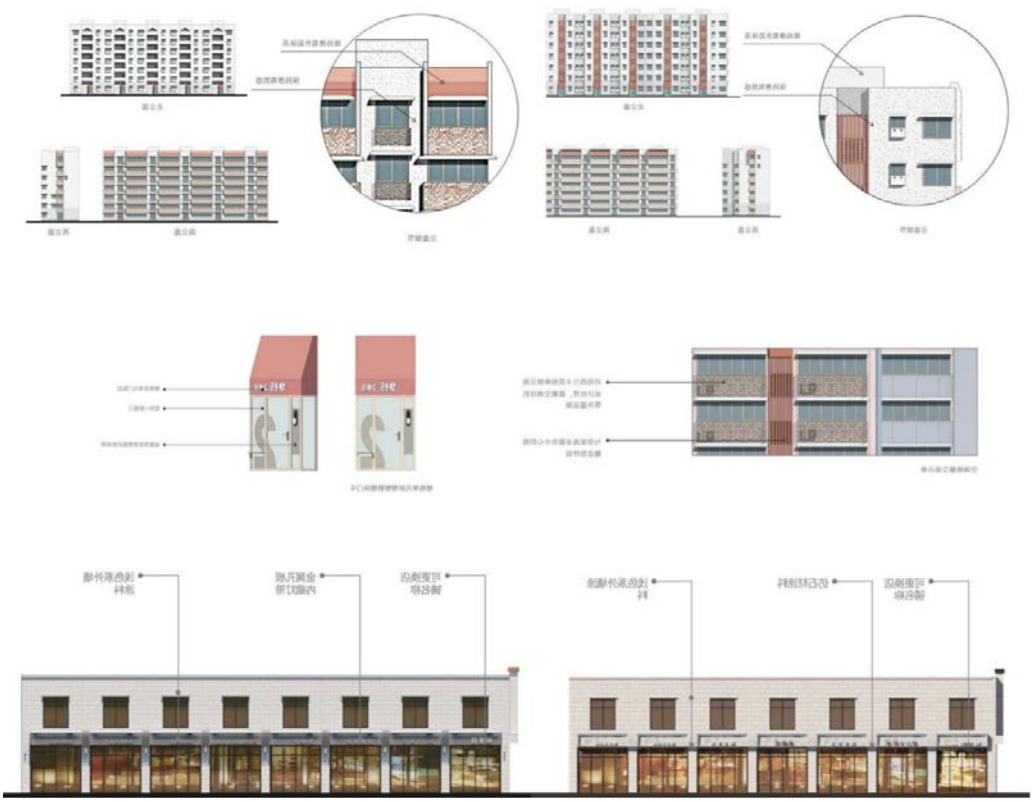

Figure 5. Facade color narrative

Conclusion

Narrative design focuses on place experience, scene culture and social characteristics, and has always been an effective tool for architects to carry out architectural practice. Looking back on the past design development of urban renewal, from the perspective of extending the life cycle of buildings, the connection between narrative design and the reconstruction of old communities can be summarized as three key points: simple narrative

design that attaches importance to the environment of old communities and users' feelings; Using the method of narrative design to explore and describe the cultural characteristics of the existing community; The application of scene-conceptual narrative design method in community environment experience participation. At the same time, the concept narrative is used as a design strategy to unify the community space and time narrative, which can expand the boundary between urban renewal design and old community transformation practice. From the completion effect of the project practice cases, in the process of the old community reconstruction practice, the narrative design method can expand the extension characteristics of the old community architecture, help to further promote the deepening design of urban renewal, and is an important design method for urban renewal and old community transformation.

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Ceramics: Narrative emotion under contemporary cultural self-confidence

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Abstract

Since the emergence of human civilization to modern industrial mass production in the era of human-machine symbiosis, ceramics has been one of the most representative artistic expressions of Chinese cultural confidence, conveying narrative emotions through technological craftsmanship. By imparting the human spirit into products and depicting people, objects, events, and scenery that characterize different eras, ceramics embody both material and spiritual aspirations. The emotions embodied in ceramic creations are not only a core manifestation of the great rejuvenation of the Chinese nation, but also a representative of contemporary cultural confidence.

Author keywords

ceramic, narrative emotional, culture confident, art

1.Introduction

Ceramics are creations, as well as narratives of emotion. These narrative emotions originate from literature; the combination of emotions and literature is an indispensable part of literary discourse, embodying unique characteristics and connotations. Through precise, vivid descriptions; profound, authentic themes; and in-depth emotions and stories, these narratives resonate with the reader. They connect the thoughts and emotions between the author and the reader, fostering empathy or creating immersive works. In this process, the author is transformed into an invisible narrator, expressing their inner voice.

Ceramics serve as a manifestation of narrative emotions in the course of human development and cultural evolution. Under the guidance of contemporary cultural confidence, China is spreading its own Chinese culture and stories to the world. Since ancient times, ceramics (China) have served as an important conduit for China's connection to the world. The stories of China's history of porcelain-making, ceramic painting, ceramic design, ceramic thought, and folk tales about ceramics are all important content for spreading China's cultural confidence. Their narrative emotions are also disseminated accordingly.

Southern Dynasty Liang - Liu Innocence wrote in "Literary Heart Carving Dragon - Eulogy Tablet" that the narration is factual and concise, while the embellishment is elegant and refined. In ceramic art, artists use specific shapes, graphics, colours, and textures to record, describe and express events on clay, conveying the underlying meanings and backgrounds of the events. The ceramics narrative contains numerous emotional narratives and

represents various regional cultures. It also reflects the Chinese nation's wisdom and self-assurance.

2.Emotional expression in ceramic narratives

Auguste Rodin believed that "The source of art lies in the inner truth，your form，your color. and the emotions you want to convey."Hegel posited that art's skill lies in manipulating emotions through the imagination. The life force of ceramic artworks stems from authentic, powerful emotions. Absent those, they lack a narrative and vitality.

The maker of ceramics is the handmade artifacts that are made to satisfy the needs of people's own lives. Ceramic objects are more functional than aesthetic in their spatial form and zeitgeist, forming an explicit narrative and emotional exchange. When the communication between artifacts and artists forms a narrative context, the additional attributes of modeling, painting, and texturing with clay are to make the ceramic artifacts have an episodic context and to respond to its narrative expectations. Once a ceramic object has fulfilled the functional narrative of being strong, durable, and waterproof as a utensil that communicates with its user, its creator creates decorative structures such as socially significant images and patterns on the surface of the ceramic object in response to the context of the present age and the competing demands of society. This epiphenomenal meaning narrative not only has aesthetic significance but also has other multiple metaphorical narratives. Thus, in the process of handmade objects, the maker and the ceramic object constitute a context of communication, and the narrative unfolds in the memory of time as a subject-object negotiation of form, function, feel, and emotion. Under the premise of prioritising function, the creator designs the object in accordance with their own thoughts and feelings, endeavouring to strike a balance between form and quality, resulting in a meaningful composition. The form conveys the creator's aesthetic interest, creating an internal communication mechanism. Additionally, the form has a narrative literary meaning.

Before the creation of ceramics artist, the conceptualization process and the creation of the framework, the potter will mobilize their own life, work, social experience, image accumulation, as well as containing their own cultural characteristics of the meaning of the various types of resources are fused, interwoven into a kind of artistic imagery. The process of conception and organization of such works is gradually clear from ambiguity, and changes and transforms continuously in the process of creation until it is satisfactory. In this series of operations, the potter's impulse to create, the passion to create, and the regularity of ceramic art form, all need to be fully from the pottery creator's heart, and through the work to show.

In the ceramic narrative emotion creation, the ceramics artist and designer through the mud, water, fire and other materials as a medium, through the personal emotion into the work, the formation of a unique ceramic context, and extend the narrative language with rich connotation. This is not only the artistic expression of the work itself, but also the comprehensive reaction of the author's thinking, action, behavior, and various ceramic additives. The display embodies the ceramic artist's desire for life.

Different from the traditional Chinese ceramics modeling, modern ceramic works of art modeling narrative as a very important means of expression. Narrative ceramic modeling, it can be geometric shape shape splicing processing and hollowing carving; is the simple form of the artistic pursuit of in-depth exploration; there are structured unit splicing twisting interspersed vertical structure; the ceramic hard and curved softness into one of the rigid and soft and continue.

For example, Mr. Bai Ming's recent ceramic works are ceramics with avant-garde concepts of abstract shape and abstract texture language. Ceramics is a material that seems to come to life through Mr. Bai Ming's narratives. "Ceramics is purified clay, and after purification, it has to be quenched by fire, just like a human being." He has allowed the warmth, elegance, versatility and unpredictability of ceramics to slowly feed into the charm of his unique character. It is as if his art, his emotions and his humanism all stem from the warmth and texture of ceramics itself. It is only when we treat the material as a living organism that we gradually understand the joys and sorrows of the ceramic material itself.

Chinese ceramic artists are at the forefront of the world in terms of their technical expertise, material quality, and decorative integrity as well as the etiquette, dignity, and aesthetics of their vessels. Objective evaluation of their skills cannot be denied. The cultural confidence exuded is well appreciated. If ceramic art can express emotions through material language and techniques that elevate it to a cultural height matching modern society's needs, this could better serve the cultural development of contemporary China. Furthermore, we aspire to have a strong sense of confidence and the spirit of Chinese culture, which Chinese ceramics practitioners aim to express through their work.

3. Cultural Confidence and Ceramic Narrative Emotion

The idea of cultural self-confidence was introduced by Fei Xiaotong, an eminent sociologist and anthropologist. Specifically, it encompasses self-reflection, self-creation and self-knowledge of its culture and development history. He defined it as the awareness of one's culture, and the historical context within which it exists. The 19th Party Congress report highlights that culture is integral to a nation and its people, and is therefore considered the soul of a nation. A thriving nation depends on the robustness of its culture, and a nation's strength is directly related to the strength of its culture. Technical term abbreviations should be explained when first used, and sentences must be clear and concise, with causal connections between statements. Formal register is crucial, and colloquial words, informal expressions and unnecessary jargon should be avoided. Consistency in grammar, punctuation and spelling are critical for grammatically correct writing. Subjective evaluations should be avoided unless explicitly stated. Cultural self-confidence is critical to achieving extreme cultural prosperity, which is essential for the Chinese nation's rejuvenation. Conventional academic structure and formatting features should be utilized, including common academic sections. Balanced language should be used avoiding biased or ornamental phrases.

Ceramic culture represents a mature realization of cultural confidence, and its recognition has played a significant role in bolstering cultural identity. This is reflected in a confident psychological state, which aids in firming up cultural beliefs during foreign cultural exchanges and instils a sense of confidence and pride in their own culture. Chinese civilization values the uniqueness and emotional significance of ceramic culture. Exploring ways to reflect the rich Chinese ceramic culture and cultivate a strong sense of self-confidence in it is worth.

Construct the ceramic narrative creation system with cultural confidence at its core while maintaining pace with the global cultural exchange and integration. The process of modern ceramic art creation involves not only upholding the outstanding traditional ceramic culture but also staying current and continuously absorbing the advanced facets of foreign cultures. By merging contemporary backgrounds and ideas, traditional ceramic narrative concepts can be brought to life and integrated into modern ceramic art creation. Only by adhering to this approach can ceramic artists comprehend contemporary trends, scrutinize the quintessence and limitations

of traditional ceramic art, and choose the most fitting Chinese narrative emotion to absorb and integrate into their ceramic creations during the actual creative process. In order to standardise the evaluation system for modern ceramic art, it is important to maintain cultural confidence. This does not mean simply relying on traditional culture or incorporating traditional elements into works for the sake of it. Rather, it involves incorporating the emotions and events of traditional ceramic culture into the development and inheritance of the art form, in order to revitalise and infuse it with vitality. Constructing the emotional narrative of ceramic art under modern cultural self-assurance is a challenging task that necessitates the collaborative endeavours of governmental bodies, social organizations, the pottery industry, and a considerable number of pottery artisans.

Conclusion

Ceramics have advanced with social and civilizational progress since ancient times. Starting from the primitive life and farming civilization of handmade objects, the evolution eventually led to modern industrial society, where standardized factory production rules the roost. In recent years, we are observing AI man-machine symbiosis under interchangeable transmutation. Ceramics have a vital role in producing meaningful communication in its narrative function. This account depends on the use of memory and technology, as well as the emotional connection that humans have with objects and their surroundings. The narrative is crafted upon the artifacts and, together, they create a compelling and meaningful story that caters to the spiritual requirements of people's material culture.

Firstly, effective treatment of ceramic emotional narratives requires deep understanding of Chinese traditional culture and the extensive history of ceramics, which is a source of pride for the Chinese people.

Secondly, it is important to acknowledge the significance of modern ceramic culture in the West, as it is shaped by contemporary narrative and emotional resources. In order to gain a deep understanding of this field and its evolution, we must not only adhere to traditional content, but also comprehend the current world to overcome any obstacles. Without comprehending the entirety of western culture, the progress of modern culture and art of our own ceramics will be hampered. It is essential to have a broad and open-minded perspective to fully appreciate our ceramics. It is essential to possess a broad viewpoint and an impartial attitude towards our own account of ceramic craftsmanship.

Furthermore, the core of contemporary society should comprise the ceramic narrative, which urges the ceramic artists to pay closer attention to reality, the contemporary world, and the current era to reflect upon it in their artwork.

Finally, our efforts should be based on serving society and the country, bearing in mind the present circumstances. Cultural confidence involves having confidence in one's country and contributing to the construction of the local ceramic culture industry. Under the guidance of contemporary cultural confidence, China is sharing its own Chinese culture and ceramic tales with the world. By using ceramic narrative emotion as a carrier, China's profound and far-reaching ceramic culture is spreading and expanding, thus contributing to the development of Chinese culture and promoting worldwide cultural exchanges.

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The Research of Narrative Expression in Fiber Art

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Abstract

As a long-standing art form, fiber art has a style that keeps pace with the times. The narrative expression in fiber art is a multi-level, diversified and innovative field. It conveys emotions, stories and ideas through fiber materials, which not only enriches artistic creation, but also brings rich aesthetic experience to the audience.

Keywords

Fiber art, narrative expression, creation

1 Narrative mode in fiber art

1.1 Pattern and craft narrative

Pattern is the visual expression of the image of things, and it is one of the main narrative ways in fiber art. In the specific narrative skills, it includes both abstract presentation and concrete description. The field of fiber art covers a variety of techniques, including tie-dye, batik, weaving, quilting, and the use of a variety of materials. In traditional Chinese culture, blue calico cloth is one of the most representative fiber art and intangible cultural heritage. The pattern narrative of the folk blue prints can be divided into two forms, that is, the single image narrative and the combined image narrative. Although they are different in the specific arrangement of the narrative plot, the narrative theme they convey is the same.

The image narrative plots of pieces include "butterfly", "goldfish playing lotus", "Magpie ascending plum", "swallow wearing flowers", etc. Each piece of cloth only presents a narrative plot about animals and plants. The narrative of material is narrated by the combination of multiple images, which is richer in content and more flexible in narrative plot. Individual images can also be used to express broader narrative themes by combining patterns, using rhetorical devices such as setting and narration and repetition. Sometimes, even without a clear causal link, different patterns can convey the same narrative theme. For example, the "Kirin send son" quilt surface on the screen, the upper and lower symmetry presents the Kirin send son pattern, surrounded by broken branches of flowers, the left and right sides of the quilt surface each side has a backward phoenix bird, and the middle of the quilt is placed with a double phoenix peony "happy meeting" pattern. Although there is no direct connection between the story of the Kirin giving birth and the double phoenix Peony, both the Kirin and the phoenix bird are legendary auspicious animals, and together they convey wishes for a better life.

Craft narration is one of the main means of traditional Chinese folk narration, which is widely used in folk arts and crafts. The purpose of the production of folk blue prints is to make them for practical use, rather than purely for decorative considerations. Craft narration endows the practical folk artworks such as folk blue prints with high artistic value through patterns. They take "creation" as the core of narrative activities and express profound narrative connotation through the presentation of patterns. The driving force of folk narration comes from the

desire for a happy life under material scarcity. The theme narrated by the patterns of Hunan folk blue prints is closely related to the specific time and space and group life of traditional society. They are realized through the material conditions at that time and with the help of material means, and they express the best wishes of the public, with distinct regional cultural characteristics.

1.2 Technology and materials

There is the application of single fiber materials in fiber art, and there is also the use of comprehensive materials in fiber art creation. No matter what field of art, artists are constantly exploring and experimenting with materials. In particular, contemporary art is colorful, some new media appear (such as video, installation, digital art, etc.), material elements to present a wide variety, eclectic situation, there is a situation of comprehensive materials in full bloom. In the context of "contemporary", the transformation of fiber art into a diversified process is inseparable from the experiment of materials. The emergence of comprehensive materials has promoted the diversified development of fiber art to a certain extent, including new fibers and various soft materials, which have been rapidly accepted by fiber artists, and artists in other fields have begun to use fiber materials for creation.

Contemporary fiber artists use a variety of ways to make their works. For example, Suchitra Mattai, a foreign artist, usually uses materials related to the family field, such as embroidery, weaving and other fiber elements. In her works, she explores puzzles and carries out historical narratives, as a way to understand the world around her and various cultures. Through a variety of paintings, fibers, drawings, collages, installations, videos, and sculptures, Suchitra Mattai creates vivid artworks that convey the ineffable, weaving narratives about the "other" in order to evoke broken landscapes and reclaim cultural artifacts (often of a colonial and domestic nature). Her works fully express the charm of fiber art in this world.

In the common fiber materials, the emotionless material is endowed with emotion, and the delicate texture with cold luster gives people a gorgeous and cold feeling, such as silk and metal; The rough and rustic texture gives a natural, simple and affectionate feeling, such as cotton, hemp, wool, etc. These different materials can directly bring people a lot of psychological feelings, such as delicate, tough, bright, gray and so on. Using Marine life as a Muse, artist, and advocate, Courtney Mattison creates ceramic sculptures that "promote awareness of protecting our blue planet." Mattison explores this environmental benefit in our changing oceans, an ongoing series that focuses on the vulnerability of coral reefs. Through art, the artist hopes to show the consequences of climate change, promote coral reef protection, and remind people that it is not too late to solve the problem. "If we come together and take action to reduce the damage we are doing to our oceans, coral reefs may come back from the brink of bleaching," she said. Perhaps if more people can appreciate Indonesia's magnificent coral reefs, we will do more to protect them for future generations." There are more contemporary fiber artists who express emotions through their works to achieve the effects that artists desire to achieve, such as missing their families, reverence for nature, and appeal to society.

In short, different materials have different narrative methods and bring different feelings to people.

2. Unique self-expression

Fiber art is the art of mind and hand. Many works are completed by hand weaving. In the process of creation, artists fully express their personal emotions in their works, spend a certain amount of time and energy to talk with their works, and the development of time is synchronous with the creation process. Therefore, fiber art works can better convey the thoughts of artists and let viewers reach emotional resonance with artists. For any fiber art work, if there is no emotional core, it loses the soul of the work of art.Formal beauty is the external surface

of the work of art. In the work of art without emotion, visual becomes the basis of its existence. The emotional expression under the form of expression is the spiritual core of the work, which has more charm from the inside out. Only the effective combination of form and spirit can make a work of art with a promising future.Emotional expression in artistic creation reflects the subjective initiative of artists in creating beauty in social life, making artworks beautiful and moving.

Artist Liang Shaoji has opened up a new field of ecological aesthetics in the Chinese contemporary art circle with his unique artistic language, and has left a deep imprint of silk oriental aesthetics in the global art ecology. He once said: "A silkworm is a world, a cocoon is a universe." This sentence, like his creation, explores the grand meaning of the universe from the micro world.In his "Nature Series" works, he chooses silk as the material to explore the deep meaning of life.At the time of the crisis, Liang Shaoji's works remind us that to solve the crisis not only needs scientific methods, but also needs to re-examine and re-build the relationship between human and nature.In the past three years, everyone has experienced a life test of "living to death", while Liang Shaoji has been exploring and thinking in his own survival situation and life experience, making the themes related to silkworms further extended and expanded.Liang Shaoji's work "Scarred Landscape" reflects his reflection in the biological century with contemporary language after facing the damage of traditional Chinese culture, so it is a kind of "scar".In "Scarred Landscape", silkworm as a medium presents a state of incompleteness and fragmentation, but also has the potential of vitality and transcendence. This work, through the creative process of living creatures, shows the whole life cycle of silkworms, covering, winding, evolving and laying eggs, full of vitality and memory. Therefore, the production process is more important than the result, reshaping waste into objects with new life. This work has two significant characteristics: firstly, it presents the complete cycle of life; secondly, it is not a finished product of industrial production, but a product of nature, which is constantly generated and changing. Therefore, this work is full of the fluidity of space and time, not only in the three-dimensional space with long, wide and deep dimensions, but also includes the dimensions of life and time. Liang Shaoji uses natural materials such as silk to create, and regards the natural world as an important proposition to frame his thinking. He regards human beings as a part of the natural world, and emphasizes that human nature itself belongs to nature. His attention to major social events comes from his deep concern for human nature, which makes his creation able to organically connect the whole humanities, humanity, life, survival and life and other fields.

3. Emotional resonance and interactivity

When artists transform fiber materials into objects that can hold emotions, they often have close physical contact with the soft fiber materials during the creation process, as if they were immersed in the warm and soft textiles, thus being cured by these warm fabrics. Lycia Danielle Trouton, for example, memorialized her hometown on linen handkerchiefs, including a list of nearly 4,000 people who died. Here, linen handkerchiefs play the role of "monuments", recreating ancient memories and memories, evoking life experiences and emotional changes in a particular audience.

Carl Gustav Jung once pointed out that psychological theory helps artists open the door to the subconscious mind, helping people begin to pay attention to the inner world, and discover the subconscious hidden in the heart. Japanese artist Yayoi Kusama, for example, achieves self-healing and spiritual healing in the process of creating her art. She projects emotional imagery into her work through artistic mediums, extending from egg reliefs to maternal soft sculptures. For example, in 1962, she introduced the "Stacking Series", in which a bench is covered with phallic-shaped protrusions, the main body of the sofa and chair, and the "phallics" are made of various soft materials such as cloth, foam, rubber, paper, etc. The reason why she adopted this gender symbol is

because of her fear of sex, so presenting these elements in her works is her way of self-healing, overcoming her inner troubles in an artistic way and rediscovering herself. When viewing Kusama's works, we not only experience the artist's inner emotional world from the psychological level, but also perceive the powerful shock force contained in her works.

The emergence of interactive art has also influenced the development of fiber art, making the spatial concept of fiber art gradually change from the static exhibition mode to the dynamic mode of participation, attracting and participating in the art works, enabling the audience to view and contact the works more directly, and allowing the audience to interact with the works. For example, Madame Butterfly, a work by teacher Lu Yue, places clothes originally placed on the human stage in the space environment of the runway. Combining textile art and installation art, fashion art creates an aesthetic atmosphere, immersed in a contemporary art environment that is different from fashion itself. Through the close combination of material language and creation form, artists constantly create freely, and then through various media such as sound, light, electricity, time and space, and computer, they can break the single purpose and form of clothing that can be worn, greatly expanding the creation and expression space of fashion art, and making fashion art close to the human body, from art space to museums, and even to outdoor. Soft sculpture art, textile art art forms, such as installation art, land art, etc.

Sum up

Different times have different characteristics, artists not only use fiber art to express emotions, but also to record The Times, to understand fiber art from different aspects, from patterns to materials to the expression of works, to convey the charm of fiber art narrative, but also to give us fiber creators more creative inspiration, perhaps in the near future there will be more people feel the charm of fiber art.

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Intertextuality theory in modern popular science picture book design Applications in

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Abstract

As an important theoretical framework, intertextuality theory emphasizes the interrelationship and interactivity between different texts, providing new ideas and methods for the design and production of popular science picture books. Through the understanding and application of intertextuality theory, popular science picture books can achieve diversified reading experiences, improve the dissemination effect of scientific knowledge and the understanding ability of children readers.

This article explores the specific application of intertextuality theory in popular science picture books. Intertextuality in popular science picture books can be reflected in topic intertext, picture-text intertext, and picture intertext. Through the combination and interweaving of selected topics, popular science picture books can provide more comprehensive, accurate and interesting scientific information. The intertextuality theory can create a richer, more interesting and effective form of scientific communication in the design of modern popular science picture books, creating a more meaningful Educational and attractive works promote the popularization and understanding of scientific knowledge. The research in this article has important reference value and practical significance for popular science picture book creators, science communicators and educators.

Author keywords

Intertextuality, popular science picture books, children, science

Introduction

In today's society, the importance of cross-cultural communication and multiple perspectives has become increasingly prominent. As an important science communication medium, popular science picture books play an important role in stimulating readers' interest in science and improving scientific literacy. Reading popular science picture books requires attention to different Scientific practices and concepts in cultural backgrounds to promote cross-cultural understanding and appreciation. In the research background of intertextuality theory, the need for cultural diversity and horizon expansion provides a theoretical basis for the design of popular science picture books.

Scientific knowledge is often closely related to other disciplines. By intersecting and integrating knowledge from different disciplines, it can help readers better understand scientific concepts and connect them with practical problems and life experiences. Intertextuality theory emphasizes cross- The intersection and integration of disciplines provide new ideas for the design of popular science picture books. In past research, intertextuality theory has been widely used in the fields of literature, media and education. The integration of science, literature, art, history and other disciplines has provided a theoretical basis for the application of intertextuality theory in

popular science picture books, which is interdisciplinary. The need for intersection and integration, cross-cultural understanding and multiple perspectives, as well as the focus on interaction in reading participation, these backgrounds make the application of intertextuality theory in popular science picture books more important and meaningful. By applying intertextuality theory, we can Improve the dissemination effect of popular science picture books, enrich reading experience, and promote in-depth understanding and application of scientific knowledge.

Definition of the concept of intertextuality in popular science picture books

Intertextuality, means "dialogue" between texts. French scholar Julia Kristeva believes that: every text is a mirror of other texts, and every text is the absorption and transformation of other texts. They refer to each other, are involved in each other, and transform and neutralize, making the texts form connections, dynamics, and transformations. , cross-relationship. The intertextual relationship can be the same type of analogy, or it can be a different type of comparison; it can be a reference to structure, or a reference to writing techniques. Based on the perspective of intertextuality, the design of popular science picture books developed from three dimensions: topic intertext, language intertext, and structural intertext, helps to broaden students' reading resources and allows students to stand at a more rational, comprehensive, and objective perspective. Comprehensively understand and analyze texts, actively construct theme meanings, and relate them to real life, thereby achieving effective transfer and application of language and learning strategies. In the design of popular science picture books, relevant picture books can be reasonably, appropriately and moderately integrated based on children's age characteristics to stimulate students' interest in reading, broaden the breadth of reading, enhance the depth of reading, and allow students to improve their language understanding and expression skills. At the same time, develop critical thinking skills, actively construct the meaning of the theme, and conduct in-depth exploration.

Popular science picture books use a combination of pictures and text to express and reproduce stories. The pictures and text respectively have their own meanings and the language they express. The most interesting thing about this is that the "pictures" are no longer just used to explain the text, but the pictures themselves. It represents a certain visual language and can independently display the content of the story without any modification of words. This is a major feature of picture books. Whether the audience is a child or an adult, they can see a whole new world through visual language! The so-called science popularization refers to the use of easy-to-understand words or images to popularize and answer relevant scientific content to audiences who do not have a certain scientific academic background. The logic of picture books telling stories with pictures is perfectly consistent with science popularization.

Natural science and aesthetics are inseparable, and they can also be used as aesthetic objects. As Mr. Li Zhengdao said, science and art are two sides of the same coin, and no one can live without the other. Vivid and interesting narration of science is what science communication workers around the world pay most attention to. topic, with the advent of the era of picture reading, popular science picture books have attracted social attention because they are conducive to building children's diversified intelligence. Although there are many excellent works in the current popular science picture books on the market, they are not limited to conveying science through a single form of drawing. , but combines games, hands-on activities, audio-visual and other forms to fully mobilize children's multiple sensory channels. The real meaning of popular science picture books is not to teach children to learn science and understand esoteric principles, but to inspire and guide children's interest in science, stimulate their curiosity and imagination, and carefully observe our lives from a rational perspective. The world, cultivate children's scientific thinking, be good at discovering problems, ask and solve problems, and have the courage to explore. Plant a scientific seed in the child's heart, wait for it to slowly sprout and grow, and bring

benefits to the child throughout his life. of infinite power.

The spiritual theme of intertextuality in popular science picture books

As an important tool for science communication and education, popular science picture books play an important role in arousing readers' interest in science and improving scientific literacy. However, blunt scientific content is often difficult for people to understand, and it also isolates the general public readers. The spiritual theme of intertextuality in popular science picture books encourages science picture books to intersect with other subject areas, integrating scientific knowledge with literature, art, and history. fusion of other elements. By quoting and drawing on elements such as culture, art, and history from other fields, popular science picture books can enrich the connotation of picture books, enhance readers' interest and understanding, provide readers with a broader perspective, and help them establish connections between different fields. Connections make popular science content more inclusive and universal.

Whether it is the beauty of words or the surface effect of pictures, they are only the most basic requirements. If we look at a higher level of artistic exploration and devote ourselves to the study of text and picture intertext, its main purpose is not the theoretical meaning of intertext itself, but It should be more based on the revelation of the law of the ultimate spiritual direction of text-image intertext, that is, the style presentation of text-image intertext is not the purpose, but the artistic effect and knowledge produced by the "synthetic force" of the combination of text and image are conveyed to the audience. The endless imagination inspired by power is the spiritual theme of intertextuality in popular science picture books.

Different forms of intertextuality in popular science picture books

In terms of intertextuality, popular science picture books can reference elements from other literary, historical or artistic works to enrich the connotation of the picture book and trigger readers' associations. For example, for readers without professional knowledge background, you can quote Shakespeare's works, ancient myths or classic allusions, and place scientific knowledge in popular background stories or allusions. This kind of citation and reference can help readers better understand science. The history and background of development, linking scientific knowledge with practical applications, increasing readers' interest and understanding, using metaphors and symbols to help readers understand abstract scientific concepts, and using symbols, metaphors, and metaphors to transform complex scientific concepts into More concrete and easy-to-understand images promote readers' perception and understanding of scientific knowledge.

Just as literary proficiency requires readers' progressive understanding of intertextuality, pictorial proficiency requires improving their ability to interpret images, so understanding of inter-imagery depends on readers' knowledge of visual images that readers use to better interpret text and the visual experience of pictures, intertextuality and picture references in picture books are not a new phenomenon. With the emergence of postmodern picture books and cross-border picture books, their significance is growing, and pictures have been largely ignored. The close connection between intertextuality and inter-picture quotation in the book focuses on inter-illustration quotation. Whenever scholars discuss the issue of illustration in relation to picture books, they usually refer to the same illustrator, Anthony Brown.The prolific artist not only referenced the work of many other authors and illustrators, but also often linked his picture books to his own previous works, so that his entire picture book collection looks like a picture room. continuum. Furthermore, scholars have shown that Brown developed varying levels of reformulation of references: verbatim reproductions, clever reformulations, or complete revisions.

The images in picture books can present scientific experiments, observation results, schematic diagrams,

etc., while the text explains and illustrates related concepts. The two work together to enable readers to better understand scientific principles. Images in picture books can use symbols and diagrams to convey scientific information. These image symbols and illustrations can represent scientific experiments, data, charts, etc., helping readers intuitively understand and analyze scientific concepts. By using image symbols and illustrations, popular science picture books can provide more intuitive and easy-to-understand scientific expressions to help readers To better understand and explore the world of science, this intertextual and intergraphic design provides a broader creative space for popular science picture books, while also providing readers with a more engaging and interesting learning experience.

Integration of topic selection and intertextuality

As an important medium for science communication and education, popular science picture books play an important role in conveying scientific knowledge to readers and stimulating their interest in science. In order to enhance the attractiveness and educational effect of popular science picture books, the design strategy of intertextuality has become an eye-catching method. This article aims to explore the integration of literature and science in the design of popular science picture books based on intertextuality, so as to enrich the connotation of picture books, enhance readers' reading experience, and promote their understanding of science.

Integrate scientific concepts with literary themes, convey scientific knowledge to readers through the plots and dialogues in the story, and echo astronomical knowledge by quoting classics from literary works, such as the planet exploration in "The Little Prince", and increase the interest of the picture book. Depth and connotation; drawing on characters from literary works and incorporating characters from literary works into popular science picture books can make it easier for readers to resonate emotionally with the story and connect with scientific knowledge, for example, by depicting detectives like Sherlock Holmes images to guide readers in developing scientific exploration and reasoning abilities. Scientific stories can also be told in literary form, scientific principles can be skillfully integrated into the storyline, and scientific concepts and principles can be explained through the development of characters and events. In addition, science fiction literature picture books can also be created. Science fiction literature is closely related to science and can be used in popular science. The picture books use science fiction elements, such as time travel, space exploration, etc., to stimulate readers' imagination about future technology and scientific development.

Integration of graphics and text

In popular science picture books, the integration of pictures and texts can be embodied in the following aspects. The interactive relationship between images and text is first of all description and explanation. Images can be used to describe and display scientific experiments, observation results or object structures, etc. Text can further explain and describe the image. Through the interaction of images and text, readers can understand scientific concepts more comprehensively. For example, to highlight important scientific experimental steps or key experimental results, text can complement images with labels, titles, or descriptions, making key information clearer and easier to understand.

Next are image symbols and diagrams, used to express scientific concepts: image symbols and diagrams in picture books can be used to intuitively convey scientific information, such as using symbols and diagrams to represent scientific experiments, data, charts, etc. These image symbols and Illustrations can help readers understand and analyze scientific concepts more intuitively. Images can expand the message and story in a picture book through detail and visual impact. For example, use methods such as expanding the perspective, zooming in on details, or providing live images to enable readers to gain a more complete understanding of the

scientific concept or phenomenon.

Through the integration of pictures and texts, popular science picture books can create a richer, more diverse and interactive reading experience. The interactive relationship between images and text, the application of image symbols and illustrations, the emotional resonance of images and text, and the interaction and participation of images enrich the expression of picture books and enhance readers' understanding and participation in scientific knowledge.

The fusion of pictures and intertextuality

In popular science picture books, through the integration of pictures and intertexts, popular science picture books can visually stimulate readers' interest, enhance the reading experience, and provide a more intuitive and vivid way of scientific expression. The interactive relationship between pictures and words, picture symbols and illustrations, picture emotions and imagination, as well as picture demonstration and interactive experience, etc., enrich the expression form of picture books and help readers better understand and explore scientific knowledge. Pictures and text complement each other. Pictures provide visual information, while text explanations supplement and explain the pictures, helping readers gain a deeper understanding of scientific concepts or phenomena. The contrasting relationship between pictures and text can emphasize the key points in the picture book. Through the comparison of pictures and text, readers can more comprehensively understand and master scientific knowledge. The pictorial symbols used in picture books can convey scientific information intuitively, such as using arrows to indicate directions, using colors or shapes to express different concepts, etc. These pictorial symbols can help readers better understand and remember scientific knowledge, and illustrations can be conveyed through pictures. Expressing scientific concepts, processes or experiments, the visual presentation of diagrams can enable readers to more intuitively understand and simulate scientific experiments, observation results, etc.

From a perceptual level, through the image description and detailed expression of pictures, readers can resonate emotionally in the artistically expressed illustrations, and then establish an emotional connection with the scientific theme. The animal images or natural landscapes in the pictures can trigger readers' emotions. Emotional responses that enhance interest in scientific topics.

In conclusion

The theory of intertextuality provides new perspectives and methods for the design of popular science picture books, thereby enriching the content and presentation methods of popular science picture books. The application of intertextuality makes popular science picture books multi-level reading and interpretation possibilities. Quotes, metaphors, symbols and other techniques in picture books combine scientific knowledge with literature, art, history and other fields. Popular science picture books can establish connections between different disciplines, stimulate readers' thinking, and encourage them to understand and understand from different perspectives. Interpret scientific concepts.

Popular science picture books inspire the ability to switch between visual and verbal codes, because pictures and texts complement each other and contain what is missing in painting itself as a means of comprehensive understanding, with its open and polysemous communication content. Therefore, it is a good choice to use popular science picture books as a medium to help preschool children acquire visual literacy. In our society dominated by mass media, where text and images are combined, popular science picture books can interweave references to different sources and Numerous discourses of different knowledge constitute the basic resources for cultivating children's reading ability, and at the same time stimulate the extension of intertextuality theory.

The application of intertextuality theory in popular science picture books can form an interesting set of imaginations in the minds of the audience, involving in an interesting way the need to expand our vision and read intertextuality, full of connotations and metacognitive allusions, and finally , transform the interpretation of cultural references into potential resources for visual culture education, and make children interested in science, form a scientific attitude, acquire scientific and technological knowledge, advocate scientific methods, and spread scientific ideas through parent-child reading or independent reading. As well as books that promote the scientific spirit, with a view to improving children's scientific literacy and cognitive abilities.

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Evolution, Metaphor and Transformation, Narrative Design in Laohekou Woodblock Prints--Taking *A piece of Harmonious Atmosphere* as an example

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Abstract
Laohekou woodblock prints are one of the traditional folk art categories in Xiangyang City, Hubei Province, and in May 2001, they were listed in the third batch of national intangible cultural heritage. This paper focuses on the work *A piece of Harmonious Atmosphere* in Laohekou woodblock prints, and conducts an in-depth study on its origin, evolution and narrative design, analyzing the narrative design in the connotation of this national intangible cultural heritage, which will help us to have a more in-depth understanding and a deeper cognition of the Laohekou woodblock prints.

Author keywords
Laohekou, Woodblock Prints, *A piece of Harmonious Atmosphere*, narrative design

Laohekou woodblock print is one of China's national intangible cultural heritages and one of the Chinese woodblock prints, born in Laohekou City under the jurisdiction of Xiangyang, Hubei Province. It is rich in artistic connotation and narrative, and its representative woodblock print *A piece of Harmonious Atmosphere* has a very unique charm.

Narrative design in the initial creation of *A piece of Harmonious Atmosphere*

The initial creation of *A piece of Harmonious Atmosphere* is closely related to the A Togetherness and Harmony (as in figure 1)created by Zhu Jianshen, Emperor Xianzong of the Ming Dynasty, in the first year of the Chenghua reign. This picture is divided into two parts, the upper part of the imperial document "imperial a group of peace and harmony picture praise", the second half of a round figure painting, roughly a cross-legged and sitting, smiling naive Maitreya; a closer look at it is found within the mystery, this picture is composed of three people, from the front view for an old man, that is, for the Buddha, Buddhism is also known as Shih Ching. From both sides of the view will find the left side of a head wearing a Taoist crown, full of smiling Taoist, this is Taoism; the right side of a head wearing a silk scarf of the Confucian general, is communicating with the opposite side of the Confucianism; this work as a whole describes the Confucianism, Taoism and Buddhism, the "three religions in one" a design. The modeling is very interesting.
Zhu uses graphic symbiosis in his design to narrate the vision of the unity of the three religions: Confucianism, Taoism and Buddhism. Through the narrative design of this figure, on the one hand, it can be seen that the function of indoctrination played an important role in the society at that time, and on the other hand, it also shows the determination of the emperor to pursue the stability of the country and the solidity of the regime.

Before Emperor Xianzong succeeded to the throne, the Ming Dynasty had just experienced the turmoil of the struggle for the throne between Emperor Yingzong Zhu Qizhen and his half-brother, Emperor Daizong Zhu Qiyu, known as the "change of the door", which led to upheavals in the dynasty and the countryside. Therefore, Emperor Xianzong titled "three people as one, up to a heart of no two. Forgetting the rights and wrongs of each other, he said, "Let's make peace." This was a warning to the court and the public that they should be able to work together to serve the country by repaying their grudges with good deeds.

Evolution of the Narrative Design of A piece of Harmonious Atmosphere

In the Taohuawu woodblock prints of Suzhou(as in figure 2), the representative figure of the Three Religions in the A piece of Harmonious Atmosphere drawn by Zhu Jishen evolved into a rich old woman in gorgeous clothes, with both ears falling down, a smiling face in exquisite clothing, and two hairpins on her head, and the composition evolved from a square circle into a square circle, combining the figure of the child and the wrinkles of the old woman's kind brows, and the styling design was closer to the daily dress of the general public, no longer a common The stylization is closer to the daily dress of the common people, and no longer the image of the court. And the Taohuayu woodblock prints are mainly plain and elegant in color scheme, with slim lines. The use of color muted gradient and line thickness changes to respond to the picture.

Laohekou woodblock print's A piece of Harmonious Atmosphere(as in figure 3)is different from Taohuayu Woodblock Print, from the perspective of composition and design, due to the characteristics of Laohekou woodblock prints, the face and hand engraving are based on line modeling, and the subsequent colors are clashed with red, green, purple and yellow contrasting colors, focusing on the contrasting relationship between the complementary colors. The pigments of the woodblock prints are made by folk craftsmen with ancient methods, the colors are strong and lasting, and the sense of the picture is very strong. In the distribution of the color blocks, it is emphasized that the red or purple color is distributed as the main color over a large area, and the yellow and green colors are distributed as the contrasting colors over a small area. The hand holding the words "A piece of Harmonious Atmosphere" is transformed into a hand holding a golden treasure, and the words "A piece of Harmonious Atmosphere" are used as the title, which is embellished with auspicious motifs and leaves. The main dress pattern is decorated with the flat pattern of the back pattern with auspicious symbols, which is more responsive to the aesthetic psychology of the general public and in line with the inner spiritual needs of the common people at that time.



Figure 1 A Togetherness and Harmony



Figure 2 A piece of Harmonious Atmosphere
in Taohuayu woodblock prints

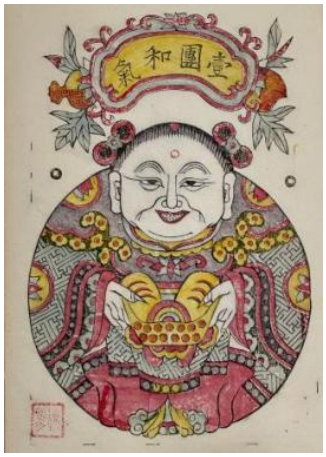

Figure 3 A piece of Harmonious Atmosphere

Analysis of the Reasons for the Evolution of the Narrative Design of A piece of Harmonious Atmosphere

Regardless of the evolution of the story being told, the circular shape of the doughnut has always been preserved. The reason for this evolution can be explained on two levels. On a subjective level, the Chinese people have had a preference for the round shape since ancient times, and in traditional Chinese culture, "roundness" means harmony, perfection, and repetition. From the objective level, the round shape of the doughnut has both practicality and decorative properties.

Aesthetic popularity in the folk era

The narrative design of A piece of Harmonious Atmosphere made by Zhu Jianshen, the Ming Dynasty emperor, Although the characters are smiling and amiable, they are still too serious for the general public, and therefore less acceptable to the masses. In the Laohekou woodblock print A piece of Harmonious Atmosphere, the facial expressions of the characters are more harmonized and decorated with blush, which makes them more amiable and has a festive atmosphere. At the same time, the dress pattern has been cut down, and the color has been changed from the original light and scattered small pieces of color to a stronger visual impact of contrasting colors,a large area of green and a small area of dotted emphasis on the formation of a contrast between the red, the green background with the back to the clothes pattern to dilute the sense of suddenness, the overall use of color is rich in tension and a sense of visual impact.

The inner spiritual needs of the general public

A piece of Harmonious Atmosphere has always been a popular artistic theme among the people, and the meaning it expresses is not only limited to the decision-makers praying for the stability of the country in their political career, but also for the people, who expect to live a stable life and have enough food and clothing. In the folk creation A piece of Harmonious Atmosphere, the artists added the golden dollar in the hands of the characters and the words "A piece of Harmonious Atmosphere" on the top of their heads to express the people's beautiful vision more intuitively. Laohekou woodblock prints focus on the expression of emotions rather than the objective depiction of the things shown in the creation. As a kind of folk handicrafts, New Year's paintings are popular among the common people and are mainly used during the New Year's period, so they are often exaggerated to show the characters' faces and senses and exaggerate certain characteristics. In A piece of Harmonious Atmosphere, the figure's head is exaggerated, with a square face, a smiling face, and full earlobes, a series of features that match the folk's concept of good fortune and meet the aesthetic needs of the general public at the time.

Conclusion

This paper analyzes A piece of Harmonious Atmosphere in the woodblock prints of Laohekou according to the background of the era, and explores three aspects, namely, the narrative design of the source of the creation of the prints, the evolution of the narrative design, and the analysis of the reasons for the creation of the prints. From the image of the old man, which is rich in metaphors and painted by the emperor himself, to the image of the kind-eyed grandmother in the folk creation now, the design in between has a different narrative, expressing the change of aesthetic psychology of different classes in different periods. The analysis of this transformation is of certain significance to understand the development and evolution of narrative design in Laohekou woodblock print A piece of Harmonious Atmosphere. At the same time, it is conducive to the promotion of the traditional culture of the Chinese nation, which is a reasonable and effective guide for us to protect and develop the traditional Chinese culture, and to seek cultural innovation and development.

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The Changes of Narrative Design in the Context of New Media

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Abstract

Narrative has continuously evolved alongside the development of human history and culture. The design methodology of narrative theory, developed from linguistics and literature with "events" as its core, exhibits modern characteristics in the context of contemporary new media. Building on this foundation, the study further elaborates that while narrative design embraces technology, it must remain cautious of its misuse. Additionally, while emphasizing the narrative design's increasing focus on self-identification and experiential demands, it must not overlook the importance of holistic systems and cycles.

Keywords

new media, narrative design, narrative theory

I. The concept of narrative design

The concept of "narrative" in narrative design originates in the field of literature. In the early 1930s, the Soviet literary community proposed studying the purity of literature, giving rise to "formalism" in contemporary literary theory. By the 1960s, the structuralist theoretical framework in France expanded the study of semiotics, focusing on how signs construct and "narrate" specific meanings. Structuralist narratology challenged traditional literary criticism, which overly relied on social and psychological factors or subjective interpretations. Instead, it shifted attention from the external context of texts to their internal structure, emphasizing the intrinsic, independent, scientific, and systematic nature of narrative works, and exploring the internal structural rules of narrative works and the interrelations among their elements. Structuralists argued that the meaning of a story depends neither on the narrator nor the reader but rather on the relationships between events—that is, the narrative structure. The task of literary research was to uncover the deep structure of narrative works. This structuralist focus on narrative structures laid the groundwork for the emergence of modern narratology.

By the 1980s, post-structuralist narratology began shifting its focus from texts to the act of reading. It overcame the limitations of structuralist narratology, which had severed the connection between narrative works and their social, historical, and cultural contexts. Beyond the story, text, and discourse, post-structuralism emphasized cultural contexts and the relationship between writing and reading. This shift can be summarized as moving from discovery to creation, from uniformity to complexity, and from poetics to politics. Post-structuralism's textualism broadened the scope of text types, applying narratological theories beyond novels, fables, and myths to non-literary texts. It developed into a discipline studying "sign phenomena, behavioral phenomena, and broad

cultural phenomena." While the study and development of narratology have historically focused on literature and linguistics, the field expanded beyond literary studies in the 1970s and entered the realm of design by the 1990s.

Narratology primarily studies two aspects: the methods of storytelling (how to tell) and the content of stories (what to tell). In fact, narrative exists in daily life and artistic creation, serving as a way for humans to understand the world and express emotions. Roland Barthes stated in An Introduction to the Structural Analysis of Narrative: "Narrative is as old as human history itself; no place has ever existed, nor does any exist, without narrative. All classes and social groups have their own narratives, which are often shared by people with different or even opposing cultural backgrounds. Therefore, narratives are neither superior nor inferior. They transcend borders, history, and cultures, existing like life itself."

Narrative and events are inseparable, as events form the basic elements of narratives. All narratives involve events. From the ancient practice of recording with knotted cords to the oral transmission of myths and the written documentation of history on bamboo and silk, humans and events have constituted the foundation of society, driving the development of civilization and the dissemination of culture.

The definition of "events" in narratology varies among scholars. For example: "Narrative is indeed ubiquitous and infinitely variable. It can be defined as the telling of real or fictional events and states in a temporal sequence." "Narrative recounts a certain number of states and events occurring within a specific world." "In narratology, what are events? Events are both actions and happenings. Both represent changes in states." H. Porter Abbott offers a perspective representative of narratologists: "Narrative is the combination of story and discourse. A story is a series of events or actions, while narrative discourse is the representation of these events." Events are the raw material for crafting stories. Based on the aforementioned discussions, we can conclude that events are critical to narratives, and their nature constitutes a key feature of any narrative. The organization of events in a narrative helps us understand and respond to the narrative structure.

Narrative design can be understood as design works with narrative structure and function. The application of narratology in design focuses on analyzing and understanding the structure and relationships among design elements. Sometimes, design is described as storytelling to an audience. Narratives change with media, and each narrative has its unique structure. In design, narrativity can be interpreted as a cognitive process shaped by a designer’ s treatment of the "text." This process reflects the personal experiences of designers as individuals and the varied interpretations of audiences. Thus, narrative-driven design works often move beyond problem-solving to address how problems are posed.

Narrative design, also known as "storytelling design" or "narrative-driven design," involves telling a story through design. In essence, it applies literary theoretical methods to design, using design symbols and narratology as a design approach in the creative process. Narrative design emphasizes expressing profound "meanings" through design, shifting the focus from "things" to "events." Through the organization, arrangement, and structuring of design materials, a series of events with narrative functions are formed. The audience’ s viewing, participation, and perception of these events help establish an open-ended conclusion and a mode of communication and exchange, thereby creating design works that evoke personal emotional experiences, memories, and associations.
As can be seen, the elements of narrative design are the same as those in traditional narratology, namely

space, events, time, and characters. In narrative design, the understanding of these four elements should not be limited to traditional models but should be viewed within the context of design. This is because the purpose and starting point of design make these four elements interact in a way that significantly differs from their role in the composition of a story. Events are distinct from everyday occurrences. The difference lies in the fact that events impart meaning to occurrences. In the design process, designers can unfold the development of events, conduct detailed analysis, or extract emotional elements for redesign. In short, events are the result of subjective manipulation and objective analysis based on occurrences, therefore possess a logical structure not inherent in the occurrences themselves.

Narrative design assigns meaning to a collection of real or fictional events. By creating a collection of events, a comprehensible story or an insightful spirit is formed. Designers inject a complete narrative structure into these events, simultaneously imbuing the events with different symbolic meanings. Just like unmediated experiences, the constructing of "events" is a quarry for narrative materials. Therefore, in narrative design, "events" represent a distinct form of design, a new approach for the designer, and a novel cognitive experience for the audience. In design, "events" should not be understood merely as a noun; they refer to occurrences, processes, actions, and gestures. In design, "events" are not simple, fragmented depictions of objects but involve organizing and reconstructing the materials at hand. They represent an open-ended structure, one that can change. Every event contains rhythm and plot. During the presentation of an event, materials must be edited and emphasized.

In contemporary times, narrative has gained a powerful material carrier—mass media. Through this media, narrative has continued to develop and grow into an energy source. Every individual can now share their personal experiences with the public through various media. People can use others' narratives to understand and experience the world while also telling and expressing their perceptions of the world. Therefore, narrative can be understood as the act of extracting segments from people's daily lives and assigning meaning to them. Narrative is the fundamental way people organize and present their experiences into events with real-world significance. In addition to mass media, emerging new media are also influencing narrative design, altering the original narrative design based on literary narrative.

II. Direct impact of media on narrative design

What is media? According to Merriam-Webster's Collegiate Dictionary, the word media has two senses: a channel or system for communication, information, and entertainment, and the material or technical means of artistic expression. The first sense views media as a conduit or method of information transmission; the second regards media as language. In the 20th century, when narratology was applied to design, mass communication emerged, marking the era of information explosion. Before that, oral and written communication served as media for exchange and dissemination, with narrative embellishments occurring spontaneously, but the flow of information was slow. The circulation of print, a new medium, greatly transformed information dissemination, ushering in the era of mass communication. The advent of newspapers initially broke the time and space boundaries of information transmission. With the Industrial Revolution, the popularity of mass production in factories also promoted innovations in mass communication media. Television unified sound, text, and images into a technological medium, enriching people's entertainment and social life. Images became new content for television as a new medium. The existence of electricity accelerated information transmission, injecting a boost into societal development. The famous communication theorist Marshall McLuhan once pointed out that "the medium is the message." It is precisely because of the accessibility of media that narrative design as a method

has emerged, allowing products and content to be showcased and disseminated.

After the Industrial Revolution, the technological revolution followed suit. Compared to traditional media, "new media" is characterized by dissemination from everyone to everyone. According to the Wired magazine, the distinction between old and new media lies in the transmission model: old media is "one-to-many," while new media is "many-to-many." For example, books and newspapers involve one author addressing multiple readers, whereas today’ s internet connects a vast number of authors and viewers, forming a more complex communication structure. The advent of the internet and computers promoted the interconnectivity of information, particularly the widespread use of personal computers, which provided a crucial technological platform for design narratives. The success of modern design narratives can be attributed to the development of advanced technologies, especially digital graphic technology, internet technology, and multimedia technology, which offer strong technical support for narrative in modern art and design. As high-end instrumental platforms, these new technologies possess multi-sensory, all-encompassing, highly integrated, large-capacity, and cross-temporal features, offering various possibilities for visualizing narrative texts.

Today, with the rapid development of technology, media has begun to diversify. New media such as digital TV, 3D movies, and holographic projection differ significantly from traditional media in terms of technological means, visual forms and languages, as well as modes and methods of communication. These new media have gradually become the mainstream. The mediums for dissemination are no longer just the visible screens but also abstract visual images and textual connotations. These too serve as mediums for conveying information and communication, bearing narrative functions in conveying both information and emotions, whether through visual forms or presentation methods, within specific contexts. As a result, the goals of narrative design have been further emphasized, aiming to imbue products with more meaning and seeking an understanding of human culture. However, with the rapid pace of modern life, the time people spend focusing on each segment of a new narrative becomes shorter. Every new narrative occurs within a specific context and challenges existing cognitive models.

To some extent, narrative design in the realm of new media can transcend traditional narrative forms, organizing events into a series of strategies and categories in a chronological order, as modern technology has broken through the time dimensions of the traditional agricultural era. For instance, real-time information transmission via internet technology, live broadcasts, or virtual technologies have deconstructed the event-based traditional concept of time. Especially with the emergence of interactive media, the boundary between the audience and the storyteller has been completely blurred. Anyone can enter the event scene through computer-generated virtual characters or agents—whether driving a concept car in a virtual scene or manipulating a new smartphone to change its appearance. These high-end technologies, centered around digital media, have made design narratives a truly experiential event space directly engaged by human senses in real-time.

The transformation of media brings more possibilities to design, and in choosing media, we are essentially selecting the method of dissemination for the design work. "Events are triggered by media, transmitted through media, and ultimately even judged by media. Everything that is happening before us has its pre-designed mode of expression and dissemination." It can be said that a widely accessible technology is a key prerequisite for design narratives. As a new cultural model, media determines the basic form of narrative design, allowing it to generate several modern characteristics under the influence of new media.

(i) Motion

Motion in narrative design differs from representational storytelling, as it is no longer confined to merely telling stories but creates a momentum, fostering an ambiance. The design of an event is not determined by inherent

texts or materials; rather, the ultimate presentation of discourse or works emerges through the continuity of time or media processing. This continuity in time or variability in outcomes keeps the design works in a constant state of motion and transformation.

(ii) Openness

Narrative design ultimately aims to form a product that is comprehensible. However, under the influence of new media, individuals access information more rapidly and fleetingly, with audiences understanding it in a more intuitive way. During the process of stimulation and comprehension, each viewer interprets information uniquely according to their personal state and sensory capacity, including varying levels of knowledge, taste, and preferences. Consequently, interpretations of the original form evolve individually, leading to outcomes that are uncertain or indeterminate, presenting an open-ended result. Each viewing of a design work thus becomes a new interpretation.

(iii) Interactivity

Interactivity in narrative design encompasses both action and physical dimensions. On the action level, this involves bodily and physical engagement, where users participate in the design through forms of bodily interaction, achieving interactivity by experiencing the work through multiple senses. On the physical level, designers allow viewers freedom of choice, with the outcomes of the design changing in real-time based on these choices. Through narrative design, designers narrate stories within a collection of events, enabling emotional feedback for the participants.

(iv) Entertainment

With modern life shifting toward entertainment, people increasingly seek novelty. While traditional narrative design provides entertainment, the integration of new technologies and media-based visual communication offers unprecedented sensory experiences across sight, hearing, and touch. "Dynamic visual communication vividly condenses and presents real-life scenarios, delivering vividness, authenticity, and a strong sense of immediacy."

These characteristics illustrate how narrative design evolves under new media, transitioning from two-dimensional to three-dimensional, from static to dynamic, and developing across media. This evolution not only reflects traits in design elements but also offers a comprehensive experience of the work, breaking away from static, fixed states and broadening expressions to achieve new aesthetic objectives.

III. How narrative design evolves

From a formal perspective, technological advancement inevitably drives changes in media, compelling narrative design to embrace diverse developments rather than remaining confined to one or two media. It breaks away from the constraints of traditional graphic arts, extending into related design fields closely tied to visual expression. The rise of interactive media and integrated information mediums enables visual communication design to surpass traditional two-dimensional formats, incorporating three-dimensional and four-dimensional spaces, advancing toward cross-media diversity. This inherently expands the dimensions of visual communication design and fosters multidimensional design patterns and thinking.

Today’ s consumer society operates within an "experience economy," characterized by increased leisure time, shifts in recreational habits, and the democratization of consumer experiences. People are transitioning from excessive material consumption to valuing non-material aspects, such as context, meaning, symbolism, and

the experiences derived from consumption. Narrative design is a direct product of the experience economy, leveraging the entertainment and gamification aspects of artistic design, integrating design into popular cultural entertainment. Experience economy, often dubbed "attention economy," highlights the fact that the market value of products depends on the attention they garner. In a society saturated with product information, attention becomes a scarce resource. When conventional product information fails to capture interest, event-driven approaches can serve as a catalyst for attracting attention. Events effectively enhance product expression due to their dynamic motion properties, aligning with people’s psychological tendencies to focus on evolving phenomena. Just as our eyes are drawn to moving objects against complex backgrounds, our attention is often given to some unique, non-conventional objects in motion. Event marketing, activity marketing, and experiential marketing operate on this principle. Narrative design often garners widespread attention due to its visual, tangible, practical, participatory, and dynamic nature. The higher the level of participation in design events, the more attention they receive from society. Consumption has shifted from a focus on material goods to engaging with the process itself, whether it’s enjoying the activity or collecting small mementos. As a novel form of consumption, its success lies in its unique narrative appeal that transitions from competition in "objects" to competition in "events."

When considering design narratives as a facet of postmodern mass culture, they manifest as commercial rather than purely reflective forms of culture. Thus, embracing technology does not entail complete dependence on it. Media technologies must undergo careful deliberation and gain acceptance among specific groups before implementation. The adoption of a medium can spawn new communication systems and methods, altering human understanding. As noted, "The uniquely human vulnerabilities, illusions, and errors are essential because they are tied to creativity, intuition, and talent. These traits, while occasionally resulting in humiliation or stubborn confusion, also lead to success and, by chance, our greatness. When using these tools, we should remain humble and mindful of human nature."

From print media to the information age with short videos and pop-up advertisements, visual content demands greater immediacy. Audiences have grown desensitized to traditional designs due to prolonged exposure to similar formats, marking a shift in their aesthetic expectations. For designers, this entails finding new points of stimulation and taking preemptive measures to re-engage audiences while maintaining the vitality of their works. This creates a paradox where narrative design emphasizing depth and meaning clashes with audience demand for fresh appeal. Lev Manovich observed that "narratives and databases are antagonists," with narratives implying a causal trajectory while databases, especially digital ones, "represent the world as a list of items and reject their sequential ordering." However, a well-structured and appropriately populated database will not hinder the generation of narrative meaning, though the audiences may have unpredictable conjectures and inherently biased interpretations.

The process of narrative design involves interaction between creators and audiences, where audience interpretation is integral to the narrative itself. Jean-François Lyotard highlighted the transition in postmodernity from grand narratives to small narratives, where grand narratives are supplanted by countless smaller ones. Individuals represent unique narratives or parts of historical ones. The growing prominence of individual narratives diversifies and destabilizes overall narrative meaning, as individuals increasingly highlight their differences and construct unique modes of thought, behavior, and systems. This explains why interactive media like video games attract audiences: their decentralization turns every player into both a "center" and a medium of narrative dissemination. Traditional mass media’s grand narratives have given way to the individual small narratives of players.

This is precisely what John Dewey, the founder of pragmatist philosophy, emphasized regarding continuity,

interaction, context, and emotion. He noted, "A true experience reveals the trajectory of an object’s movement to its endpoint, whether it is the completion of a task, the resolution of a problem, or the achievement of a game’s final level. Just as life carries history, every life has its own story, its emergence, and its progression toward an endpoint at its own rhythm. A true experience includes a solemn beginning and a formal conclusion. The flow of experience continually merges from one stream into another, with each confluence granting unique characteristics to the experience, forming its overall distinctiveness alongside other streams bearing different names. Thus, a complete ending does not exist independently; it is the culmination of the movement of the experiential flow. From this perspective, an experience is a continuum comprising the past, present, and future. Experience never ceases because the interaction between living beings and the world unfolds every day. In such authentic interaction, resistance is not seen as an obstacle to be demolished but as a signal for introspection and reflection. Like a sincere dialogue, where viewpoints continually clash and exchange, neither party remains stubbornly fixed. Instead, new ideas emerge by incorporating the other’s perspective, breaking away from established patterns of thought. As a continuum, experiences formed through interaction occur within specific contexts, and these contexts are in constant flux."

In contemporary society, people learn from stories, are emotionally influenced by them, and need stories to bring color and joy to their daily lives. In a society where power is gradually dissipating, consumers aspire to become creators and expressers of their individuality, allowing for the development of their personal myths.

From a broader perspective, narrative design as part of larger systems, cycles, and environments should always focus on addressing new widespread issues or reviving old ones to achieve higher standards for human society. As early as the 1990s, prominent design scholar Richard Buchanan emphasized that design provides complex systems or environments for living, work, entertainment, and learning, highlighting its role in integrating humanity into wider ecological and cultural contexts, shaping or adapting to these environments as needed. Currently, design involves value-driven societal issues, such as sustainability, future environments, social equity, complexity, inclusion, artificial intelligence, virtual reality, and ethics. Among these, sustainable design has become a key principle. Future-oriented product concepts are evaluated according to economic, social, and ecological sustainability. In creating meaning for artifacts, design has evolved into a history of embedding aesthetics into product value systems, granting products social significance. Products achieve social evaluative relevance only when their intended meanings are clearly expressed. As a medium of meaning, design works always reflect ethics and responsibility, address human well-being, rectify systemic dysfunctions, foster beneficial innovations, and stimulate human self-reflection. More importantly, design translates social meanings into actionable content within daily life, constructing new relationships between people, objects, nature, and society. At this level, design functions as a creative social service.

Abstract

Narrative has continuously evolved alongside the development of human history and culture. The design methodology of narrative theory, developed from linguistics and literature with "events" as its core, exhibits modern characteristics in the context of contemporary new media. Building on this foundation, the study further elaborates that while narrative design embraces technology, it must remain cautious of its misuse. Additionally, while emphasizing the narrative design’s increasing focus on self-identification and experiential demands, it must not overlook the importance of holistic systems and cycles.

A Study on the Folk Traditional Pottery Culture of Guanyao Town, Hubei

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Abstract

This paper explores the wisdom of ancient craftsmanship, characteristics of artifacts, and artistic aesthetics through an analysis of the history of Guanyao in Qichun, the origins of its pottery-making traditions, the cultural value and artistic features of Guanyao's traditional pottery, as well as the forms, decorations, and techniques of Qichun Guanyao's traditional pottery. Based on the community's history and culture, it investigates the influence of traditional pottery culture on the present.

Keywords

Qichun Guanyao, traditional pottery techniques, cultural value, artistic features

I. The history of Guanyao in Qichun

Qichun: according to Di Ming Ji (Place Name Records) by Liu Bozhuang of the Jin Dynasty, the name "Qichun" derives from its abundance of "Qi vegetables" (water celery) along the waterways. This explanation was later affirmed in Taiping Huanyu Ji (Records of the Taiping Era) by Yue Shi of the Northern Song Dynasty. "Qi", another name for water celery, gives "Qichun" the meaning "the spring of Qi vegetables". Historically, Qichun has also been referred to as Qiyang, Qichang, and Qizhou. Guanyao is a folk pottery kiln cluster located in Guanyao Town, Qichun County, on the northern bank of the Yangtze River. The name "Guanyao" originated in the second year of the Hongwu reign of the Ming Dynasty (1369 AD) when artisans of the Guan family began producing pottery there. From the mid-Ming Dynasty onward, an increasing number of residents built dragon kilns in the area to produce pottery. The scale of production grew significantly, and the town became a bustling hub of pottery workshops and stores, earning the nickname "Kiln Prefecture". By the 27th year of the Republic of China (1938), Guanyao's pottery industry had reached its peak. The three main kilns—Guan Family Kiln, Lu Family Kiln, and Li Family Kiln—operated 12 dragon kilns and 56 workshops. Along the banks of Chixi Lake, pottery artisans worked day and night. The blazing kiln fires reflected on the lake, creating a magnificent scene nicknamed "Sleepless West Lake". During its historical peak, the flourishing pottery industry in Guanyao made Qichun County a major commercial hub in eastern Hubei. (Qichun County Gazetteer Compilation Committee, 1997)

After the founding of the People's Republic of China, Guanyao Town remained one of the important ceramic production bases in Hubei Province. Thirty years ago, it was renowned nationwide as a "hometown of pottery". In 1985, the town hosted the first National Pottery Artists Conference, and in 1987, it was officially designated as the "Hometown of Pottery" by the provincial government. However, with the rapid industrial development in the

1980s, substitutes such as plastic and glass, which were more economical and durable than pottery, entered the market. As a result, the production of handmade pottery in Guanyao gradually declined. The once-thriving pottery industry began to fade, and the historic kilns that had been passed down for centuries were forced to close one by one. On July 31, 1989, the Qichun Lantouji Craft Pottery Factory was established in Guanyao Town, located on Guanyao Street. Operated as a state-owned enterprise, the factory primarily produced everyday ceramic items such as wine bottles and tableware. Today, under government planning, the site has been transformed into the Guanyao International Arts District, repurposing all its workshops, offices, and dormitories.



Figure 1: Guanyao International Arts District
Photographed by Ku Jing on December 6, 2018

II. Causes of the Guanyao Pottery Tradition (Natural and Geographical Factors)

Guanyao Town, located in Qichun County, Huanggang City, Hubei Province, lies in the western part of the county along the renowned 30 ° N latitude. It is situated on the northern bank of the Yangtze River in its middle and lower reaches, southeast of the Qihe River and west of the Yangtze, facing Huangshi City and Daye City across the river. To the north, it borders Pengsi Town and Hengche Town. With a total area of 72.3 square kilometers and a population of 31,000, Guanyao comprises 17 villages and residential committees. It has long served as a political, economic, cultural, and military hub in eastern Hubei.

Guanyao Town is characterized by a landscape of low mountains and rolling hills, with terrain gradually sloping from higher elevations in the north to lower elevations in the south. Its lowest point is Chixi Lake, the town's largest lake, situated at an elevation of 12.5 meters, with its waters flowing from northeast to southwest into the Yangtze River. The highest point is Yuanfeng Mountain, which reaches an elevation of 195 meters.

Guanyao Town enjoys excellent transportation connectivity, supported by a comprehensive network of water, land, and air routes. Key infrastructure includes the Huang-Huang Expressway, Qi-Tai Expressway, Xian-Qi Expressway (Qipanzhou Yangtze River Bridge), the Yangtze River First-Class Highway, Huanggang Airport, the Guanyao Port terminal of Qichun Port operated by China Merchants Group, and the Xi-Lan Provincial Highway. Bordering the Yangtze River with an 8,500-meter-long shoreline, the town features two deep-water ports. Upstream, it connects to Wuhan and Chongqing, while downstream it reaches Nanjing and Shanghai. The Shanghai-Chengdu Expressway runs east to west, while the Ma-Yang Expressway and Beijing-Kowloon Railway provide north-south access. Guanyao is 130 kilometers from Wuhan, 25 kilometers from Huangshi Port, and 23 kilometers from Caohe. It is also about a two-hour drive to both Wuhan Tianhe Airport and Jiujiang Airport in Jiangxi Province.



Figure 2: Transportation and Lake Distribution of Qichun Town
Source: Google Maps, created by Ku Jing on February 4, 2023

Guanyao Town is abundant in natural resources, with over 20 types of mineral deposits, including clay, iron ore, quartzite, and yellow sand, all of which are rich in quantity and high in quality. The town boasts more than 18,000 mu of water surface, over 13,000 mu of fruit orchards along the Yangtze River, 10,000 mu of medicinal herb fields, and more than 1,600 ancient persimmon trees, some over 100 years old. It is also renowned for its rich aquatic resources, including fish, shrimp, and crabs, as well as a variety of fruits such as citrus, navel oranges, peaches, plums, and persimmons, along with medicinal herbs like gardenia.

Guanyao Town is home to over 6,000 mu of water surface in Chixi Lake, featuring 16 interconnected islands spanning a total area of 1,600 mu. These islands are adorned with untouched woodlands and stunning natural scenery. Along the lakeshore, seven dragon kilns from the Hongwu period of the Ming Dynasty can be found, alongside a provincial-level intangible cultural heritage site preserving traditional handcraft pottery techniques. Furthermore, Yuanfeng Mountain is famed for its Tang Dynasty-era Indian Twin Ancestors Temple, drawing visitors from near and far.

A region famous for ceramics must satisfy three essential conditions. Around Chixi Lake, there are over ten kiln sites, including Guanyao, Cai Kiln, and Li Kiln. Guanyao is strategically located along the Yangtze River, with Chixi Lake within the town connected to the river, creating an efficient waterway for transporting ceramics. Additionally, the ancient craft of ceramic firing relied on pinewood, abundantly supplied by the dense pine forests of the Dabie Mountains. The clay used in traditional pottery was locally sourced from the yellow clay deposits in Chixi Lake. This clay is highly malleable and produces ceramics with a fine, dense texture and sturdy body. With access to rivers and lakes for transportation, abundant forests for kiln fuel, and rich clay resources for crafting, this harmonious blend of natural, geographical, and human factors fostered the thriving ceramic industry of Guanyao.

III. Traditional Pottery Craftsmanship of Guanyao

The hand-crafted pottery of Guanyao stands as a remarkable example of traditional folk artistry, deeply intertwined with everyday life and practicality. Its enduring success lies in its close connection to daily living, as the skilled artisans of Guanyao designed pottery that balanced functionality, aesthetic appeal, and affordability. The products primarily included essential household items such as jars, pots, basins, kettles, urns, vats, and bowls. These items were often adorned with simple yet vibrant motifs depicting familiar scenes from daily life,



Figure 3: Distribution of Kiln Sites in Qichun Town
Source: Google Maps, created by Ku Jing on February 4, 2023

created using techniques such as painting, carving, and engraving. The flowing, uninhibited lines showcase the bold and unpretentious charm typical of folk art. A defining feature of Guanyao pottery is its unique "water painting" decoration. These decorations not only clearly indicated the intended use of the pottery or expressed the sentiments of the people at the time but also left invaluable physical evidence for the study of ancient Chinese calligraphy and painting. The diversity of decorative techniques, including incised patterns, appliqué, impressed designs, molded flowers, and water-painted motifs, illustrates a distinctive artistic style that has had a profound influence on modern art. Especially noteworthy is how Guanyao artisans drew inspiration from traditional ink painting and calligraphy to create the signature black-on-white "water painting" style. This innovative decorative technique is a unique hallmark of Guanyao, unmatched anywhere else in China, and has gained widespread admiration. Guanyao's hand-crafted pottery not only pioneered the use of painted decorations in ceramics but also carved out a unique artistic legacy, leaving a profound and lasting impact on the ceramic arts and beyond.
As a folk kiln, Guanyao's hand-crafted pottery operated independently of government oversight and remained unaffected by the rise and fall of dynasties. Its production persisted solely to meet the evolving needs of society. Through the tireless efforts of generations of skilled artisans, Guanyao continually introduced new decorative styles, transforming raw materials into cultural treasures with their ingenuity and craftsmanship. The artisans often created simple, rustic pottery, featuring bold patterns etched or embossed onto monochromatic, rough-textured surfaces. Despite their simplicity, these works embody an irreplaceable form of folk art, reflecting the progress of social civilization, adding a colorful chapter that celebrates the creativity, resilience, and enduring spirit of traditional craftsmanship.

1. Guanyao's Eight Pottery Techniques

The traditional pottery-making craftsmanship of Guanyao in Qichun County is recognized as one of the first intangible cultural heritage items of Hubei Province. The exceptional quality of Guanyao pottery is deeply rooted in the mastery and generational transmission of eight distinct techniques. These eight techniques are: coil technique, throwing technique, knife-jumping technique, Scratching technique, slip-trailing technique, embossing technique, carving and painting technique and ash glaze technique, respectively.
Coil Technique: This method involves rolling clay into long ropes and stacking them layer by layer, using outward and inward hand pressure. It is primarily employed for crafting large pottery items.

Throwing Technique: Using the rotational force of a spinning wheel, artisans shape clay by compressing and stretching it with their hands to create thin and tall forms, ideal for circular pottery.
Knife-Jumping Technique: This process involves using a special "jumping knife" on a spinning wheel to carve rhythmic, textured patterns into the clay surface.
Scratching Technique: Scratching is performed on partially dried pottery coated with a layer of white slip. Patterns are etched into the surface, and the slip is then scraped away to reveal contrasting designs underneath.
Slip-Trailing Technique: This technique decorates freshly slip-coated pottery by drawing patterns with tools, resulting in elegant and intricate designs.
Embossing Technique: Colorful clay is shaped into desired motifs and layered onto semi-dried pottery, creating raised, decorative patterns with depth and texture.
Carving and Painting Technique: Using steel knives, artisans carve or paint three-dimensional designs onto semi-dried or fully dried clay surfaces.
Ash Glaze Technique: Originating from ancient practices where kiln ash naturally fused with clay to form a glaze, Guanyao artisans have refined this technique, innovating various glazing methods that add unique textures and finishes.

			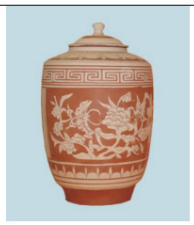
Coil Technique	Throwing Technique	Knife-Jumping Technique	Scratching Technique
			
Slip-Trailing Technique	Embossing Technique	Carving and Painting Technique	Ash Glaze Technique

Table 1 Guanyao's Eight Pottery Techniques

2. Guanyao's 108 Everyday Pottery Items

Guanyao's collection of everyday pottery encompasses jars, pots, basins, kettles, vats, urns, bowls, and similar household essentials. Additionally, it features 80 varieties of artisanal pottery, 100 varieties of packaging pottery, 20 varieties of garden pottery, 60 varieties of architectural pottery, and 30 varieties of sanitary pottery. Notable specialty items include 30 unique designs such as double fish wine sets, tilt-spout wine pots, monkey peach tea sets, scholar's four treasures (wenfang sibao), abstract animal sculptures, large ceramic wall panels, and grand buddha sculptures. Guanyao's handcrafted pottery remains deeply entrenched in the authentic folk traditions of Eastern Hubei. Through continuous innovation and evolution, it has developed distinctive artistic characteristics, including "ancient, robust forms with a timeless charm; clean, expressive carvings with simple yet vivid designs; glazes that radiate a vibrant, flowing brilliance; a perfect union of artistic beauty and practical functionality."IV.



Figure 4: Guanyao's 108 Everyday Pottery Items
Photographed by Ku Jing on October 23, 2022

Cultural Value and Artistic Characteristics of Guanyao's Traditional Pottery

1. Cultural value

1. Guanyao Pottery: A Rich History. Guanyao pottery has a long and storied history, with records dating back to the second year of the Hongwu reign in the Ming Dynasty, and its origins can be traced more than a thousand years. It embodies the essence of thousands of years of Chinese ceramic craftsmanship, vividly preserving the ancient pottery-making process. Guanyao pottery is a representative of Chu ceramic culture. Among Hubei Province's three major traditional pottery production centers, Makou, Macheng, and Qichun, Guanyao is the only one still actively producing ceramics. Its ancient dragon kiln, which has been in continuous operation for over 600 years, continues to fire daily-use pottery. The range of products includes 108 different types of everyday items.

While Guanyao pottery originated as folkware, it has also been embraced by local authorities. From the common people to the government, Guanyao pottery has woven itself into the fabric of daily life, making it an inseparable part of local culture.

2. Heritage and Innovation. From clay formulation to shaping, glazing, and firing, every step in Guanyao pottery production is meticulously designed and continually innovated. Over time, significant changes have been made to materials and techniques. Traditional coarse ceramics have evolved into finer pottery that meets the preferences of modern consumers. Furthermore, there have been innovations in glaze colors, adding new dimensions to the traditional techniques.

3. Rustic, Eco-Friendly, and Sustainable. Guanyao pottery is celebrated for its use of natural materials, including local red sandy clay and ash glazes derived from natural straw and wood. Both the glaze and the clay are free from harmful chemical additives, making the pottery safe for use as tableware. The material's unique properties provide several practical benefits: preservation: guanyao fermentation jars can keep vegetables fresh for 1–2 years without spoiling; porosity: during may, the surface of the jars may develop a salt frost, demonstrating their strong permeability; iron content: guanyao clay is rich in iron, and it is said that soups cooked in guanyao pots emit a fragrant aroma that can be smelled from up to 100 meters away; nutritional benefits: small guanyao pots are traditionally used for cooking congee or rice-based foods for children, promoting strength and reducing the likelihood of illness. Made using ancient techniques, Guanyao pottery is an eco-friendly and sustainable product that reflects the craftsmanship of its makers.

4. Distinctive Craftsmanship. Guanyao pottery is known for its unique craftsmanship, which is referred to as the "Guanyao Eight Techniques". One of the highlights is the throwing technique, which allows artisans to form pottery in a single step without the need for trimming. Another signature feature is the transparent ash glaze, which, when combined with the local clay, creates the distinctive "Golden Grain" or "Eel Yellow" hue. While Guanyao's carving technique shares similarities with the Cizhou kiln, its emphasis on yellow glazes gives Guanyao pottery a distinctive identity, making it a truly unique craft.

2. Artistic Characteristics

Guanyao's handcrafted pottery remains deeply entrenched in the authentic folk traditions of Eastern Hubei. Through continuous innovation and evolution, it has developed distinctive artistic characteristics, including "ancient, robust forms with a timeless charm; clean, expressive carvings with simple yet vivid designs; glazes that radiate a vibrant, flowing brilliance; a perfect union of artistic beauty and practical functionality." (Zhang Lihong, 2019, p. 140).

Ancient and Sturdy Shapes: The pottery of Guanyao is crafted from locally sourced yellow clay from Chixi Lake, which is soft and highly malleable. This gives the pottery a fine texture and thick, solid body. The vessel shapes, inspired by both bronze and porcelain designs, feature an ancient, weighty look that adds to their timeless appeal.

Simple and Vivid Carvings: The carvings on Guanyao pottery reflect the influence of local folk art, particularly traditional paper-cutting and Chinese painting. A layer of slip is applied to the clay surface, and various techniques such as incising, carving, and scraping are used to create intricate patterns. These methods contrast the decorative designs with the underlying glaze, bringing the patterns to life. The use of carving, scraping, and painting creates a vivid, dynamic visual effect.

Radiant Glazes: Guanyao pottery incorporates glazing techniques that are inspired by the northern Cizhou kilns, resulting in a unique "brown base with white floral" style that distinguishes the pottery from other regional styles.

Practical Functionality: The shapes of Guanyao pottery are generally round with outward-curving bodies, with

both the inside and outside glazed. These forms were designed with everyday use in mind, meeting the practical needs of common people. The pottery is marked by a strong rural charm and regional character, reflecting its deep connection to local life.

Decorative Themes: The primary motifs in Guanyao pottery feature elements from everyday life, such as flowers, birds, fish, and insects. Located near the Yangtze River and surrounded by numerous lakes and water networks, the potters are intimately familiar with and emotionally connected to nature, incorporating elements like water, fish, lotus, ducks, and plants into their designs.

Varied Decorative Patterns: The decorations, which include animals, plants, geometric patterns, and calligraphy, are arranged freely in pleasing combinations, showcasing the potters' creativity. These designs not only reflect the potters' rich imagination but also express the local people's desires for prosperity, good fortune, and a peaceful, stable life.

Plant Motifs	Animal Motifs	Geometric Patterns	Textual Patterns
Plum blossom	Magpie	Weaving pattern	Longevity character pattern
Lotus flower	Carp	Stamping pattern	Happiness character pattern
Peony	Mandarin duck	Fret pattern	
	Heron	Circle pattern	
	Duck	Vegital scrolls	
	Butterfly		

Table 2: Classification of Common Decorative Themes in Guanyuan pottery







Figure 5: Scratching Technique - Heron and Lotus

Figure 6: Scratching Technique - Carp and Lotus

Figure 7: Scratching Technique - Duck and Lotus

Photographed by *Ku Jing* on October 22, 2022

Among them, the magpie, due to its auspicious and celebratory symbolism, is the most frequently appearing pattern in the decoration of Guanyuan pottery.

V. Conclusion

The traditional pottery culture of Guanyao Town in Hubei is an intangible cultural heritage passed down through



Figure 8: Embossing Technique - Magpie and Plum Blossom

Figure 9: Slip-trailing Technique - Magpie

Figure 10: Scratching Technique - Magpie

Figure 11: Scratching Technique - Magpie

Photographed by Ku Jing on October 22, 2022

generations. The ancient dragon kiln, dating back to the Ming and Qing dynasties, is still in operation today, making it the only remaining pottery-making cultural landmark in the Jingchu region. Guanyao's traditional pottery culture combines elements of folk art, craftsmanship, and sociology, among other disciplines. It also offers valuable insights into the lifestyles and customs of the people in Eastern Hubei, providing a precious record of daily life. The diverse forms and traditional patterns of Guanyao pottery have enriched Hubei's folk art and ceramic design, offering abundant narrative examples. A comprehensive study of Guanyao's folk traditional pottery culture is of great importance.

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Strange group narrative: Research on service design of rural creators based on the "Happy Village Leader Plan"

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Abstract

With the widespread use of mobile networks, emerging rural creators have gained prominence, providing a platform for rural residents to express themselves. However, the "three rural" live streaming and short video sector is facing challenges like narrative uniformity, limited narrative structures, and superficial content. These issues could impact creators' appeal and viewer loyalty. This study aims to address these problems through innovative design practices, improving content quality, diversifying narratives, and fostering the sustainable growth of rural creators. Using methods like stakeholder mapping, SWOT analysis, Deep-Daze tools, and service blueprints, this research expands the development opportunities for rural creators, encourages diversity in competition, and opens new horizons in the digital era for rural creativity.

Author keywords

Narrative Design, Rural Revitalization, Rural Creators, Machine Learning

Introduction

As internet and mobile technology advanced, social media platforms emerged as new outlets for expression. People now share their thoughts, document their lives, and promote various activities through text, images, audio, and videos. In the context of industrialization and modern society, rural communities face challenges. Among media forms, short videos stand out due to their ease of use, low barriers to entry, and freedom from time and space constraints. Adapting rural customs to a society of strangers in the digital age is a primary focus. Our goal is to transform "rural" from a negative term into a thriving cultural destination. This guides our observation and design efforts.

Background analysis based on the "Happy Village Leader Plan"

"Agriculture, rural areas and farmers" go digital

Fei Xiaotong once noted, "From a grassroots perspective, Chinese society is deeply connected to the countryside." Rural areas in China encompass a substantial portion of the population and serve as significant consumer and resource markets. The "three rural" sectors, including rural areas, agriculture, and farmers, hold paramount

importance in China's national economy and social stability. Consequently, the government consistently prioritizes addressing "three rural" issues, considering agricultural and rural economic development a top economic focus.

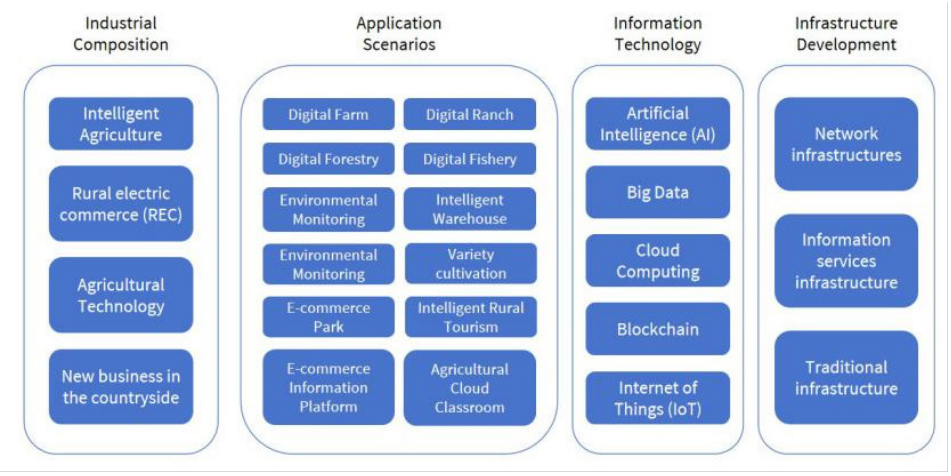

Figure 1.Industrial composition diagram of Sannong digital economy.

With the rural revitalization strategy in progress and widespread mobile internet adoption(see figure 1), the emergence of "village livestreaming" has become a pivotal development. This not only invigorates rural revitalization but also consolidates developmental momentum. Internet companies, through initiatives like rural livestreaming and rural e-commerce, promote not only the advancement of rural industries but also the transmission of rural culture, elevating the social status of farmers.

Kuaishou platform development history

Kuaishou's journey began with "GIF Kuaishou" in March 2011. However, the pivotal moment came in July 2013 when it redefined itself as a social platform, marking the start of a transformative phase. By the end of 2014, the platform officially adopted the name "Kuaishou," leveraging its technological prowess to swiftly gain market access and a substantial user base.

Kuaishou employed a meticulous operational strategy, focusing on content relatable to users in smaller cities and utilizing algorithms with inclusive characteristics for content recommendations. This approach fostered a decentralized ecosystem where each user's content had equal exposure opportunities. Central to this strategy was the use of big data algorithms and AI technology to distribute traffic fairly, eliminating disparities in content dissemination. This shift disrupted the traditional influencer-dominated communication model, empowering ordinary people to document and share rural-related information. This not only boosted the visibility of "rural" topics but also facilitated the transmission of rural information, contributing to rural revitalization.

The integration of livestreaming and short videos, part of the "live plus short video" trend, bridged the gap between agricultural products and markets. It also emerged as a "new tool" for rural revitalization, actively participating in agricultural production and value creation processes. This innovation fostered a multi-level employment ecosystem in rural areas, supporting robust economic and social development.

"Happy Village Leader Plan"

Since 2018, Kuaishou has implemented its "Happiness in the Countryside" strategy, focusing on rural e-commerce and revitalization, and engaging in systematic poverty alleviation. Under this strategy, Kuaishou has established a multi-dimensional poverty alleviation mechanism, covering areas like traffic support, e-commerce assistance, consumption promotion, education support, and rural tourism development.

By 2022, Kuaishou hosted over 260 million original rural short videos, with daily viewership exceeding 1.8 billion for rural content. The "Happiness in the Countryside Leaders Program" supported 100+ rural leaders in 27 provinces, revitalizing 16 local industries and impacting millions.through this strategy and mechanisms, Kuaishou has leveraged its short video and livestreaming platforms to actively participate in rural revitalization, contributing significantly to sustainable development.

Narrative analysis of rural creators based on the "Happy Village Leaders Program".

Narratology originated in the 1960s during the rise of French structuralism. Classical narratology is defined as a scientific study aiming to construct narrative grammar or poetics to deeply analyze the components, structural relationships, and operational principles of narrative works. This provides a comprehensive perspective for an in-depth examination of narrative works in terms of both content and expression. In this paper, we primarily focus on the aspect of "expressiveness" using classical narratology theory. Through an analysis of narrative homogenization, narrative structural uniformity, and superficial narrative content, we aim to explore the narrative challenges in rural live streaming and short videos.

In the realm of live streaming and short videos, creators employ diverse perspectives to achieve maximum impact based on their chosen themes. This represents a significant departure from the traditional media era where farmers were mere subjects of storytelling, presented in the third person. With the advent of the internet and social media, farmers have gained the ability to shape their own narratives, transitioning from being portrayed by others to becoming the authors of their own stories—an important evolution.

Notably, creators of short videos in the farming community often favor an intimate narrative approach, sharing their experiences from a first-person perspective. This approach not only strengthens the bond between the protagonist and the audience but also fosters emotional connections. For instance, "Northeast Old Fei" employs a casual, selfie-style narration to depict rural life. Similarly, the TikTok account "Farmer Xiao Fang" engages directly with the camera, using an introspective perspective.the use of first-person storytelling, such as selfies and direct introductions, effectively bridges the gap between the short video protagonist and the audience. Viewers feel as if they are engaged in a genuine, face-to-face conversation with the protagonist, fostering a sense of closeness that facilitates emotional resonance. In the era of new media and the internet, audiences are no longer passive consumers but active choosers, empowered to select content and topics that genuinely interest them.

Homogenization of narrative themes

The ongoing progress of rural revitalization policies and the growing maturity of technology on short video and live streaming platforms have stirred increased interest in the "rural" domain, primarily fueled by economic motives. Amidst the vast realm of "rural" short videos and live content, rural life and cuisine have emerged as top choices for many creators due to their easy production, high appeal, and replicability.This surge has led to a flood of videos on short video .Influential accounts like "Li Ziqi" , renowned for their emphasis on food preparation and pastoral life, have spurred numerous new creators in the agricultural sector, exposing a trend towards content homogenization in rural live streaming and short videos.Homogeneous content creation can lead to viewer fatigue, declining interest, and reduced loyalty to content in this field, ultimately impacting creators' influence.

Narrative structure homogenization

In the world of short videos and live content creation, narrative structure is pivotal. It's the framework that dictates how stories unfold logically. A well-crafted narrative structure is essential for creators to effectively express their ideas. Creators often develop their own shooting, editing, and storytelling patterns, which boost efficiency and quality while maintaining creative consistency.However, relying too heavily on standardized narratives can lead to audience fatigue and make content susceptible to imitation. An analysis of "rural life" live

streams and short videos reveals a common trend: many rural food accounts follow identical narrative structures, resulting in uniform content.For instance, the popular rural food blogger "Kangzi Farmer" typically follows a template of harvesting ingredients, cooking, and tasting. This standardized approach can diminish the appeal of such content and reduce long-term audience engagement.

Shallow narrative content

Narrative content is the essential core of storytelling, encompassing events, characters, and settings. In the realm of "rural" short videos and live content, creators often focus on rural daily life, agricultural work, and natural landscapes, forming the basis of their narratives.However, some creators, driven by economic incentives, may present rural life and farmers in a biased manner, catering to traditional stereotypes. This can result in shallow, less authentic, and less profound narrative content.Farmers are sometimes depicted negatively in the media, perpetuating stereotypes and distorting public perceptions. In the pursuit of online popularity, some creators resort to comedic exaggeration and caricature. For instance, "Little Ma Yun" gained attention through humorous exaggerations, but this kind of shallow content fails to sustain audience engagement and hampers the conveyance of positive messages. It not only reinforces farmer stereotypes but also hinders the potential for rural narratives to carry meaningful themes.

Innovative design practices of rural creators based on the "Happy Village Leader Program".

Analysis of rural creators based on the "Happy Village Leaders Program"

Stakeholder mapping, a vital component of service design tools, played a pivotal role in the research for the "Happy Rural Leaders Program" involving rural creators. It was used to analyze the various stakeholders within the service system and environment, including users, personnel, businesses, and organizations(See Figure 2).In this project, stakeholder mapping assisted in assessing the current situation by categorizing stakeholders involved in the agricultural trading process as core, important, or peripheral stakeholders.

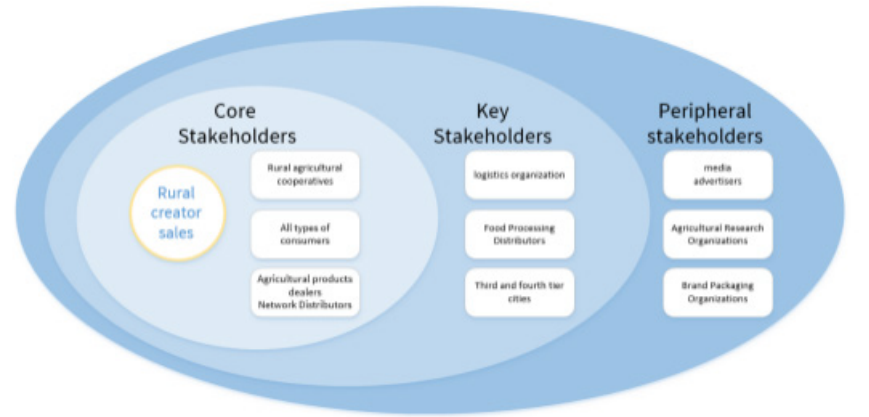

Figure 2.Stakeholder diagram based on farmer creators.

SWOT analysis is a valuable tool for understanding the internal strengths, weaknesses, external opportunities, and threats associated with promoting agricultural products through online live streaming and short videos by farmers. It consolidates these factors into a SWOT matrix to facilitate better strategic planning(See Figure 3). When conducting a SWOT analysis of the current sales situation in the "Happy Rural Leaders Program," several key factors emerged.Internal strengths include strong platform and government support, providing a solid foundation for the project. However, there are internal weaknesses, such as the perishable nature of agricultural products, storage challenges, high transportation costs, and the prevailing rural poverty and underdevelopment.

External opportunities encompass rural revitalization and consumer demand for green agricultural products, but they also come with threats like seasonal weather and market fluctuations.

"Happiness Village Leaders Program" Rural Creators SWOT		dominance	inferior
		Platform Support Policy support Somewhat interactive	Single content Single form Too little information on agricultural products
CHANCE	Rural Informatization The government's "Farm-to-Community" People accept this form. The Internet is becoming more and more popular.	So: Relying on Racer's platform and traffic advantage Launching specialty agricultural products	Wo: Rural cooperatives take the lead Broadening Information Channels Internet sales model
THREAT	Impact of agricultural harvests Marketing	St: Platform and Government Cooperation Mechanism Harmonization of guarantees, pricing	Wt: Processed into agricultural products

Figure 3.SWOT diagram based on farmer creators.

Service blueprint for rural creators based on the "Happy Village Leaders Program"

A service blueprint, a critical tool in service design, visually outlines the framework of a service system across its pre-service, during-service, and post-service phases. It provides clarity to otherwise implicit service processes. In the service blueprint for rural creators in the "Happy Rural Leaders Program," key elements like physical cues, user behaviors, frontstage and backstage activities, support processes, and emotional aspects are included. This blueprint also categorizes the environment to ensure thorough service system planning and design.

Developing a service blueprint helps pinpoint deficiencies in the service chain and offers a robust tool for enhancing the service system for rural creators in the "Happy Rural Leaders Program," ultimately leading to an improved user experience(See Figure 4). To further refine this service system, systematic planning is necessary to meet the functional needs of both customers and rural creators. Additionally, integrating online services with offline activities to boost user engagement is crucial. Optimization of information delivery is vital, focusing on delivering content that piques customer interest while maintaining an appropriate notification frequency and timing.

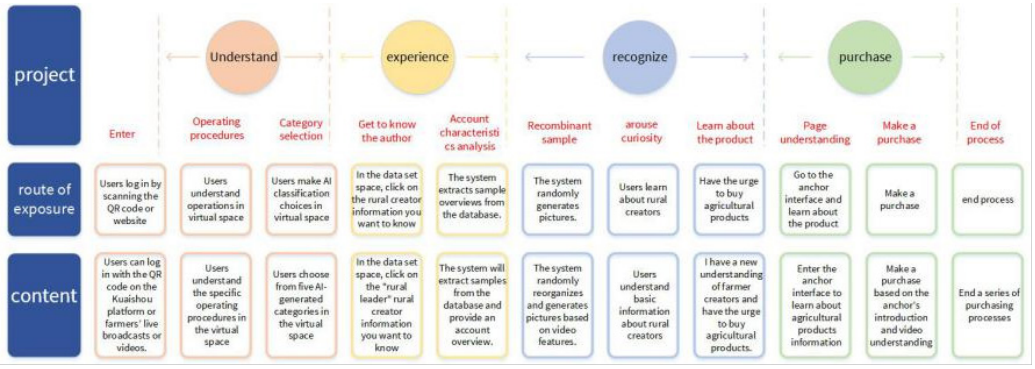

Figure 4.Service blueprint for customer participation in ruralmedia.

Service design practice of rural creators based on the "Happy Village Leader Plan"

This project analyzed a portion of the "Village Leaders" program initiated by Kuaishou in September 2018. It encompassed 61 short video accounts distributed across 26 Chinese provinces, with video content falling into five

categories: travel, charity, tourism, local products, and daily life. Using machine learning to transform short video text into images, it objectively portrays account activity, influence, and content traits.

This design project focuses on a web application for visualizing social media data, specifically using China's Kuaishou platform and video data from accounts related to the "Rural Leaders" project, which supports poverty alleviation.By distilling text information from video comments and inputting it into Deep Daze, individual narrative landscapes of residents in underdeveloped regions of China are generated from a machine perspective. These contrast with the way people typically browse social networks in their daily lives.

Regarding data selection, we chose data from 61 accounts participating in the Kuaishou "Happy Rural Leaders" program. We gathered keywords and their frequencies from comments made by other internet users on these accounts' videos in the last 90 days. We then transformed these keywords into descriptive sentences.

For model training, we inputted these sentences into Deep-Daze, a tool developed by Phil Wang in March 2021. Deep Daze combines the CLIP model with Siren and employs the CLIP-VIT-B/32 pretrained model to convert text descriptions into corresponding images. If necessary, to guide the AI-generated images and prevent them from being too fanciful, a reference image could be specified for creative generation, with the resulting images viewed in a designated path(See Figure 5).

In the final design outcome, AI-generages were categorized into five types: Artistry, Tourism, Lifestyle, Local Products, and Charity. These categories broadly encompass the different types of accounts within the "Happy Rural Leaders Program.

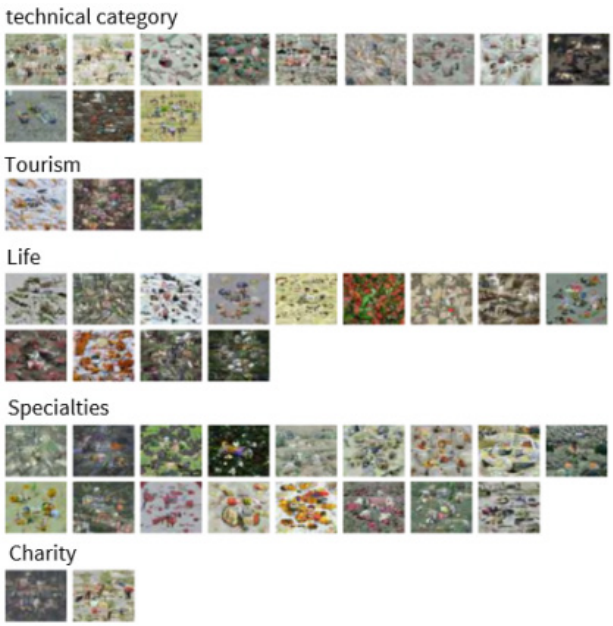

Figure 5.Deep Daze model generates graphic sample classification.

The innovation here lies in offering a fresh perspective on rural creators, making their narratives more accessible to the public. This is achieved through engaging, informative, and visually appealing interactive spaces that help the public understand rural creators' narratives, piquing their curiosity and encouraging them to support rural products.The user process involves four steps(See Figure 6):

Step 1：Users access the virtual space through various channels and learn the operating methods. They then select one of five categories of AI-generated images.:

Step 2：After choosing an AI-generated image, users enter the data generation space. They interact with particles

generated from video keyframes while exploring specific account information.

Step 3：Users find accounts based on geographic prompts, view basic information, including ID, account description, location, recent activity, and popular video comment words.

Step 4：Users trigger machine-generated visuals by long-pressing an account avatar.

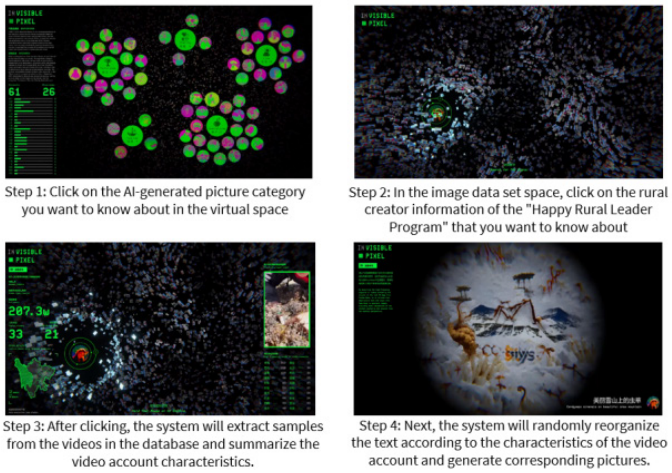

Figure 6.User operation and design work renderings.

Conclusion

Given the recent emergence of farmer livestreaming and short videos in China, it's vital to explore content and design for future rural creator initiatives. This exploration should address issues like narrative homogeneity, predictable storytelling, and shallow content, considering user interactions among customers, platforms, and rural creators.The aim is not just to create design outcomes but also to provide users with diverse experiences. Ultimately, this fosters two-way interactions between customers and rural creators, encouraging deep reflections and supporting economic development in rural areas.

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The narrative of Chinese handicraft design from the perspective of iconology

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Abstract
It is challenging for traditional iconology to interpret the aesthetic essence of handicraft image design form, and the evolution and transformation of narrative form in handicraft image design render traditional iconology inadequate for interpretation. This paper aims to employ image theory derived from iconology to categorize and elucidate the narrative form of handicraft, as well as forecast its transition into new narrative modes while combating "alienation."

Author keywords
iconology, handicraft, image

The collision between the study of iconology and handicraft

Handicraft creation is the result of traditional rural lifestyles during the agricultural era. It encompasses production activities aimed at fulfilling essential human needs such as clothing, food, shelter, and transportation. Moreover, it serves as a natural expression of artistic creativity and lifestyle choices observed within society. According to Maslow's hierarchy of needs theory, human requirements are constantly evolving, leading to continuous development in creative endeavors that cater to individuals at all levels. These creations adapt alongside changes in people's lifestyles and societal advancements. The intentional or unintentional acts of human creation reflect ideological shifts within the superstructure encompassing society and religion. This unconscious revelation can manifest through an artist's inner spiritual world expressed in their work or through thematic creations that depict the realities of their contemporary era, serving as external expressions conveying stories, concepts, and information from within. Therefore, handicraft creation provides us with valuable clues for tracing historical transformations in both production methods and daily life experiences while also encapsulating cultural concepts narrated through these crafts.

The interpretation of artistic creation narratives has been a common practice throughout art history and has evolved into a research method known as iconology since Panofsky's analysis of European Renaissance artworks. Iconology progresses through three stages: initially describing the form and environmental ambiance depicted within an image; subsequently identifying subjects and allusions present; finally revealing broader trends related to time periods, societies, philosophies by combining artists' creative ideas with global circumstances and perspectives. Panofsky's traditional iconology has given rise to numerous works exploring this approach further – examples include Mitchell's "Pictorial Turn" or Gombrich's "Gombrich on the Renaissance:Symbolic Images", and so on.

The three-layer research method of traditional iconology has always been a significant approach to studying handicraft art. However, with the enrichment of narrative methods in handicraft design, solely focusing on the study of allusive narratives through traditional iconology is no longer sufficient for interpreting handicraft design. The theory of image and image transformation derived from traditional iconology helps us explain the changes in modern handicraft.

The Image theory

The evolution of handicraft narrative form can be elucidated by the theory of image. Image theory originates from Mitchell's iconology, but an essential definition for image does not exist; it is more akin to a "feeling" formed through a "process." To comprehend an image, one can refer to Mitchell's constructed concept of the image family, which encompasses "graphic image," "optical image," "perceptual image," "mental image," and "verbal image." Among these categories, images exist within the realm of perception images. When we encounter an object's optical or word-based representation, they imprint a vague perceptual impression in our minds, prompting our brains to imagine a mental depiction that allows us to recreate it after its disappearance. In general terms, there are two forms: one being tangible carriers such as objects, statues, pictures or words; while the other involves highly abstract cognition. Prolonged exposure to this type of cognition influences individuals and eventually shapes the essence representing a particular era – what Mitchell refers to as these inherent resemblances being intrinsic qualities possessed by images themselves. By combining this concept with subsequent paragraphs on handicraft narration, the comprehend of 'image' will become clearer.

The form of narrative in handicraft

In general, the expression forms of handicraft narration can be divided into graphic narration, narrative (alluding) narration and artistic narration. These narrative forms also reflect the vertical development history of handicraft, and also experience the reflection of the process between multiple "images".

A.Graphic narrative

The graphic narrative achieves a specific narrative effect through the arrangement and combination of fundamental shapes. On the painted pottery unearthed from tombs in the primitive era, we can observe numerous abstract patterns of animals and plants composed of points, lines, and geometric shapes. These patterns were extracted by early humans after observing their surroundings and reproduced on the painted pottery with remarkable modeling features that left a lasting impression on their memory. This is also why highly abstract figure patterns emerged. By combining image theory, primitive humans derived "perceptual images" from visual observations of objects, imagined "mental images" to reproduce these feelings, and subsequently recreated them as "graphic images". Over time, reflections on various images gradually gave rise to "verbal images", which are words themselves. The working people in our country have retained this mode of production rooted in original thinking and continue to apply it in social life. Consequently, there will still be many simplified morphing patterns composed of animal and plant motifs in handicraft image design.

The narrative within graphic storytelling precisely constitutes an "graphic image" comprised of subtle elements such as shape, color, composition, brushstroke technique, lighting effects,line work,and spatial arrangements depicted through handicrafts.This evokes both the audience's spiritual perception and visual interpretation, enabling them to identify the main subject matter within the pattern while generating emotional responses.

B.Allusion narrative

In the process of prolonged mutual reflection of the aforementioned images, a prevalent "similarity" has been established within the soul, which can be interpreted as an "allusion," and has become a widely adopted artistic

motif in handicraft design. For instance, in Chinese handicraft image design, the pomegranate symbolizes longevity and the peach represents reproduction of descendants. The thread signifies endless wealth and so forth. When the "verbal image" is incorporated into this interrelated group of images, their relationship becomes closer and more corresponding. For example, "chicken" and "Ji" are homophones in Chinese language and have become symbolic elements for household blessings. Similarly, "sheep" is associated with auspiciousness which further evolves into connotations like beauty. Ultimately, when textual imagery interacts with visual imagery through reflection, it gives rise to fables known to mankind. Storytelling relies on allusions that viewers identify within pictures to fulfill its narrative purpose.

C.Artistic narrative

Prior to the 20th century, art revolved around narration; however, with the emergence of modern art forms came a completely different style of storytelling. Modern abstract art demonstrates its ability to transcend reliance on text-based schemas by directly expressing emotions and sentiments more fluidly. It no longer depends on identifying verbal image associations or evoking mental images but rather aims at presenting unadulterated "perceptual images," arousing emotional responses from audiences as much as possible without modification or disguise. Examples include Kandinsky's abstract narrations inspired by musical melodies or Mark Rothko's experiential expression of his own emotions through artwork creation.The artistic narration found in handicrafts shares similarities with sculpture where emotional experiences are conveyed not only through color and imagery but also via materials used, shapes formed, and foundations laid.

As evident from the aforementioned, the first two narratives are grounded in this notion of "soul similarity," while the artistic narrative no longer relies on mere recognition of imagery and allusions. This also signifies that traditional iconology is insufficient to meet the demands of handicraft research.

The de-alienation and turn of handicraft

In modern society, the production of all images has transformed art into a manifestation of capitalist aesthetics fetishism, resulting in the estrangement between handicraft and humanity. The purpose of handicraft has always been its utilization by people; however, with commodification, it has acquired an illusory concept overlaying its essence. Consequently, the relationship between artistic handicraft and individuals has become inverted as people elevate and worship them on a pedestal. A potential solution to liberate handicraft from this illusory concept is to return to its original function for practical use by individuals. The process of living through art may gradually eliminate some projections obscuring handicraft's true nature. Therefore, the transformation in narrative mode parallels both the disalienation process and serves as a means to emancipate handicraft.

Conclusion

In summary, image design in handicraft surpasses mere artistic motifs, necessitating a departure from solely studying allusions and narration traditionally employed for interpreting such designs. Employing image theory to interpret changes in narrative modes within handicraft can aid understanding underlying reasons behind these transformations. As society progresses further, theories like image turning and meta-image can drive innovation within handicraft image design while presenting novel perspectives. Alongside art life itself, de-alienation within handicraft can create a more comfortable living environment brimming with new vitality.

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Design practice of multi-function pickup truck concept car based on intelligent agriculture and animal husbandry

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Abstract

The research aims to explore the application of intelligent technology in agriculture and animal husbandry based on the design practice of intelligent agriculture and animal husbandry, and solve the challenges of low efficiency, resource waste and environmental problems in agriculture and animal husbandry. The value and design principle of the concept car are reviewed and analyzed. In the design stage, systematic methods are adopted, including the functional modules and system design of the body structure and appearance design, new energy power system selection and design, communication technology and environmental monitoring data collection and processing system design, etc. The intelligent and automation technology will be applied to the combination of UAV and on-board intelligent system, the retractable carriage structure design, the design of manned and cargo flexibility, driving assistance and autonomous driving technology. The developed multi-functional pickup truck concept car has solved the problems of inefficiency, resource waste and environmental problems in agriculture and animal husbandry, improved work efficiency, realized resource utilization and conservation, and protected the environment and sustainable development. The practice verification results show that the concept car has good functions and performance, and has received positive feedback from practical scenarios and users. Future prospects include further optimization of design and technology applications, enhanced cooperation and improvement to achieve the sustainable development of intelligent agriculture and animal husbandry.

Author keywords

Multifunctional pickup truck concept car, intelligent agriculture and animal husbandry, sustainable development

Introduction

In the context of rapid global economic development, agriculture and animal husbandry, as important basic industries, play a key role in ensuring food supply and social stability. However, the traditional agricultural and animal husbandry production methods face many challenges, such as limited land resources, labor shortage, low efficiency and other problems, which limit its further development and modernization. With the rapid development of information technology and automation technology, intelligent and automation solutions are being widely used in various fields. In agriculture and animal husbandry, the application of intelligent technology has also made some progress. Among them, the concept of smart pasture was proposed, aiming to use advanced technological means to improve the production efficiency and sustainable development of animal husbandry. However, the current smart pasture technology mainly focuses on the automation and data management within pastures, while there is a relative lack of research on the means of transportation and collaboration between pastures. In the existing pasture vehicles, pickup trucks are widely used because of their flexibility and versatility.

However, traditional pickup trucks have some limitations in pasture applications, such as limited load capacity, low fuel efficiency, and manual operation. Based on the above background and challenges, this study aims to design and study a smart ranch scalable pickup truck based on intelligent control and versatility to meet the needs of modern animal husbandry for efficient, sustainable and intelligent transportation vehicles. The research will draw on international advanced technology and experience, combined with the historical background and future development trend, and explore how to apply intelligent technology, automatic control and scalable design principles to improve the performance and adaptability of pasture transportation vehicles.

This paper aims to meet the needs of modern animal husbandry for efficient, sustainable and intelligent transport vehicles. Specific objectives include the design of an intelligent control system, Deep learning algorithms to implement visual recognition and environment perception, Implement automated driving, navigation and safety management functions, Improve the operation performance and safety of the pasture transport vehicles; To achieve the versatility of the design, a Such as "Integrated carrier cargo module, power drive module, and operating tool module", Explore the design principles and techniques of retractable pickup trucks, Integrating multiple functional modules, Improve their ability to adapt to different scenarios and task requirements; Improve the efficiency of pasture transportation, Reduce the transportation time by 20%, Improve energy efficiency by 15%, Through the intelligent and automated design and application, Optimize energy utilization efficiency and transport efficiency, Improve the production efficiency and economic benefits of animal husbandry; Promote pasture cooperation and collaboration, Through the design and application of smart ranch retractable pickup trucks, Promote cooperation and collaboration between the pastures, Using a cloud-based platform-based data-sharing system, Or develop task scheduling and collaborative algorithms, Realize information sharing, resource sharing and task coordination; Promoting the sustainable development of animal husbandry, Using low-emission power systems or renewable energy sources, And measures to optimize the lightweight design of vehicles, Integrating environmental protection and resource conservation principles into the design, To achieve the sustainable development goal of animal husbandry. Through the realization of the above research objectives, this paper aims to provide an advanced transportation tool solution for animal husbandry, promote the application of intelligent and automated technologies in animal husbandry, and promote the modern transformation and sustainable development of animal husbandry.

The theoretical research significance of this paper is to promote the application of intelligent control and versatility in the field of livestock transportation. Exploring the design principles and technologies of multifunctional pickup trucks, as well as the development and integration of multifunctional modules, will provide new theoretical support and guidance for the future development of intelligent pasture transportation vehicles. In addition, the practical research significance of this paper is to provide an innovative transportation solution for animal husbandry, promote the modernization of animal husbandry transformation and sustainable development, intelligent and automatic design and application can optimize energy efficiency and transportation efficiency, reduce the waste of resources and environmental pollution, so as to achieve the sustainable development goals of animal husbandry. The design and application of intelligent pasture multi-functional pickup truck based on intelligent control and multi-functionality will improve the transportation efficiency and production efficiency of animal husbandry, reduce the labor cost and time cost. Intelligent transportation means will improve the production efficiency and economic benefits of agriculture and animal husbandry, and promote agriculture and animal husbandry to the direction of modernization and intelligence.

Current Research Level And Status In China And Foreign Countries

Smart ranch retractable pickup truck is a mobile platform combining new energy power system, intelligent

control technology and versatility design. It can undertake multiple tasks such as environmental monitoring data collection, accurate operation and emergency transportation in the ranch. In China, the research of intelligent pasture technology and equipment has made some progress. Among them, intelligent control technology is one of the core technologies to realize intelligent pasture. At present, many scholars have made exploration and research on the intelligent pasture management system, such as the intelligent pasture management system based on the Internet of Things technology, the intelligent pasture management system based on the cloud platform, the intelligent pasture management system based on the sensor network, etc. In addition, some scholars have conducted research on intelligent pasture operation equipment, such as intelligent lawn pruning robot, intelligent harvesting robot, etc. However, the current research on smart ranch retractable pickup trucks is still relatively limited, and no relevant research results have been seen in China. Therefore, this paper aims to conduct in-depth research and exploration of smart ranch scalable pickup trucks, and to make more contributions to the development of smart ranch technology.

In foreign countries, intelligent agriculture technology has been widely used and studied. Among them, the research of intelligent agricultural machinery and equipment is a crucial link in the development of intelligent agricultural technology. In the field of intelligent agricultural machinery, the research results of the United States, Japan and European developed countries are more outstanding. For example, John Deere's " Autonomous Type harvester ", can realize automatic harvesting operations according to the height and density of the crop; the" intelligent tractor " developed by Fuji Heavy Industries in Japan can automatically adjust parameters such as operation depth and speed according to different operating environments. In addition, there are many other types of intelligent agricultural machinery equipment are widely used, such as intelligent sprinkler irrigation system, intelligent sowing robot and so on.

Development status and development needs of intelligent agriculture and animal husbandry industry

The development of intelligent agriculture and animal husbandry industry is gradually accelerating in China, but it is also faced with some current situation and problems. According to the latest data, the average labor productivity in Chinese agriculture is about a tenth of that in the United States, meaning the output per farm worker is relatively low. Due to the influence of historical and realistic environmental factors, most of the farmers and herdsmen of conservative ideas, scientific and technological innovation of agriculture positive role of understanding, not deep, for some new ideas, new methods, new technology is resistance, not to mention play a subjective initiative to scientific and technological innovation and applied in the practical work. Therefore, the application and popularization of new knowledge and new technology in agriculture and animal husbandry are more difficult, and the production level is relatively backward. In addition, for a long time, the promotion of agricultural and animal husbandry science and technology is mainly aimed at improving the number of agricultural and animal husbandry products. There are more research on conventional technologies, less high and new technologies, more technological achievements introduced, and less technological achievements with independent intellectual property rights. Farming into a new stage of development, the contradiction of the main agricultural yield and quality, the contradiction between agricultural production and farmers' income will become increasingly prominent, the traditional agricultural research and farming unit integration ability is poor, agricultural scientific research project, caused the low level of agricultural research, agriculture science and technology innovation of agricultural growth contribution is not obvious. According to China's Agricultural Informatization Development report, the current level of national agricultural informatization is only 36.7%, far lower than the level of developed countries.

Multi-function pickup truck concept car has an important value in the research and development of intelligent

agriculture and animal husbandry. The design of the concept car aims to solve the diverse needs of agriculture and animal husbandry work, combining traditional agriculture and animal husbandry tools with intelligent technology to provide an efficient and convenient solution. Through the integration of various functional modules and systems, the multi-functional pickup truck can realize various tasks such as farmland operation, animal feeding, material transportation and so on, improve work efficiency and reduce labor costs. Its flexible design and intelligent control system can also adapt to different farming and pastoral environments and needs, and provide personalized solutions for farmers.

PIONEER Multi-function pickup truck concept car design

The design of the multi-function pickup concept car follows a series of design principles and methods to achieve its versatility and efficiency in intelligent agriculture and animal husbandry. Considering the complexity and hardship of the agricultural and animal husbandry working environment, the structure and material selection of the concept car should have enough strength and durability to ensure a reliable operation for a long time. The design of the multi-function pickup truck concept car should be modular and configurable, so that farmers can flexibly combine and customize according to different tasks and needs to meet the requirements of diversified agricultural and animal husbandry work. In addition, security and intelligence are also the factors that can not be ignored in the design. Vehicles should be equipped with advanced safety systems, such as collision warning, automatic driving assistance, to ensure the safety of staff and equipment. The application of intelligent technologies, such as artificial intelligence, sensors and automated control systems, can improve the operation convenience of vehicles and the efficiency of agriculture and animal husbandry work. Finally, through prototyping and practice verification, and through actual testing and user feedback, the design is improved and optimized to ensure the feasibility and practicality of the multi-functional pickup concept car.

The combination of a PIONEER smart pickup truck in the design of a drone and an on-board smart system is a key part. PIONEER The intelligent pickup truck adopts the combination of the uav and the on-board intelligent system, realizes the dynamic linkage monitoring mode, and provides panoramic empirical support for the management and decision-making of the intelligent pasture. The specific principle is the monitoring function of uav. The intelligent pickup truck is equipped with uav. When regional monitoring or rich group monitoring is needed, the uav can automatically take off to carry out patrol tasks. The drone is equipped with corresponding sensors and cameras, which can collect images and data from the pasture area in real time. The second is the on-board intelligent system. The intelligent pickup truck is equipped with the on-board intelligent system, which is responsible for receiving, processing and analyzing the images and data collected by the UAV. The on-board intelligent system can analyze the data in real time through the intelligent algorithm and decision system to extract valuable information and indicators. Then there is the data transmission and interaction. The real-time images and data collected by the UAV are transmitted to the on-board intelligent system through the wireless communication technology. After receiving the data, the on-board intelligent system can display the key information on the interactive interface in the car for the ranch managers to view and analyze in real time.

The design of drones combined with on-board intelligent system makes PIONEER smart pickup a mobile platform with comprehensive monitoring capabilities. It can help the pasture to realize fine management and efficient operation, improve the efficiency of monitoring and decision-making accuracy, and further reflect the concept of intelligent production and technology empowerment in the new era.

In order to improve the adaptability and use efficiency of the PIONEER smart pickup truck, a retractable carriage design is adopted. This design enables the space of the carriage to be deformed and adjusted according to different needs to better meet different use needs. First, the PIONEER smart pickup truck box using a stretched

design, with the function of expansion. This design can add more space to the container as needed, providing greater cargo capacity. At the same time, the container can shrink when unnecessary, saving space and improving the weight distribution of the vehicle. Secondly, the retractable carriage design makes the interior space of the carriage can be flexibly deformed according to the needs. For example, a flexible combination of human ride and cargo loading can be achieved through adjustable partition panels or folding seats.

This design gives the PIONEER smart pickup truck more flexibility in transporting both people and goods. Then, the scalable car can also be designed to support different types of functional applications. For example, by adapting to different equipment or tools, the carriage can be used for various tasks such as environmental monitoring data collection, deployment of driver assistance equipment, installation of emergency transportation equipment and so on. This versatile design makes the PIONEER smart pickup truck an ideal mobile platform for smart ranch operations. Through the multi-functional retractable carriage design, the PIONEER intelligent pickup truck realizes the flexible deformation of the compartment space, improving the adaptability and use efficiency of the vehicle. This design allows the vehicle to be adjusted according to different use requirements to meet the multiple task requirements of smart ranch operations. Therefore, in the design of the PIONEER smart pickup truck, the multi-function retractable carriage structure design plays a key role, enabling the vehicle to better adapt to different use scenarios and needs.

Conclusion

This paper is based on the intelligent agriculture of multi-function pickup truck concept car design practice, further discusses the application of intelligent technology in farming and animal husbandry, multi-function pickup truck concept car design principles and methods, as well as the problems and innovation, including the agriculture work efficiency, resource utilization and saving, environmental protection and sustainability, etc. Despite the present paper research on the design practice of multifunctional pickup truck concept car, there are some challenges and future directions. First, the concept car design and intelligent technology application need to be further optimized to meet the needs of different regions and farming and animal husbandry characteristics. Secondly, it is necessary to strengthen the cooperation with agricultural and animal husbandry practitioners and experts in related fields, and constantly improve and optimize the function and performance of the concept car in combination with the actual needs and feedback. In addition, we need to pay attention to data security and privacy protection to ensure the reliability and sustainability of the application of smart technologies in agriculture and animal husbandry. In the future, more intelligent technologies and innovative designs, such as artificial intelligence and drones, can be explored to provide more solutions and development opportunities for agriculture and animal husbandry. To sum up, multi-function pickup concept car has broad application prospects and important research value in intelligent agriculture and animal husbandry. Through continuous innovation and optimization, it can make a positive contribution to the development and sustainability of agriculture and animal husbandry.

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Innovation and Aesthetics of Hans Wagner's "Chinese Chair"

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Abstract

This article studies Hans Wagner's "Chinese Chair" design, analyzes the characteristics of Ming style furniture and the innovation of "Chinese Chair", and discusses its innovation and improvement, as well as the aesthetics behind multiple "Chinese Chairs" by Hans Wagner. By studying the innovation and success of "Chinese chairs" on the basis of Ming style furniture, we can inspire modern design and promote the continuous progress of Ming style furniture redesign in the changing times.

Author keywords

Hans Wagner, Chinese chairs, Innovation, Aesthetic Thought

Introduction

The development of Ming style furniture has a history of several hundred years and holds a pivotal position throughout the entire history. Chinese Ming style furniture has emerged due to the abundance of wood, the rise of garden architecture, and the improvement of wooden tools. Its characteristics are simple, thick, refined, and elegant, with the beauty of craftsmanship, craftsmanship, materials, and structure, making it unique among traditional Chinese furniture. However, Ming style furniture did not have much development after the Ming and Qing dynasties, and modern Ming style furniture redesign often imitates and simplifies Ming style furniture, failing to preserve its essence while promoting innovation. This article will start with Hans Wagner's "Chinese Chair" design and explore Hans Wagner's design philosophy and innovative perspective, as well as the aesthetic ideas retained behind it, in order to provide design ideas and methods for modern design.

1 Hans Wagner and Chinese Chair

1.1 Hans Wagner Design Features

Hans Wagner began his apprenticeship as a furniture carpenter at the age of 14, and therefore had a great understanding of woodworking and a certain interest in wooden products. At the same time, he was influenced by Scandinavian design and upheld the personification and emotion of products, emphasizing both function and formal aesthetics. He liked to use natural materials and effectively applied the characteristics of combining function and simple form aesthetics in his product design, Therefore, we can see from his design that he not only loves the use of natural materials, but also emphasizes the combination of aesthetics and human-machine design. His works have a profound handicraft tradition as a basis, as well as a rich reserve of wood and a pursuit

of nature attitude.

1.2 Development of Chinese chairs

Why did Hans Wagner design Chinese chairs? Where did his inspiration come from? There were two claims here. Firstly, Hans Wagner saw a portrait painting in which a Danish businessman sat on a Ming style chair, which sparked his curiosity about Ming style furniture; Secondly, during his visit to the Danish Museum, he saw Ming style chairs, which caught his attention and led to his research on Ming style chairs. After in-depth research on exam design, the "Chinese chair" designed in 1945 is a typical representative. Afterwards, he did not stop his steps and continued to launch the "chair" armchair in 1949. In 1950, an American magazine published this chair and it received widespread attention, even praising it as the "most beautiful chair in the world" in the magazine's content. Later in 1960, just as Kennedy was in the US election, both Kennedy and Nixon were sitting on this seat during the debate, making it famous.

2.Innovation of "Chinese chairs" for Ming style furniture

Ming style furniture is divided into three categories: hardwood furniture, lacquered furniture, and inlaid furniture. The types are mainly divided into chair and stool, children's table, cabinet, stand, screen seat, and bed. This chapter mainly analyzes chairs. Ming style furniture pays attention to the texture of wood and often uses hard tree species, hence it is also known as hardwood furniture. At the same time, its furniture fully retains the color and texture of the wood during production, without adding paint. In terms of production modeling, wooden frame structure is used, with a precise and exquisite structure that pays great attention to scientificity. Its structure is solid and firm, and the "edge gathering" technique is used for production. As mentioned earlier, the development of Ming style furniture was due to the abundance of wood, the rise of garden architecture, and the improvement of wooden tools. Therefore, when making Ming style furniture, it is often necessary to maintain a harmonious and consistent style with the garden style. The design of Ming style furniture is more in line with traditional etiquette and lacks ergonomic considerations, resulting in a lack of comfort during use. At the same time, due to the need to maintain consistent style characteristics with the entire garden decoration in the production of Ming style furniture, it is also constrained and limited by the environment. Hans Wagner conducted in-depth thinking based on the above issues, while inheriting the characteristics of Ming style furniture and incorporating more modern and design elements.

2.1Simplification of design

The overall design of furniture in the Ming Dynasty was simple and elegant, characterized by simplicity, thickness, refinement, and elegance. It is evident that in terms of production, the design requires both elegance and simplicity. But ancient China preferred to use handicrafts that had both functional and rich connotations and charm when making items. Therefore, although the shape of Ming style furniture is generally simple, its form is still very cumbersome and not modern enough. Ming style furniture is more primitive and has a charm, and is not suitable for the modern design of home decoration environment. Therefore, it is necessary to simplify the design of Ming style furniture. Hans Wagner's "Chinese Chair" FH4283 is inspired by the Ming Dynasty circular chair in China. His "Chinese Chair" is a simplified design based on the Ming Dynasty circular chair. He retains the backrest, circular armrests, and three support pillars of the Ming Dynasty circular chair, retaining the most essential features of the Ming Dynasty circular chair. At the same time, he abandons the cumbersome decorative patterns of the Ming Dynasty circular chair and uses support pillars and circular armrests of varying thickness as a transition, It also abandons decorations such as drumsticks and fangs, making its overall design more simple and modern. Wagner's chair innovates through inheritance, extracting the exquisite, elegant, thick, and introverted beauty of Ming style furniture, abandoning the irrelevant styling elements of Ming style furniture. It can be seen

that simplifying design is the main method for modernization of Ming style furniture, and is a process of design improvement and perfection.



Figure1 Comparison between Wagner's "Chinese Chair" FH4283 and Ming style circular chair armrests

2.2 Extension of Materials

Ming style furniture places great emphasis on the selection of materials for production, often using precious wood for production, such as rosewood, rosewood, rosewood, walnut, and other hardwoods. Therefore, Ming style furniture is also known as hardwood furniture. These woods are made without the use of paint, which to a large extent preserves the true beauty of the original grain samples of the wood. However, there are many problems with these woods in modern design and processing. Firstly, the wood used in Ming style furniture is very expensive, with a long growth cycle and low yield, making subsequent processing difficult. It is impossible to achieve mass production in factories and to cater to the general public as consumers. And Hans Wagner precisely considered this in his design, using cheaper and more affordable cork and artificial boards for production. Artificial panels have the characteristics of more convenient processing, high utilization rate, and less deformation, so they can be well replaced and solved for the material problems existing in the Ming style furniture mentioned above. And this decision meets the principles of easy processing and mass production in modern production, reducing production difficulty and cost, which is also an important point for its design to be successful. The Wishbone chair is a representative work of the "Y" chair, and its biggest feature is the combination of traditional manufacturing techniques and simple design. The use of manual weaving on the cushion increases comfort during use, and also gives it a more modern and design feel, reducing the use of wood to make the entire chair look more minimalist. Therefore, while adhering to the modern design principle of "less is more", more practical, minimalist, and comfortable considerations have been added, making the entire design more humane and representing the concept of Scandinavian national design.

2.3 Structural Innovation

The structure of Ming style furniture comes from the beam frame structure of architecture, which is very rigorous. Glue and nails are not suitable for bonding between various components. Instead, a mortise and tenon structure is used, and different forms of mortise and tenon are used for different parts. Each part is combined without the use of a nail and glue, making it very sturdy and durable after integration and assembly. As Mr. Philip de Baker said, At first glance, Ming style furniture may not seem complicated, but its simple lines and pure proportion hide a very complex mortise and tenon structure. Although Ming style furniture also belongs to modular design, due to a series of issues such as the value of wood, the emphasis on intricate patterns, and the complexity of mortise and tenon, mass production cannot be achieved. The solution is to use a universal, standardized, and systematic approach to interface methods, interface dimensions, and interface shapes Unified design, modular design of structural interfaces for general modules. The modular mortise and tenon structure of the "Chinese Chair" is

more concise. Hans Wagner simplified the mortise and tenon structure and adopted a universal and standardized design for the size and shape of the interface. The advantages are similar to the current standardization of mobile phone interfaces. Previously, various mobile phone interfaces were different, but later, mobile phone interfaces and charging cables were standardized and unified, making it more convenient to use. The standardization of the mortise and tenon interface of the "Chinese chair" makes it easier to disassemble and assemble the chair. Simplified complex mortise and tenon splicing. This has to some extent promoted the mass production of this design and is closer to defining consumers as the general public.



Figure 2 Mortise and tenon structure

2.4 Innovation in Ergonomics

Hans Wagner once said, "The human body will never rest or settle down. A good chair should allow people to freely adjust their posture on it and maintain long-term blood flow." From his words, we can feel that one of the principles of Scandinavian national design is "human touch design," which not only takes into account the cushion, including the armrest, foot rest, and seat parts, Hans has fully considered. When we use seats, we usually consider the aesthetics of the seats, their compatibility with the room or environment, and then the issue of comfort. Especially with the increasing number of "sedentary parties" in modern times, people are paying more attention to the health issues of the cervical spine and lumbar spine, so ergonomic considerations for seats are essential. Hans Wagner also realized this in his design, so he designed the seat circumference very smoothly, elegantly and kindly. Observing the habits and postures of modern people when using seats has simplified and innovated the armrest, back, and other parts, making them more in line with ergonomics.

3 The Aesthetic Thought of "Chinese Chair"

The inspiration for 'Chinese Chair' comes from a Chinese Ming style furniture chair from the Danish Museum of Crafts. The design concept of this work is to use as few materials as possible to make curved wooden armrests, so new materials were used in the design to replace some of the production. From an aesthetic perspective, the material used in this work is wood, retaining the visual appeal of the original Ming style furniture materials. Gives people a sense of familiarity and warmth, giving them a sense of closeness when they see this seat. It is easy to bring the work closer to people. The beauty of natural wood materials fully utilizes the color and texture of the wood itself; In terms of structure, cold-formed high-pressure wet wooden poles are used, and due to the use of mortise and tenon technology, no production marks can be seen on the external shape, making the overall shape cleaner and simpler. Hans Wagner's chair design reflects his consideration of "people" in design, retaining

the humanistic style as much as possible and adhering to the design concept of "people-oriented". The backrest design in its chair design is no longer designed to consider the human body's user experience for aesthetics. When designing, the human body curve is observed and ergonomic principles are added, which is more in line with the user's psychological and physical needs, making the user feel more comfortable and truly meeting the user's needs.From the aesthetic perspective of form and function, Hans Wagner borrowed from traditional Chinese chair design, while retaining traditional elements and charm, to make his works conform to modern aesthetic and value orientation, achieving the transformation of classical furniture from tradition to modernity, and meeting human physiological needs.



Figure 3 Chinese Chair

4 Summary

Hans Wagner's design not only focuses on surface design and simplified thinking about appearance, but also comprehensively examines how a design can be more suitable for modern design while retaining its most original characteristics. He considers how to be more simple and generous in terms of appearance, and how to preserve the most authentic characteristics of Chinese Ming style furniture while making it more modern without being affected by space and environment; He also considered the issue of material processing, saving costs to some extent and even trying some new materials, which are durable and can replace expensive wood, reducing production costs; He pondered the biggest problem in mass modern production, how to preserve the mortise and tenon joints while simplifying their splicing and dismantling processes? Unify its interfaces, which are all optimizations he performs while preserving the essence; In the era of the rise of ergonomics, he also designed the seats with the greatest consideration, making them more suitable for human usage patterns. His design not only represents his personal identity, but also represents the design philosophy of Scandinavian countries. In the era of "less is more" modern design, it meets the requirements of serving and designing for people by incorporating humanized design.

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On narrative mechanism and construction of ideal space in Dunhuang mural painting Wutai mountain

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Abstract

Dunhuang Cave 61, Wutai Mountain, shows the brilliant Dunhuang culture in the FiveDynasties period. As a map of Buddhist historical sites, it also has the nature of a map ofpublic opinion, This paper mainly starts from the narrative and spatial perspectives of thepicture, tries to trace the performance mechanism of the narrative of the Wutai MountainMap and the creation of the ideal space in the picture, and analyzes the images and the actual distribution of the Wutai Mountain Map in-depth, so as to provide a brand-new perspective for the study of the visual art performance of the Wutai Mountain Map, and also to provide a new way of thinking for the study of the public opinion maps of the nature of religion.

Keywords

Wutai Mountain；Spatial order；Manjusri belief；Map of Mount Wutai in Cave 61

I. Wutai Mountain and the Map of Wutai Mountain

Wutai Mountain, now located in Xinzhou City, Shanxi Province, has been a famous Buddhist mountain and an important cultural center of Buddhism in China since ancient times. Wutai Mountain is very similar to the Qingliang Mountain in Buddhism due to its refreshing climate, beautiful scenery and verdant forests in the valleys. In the Avatamsaka Sutra, it is written that in the northeast, there is a Bodhisattva's dwelling place called Qingliang Mountain, where all the Bodhisattvas of the past used to live. There is a Bodhisattva named Manjushri, who has 10,000 Bodhisattvas in his family, and he is always giving speeches. It is clear that Mount Qingliang is the place where Manjushri Bodhisattva dwells and preaches sutras to all sentient beings. In the Yuanhe County Records, Volume 14, it is mentioned: Wutai Mountain, 40 miles northeast of (Wutai) County,"Taoist scriptures" as "Zifu Mountain", "Inner scriptures" as "Qingliang Mountain". Therefore, when Buddhism spread in China, the world thought that the Qingliang Mountain in the Buddhist world referred to Wutai Mountain. Wutai Mountain in and Manjushri after the bond, to and from the increasing number of believers, but often limited to the surrounding areas of Wutai Mountain, other areas of believers are difficult to go to the Wutai Mountain pilgrimage, this demand has driven the "Wutai Mountain map" of the drawing. Cave 61 at Dunhuang is a cave from the Five Dynasties period, with a dipper-roofed cave, a Buddhist altar in the center, and a back screen to the top of the cave behind the altar. The most striking feature of Cave 61 is the Wutai Mountain Picture on the west wall (Fig. 1-1).



Figure 1-1 [Five Dynasties] Wutai Mountain Picture 13.45m long 3.42m high

II. Narrative and Spatial Logic: Visual Representation in Wutai MountainMap

The Wutai Mountain Picture is narrated in three parts: (1) the upper part shows theBuddhist world. (2) In the center are various monastic courtyards, accompanied by Buddhist spiritual phenomena and Buddhist allusions. (3) The lower part shows the world of the earth.

When looking at the Wutai Mountain Picture, one can observe that the composition of theWutai Mountain Picture is symmetrically distributed in the center, with the "Top of the Central Platform," "Hall of the True Body of the Great Sage Manjushri," and "Ten Thousand Bodhisattva Buildings" as the central axis. "for the central axis, and the three are the same vertical line, both sides of the uniform symmetrical distribution (see Figure 2-1).

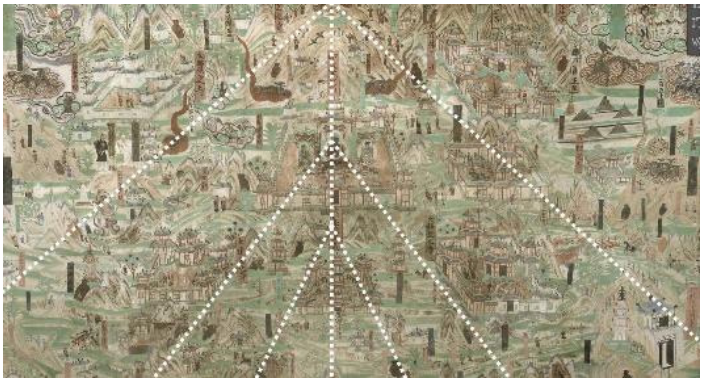


Figure 2-1 Composition of Wutai Mountain Picture

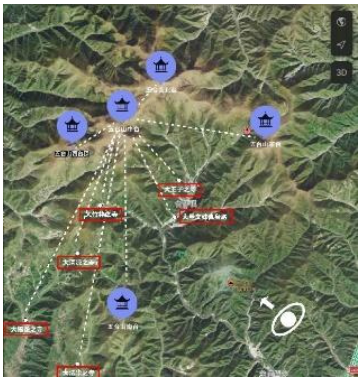
Ancient Chinese paintings often show multi-perspective compositions. When we connect the perspective lines in the picture and find the visual vanishing point, we will be surprised to find that there is more than one vanishing point in the picture, and it will move with the change of the central axis, which is a kind of "fishbone composition" - a symmetrical composition with the central axis as the center. The diagonal lines formed by the buildings and other scenery on both sides are connected to the central axis, forming a variety of visual vanishing points. the "Wutai Mountain Picture" conveys a strong sense of religious visualization to the audience.

Although the Wutai Mountain Map, as a map of Buddhist historical sites, has the characteristics of a public opinion map, there is a great deviation from the actual geographic location of the Wutai Mountain. (see Fig. 2-2 and Fig. 2-3). Through the satellite 3D map, it can be seen that the actual spatial distribution of Wutai Mountain is not as balanced and symmetrical as in the Wutai Mountain Map, but is staggered among the mountains. In the "ancient Qingliang biography" on the Wutai Mountain location of the description: "climbed above the center of the platform, looking around, only Heng Yue in the second." The Heng Yue here refers to Mount Heng. "East Platform, thirty-eight miles high, the top of the ground is flat, the circumference back to three miles, go to the center of the platform Taihua Spring, forty-two miles." "West Terrace, thirty-five miles high ..... east to Taihua Spring, four miles." "South Platform, thirty-seven miles high ..... north to Taihua Spring eighty miles." "North Platform, thirty-

eight miles high, the top of the ground level three miles, south to Taihua Spring twelve miles."



Figure 2-2 Location Distribution of the Wutai Mountain Map



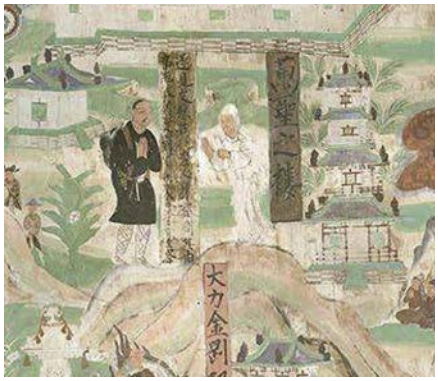


Figure 2-3 Distribution of the actual location of Wutai Mountain under satellite image

Figure 2-4 Buddha Poli Meets the Elder Manjushr

There are sufficient records in the literature about the exact geographic location, and the craftsmen who drew the Wutai Mountain Map would not be unaware of the actual location of the peaks of the Wutai Mountain, and the reason for the drawers to distribute the picture in this way is in fact based on the influence of religious concepts. This way of composition can put the religious elements in the visual center, so that the picture has the sacredness and majesty.

The performance of landscape in Wutai Mountain Picture is inherited from the landscape painting in Tang Dynasty, the landscape painting is often used as the background to serve the buildings and figures, characterized by "big people over the mountains, buildings and figures, etc.", and such visual performance is also fully embodied in the "Wutai Mountain Picture". As a map of Buddhist historical sites, the Wutai Mountain is interspersed with a large number of Buddhist allusions throughout the map (e.g., Figures 2-4), this fragment is an allusion to the encounter of Buddha Poli with the old man Manjushri, and in contrast to the relationship between the two of them and the surrounding buildings, the figures appear particularly tall, so that "the man is bigger than the mountain", and such a way of narrating the picture and the visual performance highlights the important figures in the Buddhist allusions, as well as the stories of the figures. This narrative and visual representation of the picture emphasizes the important characters in the Buddhist canon and strengthens the faith of the believers. It is worth noting that in the Wutai Mountain Map, there is also a scene of the second encounter with the old man Manjushri, and this kind of picture narrative is also common in the Buddhist type of public opinion maps, which shows the story of the sutra for the viewers through the drawings, and this kind of "comic strip" type of composition brings the believers and the Buddhism closer to each other.

III. Conclusion

Through the analysis of the spatial images of the Wutai Mountain Picture, we can draw thefollowing conclusions: (1) The Wutai Mountain Picture was influenced by the subjective concept of the artist in the process of painting, which made the Wutai Mountain Picture have an imaginative color in the expression of actual space, and create an ideal space to serve a specific ideology. (2) Based on the influence of the religious concepts of the time, the Wutai Mountain Picture incorporates the Buddhist historical records into the picture in a narrative way through visual changes, clever composition, and interspersing of supernatural appearances, so that the Wutai Mountain Picture has the characteristics of a public opinion map and at the same time carries a strong religious color.

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Research on Narrative Design Strategy of Agricultural Product Packaging Based on Cultural Genes

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Abstract

Purpose Based on the cultural gene level, through narrative design, to study the systematic strategy of agricultural product packaging design. **Method** First, analyze and summarize the narrative design applications of the cultural gene perspective. Then, combine the case of Yueyahu Township to construct a cultural gene map, which helps determine narrative themes and build narrative scenes. Finally, provide a detailed analysis of narrative expression approaches. **Finding** Based on the cultural gene level, narrative design of agricultural product packaging is characterized by clear narrative themes and a structured framework. Cultural genes contribute to branding in agricultural product packaging. Visual genetic elements play a driving role in narrative expression. **Conclusion** By constructing a cultural gene map, it is beneficial for the extraction of narrative design themes, it also enriches the cultural value and regional characteristics of agricultural product packaging design, which is conducive to brand building.providing new design ideas for agricultural product packaging.

Keywords

Narrative design, Agricultural Product Packaging, Cultural Gene, Yueyahu Township

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Introduction

Rural revitalization revolves around agriculture, rural areas, and farmers, encompassing both economic and cultural revitalization. Agricultural product packaging design, as one of the activities in agricultural marketing (Peng and Chang, 2016, p.1) (Yang and Meng, 2022, p.93), has become a hot topic in rural revitalization. Personalized and high-level packaging design plays a positive role in enhancing the regional image, visibility, and reputation of agricultural products. China government advocates supporting rural areas in leveraging their natural and cultural advantages, developing characteristic brands, and using branding as a core competitive

advantage to promote rural economic development and the redistribution of social resources. The successful construction of rural agricultural product brands in the past has mostly relied on regional culture as an important driving force, indicating that cultural resources have greater sustainability. By deeply exploring the cultural genes of rural areas and approaching agricultural packaging design from an innovative narrative design perspective, cultural genes can be transformed through storytelling, creating visually appealing images. This provides new problem-solving approaches for agricultural product packaging design and offers deeper research opportunities for rural design and rural culture.

Related Works

Agricultural product packaging design

In the context of rural revitalization, agricultural product packaging is not just a visual symbol but also serves as an intuitive expression of the external image and an extension of the intrinsic quality of agricultural products (Dong, 2023, p. 1). Product packaging can bring additional value to the products themselves, shape a unique brand image, promote rural products in various aspects of society, and stimulate consumer interest and purchasing behavior (Xu, 2022, p. 1). Discussions surrounding agricultural product packaging design mainly focus on topics such as structure, materials, visuals, and sustainability. This study specifically concentrates on visual expression. Huang, in his research, argues that through agricultural product packaging design, brand cultural connotations and contextual values can be conveyed to consumers, establishing an emotional bond between the brand and consumers (Huang, 2020, p. 2). This provides a theoretical framework for the current study, which explores agricultural product packaging design based on rural cultural genes.

Narrative Design

Narrative design, which refers to telling a story through design, has been widely accepted in the academic community (Fisher W R, 1985). As a design strategy and approach, narrative design shifts the focus of design from individual objects to the entire event that constitutes the design, thereby adding spiritual value (Chen et al., 2023, p. 1). Furthermore, narrative design can help establish a deeper interactive relationship and foster trust between users and products (He and Ge, 2017) (He et al., 2023, p. 5).In the literature surveyed in this study, most researchers emphasize the uniqueness of narrative themes when applying narrative design to agricultural product and brand design, and they employ uniqueness as a design principle in their case studies. For example, Zhang utilized the "positive deviation" approach in his research to discover unique narrative themes related to high selenium content in the soil of Da'an region, Jilin Province (Zhang, 2021, p. 4). Peng employed semiotics as a research method, combining local legends, events, and lifestyles with local natural materials (Peng and Chang, 2020). However, such practices are often case-specific, and the selection process of narrative themes can be subjectively influenced by the designers if the rationale behind the choice is not thoroughly analyzed. Ou Yang, in their study, introduced the KANO model analysis to assess the correlation between key narrative design elements in rural brand storytelling and user satisfaction, thus extracting specific design points for narrative design in rural brand contexts and emphasizing the uniqueness of narrative themes (Ou and Yang, 2023, p. 5). This provides a quantifiable approach to selecting narrative themes. This study argues that the key challenge of narrative design lies in determining narrative themes. In agricultural product packaging design, determining narrative themes based on cultural archetypes allows the development of narrative structures and techniques that can align with different aspects of cultural genes. This approach to narrative ambiance and techniques demonstrates certain regularity and reference value.

Cultural Genes

Richard Dawkins, in his book "The Selfish Gene," elaborates on genes as the basic units with species as their

hosts. He suggests that similar behaviors to genetic inheritance in biology also exist in the transmission of culture, and "memes" refer to the genetic behaviors of cultural genes (Fan, 2021, p. 18). Rural culture is fundamentally a combination of moral emotions, social customs, norms, basic behavioral patterns, and ideal pursuits (Berry, Leonard L., 2000). In the field of design, experts believe that genes can be visualized and manifested in external visual and experiential processes through the translation of codes. Yang, in his research, analyzes the factors of rural cultural genes to explain the methods and derivation processes of acquiring rural cultural genes. He proposes the existence of latent spiritual factors that require the expression of explicit language and narrative techniques for their translation (Yang and Meng, 2022, p. 97). Research focused on cultural genes in narrative design is still relatively uncommon, and no fixed paradigm has been established yet.

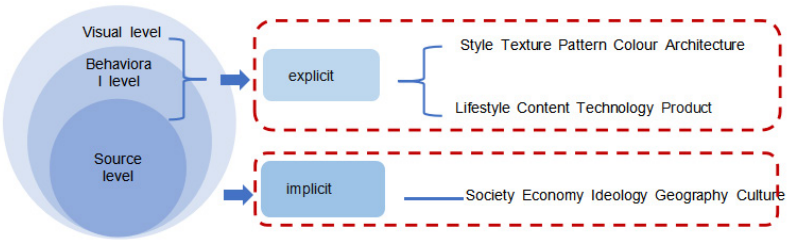

Figure 1. Rural cultural gene layers

Research Method

Firstly, this article analyzes and interprets cultural genes based on the theory of cultural levels, dividing them into three levels（Figure1.）. The visual level represents the surface level, which encompasses the content that humans can directly perceive and touch through observation. This includes rural living scenes, objects used, architectural places, and famous historical sites. The behavioral level represents the intermediate level, which includes the technological means used in production processes and the habits, customs, and etiquette formed in daily interactions. It encompasses the content of rural life, with specific characteristics unique to rural areas. The origin level represents the innermost level, which includes the ideology and values hidden in human consciousness and the system of thinking. It is the source of rural cultural life. It is formed by the long-term accumulation of historical culture, regional culture, and folk customs, and it subtly influences the visual and behavioral levels.

Furthermore, in establishing a narrative design pathway, the physical entity of agricultural product packaging is rural crops or economic products, but the visual presentation of the packaging is closely connected to the cultural connotations of the rural area. The narrative theme is influenced by the natural environment, historical context, social environment, and cultural activities, and it is only by considering the regional characteristics of the environment that we can avoid the homogenization and superficiality of narrative expression. Therefore, from the perspective of cultural genes, the first step in establishing a narrative design pathway is to trace the roots of local culture and then extract narrative themes with regional characteristics to construct the core structure of the narrative. Subsequently the visual elements' genes are translated into narratives and expressed aesthetically（Figure2.）This study takes the perspective of researching the agricultural product packaging in Yueyahu Township, Xingqing District, Yinchuan City, Ningxia Hui Autonomous Region, and conducts field investigations in Yueyahu Township. Located at the junction of the Mu Us Desert and the Yellow River, Yueyahu Township derives its name from a lake shaped like a crescent moon, making it a typical rural area along the Yellow River. The researchers have conducted preliminary categorization of the cultural gene types in Yueyahu Township(Table1).

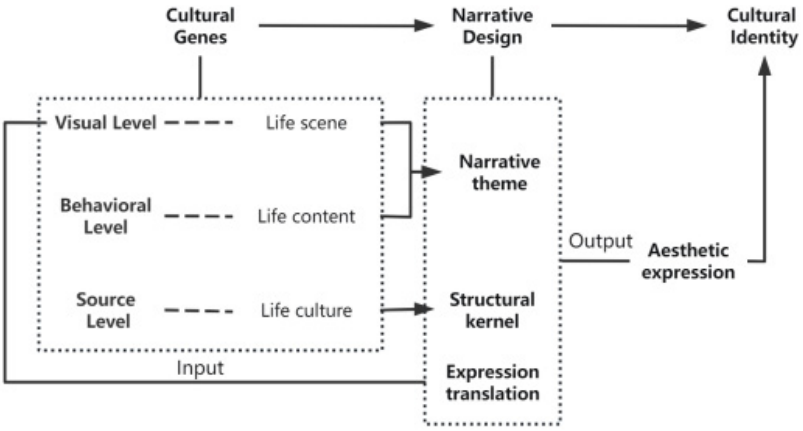

Figure 2. Narrative design path

explicit	Material Culture	architecture ecology heritage	visual elements
		Rural products rural industries	behavioral elements
implicit	Intangible Cultural	History culture Folk customs Regional culture	Tracing the cultural connotation

Table 1. Yueyahu Township Cultural Gene Classification

The research findings reveal that Yueyahu possesses beautiful historical legends, abundant rural industries and natural resources, as well as precious intangible cultural heritage. In recent years, it has developed a unique economic construction. According to legend, in 33 BC, Princess Zhaojun left the frontier and shed tears of homesickness at the Yellow River crossing, which fell on the sandy riverbank and formed a crescent moon shape. This is how the name "Yueyahu Township" originated. The scenic spots and historical sites of Yueyahu include the Huangsha Ancient Ferry, Yellow River Wetland, Binggou Han Tomb Groups, and the Populus euphratica forest conservation area, which bring together the elements of the Yellow River, the desert, wetlands, Populus euphratica trees, and pastoral landscapes. Additionally, Yueyahu Township possesses the resilient spirit of immigrant settlers. Through their diligent efforts, the ecological environment has greatly improved, and industries have gradually flourished. The sandy soil in Yueyahu is very suitable for growing honeydew melons, developing specialty fruit and vegetable cultivation, beef cattle farming, clean energy, and other industries. In recent years, the development of the intangible cultural heritage of Ma weaving has also become a regional cultural feature of Yueyahu. Based on the aforementioned cultural gene elements, the researchers have constructed a cultural gene map of Yueyahu Township(Figure3.), which highlights the cultural genes of "homesickness," "Yellow River," and "melons," forming the distinctive cultural characteristics of tourism and leisure in this rural area.

The narrative design path adopted by the researchers mainly includes determining the narrative theme, analyzing the narrative structure, and expressing the narrative mood(Figure4.). The determination of the narrative theme can be selected and extracted through the cultural gene map. As one of the pillar industries in Yueyahu, the network-patterned melon occupies the ecological gene elements relying on the Yellow River and the desert greenhouse. The melon's harvest season falls in late summer and early autumn, which is close to the traditional Mid-Autumn Festival. Combined with the origin of Yueyahu's name, it possesses historical gene characteristics.

Therefore, a clear thematic and structurally coherent narrative path can be formed, providing unique cultural connotations and regional characteristics at the cultural gene level.

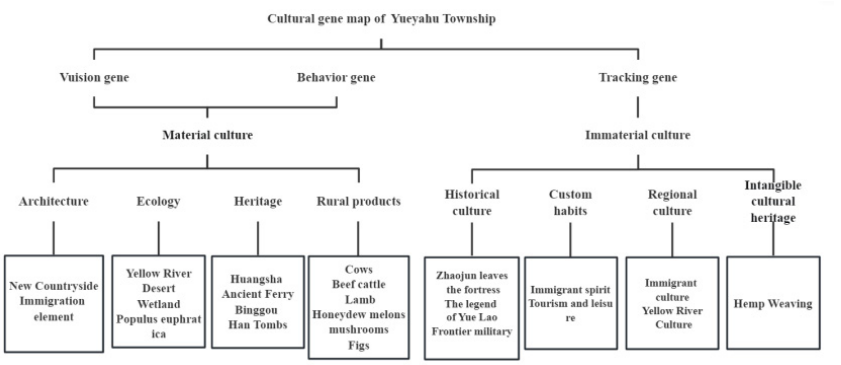

Figure 3. Cultural gene map of Yueyahu Township

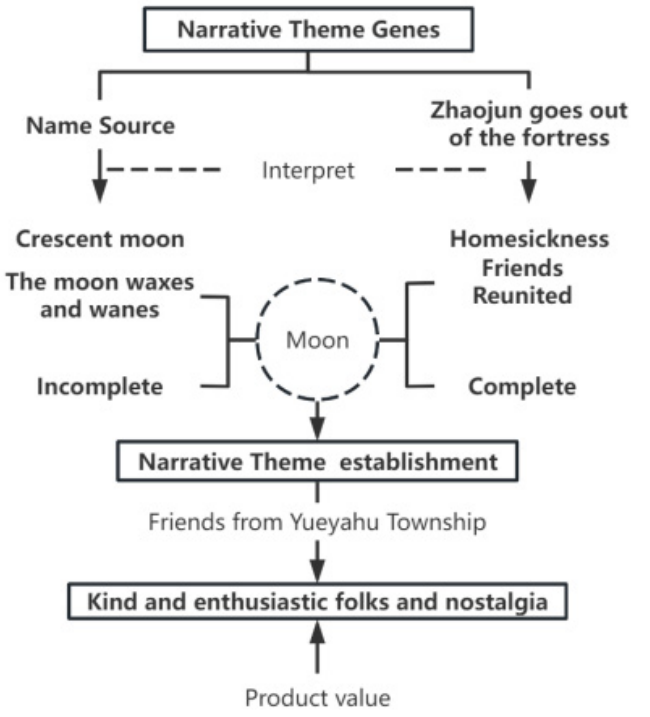

Figure 4. Yueyahu Narrative Theme

The technique of narrative expression, combined with digital illustration design, is used to create an emotional atmosphere for the network-patterned melon of Yueyahu. In addition to melons, other fruits such as figs and raspberries can also be packaged and filled in the form of a series of illustrations, enriching the theme of gifts from friends of Yueyahu. Each image contains thematic characters, events, scenes, and emotional expressions, which can generate a strong sense of atmosphere and resonate with consumers emotionally. At the same time, itenhances the practicality and applicability of the packaging. The translation of visual imagery directly refines rural products and showcases the mapping of life through beautiful legends and visionary living scenes. It conveys a sense of nostalgia aesthetics that embodies natural harmony, reunion, and joy（Figure5）



Figure 5. Yueyahu Narrative Theme Design

Finding and Discussion

-The narrative design of agricultural product packaging based on the cultural gene level is characterized by clear thematic expression and a coherent structure.

Based on the cultural gene map of Yueyahu, researchers systematically and logically analyze the complex rural situation. At the material level, the network-patterned melon, as a thematic expression, is extracted to highlight not only the characteristics of rural industries but also the characteristics of regional ecological environment and culture. Through the sorting of relevant genes and the assistance of thematic expression, particularly the implicit intangible genes, the legend behind the name of Yueyahu, as a gene representing the connotation value of regional culture, serves as a source-tracing level gene. The structure of the narrative is clearer, and it can complement each other in terms of scene shaping, color expression, and visual atmosphere. This method of narrative design enables more accurate extraction of themes, a more comprehensive structure, and a more appropriate creation of artistic conception（Figure6.）



Figure 6. Yueyahu Agricultural Products Packaging Design

-Cultural genes contribute to the branding of agricultural product packaging.

Researchers have summarized the types and cultural gene map of Yueyahu, and it can be observed that visual and behavioral genes in the gene map are influenced by the cultural connotation at the source-tracing level, and there are certain connections between genes. When designing agricultural product packaging, researchers

tend to first select genes with dominant roles and representativeness, which can form unique identification. Then, at the narrative level, the genetic elements are linked together, allowing melons, figs, raspberries, and other characteristic products to be combined with narrative scenes, thus forming a series of scenes. Therefore, it can be said that the application of cultural gene maps not only highlights narrative themes but also enables the formation of a series of designs, contributing to the branding of agricultural product packaging.

-The driving role of visual genetic elements in narrative expression.

Based on the concept of cultural levels, researchers divide rural genes into three levels: visual level, behavioral level, and source-tracing level. Cultural genes at the visual level can directly undergo visual transformation. For example, ecological resources, desert elements, Yellow River elements, and crescent shapes can all be transformed into visual elements and color tones during the expression of narrative artistic conception. Through visual communication design methods, they are visually presented to resonate with the narrative theme.

Conclusion

This study explores agricultural product packaging design based on the cultural gene level using narrative design methods. By combining it with the actual case of Yueyahu Township, a rich regional culture is constructed to form a cultural gene map, which facilitates the extraction of narrative design themes. In the context of rural revitalization, agricultural product packaging design not only needs to improve quality and creativity but also create regional brands. By refining narrative themes through cultural genes, the cultural value and regional characteristics of agricultural product packaging design are enriched, which contributes to brand building and provides new ideas for the application of narrative design in packaging design.

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Narratives of Ritual in Ancient Lacquerware
Exploring the Ancient Chu Lacquerware Design and its Implicit Ritualistic Significance

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Abstract

The earliest history of human natural lacquer use can be traced back 8000 years, with the largest collection of lacquerware in history unearthed in the Yangtze River basin 2000 years ago, during an era characterised by the prominence of "ritual vessels." Emphasizing "ritual vessels" underscores the central role of art within the ceremonial system. Archaeological artefacts dating from 770 BC to 220 AD reveal that, in ancient China, from the Spring and Autumn period to the Han dynasty, bronze, jade, and lacquerware were the primary materials used for ceremonial objects. However, research on ancient ritual vessels has predominantly centred on bronze and jade sacrificial vessels, with limited scholarly literature on "ritual lacquerware." The lacquerware discovered in the Yangtze River region, particularly in the middle reaches, stands out for its remarkable variety and exquisite craftsmanship, unrivalled by other regions and eras， due to its abundant raw lacquer production and highly developed ritual civilization. Most of these lacquerware items were found in the ancient state of Chu (楚) which in the middle Yangtze where has the most suitable climate and soil for the growth of lacquer trees, making it the main production area of raw lacquer materials in the world. Through research, the majority the Chu-style lacquerware has been verified that consisted of ritual vessels and also served practical purposes in daily life, making them integral to various ceremonies and religious rituals, such as" 士 冠 礼 " (coming-of-age ceremony for young men), " 士昏礼 " (wedding ceremony), " 士相见礼 " (rituals for meeting scholars), " 乡饮酒礼 " (local drinking rituals).

Both aesthetically and technically, these lacquerware items serve as reflections of the social civilization, usage systems, and craft production techniques of their time. Furthermore, these lacquerware manufacturing techniques have been continuously employed in Asia to this day, serving as the origin of the global circulation of lacquerware art. They hold significant sociological and art historical importance. These encompass various internal structures constructed from different materials like wood, bamboo, and , discovered within various types of Chu lacquer ritual vessels such as Dou-dishes (豆), Dun-containers (敦), Jue-cup (爵),Bian-containers (笾), Zun-vessels (樽), Ding-tripods (鼎), , se-zithers (瑟), and more. the research selects representative lacquerware items from the dataset and compares them with relevant texts from ritual studies classics such as the "Yili" and "Liji" to meticulously reconstruct their specific functions. This process aims to unearth the Eastern aesthetics encapsulated in these lacquer ritual utensils from over two thousand years ago. Lastly, it delves into the challenge of perpetuating these ancient technologies with such a natural material in today's artistic creations.

Keywords
Ancient Lacquerware, Ritual Vessels, usage systems, Yangtze River Civilization

From the perspective of the sociology of art, the initial function of Chinese art sprouted from ritual vessels, which gradually gained independence from today's landscape through the passage of time and the refinement of the social division of labor. Therefore, the origin of ritual vessels can be regarded as the inception of Chinese art, as they were the earliest entities to condense abstract meanings and implicitly incorporate concepts and principles into their forms, colors, material mediums, schemas, and inscriptions. The longstanding reverence for ritual in China throughout the ages has profoundly permeated the values of the entire nation and its lineages. "Ritual objects" as a form of art emphasize the central role that art can play within this system of rituals.

Examining archaeological remains dating from 770 B.C. to 220 A.D., it is evident that the artifacts used in ceremonial activities in China, spanning from the Spring and Autumn period to the Han dynasty, primarily consisted of bronze, jade, and lacquer wares. The lacquer wares unearthed in the Yangtze River valley, particularly in the middle reaches of the Yangtze River, are particularly remarkable, featuring a wide variety of items and intricate shapes that are unparalleled in other regions and eras. Most of these lacquer wares were excavated in the state of Chu at that time and are hence referred to as Chu lacquer wares. It can be verified and compared that the majority of these lacquer wares served ceremonial purposes while also functioning as daily-use items. Therefore, both in terms of aesthetics and craftsmanship, they all reflect the social civilization, usage system, and production methods of that era. Undoubtedly, they are considered the precursors of contemporary lacquer art, bearing significant sociological and art historical significance.

Lacquerware in China throughout the ages has been a rare luxury, reserved for the powerful elite, reflecting the intricacies of the ancient ritual system. In China's rich 5,000-year ceremonial culture, the scholar class and those above them engaged in a multitude of daily practices, including the Shi crown ceremony, Shi fainting rituals, Shi meet rituals, country drinking rituals, township shooting rituals, big shooting rituals, court hiring rituals, and more. These various rituals form the daily narrative of the Shi class, and artifacts serve as a tangible manifestation of these "rituals," serving as the wellspring of Chinese aesthetics. The "ritual vessel" stands as the wellspring of aesthetic objects in Chinese culture. When we compare textual records from ritual texts like the Rites of Passage and the Zhouli Shuzhu with archaeological specimens of Chu lacquerware from the Yangtze River basin, we discover that the ritual objects described therein closely correspond to a significant number of surviving Chu lacquerware pieces. The form and spatial symbols of these objects convey the core aesthetic principles of Chinese civilization. This perspective enables us to interpret the aesthetics and material craftsmanship of lacquerware through the lens of "ritual." Furthermore, lacquer craftsmanship, as an integral part of China's intangible cultural heritage, experienced flourishing during the pre-Qin and Han dynasties. It later spread extensively to East Asia during the Sui and Tang dynasties, reached its zenith in aesthetic terms during the Song and Yuan dynasties, expanded westward to the Eurasian continent during the Ming and Qing dynasties, and subsequently waned after the end of the Republic of China, almost disappearing with the onset of the industrial age. However, today, the art of lacquer is once again capturing the attention of scholars and artists. While there has been substantial research on bronze and jade ritual vessels, in-depth studies on "lacquer ritual vessels" have been relatively scarce. This thesis aims to explore the aesthetic origins of lacquer art through an in-depth investigation of "lacquer ritual vessels."

The abundance of lacquerware production in the middle reaches of the Yangtze River is closely tied to the region's role as a source of raw lacquer material. Asia stands as the sole origin of natural lacquer, with China being the largest producer in the continent. The distribution of lacquer economic forests in the Yangtze River Basin is

particularly dense, especially in Hubei, known for the highest-quality natural lacquer, unparalleled purity, and optimal drying properties. Hubei, as the ancient homeland of Chu lacquerware manufacturing, played a pivotal role in its prosperity.

Lacquerware crafted in Chu is often referred to as Chu-style lacquerware. The technology behind Chu-style lacquerware had reached an advanced level during the Spring and Autumn and Warring States period. The superior craftsmanship and aesthetic preferences of this era harmonized seamlessly with the aesthetic demands of rituals, evoking a sense of grandeur and solemnity. Consequently, many surviving Chu lacquerware pieces are ceremonial in nature, with their forms often comparable to those of bronze ceremonial ware. Another category of lacquerware from that time includes ancient lacquer musical instruments, also products of the ritual civilization of that era. Among these, the most notable example is the "se-zeither," unearthed in Zenghouyi's tomb in Suizhou, Hubei province.

Drawing upon archaeological artifacts and records, we conducted an iconographic analysis of representative Chu lacquer ritual objects unearthed in the Yangtze River Basin. These analyses allowed us to make aesthetic arguments. Firstly, we outlined the aesthetic characteristics of these objects in terms of their forms, patterns, colors, and inscriptions. Secondly, we delved into the production process and painting techniques. The term "paint" in the context of lacquerwork, as mentioned in the Book of Han, signifies covering, wrapping, and protecting. The material properties of lacquer, including its solid texture, striking luster, warm feel, and vibrant patterns, made it synonymous with durability and magnificence. Compared to wood, it had a warmer texture than bronze and was more versatile than jade in serving daily functions, thus becoming a distinct category of ceremonial objects.

In Chu, where rituals held great reverence and feudal lords were stratified, the specifications and aesthetics of ritual vessels symbolized the power and status of scholar-officials. This environment fostered the creation of numerous precious bronze, jade, and lacquer vessels. The earliest archaeological evidence of lacquer's application dates back to 8,000 years ago at the Cross Lake Bridge site, a tributary of the Yangtze River Basin. Here, lacquer was used to paint bows and arrows, serving both aesthetic and utilitarian purposes, marking an early prototype of later "archery rites." The aesthetics of ritual objects have profoundly influenced contemporary art, leaving behind original aesthetic symbols, ancient craftsmanship, and even specific decorative techniques.

While there are records of lacquerware being unearthed in Chu tombs dating from the Xia to the Shang dynasties, such finds were not abundant. Bronze remained the primary symbol of state power, relegating lacquerware to a secondary role during the Bronze Age, primarily reserved for ceremonial use. This situation persisted due to centralized political authority, wealth concentration among a few individuals, and exclusive control over important weaponry. Social appreciation for lacquerware remained limited. It was only during the Warring States period that feudal lords facilitated the large-scale development of lacquerware, shifting its focus from exclusive use in rituals to broader practical applications in daily life.

Subsequently, during the Warring States period, the craft of lacquerware expanded and improved. From the early Warring States period to the middle of the era and from the pre-Qin period to the Western Han period, each period witnessed advancements in lacquerware craftsmanship. These advancements included unique characteristics in the production of lacquerware, particularly in the production process itself and the materials used. These distinctive characteristics served as a foundation for understanding the evolution of lacquerware.

Lacquerware, akin to bronze and pottery, provides important dating clues through pattern characteristics and production traces. Moreover, the production methods for lacquerware tires and bases offer additional supporting evidence for dating lacquerware. To examine the evolution of lacquerware over the 600-year period from the Warring States to the Han Dynasty, this thesis will reference lacquerware unearthed from different periods and

burial levels. It will also consider archaeological objects and documents related to lacquerware from the Warring States, Qin, and Han Dynasty groups. Additionally, this research will explore traditional lacquerware practices and create a database of lacquerware presented in charts and graphs, offering clearer insights for subsequent studies. In this paper, we delve into textual records from the " 仪 礼 " (Book of Rites), " 周 礼 疏 注 " (Annotated Records of Rituals), and other ritual books. We then compare and contrast representative artifacts selected from archaeological specimens in the Yangtze River valley, exploring their forms, rituals, and the aesthetic ideas they embody. This exploration allows us to appreciate the oriental aesthetics and the material concepts conveyed through lacquerware.

To trace the evolution of molding and painting techniques in Chu lacquerware over the 600 years from the Warring States period to the Han Dynasty, we reference the development of lacquerware groups from the Warring States, Qin, and Han Dynasties in Chu. We include more than one hundred objects excavated from graves spanning eight historical periods, presented in charts and graphs to provide comprehensive data. This dataset spans the early, middle, and late Warring States period, the Qin dynasty, and the early Western Han dynasty.

It encompasses specimens of Chu lacquer ritual vessels, including beans, cups, tripods, bottles, and notable examples such as the dragon and phoenix-patterned lidded beans from the tomb of Zenghouyi in Suizhou, Hubei, and the lacquer case from Tomb No. 1 of Changguantai in Xinyang, Henan. Our specific studies also examine lacquer inner tubes made from various materials such as wood, bamboo, and lagenaria. We investigate lacquer production methods of the time, such as hacking, spinning, and clamping ramie. Additionally, we explore the primary decoration methods, including black-ground vermilion-painted back patterns, brown-ground cinnabar-painted cloud patterns, the use of metal buttons, and cone paintings.

Through a comparative study of relevant texts and extant lacquer specimens, we have focused on the chopping board, bean, jue, ban, dun, washbasin, and cup as the most significant types of Chu lacquer ceremonial vessels in the Yangtze River basin for our research. These vessels were primarily used in various ceremonial rituals, including the " 士冠礼 " (coming-of-age ceremony for young men), " 士昏礼 " (wedding ceremony), " 士相见礼 " (rituals for meeting scholars), " 乡饮酒礼 " (local drinking rituals), " 乡射礼 " (local archery rituals), " 大射礼 " (grand archery rituals), and " 朝 聘 礼 " (the rite of hiring in the imperial court).By deducing the sociological function of lacquer ritual vessels from both texts and objects, we can further explore the ceremonial rituals, spatial relationships, functions, specific aesthetic symbols, and even decorative elements embedded in ancient lacquer ritual vessels during their use.

Two crucial aesthetic factors play a significant role in the use of lacquer as ritual objects: the quantity of ritual objects and their spatial arrangement. For instance, from the "Yi Li" document, we can infer the shapes and quantities of vessels used in wedding ceremonies, such as six " 豆 " dishes, four " 敦 " dishes, four " 爵 " goblets, a pair of " 合 巹 杯 " cups, along with a " 禁 " stand and a " 俎 " platter, as well as a washbasin (" 匜 ") implicitly included in the washing ritual. These vessels were documented to be used in various ceremonial rituals and had specific settings or usage methods. When we compare these archaeological discoveries with existing findings, we observe that a certain number of lacquer vessels with corresponding shapes have been unearthed in Chu and Han tombs within the Yangtze River basin. These findings closely align with the descriptions in the literature.

To a significant extent, the spatial arrangement of ritual vessels highlights the spatial consciousness within ritual culture. The spatial elements of southeast, northwest, and north constitute a unique set of "spatial codes." These codes establish order through the alignment of objects and actions, revealing social relationships such as hierarchy, affinity, fortune, and misfortune. Additionally, they encompass astronomical, geographical, mythological, psychological, and philosophical aspects, alluding to power and aesthetic characteristics.

"The Book of Rites: Wedding Ceremony of the Scholar" provides detailed accounts of the six rituals in the

wedding ceremony, namely: 纳采 "Nacai" (betrothal gifts), 问名 "Wenming" (inquiring about the bride's name), 纳吉 "Naji" (presenting auspicious gifts), 纳征 "Nazheng" (presenting betrothal gifts), 亲期 "Qingqi" (choosing the wedding date),
and 亲迎 "Qinying" (welcoming the bride to the groom's home). Among the first five rituals, various items such as wild geese and deer hides were commonly used as ceremonial objects. The use of lacquerware, it is currently inferred, was primarily associated with the "Qinying" ritual. Descriptions related to lacquerware and its application can be found in "The Book of Rites: Wedding Ceremony of the Scholar" and are concentrated in two sections, as follows：
" 设洗于阼阶东南。馔于房中：醢酱二豆，菹醢四豆，兼巾之：黍稷四敦，皆盖。大羹湆在爨。尊于室中北墉下，有禁，玄酒在西，綌幂，加勺，皆南枋。尊于房户之东，无玄酒，篚在南，实四爵合卺。"
Place a basin for washing in the southeast of the main ritual platform. Prepare food in the room. Prepare various dishes, including two plates of seasoned sauce and four plates of pickled dishes. Simultaneously prepare four plates of millet and grains, all covered. Place the large soup on the stove to keep it warm. In the room, position a wine vessel (尊) under the northern wall, along with a container (禁).The dark wine (玄 酒) is placed in the west, covered with a silk cloth (綌幂), and a ladle is added. All of these are positioned on a south-facing frame (南枋).Another wine vessel (尊) is placed to the east of the room's entrance, without dark wine (玄酒). A container (篚) is located to the south, filled with four wine cups and the combined goblet (合卺).
This passage describes specific rituals and the arrangement of ceremonial objects in a wedding ceremony. These details outline how food and wine were prepared for the ceremony and the specific placement of various ceremonial items. These elements were crucial components of ancient wedding ceremonies, contributing to the richness and symbolism of the event.
Next part as the passage describes the detailed procedures of a wedding ceremony, including the seating arrangement, washing rituals, placement of food and wine, and the order of the meal service and offerings，as follows：
" 夫入于室，即席，妇尊西，南面。媵御沃盥交。赞者彻尊幂。举者盥，出，除{曰鼎}，举鼎入，陈于阼阶南，西面，北上。匕俎从设，北面载，执而俟。匕者 逆退，复位于门东，北面，西上。赞者设酱于席前，菹醢在其北。俎入，设于豆东。鱼次。腊特于俎北。赞设黍于酱东，稷在其东。设湆于酱南。设对酱于东，菹醢在其南，北上。设黍于腊北，其西稷。设湆于酱北。御布对席，赞启会，却于敦南，对敦于北。赞告具。揖妇，即对筵，皆坐。皆祭，祭荐、黍、稷、肺。赞尔黍，授肺脊，皆食，以湆酱，皆祭举、食举也。三饭，卒食。赞洗爵，酌酳主人，主人拜受，赞户内北面答拜。酳妇亦如之。皆祭。赞以肝从，皆振祭。啖肝，皆实于菹豆。卒爵，皆拜。赞答拜，受爵，再酳如初，无从，三酳用卺，亦如之。"
"When the husband enters the room, he takes his seat, while the wife sits to the west, facing south. The attendants assist in the ritual of washing their hands with water. The one who presides clears the wine vessel's cover. The one who offers the wine washes his hands, goes out, and removes the (unspecified) vessel. He then raises the vessel and places it on the south side of the main ritual platform, facing west and going north. The utensils and sacrificial dishes follow suit, being carried to the north while facing north, and they are held in wait. The one with the utensils faces back and resumes his position to the east of the door, facing north and going west.
The presiding attendant arranges the sauce in front of the seats, with the pickled dishes to the north of it. The sacrificial dishes are placed to the east of the beans. Fish comes next. The special meat is placed to the north of the sacrificial dishes. The presiding attendant places millet to the east of the sauce, with grain to the east of it. The broth is placed to the south of the sauce. They arrange facing the sauce to the east, with the pickled dishes to the south of it, going north. They place millet to the north of the special meat, and grain to the west of it. The broth is placed to the north of the sauce.
The wife and husband sit facing each other across the seats. All sit down. All participate in the sacrifices, offering

sacrifices of millet, grain, and lung. The presiding attendant presents the millet, offering the lung and diaphragm. All eat, using the sauce. All participate in the sacrifices and raise their vessels, as well as eat, raising them as well. Three courses are served, and the meal is completed. The presiding attendant washes the wine vessels, pours the wine, and offers it to the host. The host accepts with a bow, and the presiding attendant bows facing north inside the house, in response. The wife also follows this procedure. All participate in the sacrifices. The presiding attendant offers the liver, holding it up as a sacrifice. They nibble on the liver, all placing it in the pickled dishes and beans. After emptying their vessels, all bow. The presiding attendant responds to the bow, accepts the vessels, and offers wine again as in the beginning. There is no need to pour, and for the third time, they use the combined goblet, following the same procedure."

While this passage may appear somewhat obscure and uninteresting to read, it conveys two key aesthetic factors in the Scholar's Wedding Ceremony and the broader Rites: the quantity of ritual objects and their placement. From the text, we can infer the form and quantity of the objects used in the "Qin ying" ritual, including six beans, four ceremonial.



fig1 Painted lacquer Zu-platter,， Warring state period.

vessels, four wine cups, and a pair of combined goblets. Additionally, there is mention of a " 禁 " (a type of wine container) and a " 俎 " (a type of ceremonial dish), as well as an implied reference to a " 匜 " (underlined in the original text). Archaeological discoveries in the Yangtze River Basin, such as Chu and Han dynasty tombs, have yielded a significant number of lacquerware items matching these descriptions.

"The Book of Rites" mainly describes these details, with the overall concept aligning with the statement found in "The Record of Rites: Wedding Ceremony Etiquette": "When the wife arrives, the husband greets her as if she were a guest, and they share a meal together, sipping from combined goblets. This is done to harmonize their status, promote closeness, and foster intimacy." In other words, after reaching the inner chamber, the husband and wife share a meal together, using separate vessels for the grains, pickled dishes, and sauce, with each having their own portion. These portions are stored in six beans and four ceremonial vessels. The "beans" hold the sauce and pickled dishes, equivalent to today's plates, while the "ceremonial vessels" hold grains like rice and millet, similar to today's bowls. However, the "lao" (a type of ceremonial dish) used for the " 牢 " (a type of meat dish) on the " 俎 " (a type of ceremonial dish) is not divided; the husband and wife share it together. The term " 合巹 " refers to the wine vessels, where a ladle is used to separate a gourd-shaped container into two parts, with both halves attached by a red ribbon at the handle's end. After the meal, the husband and wife each hold one half to sip wine and rinse their mouths, known as " 合巹而酳 ."

俎 Zu, 豆 Dou, 爵 Jue, 禁 Jin, and 敦 Dun are the primary lacquer ritual vessels in the Yangtze River region. 俎 (Platter)Zu is a substantial component among lacquer ritual vessels, serving as an ancient ceremonial implement for carrying meat during sacrificial rites and feasts. In the "Yili: Shihunli," it is mentioned that "offerings" (referring to young pigs) must be placed in the same Zu and shared by the newlyweds. "Shuowen Jiezi" records, "Zu, a ceremonial vessel, is derived from 'half,' with 'meat' above it." From the Yin and Shang periods to the Spring and Autumn and Warring States periods, Zu vessels typically took the form of square quadrangles, commonly used to present beef, mutton, pork, and other meats. They resembled tables in shape but gradually evolved into wooden lacquer trays by the late Western Han period. As a significant ceremonial implement in the pre-Qin era, Zu vessels had established combinations and specific orientations in various ritual activities. The distinctive features of Zu vessels include a square and sturdy shape, with slightly upturned ends to prevent food from slipping off. In terms of aesthetics, they carry a pronounced "monumental" quality, with their square form and straight lines evoking a strong sense of ceremony. The raised flat surfaces on both sides make it visually distinct from ordinary utensils, emphasizing its status as a ceremonial vessel. The ceremonial regulations surrounding Zu vessels stipulate that they must be associated with yang (positive) attributes due to the meat they contain, with quantities often appearing in multiples. In the "Yili: Shihunli," it is explicitly mentioned that "the knife and Zu are arranged together, placed to the north...the Zu is positioned to the east of the Dou," defining their spatial arrangement to correspond to the relevant ritual procedures.



fig 2 Colour Painted lacquer Dou-beans, Warring state period

On the west side of the Zu vessel, it is common to place "Dou" vessels. Although small, Dou vessels hold significant importance. The right half of the character " 禮 " (ritual) even contains the character for "Dou." Archaeological evidence suggests that from the Three Dynasties to the Warring States period, the manufacturing of lacquer Dou vessels became increasingly sophisticated, with more intricate decorations. However, the use of Dou vessels gradually declined during the Han Dynasty. Dou vessels functioned similarly to modern-day small dishes used to hold condiments, fish sauces, and other items. Wooden Dou vessels were known as "Dou," while bamboo ones were called "Bian," used for storing preserved fruits. While they may appear as small dishes by today's standards, their significance is evident from their prevalence, variety in design, and archaeological findings. Dou vessels were not limited to the Shihunli but featured in nearly all ritual records in the "Yili" except for the "Xiang she li." Since the items stored in Dou vessels were often related to plants and fish sauces, they were typically presented in even numbers. Dou vessels were known for their high aesthetic craftsmanship, often featuring elegant and elongated structures that conveyed a sense of ceremony. The character " 豆 " (Dou) evolved from its shape, characterized by an open mouth, a tall neck, and a round base. The lacquerware Dou vessels followed the ancient practice with black lacquer as the base and vermilion designs on the outside, often featuring fixed patterns. However, some Dou vessels took on unique biomimetic forms, such as Mandarin Duck-shaped Dou or Dragon-shaped Dou, typically reserved for special occasions and high-ranking burials. In everyday ceremonial use, Dou vessels with tall feet and open mouths were more prevalent, as shown in the accompanying illustration.

Apart from "Dou" vessels, "Dun" vessels were also commonly used in ceremonial settings. They were used to hold various grains, equivalent to what we today call a rice bowl. However, in large-scale ritual activities, large bronze vessels like "Gui" were typically used to store mixed grains, while Dun vessels were primarily used in more domestic rituals such as the "Shi Guanli" and "Shihunli." A representative form of Dun vessel is one excavated from the Jiulian Dun site in Hubei province (see illustration), which takes on a bowl-like shape with a bulging abdomen and relatively high ringed feet.



fig 3 Wood lacquer dun-container, Warring state period

Wine vessels also play a crucial role in ritual objects. In the "Yili. Shihunli" (Rites of Zhou. Wedding Ceremony), the main wine vessels used as ritual objects are the "Jin" (禁), "Jue" (爵), and the "Heqin" cup (合卺杯). During the pre-Qin period, the "Jin" was used as a stand to hold wine vessels. Due to concerns about excessive alcohol consumption leading to the decline of the Xia and Shang dynasties, the Zhou people issued one of the earliest known alcohol restrictions in Chinese history. This regulation permitted the consumption of alcohol only during sacrificial ceremonies, imbuing these objects with rich cultural connotations resulting from their association with a specific social class and the concept of ritual. Jin vessels came in both square and circular shapes because they needed to support other wine vessels. Consequently, they tended to be low and had relatively flat surfaces. The Jin vessel held in the Hubei Provincial Museum (see image) is an intricately carved square-shaped vessel with dragon-shaped legs, designed to support wine pots. It was unearthed from the Zenghouyi tomb, signifying its status as a prestigious item. The complex craftsmanship and symbolism make it not just an everyday wine vessel but also a highly valuable artistic lacquerware treasure. In addition to the Jin, the "Jue" vessel is another significant ritual object. There are various forms of Jue vessels, including cup-shaped and goblet-shaped. The most representative form of the Jue vessel in the Yangtze River region is the "觞 shang" form, which corresponds to what we today call an ear cup. The ear cup is oval with curved double ears on both sides, suitable for drinking wine or holding food. This style was popular during the Warring States to the Han and Jin dynasties. In the "History of the Former Han" (《汉书》), it is recorded as " 羽觞 Yushang ", also known as Jue, shaped like a living bird with a head, tail, and wings." The shang vessel has a delicate and slender shape, with the two ears on the sides resembling wings, which is why it is also called the "feathered shang" in the "History of the Former Han." The design of the 觞 shang vessel has been passed down through many dynasties. After the Wei and Jin periods, many ritual objects changed their forms, but the shang vessel consistently retained its ear cup design. Lacquer shang vessels used in the gatherings of literati during the Jin Dynasty, such as the "Qushuiluoshang" (曲水流觞), closely resembled the shape of shang vessels found in Chu lacquerware.



fig 4 Trap linen innerbody lacquer Shang-shape jue-cup, west Han-dynasty

As for the "Hejin" cup, it is a special type of ritual vessel. The Hejin cup is essentially a type of Jue, but it is unique because two cups are connected, forming four Jue cups, hence the name "Hejin" (合 斝), meaning "combined cups." The Hejin cup is exclusively used in the Shihunli ritual. It is typically created by splitting a bitter gourd in half, coating it with lacquer, and joining the two halves. This process resembles the crafting of modern-day gourd-shaped lacquerware containers. During the ceremony of welcoming the bride, the bride and groom each hold one half of the Hejin cup and perform a ritual act called "Hejin eryin" (合 斝 而 酳), which involves sipping wine and rinsing their mouths. The ingenious design of the Hejin cup, where two cups are perfectly symmetrical and can be combined into one, symbolizes harmony and unity in terms of aesthetics.

The five types of lacquer ritual vessels mentioned above are referenced in the "Yili" (Rites of Zhou) during the Shihunli (Wedding Ceremony) section. With the exception of the Hejin cup, these vessels are employed in various ceremonies described in the "Yili," including the Shiguanli (Coming of Age Ceremony), Shihunli (Wedding Ceremony), Shixiangjianli (Meeting Ceremony), Xiangyinjiuli (Village Drinking Ceremony), Xiangsheli (Village Archery Ceremony), Dasheli (Grand Archery Ceremony) and so on.

Ritual lacquerware played a pivotal role in representing both the abstract concepts of the ritual and the social order it sought to convey. Their quantity and functional systems together constitute their symbolism in rituals, representing beautiful meanings and aspirations For example, " Six Beans (六豆) "These beans hold significant importance in the "wedding ceremony." The number six carries symbolic significance, often associated with harmony and balance. These beans likely held sauces or condiments and were placed on the ceremonial table. The "Four Dun Dishes(四　敦) " had specific roles within the ritual, holding portions of grains to emphasize abundance and fertility, both crucial themes in wedding ceremonies. " : These Four jue-cups(四爵) " symbolize completeness and unity in the ceremony. They were probably used for serving wine or other beverages. "Paired Wine Cups(合巹杯)" This pair of cups holds particular significance. They would have been used for the couple to share a symbolic drink together, emphasizing unity and shared experiences in their married life. " The stand(禁) "likely served to elevate or present certain dishes or items during the ceremony, making it an essential element of the ritual's spatial arrangement. "The Platter(俎)" is a ceremonial platter where offerings or special dishes may have been placed, representing an essential part of the ritual setup.

The spatial orientation and placement of these ceremonial objects within the wedding ceremony carried profound symbolism. The cardinal directions also held specific meanings as below :
East: Signified the beginning, representing the couple's new life together as they embarked on their marital journey. South: Symbolized warmth, growth, and fertility, all desirable aspects of a harmonious marriage.
West: Represented maturity and fulfillment, reflecting the hope that the marriage would mature into a stable and fulfilling partnership.
North: Associated with wisdom and guidance, suggesting that the couple would seek wisdom and guidance in their marriage.
In summary, the selection of ceremonial objects and their placement involved careful consideration to symbolize the ideals and aspirations of the wedding. These objects were not merely functional; they were integral to expressing the aesthetic and cultural values of the time. Furthermore, the orientation of these ritual objects represents a sense of spatial consciousness in the Rites. The spatial elements of east, south, west, and north together form a "spatial code," which, when combined with the use of ceremonial objects and actions, expresses order and signifies various social relationships, such as hierarchy, closeness, auspiciousness, and inauspiciousness. These spatial arrangements also encompass elements of astronomy, geography, mythology, psychology, and philosophy, subtly reflecting the aesthetic characteristics promoted by the authority's will.

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Research on the narrative design strategy of rural regional brand - -Take Shukou Village, Taihe City, Jiangxi Province, for example

Tian Tao

A**bstract**

"brand strengthening agriculture" is a powerful means to enhance the competitiveness of agricultural industry, and agricultural branding is also the only way to realize the transformation of agricultural modernization. China's agricultural brand construction is still in its initial stage. Building regional brands and shaping regional image is an important guide for the practice of rural revitalization. How to build regional brand culture in visual image design is the focus to pay attention to. By sorting out and summarizing regional characteristics, refining narrative patterns and color elements, and designing the tea industry in Shukou Village, Jiangxi province with visual images, so as to realize the brand promotion and development of "Shukou Tea".

Key words

brand design, brand narrative, agricultural branding

In 2023,the no.1 document of the central government focuses on vigorously supporting poor areas to establish influential regional brands.With the government support for rural revitalization,China's agricultural brand development has become an important measures to improve the core competitiveness of agriculture,in the rural characteristic brand culture level,visual image expression,from the historical background,regional characteristics and long-term planning,adapt the regional brand characteristics,then through the design guide the rural brand concept"timely,suitable,comfortable"embedded in rural development genes,combing brand context,building brand differences,reveal regional characteristics,with brand narrative to consumers brand history and core values,realize the effective spread of brand culture.

1.Regional branding development

Under the background of current cultural demand,it is difficult to drive the vigorous development of rural tourism only by the natural resources and folk customs of the countryside,so it is necessary to rely on diversified communication means to build a rural cultural brand with local characteristics and enhance the core competitiveness of the countryside.Using the method of narrative science combined with brand design,the brand design content presents a narrative structure,so as the brand history,culture and allusions are implanted into the design to achieve the effect of brand narrative.Brand narrative is a way to convey the information such as brand culture,values and product interest points to the audience from the perspective of narratiology.It can help the brand to better convey its unique ideas,so as to realize brand communication more effectively.Regional rural brand design is the cornerstone of rural development work,based on regional characteristics for the rural basic development framework,from the local characteristic cultural resources,natural resources,industrial resources,cut into the problem of brand development explicit,visual core,combing rural resources,extract the cultural gene and advantage resources,comprehensive existing development conditions to guide the rural brand

design.

1.1Characteristic cultural resources

Regional cultural symbols are the elements that can most highlight the local cultural and tourism characteristics. Tourists can intuitively feel the local customs and cultural atmosphere from the regional cultural symbols. The construction of general countryside pays attention to green ecological development and considers the harmonious coexistence between man and nature.Therefore,in the process of brand design,we should not only achieve both beautiful and practical,but also integrate regional natural elements into them,so as to achieve a high degree of unity of cultural landscape and visual symbols.

Shukou Village,Taihe County,Jiangxi Province,also known as Shukouzhou and Shujiang Ancient Village,belongs to the Luling cultural area of China.Its life is mainly composed of Jiangxi buildings,and the folk customs have the characteristics of inclusiveness,culture,pragmatic and innovative,diligent and diligent learning.Chongwen era background has been guiding the regional development,the first attention is the family education,so shu mouth village couplets,plaques there are many Dan family precepts words,these Dan family precepts with ritual,righteousness as the core spirit,such as"room low green nursery interest,inch heart long and white clouds idle",etc.,standardize the spiritual development of later generations and behavior.These Dan family precepts carries the region in sociology,religion,education in the fields of cultural connotation,expressed the world view of the regional group,values,morality,presents the local family unit as the main development unit,is the focus of LuLing culture content,is also the main cultural pillar of regional brand.

Regional characteristic culture generally comes from long-term social evolution.Therefore,the induction of cultural resources should be based on the local cultural development context,and gradually explore the characteristic cultural resources in different periods,so as to transform into representative brand cultural elements and show the local personalized local culture.Through in-depth investigation of the local natural environment and cultural atmosphere,from the perspective of humanity,ecology,aesthetic,customs and other perspectives,the leading cultural characteristics of rural regional brands are finally determined,and the design into cultural symbols easy to spread.

1.2Characteristic industrial resources

Regional industries are generally based on the local natural resources advantages or human resources advantages,combined with the relevant policies and opportunities brought by the historical background,so as to produce benign development.Generally speaking,leading industries play an important role in improving the image of rural areas,which can drive the development of local economy to a certain extent,and serve as a characteristic window to display local industrial resources.In the early stage,rural tourism can expand the rural consumer groups,stimulate the rate of population flow,so as to attract the investment of foreign resources,increase the investment opportunities,and finally achieve the role of promoting industrial development and stimulating industrial upgrading.

Shukou Village is close to Ganjiang River in the south and Shushui in the north.The natural environment is relatively favorable and also vulnerable to floods.Therefore,from the macro point of view,the economic development of Shukou Village is slow,and it is difficult to carry out long-term cash crop planting planning. Traditional industries have two parts:sugarcane and tea,and rice,vegetables,fruits and other crops are mostly used for self-sufficiency.Later,due to the closure of Taihe sugar factory,only tea survived as the leading industry. Rural brand design should constantly extract publicity elements from the local industry to build a more three-dimensional brand image,but also can effectively highlight the advantages of local tourism resources,enrich the connotation of the brand and improve the resource value of the brand.Therefore,regional resources,industries and rural brands are complementary.In the construction process of rural revitalization,both of them are

indispensable.In order to avoid the homogeneous development of rural brand design,it is an indispensable design principle to extract unique elements from the complex regional resources.

2.Regional brand construction of Shukou Village

When building regional brands,it is necessary to consider from the aspects of brand spirit and culture,brand visual differentiation,market economy tendency and consumer recognition.Different from the construction of enterprise brands,rural regional brands need to be more image,more direct,more influential and memory. In the process of regional brand design and construction,the author first takes the brand logo and industrial characteristic agricultural products as the breakthrough point.Based on the research status of Shukou Village,the industrial strategy of"farming+hand+home gift"is proposed and the design concept is taken as the key word.By accurately positioning the brand image,the logo,auxiliary graphics and color system are supplemented,and the brand regional basic characteristic product development and design identification system are generated.Based on the brand image,guide the local leading industry design and planning,and follow the traditional production and life mode of"local resources-local technology-local production",and form the signature goods based on the product ontology value and spiritual culture,with packaging practical value,aesthetic value and cultural value as the added value of products.

2.1Brand identification and color narrative

The regional culture reflected in the regional brand design is the core element of the difference of the regional brand image,and also the important connotation of the cultural promotion.It is extremely important that the essence of the regional culture is presented in a more artistic and branded way to the regional development. Combined with the regional situation of Shukou Island,the main design elements of Shukou Village brand refine the elements from three aspects:the domain name-Shu(meaning Shu River,Shukou),regional environment-Zhou Island(water culture),regional culture-tea culture.

In the design of the logo of Shukou Village,the following points are summarized as the core elements:First,"Shukou"is the name retained after the passage of time,which is the cognitive memory of the local people to their hometown,and also the most direct representative symbol of this area.From the local character symbol system,select couplets,plaques content extract down head,preliminary selected"shu"the"word"as a logo,and adopts the brush body to present the culture of the village of culture,but because of the text itself is too complex,from the perspective of transmission,the illustration degree is not enough,unable to carry other cultural symbols,so only do brand name design.thenceforth,The second edition logo,from the perspective of geographical form,Fusion design profile,Considering that Shukou Village is located at the intersection of the Shu River and the Ganjiang River,The overall outline of the island becomes round and beautiful under the erosion of the river,Can serve as a background to the logo,It is also the cornerstone of brand culture,Combined with the horizontal line strokes in the logo,Integrating the river forms into it,Therefore,some elements of the logo are mainly arc design;In the humanities,Integrating local representative cultures as material,First all are the abundant water resources,This is the regional characteristic representative of Shukouzhou,So we choose the image of water;Secondly,according to every family growing tea in the area,The tea culture of everyone drinking tea,Using the morphological characteristics of tea leaves in the design,Also strengthened the overall style of the logo"hand"sense;last,Combined with the Luling cultural heritage of the local farming and reading family,Create elegant and clean,good as water,social commitment brand image.The logo display of regional brands can quickly lock the homesickness of local people and the regional identity of consumers.Through the process of name echo and cultural comparison,the tourists can leave a deep impression.

In shu mouth village brand design color system,also need to refine from regional environment and cultural

atmosphere,the overall color belongs to the traditional Chinese color system,and accordingly from the river,architecture,vegetation,folk culture extracted wood gold,ochre red,tea green,water blue for shu mouth village regional color,show shu mouth state beautiful natural environment and thick cultural background.From the design method,it is clear that all meanings and forms are"local and local".When the clear color system determines the brand keynote,it further integrates the regional brand image of Shukou Village,so that the brand image of Shukou Village has been strengthened.In shu mouth village brand design auxiliary graphics,the author from the regional characteristic cultural symbols,architecture and natural elements,based on regional form characteristics,tea industry culture,magpie palace roof pattern,architectural form and ecological environment,derived five types of elements:the shape of the continent,the shape of tea,the shape of the house,architectural elements and water elements.The subsequent brand design scheme involving symbols can be carried out on this basis,and the design can be properly fitted with the auxiliary figures to form a harmonious form of artistic presentation.

2.2Visual narrative of product packaging

The outer packaging of the product can play the effect of the finishing touch,under the premise of ensuring the quality of the product,the combination of the two will often produce the effect of 1+1>2,with the power of secondary transmission.As the main part of product design,packaging adopts the paper packaging closest to the connotation of"home gift",which simplifies the packaging form and controls the cost;on the other hand,it also ensures the environmental protection and low carbon property of agricultural products packaging.But considering the artistic expression of net paper is less,in order to better display shu mouth village landscape and customs,design paper design for daily form,style is borrowed the characteristics of the old paper,the paper copywriting,content around the village of ecological landscape,history and culture,architectural characteristics,agricultural characteristics,through the narrative content to the public shu mouth village of ancient style and simple folkway.In the subsequent use process,the packaging can also intuitively and dynamically play the effect of the second publicity of the cultural landform of Shukou Village,and achieve the unity of brand design from the details.

The outer packaging only basically introduces the basic situation of Shukou Village,and it is still lacking in the characteristic cultural expression.Referring to local folk customs,in the most important things,will write the language of blessing on the red paper,so add a layer of red paper to the top of the design of packaging,it is easier for consumers to accept the concept of"home gift".In terms of content,the main elements on the red paper are the cultural symbols formed after the organic combination of the word"fu"and the local characteristic culture,like the symbol paper in the past New Year,which has a unique regional belief.The architectural symbols,tea forms and the form of rice are integrated into the characters to form two original cultural symbols,supplemented by graphic decoration,to distinguish the packaging of Shukou tea and Shukou rice.After the packaging design of the two products,a simple packaging form with certain differences is finally formed.From the point of view of the production packaging process,such packaging design has the advantages of convenient and environmental protection,and in the subsequent product marketing process,it can graft interactive links,copy or independently design their own"blessing",and as a part of the good blessing of"family gift".

3.sum up

From the perspective of the research and design process,Shukou Village has the dual resources of humanity and nature,which is a place worth developing and with great potential.But at present,Shukou Village has not accurately positioned its own regional brand image,nor has it established a mature characteristic industry.The brand construction and narrative design of Shukou Village need to start from the perspective of innovation,avoid following the trend of design and application scheme,and create their own regional brand culture.Second,shu

mouth village thick humanities history is worth exploring,education is the global research topic,through the activation of the region's fine traditional tutor culture and academy culture,make the history of shu mouth village of humanities and ecological environment tourism achieve organic integration,so as to establish a long-term and sustainable development mechanism,can dynamically avoid homogeneity problem.After shu mouth village case practice design,summarizes the feasible rural brand design strategy,give more beautiful rural construction method guidance,through the research of regional culture and symbol detailed development,again through the design will transform regional rural culture into visual,readable,touch,can spread the image of the symbol,create rich connotation of exclusive brand image,attract more categories of groups to rural tourism and even settled.
The author also hopes to deeply study regional branding,explore a set of feasible design methods,drive regional economic growth by improving regional cultural value,and integrate the excellent experience of other countries and contribute their own design strength.There are still many unsolved problems in this paper.The form of information communication and the visual language in the current Internet era are constantly iterated,and the regional brand design research needs to be integrated into digital technology to find breakthroughs in the multi-field,multi-form and multi-media performance application.

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Research on 3D printing bicycle design based on topology optimization

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Abstract

This topic first through the investigation of domestic and foreign practice and theoretical research status of topology optimization bicycle, summarize and analyze its advantages and disadvantages, and then introduce the topology optimization into the bicycle design for research and analysis. Starting from the bicycle frame structure, through the way of topology optimization, we plan to design a bicycle frame in the form of 3D printing. Through the reasonable planning of the distribution of material structure, it can achieve the effect of reducing the amount of material, and also reduce the consumption rate of energy and the emission of harmful substances in tail gas. Secondly, taking topology optimization as the breakthrough point, the design idea of topology optimization in the design process of bicycle frame is studied deeply, which provides reference and verification method for the research and development of new bicycle models.

keywords

Topological optimization, 3D printing, Bicycle

Introduction

China is one of the countries with the largest production of bicycles, with a production of 10. 7 million since the first quarter of this year. China is also a big importer and exporter of bicycles, with more than 60 % of the world's international trade in bicycles coming from China. In response to the call of the national sustainable development strategy and the ecological civilization construction strategy, bicycles are an important tool for green travel. However, with the popularity of 3D printing technology, it differs from the common ink or laser printers that work on flat surfaces. Its special feature is based on digital model files, using powder-like metal or plastic and other adhesive materials to build objects by layer-by-layer stacking accumulation. Its unique molding method is bound to bring a new revolution to the traditional bicycle manufacturing industry and further develop the bicycle industry in China. This article uses topology optimization and 3D printing technology to carry out lightweight design and production of mountain bike structural components as a case study.

Design practice of 3D printing bicycle based on topology optimization.

By summarizing the existing frame model, the solid model of the frame is imported into ANSYS in "STP" format, the material is set for the model, the middle face is extracted and meshed (Figure 1). And apply load and load to it. So as to carry out static and modal analysis.

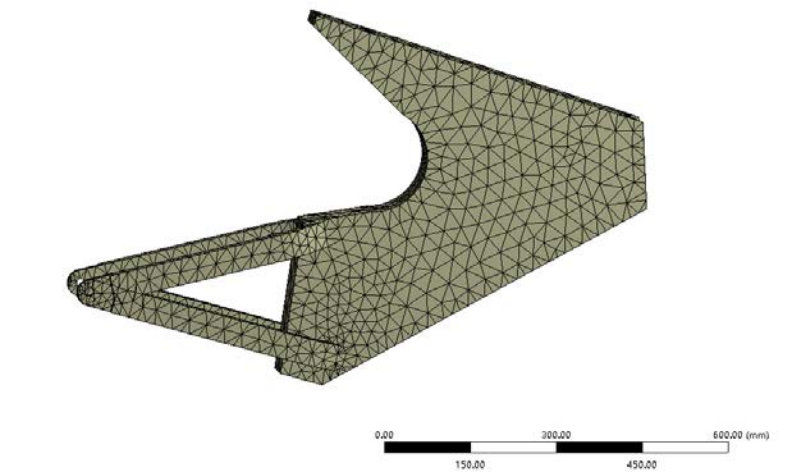

Figure 1. Model meshing.

Use the Static Structural selector Solve command in the Outline (analysis tree) to view the stress results as follows (Figure 2): the maximum stress is 86.7MPa. According to the yield strength of 45 steel of 355MPa, the safety factor is almost 4 times. The strength is qualified and the safety factor is too high. The deformation cloud diagram is as follows: the maximum deformation is less than 0.013mm, the deformation is very small, and within the allowable range, the model stability is qualified.

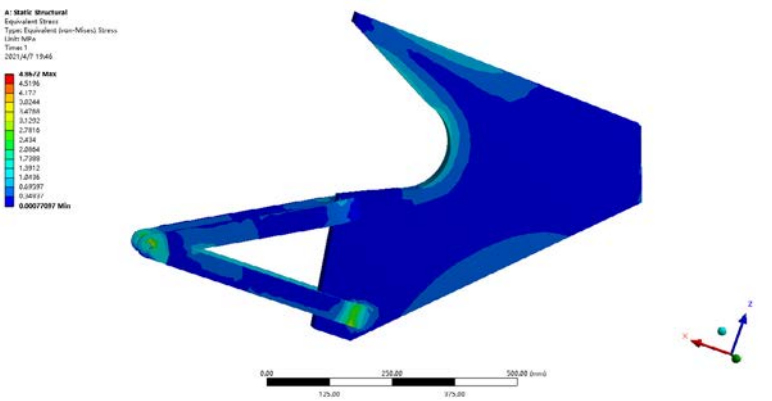

Figure 2. Model stress results

Transfer the qualified model files to the topology optimization module for lightweight optimization, set the optimization to overall optimization, and the optimization target is 60%. Check the optimization results, as shown in the figure below (Figure 3). The remaining missing

parts indicate that they can be removed for weight loss. Based on the results, the model is optimized and post-processed (Figure 4).

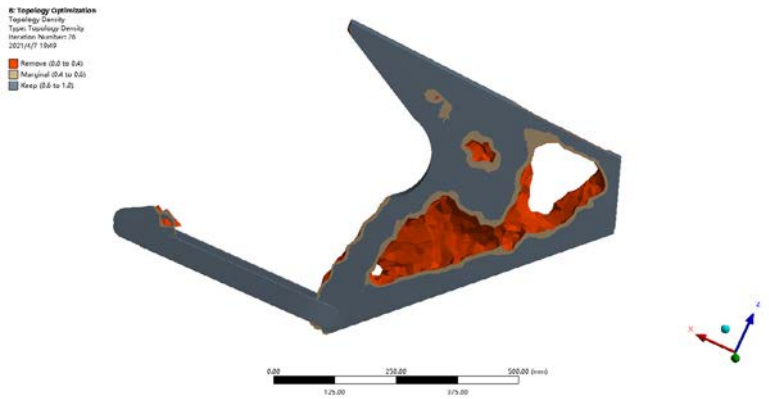

Figure 3. Model optimization results

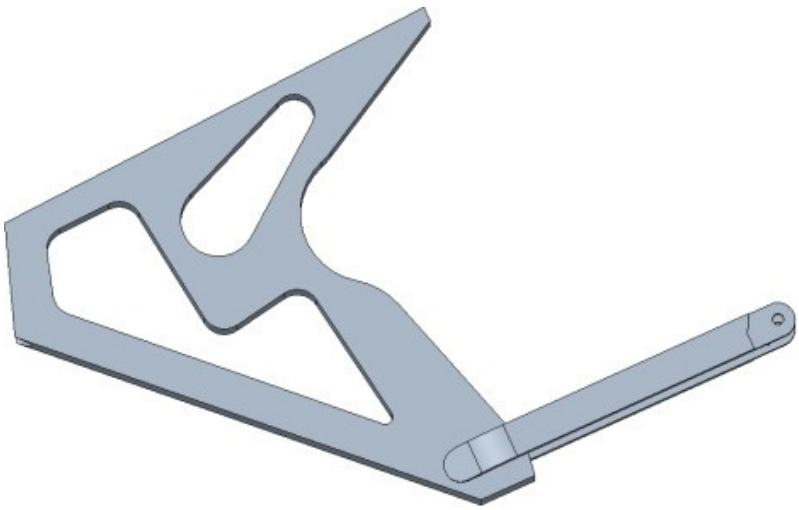

Figure 4. model post processing

Re-import the model into ANSYS for calculation, and you can see that the weight has been optimized to 56.4, which is 60% of the original value. At this point, the first stage of topology optimization is completed.

The optimization model of the first stage needs to be imported into Asnys again in order to pursue the most optimal frame optimization structure. The load and mesh division should be set in the same manner as the first stage for topological optimization of the model. Subsequently, post-processing of the optimized results is conducted to obtain the model depicted in (Figure 5). At this juncture, completion of the second-stage optimization design is achieved.

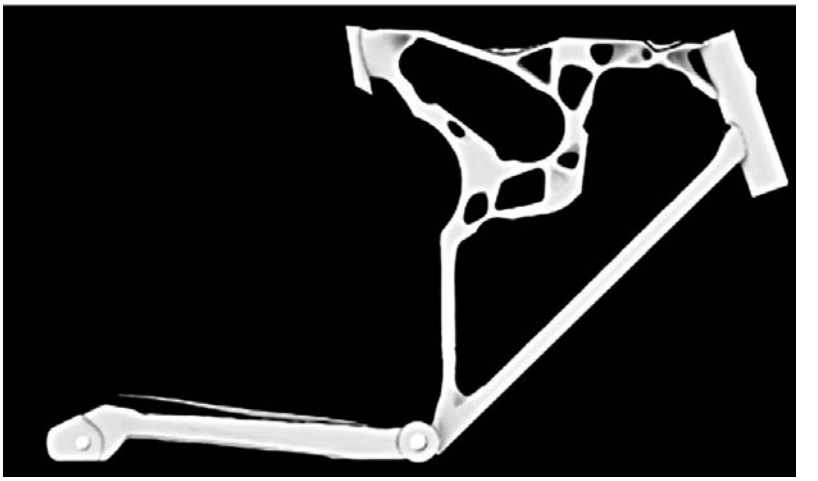

Figure 5. The model after quadratic topology optimization.

Sketch drawing and 3D model making

On the basis of the model after quadratic topology optimization, the sketch was drawn (Figure 6) to determine the final frame shape and product size. The design concept is verified by the way of three-part modeling, and the details of its structural parameters and functional design are further refined.

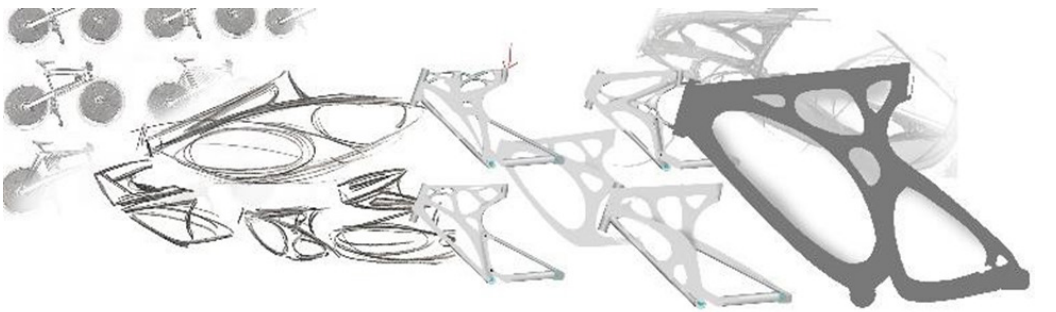

Figure 6. Sketch drawing

Static analysis of frame after design optimization

The optimized frame is imported into ANSYS in STP format, the relevant parameters are defined, and the mesh is divided to complete the finite element model.

After the relevant parameters are set in ANSYS, the solution is submitted. After optimized design, the strain and stress distribution of the frame are shown in Figure 7. By comparing the strain and stress distribution of the frame before and after optimization, it is obviously found that the optimized design is consistent with the original design intention. The maximum stress after optimization is 10MPa, according to the yield strength of nylon material is generally greater than 60MPa, and the safety factor is almost 6 times. The strength is qualified. The stress distribution of the frame is more uniform than before optimization. Although the weight of the frame is reduced after the lightweight design, the material distribution of the frame is more reasonable, and its strength is greatly improved under the strength constraint conditions.

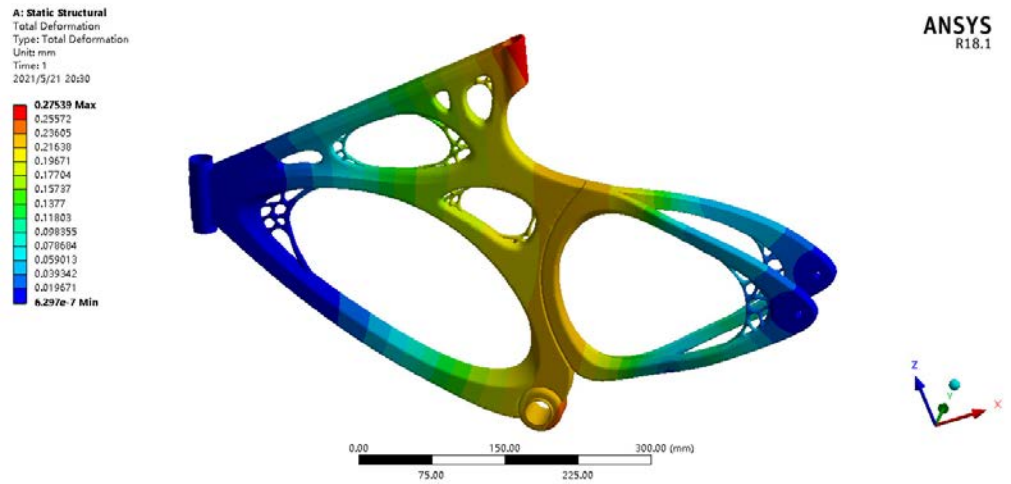

Figure 7. Static strain of the rear frame is optimized

Modal analysis of frame after design optimization

The natural frequencies of each order of the frame, as depicted in Figure 8, are more than four times higher than the excitation frequencies under various road conditions. This effectively prevents resonance by avoiding frequency alignment with road excitations.

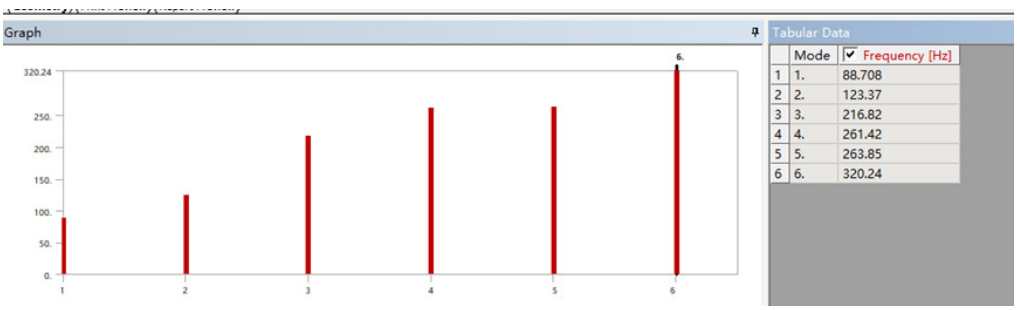

Figure 8. Modal analysis results.

Model making

Through the way of 3D printing, the frame is made of black imported PA12 nylon with sls molding process, and the body parts are made of resin material with sla molding process. After grinding, painting color, surface texture creation, after natural drying manually connected assembly. (Figure 9)



Figure 9. Model

CONCLUSION

In the context of national sustainable development and ecological civilization construction strategies, a novel topology optimization design method is employed to create a bicycle frame that meets both static and dynamic requirements. This approach enables rational material distribution, reduces material usage, and minimizes resource waste and pollution. The bicycle frame is optimized through topological optimization software, which generates an aesthetically pleasing new model. By optimizing the prototype of the bicycle frame using topology optimization, this product achieves reasonable force distribution while minimizing material usage. Furthermore, it completes the design of the frame structure and verifies its structural stability through topology optimization application, providing reference methods for developing new models.

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Exploring the Temporal and Spatial Narrative Features of Chinese Sequential Art: A Theoretical Framework

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Abstract

Chinese Comic Strips（Lianhuanhua） is a multi-media art style that creates spatial narratives using a combination of images and texts. Despite having a lengthy history, Chinese comic strips' spatial and temporal narrative aspects still lack a coherent theoretical foundation. This investigation seeks to close that information gap. The goal of this study is to analyze the cultural and artistic relevance of Chinese Comic Strips 's spatial and temporal tales and to develop a theoretical framework for these narratives. Understanding the temporal and spatial narrative aspects of comic strips, putting forth a theoretical framework, looking at how culture affects them, and highlighting their significance for cultural inheritance and artistic innovation are some of the specific goals. To create a theoretical foundation, research findings about Chinese Comic Strips and spatiotemporal narratives were first sorted out. The patterns of spatio-temporal narratives at three levels, including continuity and skipping of time in serial paintings, single-space and multi-space layouts, and transformation of time and space, were then thoroughly analyzed through case studies and narrative analyses. This study establishes the theoretical underpinnings of spatiotemporal narrative aspects, encompassing fundamental theories and models like the timeline, spatial presentation, and visual components. Serial paintings also feature a variety of spatio-temporal tales, which are significant for both aesthetic innovation and cultural inheritance. This study emphasizes the importance of Chinese Comic Strips in the realms of culture and the arts by offering a solid theoretical foundation for comprehending their spatiotemporal narratives. This study broadens our understanding of serial paintings while also offering fresh viewpoints and ideas for future research and development in related areas as well as tips on how to make more imaginative and intricate serial paintings.

Author Keywords

Chinese comic strips, spatio-temporal narratives, images and texts, theoretical frameworks

Introduction

Chinese comic strips are a type of multimedia art that use both words and graphics to tell stories and deliver ideas in a distinctive way. Since the late 19th century, this art style has a lengthy history and has been significant

to Chinese culture. The popularity of Lianhuanhua peaked at the end of the 20th century(Chang, 2015), when it became a significant component of the culture of popular entertainment(Jing, 2009). Since then, its narrative and artistic forms have undergone numerous changes and improvements(Shaojun, 2008).

Although Chinese comic strips have a significant impact on cultural heritage and amusement, theoretical study on their spatio-temporal narrative aspects is still very few. The creation of timelines, the display of spatial layout, and the relationships between graphic elements are all examples of spatial-temporal storytelling aspects. These elements together make up the distinctive charm of comic strips(Shenqiwang, 2011). However, no comprehensive theoretical framework has yet been developed to analyze and thoroughly explain these important narrative components in Chinese serial paintings.

In order to explore the distinctiveness of this art form, this study intends to close this knowledge gap by developing a theoretical framework on the spatio-temporal narratives of Chinese serial paintings. By analyzing specific situations and making cross-cultural comparisons, the study will investigate the patterns, variations, and cultural impacts of spatio-temporal narratives in Chinese comic strips from both theoretical and empirical viewpoints. As well as offering fresh viewpoints and inspiration for study and creativity in relevant domains, this will help us understand the creative and cultural worth of Chinese comic strips.

Literature review

Different media representations have their own flaws, using a linear temporal medium to represent space, or using a spatial medium to represent linearly unfolding time, is one of the methods of representation of image, text and consciousness narratives(W.J.T.&Chenyongguo, 2012). Comic strips use the close cooperation of pictures and texts as the medium of artistic expression, focusing on the shaping of characters, and reflecting artistic stories with montage through the construction of a complete storyline and the depiction of specific environments. Image and text appear in the same space at the same time, showing the trend of language and picture merging, and the language and picture take up the narrative function together(Lutao, 2011). At present, the research on the graphic and textual narrative of comic strips focuses on the study of the relationship between image and text. For example, Shenqiwang paid attention to the historical evolution of comic strips as an intrinsic factor in the logic of graphic-text relationship(Shenqiwang, 2011); Wang Wenxin sorted out "Text-graphic intertextuality" from the perspective of literary narrative, focusing on the Text-graphic intertextuality in the pictorial adaptation of literary works(Wangwenxin, 2016); Li Honghua paid attention to the Text-graphic imitation and translation, and analysed the Text-graphic space formed by the Text-graphic imitation and translation, and analysed the Text-graphic relationship. Li Honghua focuses on the Text-graphic space formed by Text-graphic parody and translation, analyses and sorts out the three types of Text-graphic relations and three characteristics, and proposes that language is a "temporal symbol" and image is a "spatial symbol"(Lihonghua, 2018). The starting point of researchers is often the relationship between pictures and texts, which mainly reveals how pictures and texts interact, complement each other and jointly construct the narrative of comic books. However, there is still a lack of attention to the issues of time and space in comic strips and how the two are transformed.

The spatial and temporal narratives in comic strips are both the real existence of frozen moments and spatial transitions, and the comprehensive treatment of historical facts made figuratively by graphic creators with highly individual perspectives. This determines that the narrative strategy of this theme is mostly to develop spatialised expression in sequential time, which gives the narrative a perceptible sense of multi-dimensional space. And in the overall structure of the plot, it is again the re-temporalisation of space.

1.Continuity and skipping of time

According to Joseph Frank, narrative is storytelling, and a story always includes a series of events in chronological order, i.e., it recounts events that occur over a period of time(Frank & Qinlinfang, 1991). Therefore, narrative is possessed of temporality, its purpose is to tell a story, and the graphic narrative presented is inseparable from time. The spatial and temporal narrative of comic strips in the context of visual culture, the spatial and temporal narrative relationship presented by the graphic text contains the three levels of complementing the text with the graphic, interpreting the graphic text with the text, and the graphic text complements the graphic text(Lessing, 2013). The creation procedure of the comic strip is first text script, and then image creation, the "chronological order" of the text determines the visual "continuity" of the image. Graphic and text both complement each other, unify each other, but also maintain their independence.

1.1 Coherent picture arrangement

The German aesthetician Lessing pointed out: "Painting can only use a certain moment of action in its simultaneous and parallel composition, so it is necessary to choose the most nurturing moment, so that before and after can get the clearest understanding from this moment." (Lessing, 2013)The medium carrier of the comic strip is traditional printed paper, and the time in the narrative process is condensed in the "compartment" of each page. The medium of the comic strip is traditional printed paper, and time in the narrative process is condensed in "compartments," where the images on each page are static and the textual content is expressed in synchronised continuity.

As an example, Master Liu Jixin's Chicken Hair Letter demonstrates the combination of specific, individual, continuous, and qualified character's momentary actions in order to create a continuous plot and a rich narrative experience. For example, in Figure 1, page 4, the narrative of Haiwa keeping watch under the tree is a combination of images of Haiwa squatting under the tree with the red tasseled rifle; Haiwa putting down the red tasseled rifle and looking away from the mountain on page 5; Haiwa lying on his back on the top of the mountain and looking carefully away; and Haiwa wrenching down the trunk of the tree and leaning over and pressing down on it on page 8. This involves selecting each of the "most fertile moments" in time to be pictorially depicted, outlining the continuity and dynamics of the same spatial event. Through this kind of narrative, the comic strip organically connects successive actions and scenes, enabling the reader to follow the characters' actions and feel the passage of time and the development of the plot. This specific and qualified narrative adds depth and attraction to the comic strip, allowing the reader to be more deeply integrated into the story.also has an inherent temporality, and is burdened with the function of narrative through visualised spatial depiction.

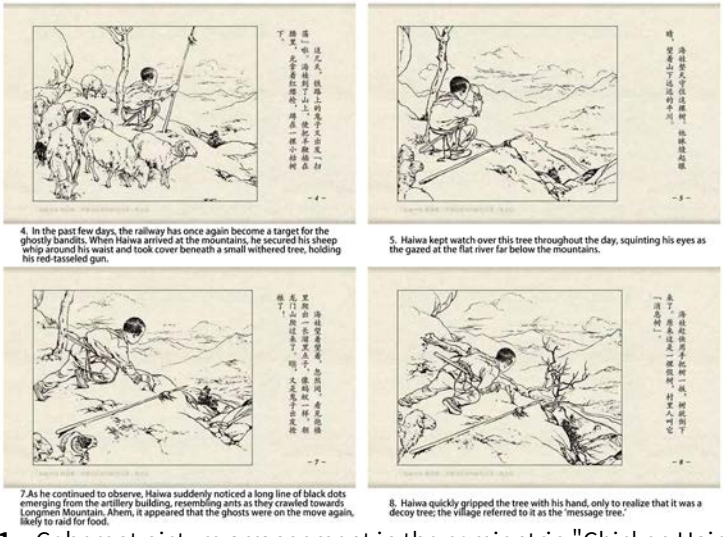

Figure 1. Coherent picture arrangement in the comic strip "Chicken Hair Letter"

1.2 Time jumpiness

A non-linear experience of time is created in the narrative. Multiple images are arranged in a certain order, thus creating a context in which the viewer can easily see the causes and consequences of events(Lutao, 2011). The main point of this narrative mode is to combine the events of the jumping scenes, which are "moments in time", through a sequence of cause and effect that develops successively on the timeline.

In the comic strip "How Iron is Made", illustrated by Yi Jin, the narrative unfolds with the priest punishing schoolboy Kochakin, who, after being punished in a senior classroom, discovers that the teacher is speaking differently from the Bible. Three compartments of the same scene are used to tell the story of the character's journey from entering the classroom, to listening to the lecture, to discovering the doubt. And the next split frame is outdoors where Kochakin goes to the priest to ask him about the doubts he has discovered and is thrown out of the school by the priest. The narrative unfolds through the jumping scenes in the lower classroom, the upper classroom, and the outdoor area of the campus, but through the continuity of the graphic layout of the causal relationship of the events, they are juxtaposed on the same time line, showing the interlocking narrative effect, allowing the reader to understand the logical relationship of the events over time in a multi-dimensional way. At the same time, the objective time with cause and effect relationship to link the events is one of the effective space-time narrative methods, mostly used to express the complex narrative, especially in the beginning part of the multi-character, multi-event events with cause and effect relationship.



Figure 2. Time jumpiness in the comic strip "How Steel is Made"

2. single-space and multi-space layouts

The basic element of spatial art is "presence", while the basic element of temporal art is "continuity", but the "presence" of spatial art implies temporal relations, and the "continuity" of temporal art implies spatial relations. The "continuity" of time art also implies spatial relations(Longdiyong, 2015). Single-space layouts are usually used in the same way as single-space layouts. [6] Single-space layouts are usually more concise and coherent, while multi-space layouts allow for more complex plots and wider narrative space, bringing readers more layers of narrative experience.

Macroscopically speaking, the sense of time in the space of a comic strip reflects a particular historical era or style, and the spatial representation of visual images and the temporal dimension of textual narration jointly express the spatial and temporal context of comic strip narratives. From a micro perspective, time in real life is quantified by seconds, minutes and hours, while in the image narrative of the comic strip, the length of time is a more vague concept, unless the amount of time is expressed in specific words.

2.1 Momentary time points in single space

In a single-space layout, the storyline usually takes place within the same frame or frame without jumping to different scenes or locations. This layout is characterised by presenting a coherent sequence of events or moments in a single frame. Using a single-space layout is often used to narrate a simpler plot or to emphasise a key moment. It helps to provide a clear temporal and spatial context so that the reader can focus on a single plot point. Examples include revealing implied plot details, character psychology, or a reversal of the plot, thus engaging the viewer to think more deeply about the story. Comic strips consist of multiple continuous images, which are inherently temporal. On the one hand, the visual narrative of "momentary point in time" is to use images to narrate the iconic "moment" of a specific scene or a certain plot, which signifies that this moment has a crucial role in the development of the whole event. On the other hand, the text usually has a time continuity in this "moment in time", which breaks through the image limitation of "moment in time". When the reader reads the text, he or she can naturally relate the image of the "momentary point in time" to the development of the plot in the timeline, and generate associations and imaginative images. The compartmentalised image also has an inherent temporality, and is burdened with the function of narrative through visualised spatial depiction.

2.2 Parallel plots in multiple spaces

The time jumps in space have already been mentioned above, but here we are discussing the temporal rhythms generated by the arrangement of parallel plots, which involves the "presence" of time in multi-spatial narratives. As Simmel points out, "rapidly shifting images, fleeting interruptions, and a sudden sense of the unexpected" constitute the main characteristics of the urban aesthetic experience(Ziaorg Simmel, 2001).

In the comic strip Blood Splattered in Tianjin, Hao Ming and his armed forces team infiltrate Tianjin in disguise and cause havoc in the city, creating a multi-spatial and spatial narrative. For example, on page 15 of Figure 3, Hu Lai of the Rongye Street police station speaks to Yan Jiaqi, the police chief; on page 20, Yan Jiaqi speaks to Duo Doliang of the police headquarters; and on page 26, Guo Wenrui, the manager of the Yuanji Huide No. Money Store, speaks to Yuan Wenhui of the Yuan Mansion. These episodes in different places and spaces are closely connected through the element of "telephone line". The use of the "telephone line" creates a temporal "presence" narrative in the comic strip, organically intertwining events from different points in time. Unlike a single-space layout, a multi-space layout involves showing different scenes or locations between panels or frames. The storyline can alternate across multiple spaces, covering a broader plot or timeline. In this parallel-plot narrative, the reader is able to experience multiple episodes occurring at the same time, adding to the complexity and appeal of the story.

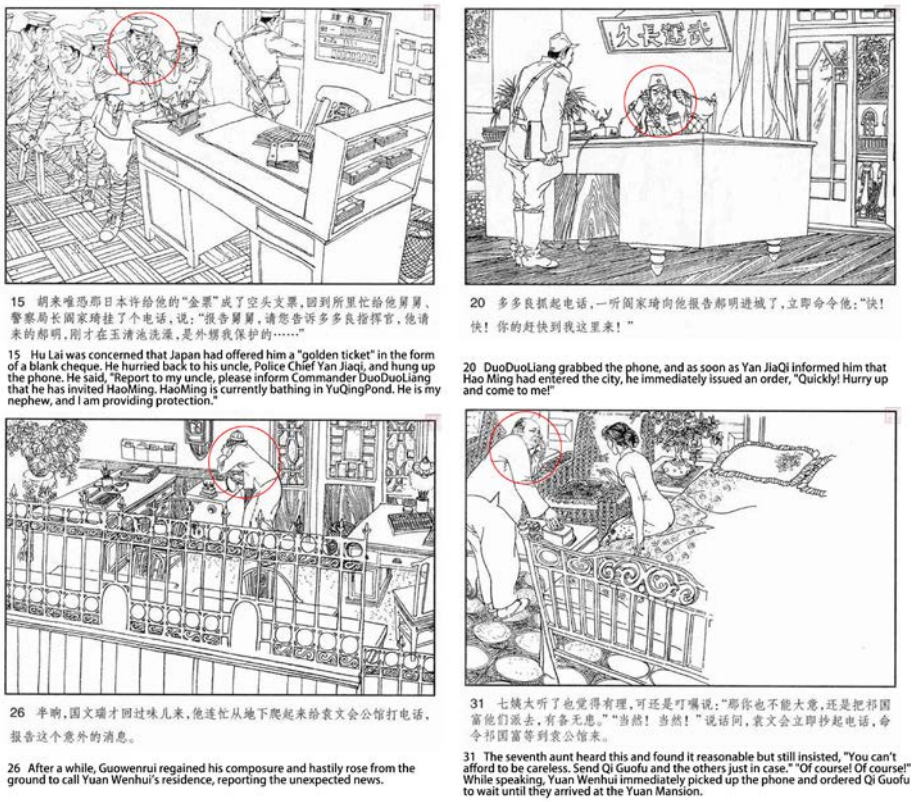

Figure 3. Parallel plots in multiple spaces in the Comic Strip "Blood Splattering in Tianjin "

3. Transformation of Time and Space

Each page of the comic strip has relative independence and completeness, and its overall purpose is to express specific historical stories. The single spatial image nurtures the "moment" of time, and the multiple continuous images use the transformation of multiple spaces to tell the story of mobility. This kind of spatial and temporal narrative expression, on the one hand, makes the time produce multi-dimensional spatial transformation, and the performance of time in space has "sequentiality", but also expresses its "co-presence". On the other hand, the high-frequency cuts in the plot and the suddenness of multiple events constitute the tense rhythm of a tense narrative. In Chinese comic strips, the transformation of time and space is an important narrative technique, used to present the flow and diversity of storylines.

Lianhuanhua artists can realise the transformation of time in many ways. For example, they can use different numbers of pages to represent different points in time so that readers can see the passage of time in the story. This transformation of time can be used to show the growth of characters, the evolution of events, and the development of the storyline.

However, spatial transformation involves switching between different scenes. Serials can be used to show plot development in different locations by switching the layout of single or multiple spaces. This technique makes the story more vivid and multifaceted, and the reader can follow the actions of the characters as they travel through different locations.

Serials will cleverly cross time and space in the narrative to create a complex plot structure. This can be achieved by interweaving scenes from different points in time with each other, or through flashbacks and flashforwards. This type of narrative can add depth and appeal to a story. Serial artists can also use visual effects to emphasise

the transformation of time and space. For example, they can change the tone, line or perspective of the picture to convey changes in time or space. These techniques of transforming time and space allow Chinese comic strips to narrate stories in a unique and rich way, while providing artists with a wealth of creative possibilities to create compelling narrative experiences.

4.Theoretical Framework of Spatio-Temporal Narrative Characteristics

Based on the study, we propose the following theoretical framework of spatio-temporal narrative features to explain the spatio-temporal narratives in comic strips. As shown in Figure 4, the comic strip divides time into linear and non-linear, expresses these points in time through specific images, and is accompanied by textual narratives to present the continuity of time; and organically connects events at multiple points in time through coherent picture arrangement and layout to emphasise the jumps generated by cause and effect. And the spatial display from a single scene to multiple scenes can create a time experience of continuity of a single scene, emphasising the momentary point in time nurtured in a single spatial image; it can also display multiple parallel episodes, comparing and contrasting them through timelines in different spaces, thus enriching the complexity of the narrative.

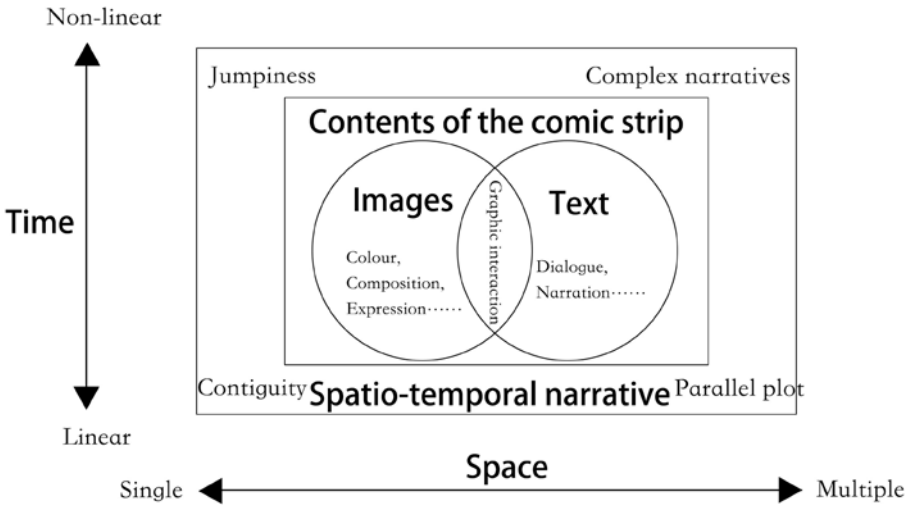

Figure 4. A Theoretical Framework for Spatio-Temporal Narrative in Comic Strips

The temporal and spatial narrative features of comic strips make narratives more multidimensional and complex. It allows for the simultaneous exploration of events at different points in time and space, providing richer narrative layers and depth. At the same time, the value and impact of this art form can be better understood, and this theoretical framework provides a strong foundation for further research on comic strips and exploration of their narrative potential.

5.Conclusion

Taken together, the results of this study provide a solid theoretical framework for understanding the spatio-temporal narratives of Chinese lianhuanhua, and at the same time highlight its importance in the field of culture

and art. Through an in-depth study of the characteristics of spatio-temporal narratives, we are not only able to better understand the serial painting as a unique narrative art form, but also to recognise its potential for cultural inheritance and artistic innovation.

The significance of this study lies not only in bridging the theoretical gap about the temporal and spatial narratives of comic strips, but also in bringing new perspectives and inspirations to the research and creation in related fields. We hope that the results of the study will stimulate more in-depth discussions about comic strips, providing unique research opportunities for artists, scholars, and cultural inheritors. In addition, this study reminds us that in the contemporary digital and multimedia era, serial painting still has irreplaceable value. It is not only a part of Chinese cultural tradition, but also an art form full of creativity and expression. We encourage artists to continue to explore how the theoretical framework presented in this study can be applied to create more creative and complex works of Lianhuanhua to enrich our cultural heritage and pass it on to future generations. This study provides a solid foundation and inspiration for the future development of comic strips.

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Narrative research in information visualization design -- taking Chinese jade information visualization as an example

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Abstract

This paper analyzes the narrative and cultural value of the Chinese jade infographic from various narrative ways in information visualization design.

Jade culture is unique to China, although other countries also produce jade, but no country has as long a history of development as China. But even in the present, jade still has infinite vitality. Jade is a vivid symbol of the Oriental national spirit, which contains profound cultural connotation. We can see the profound historical connotation of Chinese culture in jade.

Information visualization design is to disassemble, reconstruct and finally present a theme and a story to the viewer in a kind of graphic language. It can make the complicated narrative concise and clear, and shorten the path between the viewer and reality. The jade story is presented in the way of information visualization design, taking into account the accuracy and vividness of information, which is undoubtedly a very appropriate and advanced expression in visual design.

Author keywords

Jade culture, narrative method, Popularization of knowledge, Information graphic design

Introduction

opportunity

The ancients said that jade is a beautiful stone. China is the earliest and most extensive country that mines and uses jade in the world. China's four famous jade are Xinjiang Hetian jade, Henan Dushan jade, Liaoning Xiuyan jade, Shaanxi Lantian jade, they are the representatives of China's jade.

With the development of modern social economy and the improvement of consumption level, more and more people begin to collect and play with jade products. Jade is not like diamonds, gems as dazzling, publicity, it is very warm, subtle, delicate, like the character of the gentleman as extraordinary, so by many people love.

I love jade very much, marveled at the natural beauty of jade, in daily life often pay attention to the jade market, information, etc., at the same time found that the peers around almost will not give attention to jade. As a student majoring in visual communication design, I found that there were few cases of jade information design in China and even in the world during my professional study, so I came up with the idea of this graduation theme.

The creative point and value of the subject

The color, texture, texture and other characteristics of each jade are reproduced through modern visual design techniques. Different from traditional forms of expression, it is not a 1:1 restoration of what is seen by the naked

eye, but more abstract symbols that integrate points, lines and surfaces, conveying the unique emotions and feelings brought by each jade from a variety of senses.

This topic aims at popularizing knowledge about natural jade, changing people's inherent impression of jade, inheriting the connotation of Chinese jade culture, and driving the development of jade industry. Solve the problem of aging of jade audiences, let the contemporary young people know more about jade itself and the ancient Chinese jade culture behind it, inject new vitality into jade, which has high cultural and aesthetic value.

The general situation of jade

The category of jade

Nephrite is a mineral. Divided into jadeite, nephrite, usually said jade refers to nephrite, and jadeite refers to jade, belongs to one of the common jewelry.

Jade, originally stone, is a natural creation, the gift of heaven and earth. The use of jade in China originated early, lasted for a long time, and was widely used. In China, the distinction between jade and stone is not obvious, the ancients believe that as long as there is a certain hardness, beauty, and applied to the jade process of the United States stone, can be called jade. From the physical point of view, there is a big difference between jade and stone, but the visual difference between jade and stone is not very obvious. So those minerals between jade and stone can be called both stone and jade.

The jade studied in this subject is a broad sense of jade, which is selected according to the natural jade catalog of the Name of Jewelry and Jade published by the national standard, rather than the traditional narrow sense of jade. Natural jade refers to a collection of minerals produced by nature with beauty, durability, rarity and technological value, a few of which are amorphous.

Jade historical and cultural inheritance

In the current era of accelerating economic globalization, the implementation of the top-level national strategy of cultural communication is particularly urgent. In order to better realize the internal and external communication and development of Chinese excellent traditional culture, we need to explore new cultural carriers. In China, "jade" is a very important cultural symbol. In the splendid civilization of 5000 years in China, jade culture is an important part of it. Together with silk culture, tea culture and porcelain culture, it forms the spiritual and cultural treasure house and symbol of the Chinese nation.

Jade culture is unique to China, although other countries also produce jade, but no country has as long a history of development as China. But even in the present, jade still has infinite vitality. Jade is a vivid symbol of the Oriental national spirit, which contains profound cultural connotation. We can see the profound historical connotation of Chinese culture in jade.

Jade is the creation of heaven and earth, the gift of nature, condenses the elite of mountains and rivers, the exquisite of humanity. It is a treasure left behind by geological activities, and is the most beautiful work of Mother Earth, with great artistic research value. Its beauty should be discovered by more people. In the face of the reality that people's attention to jade has gradually decreased in recent years, I think I should exert my professional knowledge and try my best to reverse this situation.

Problems encountered in the development of jade industry

Jade consumption is still in the more traditional stage, the industrial chain is not complete, the local brand scale is small, the industrial development momentum is weak, and the jade industry and market need to be cultivated. Due to price, publicity techniques, stereotypes and other factors, the overall age of the jade audience is relatively high, and contemporary young people rarely pay attention to, appreciate, and play with jade.

At present, China's jade brand and publicity design are still in the traditional aesthetic, the style is backward and

outdated. The information content covered is not comprehensive and in place, often only for a single variety or brand, and the lack of actual landing application and online publicity, and the Internet information age and modern aesthetic gradually derailed.

Due to the huge system, complex content, high degree of professionalism, and wide scope of involvement, the design and publicity of this field at home and abroad tend to stagnate. Especially for the systematic arrangement of jade knowledge system and information visualization design, there are few cases that can be queried.

Jade industry status quo development of new demand

China's jade market product marketing model is aging, the publicity is not in place, and the audience mobility is weak. In the era of high popularity of the Internet and information explosion, in the face of new information media, how to break through the constraints of the traditional jade industry and seek a more effective way of publicity is an imminent problem for the jade industry.

The lack of jade knowledge has led to a high consumer entry threshold, and it is difficult for young people to become interested in jade products. At present, the jade industry urgently needs to attract new customer groups, and the premise of purchasing behavior must be that the public has a basic understanding of jade, at least to understand the types of jade, advantages and disadvantages, prices and cultural connotations behind. Therefore, through information design, these various and complicated information is expressed and conveyed in the form of art design, and the public's cognition of jade is not only the development and inheritance of Chinese jade culture, but also a very good way to publicize jade products.

Preliminary planning of jade infographic

People's understanding of the current situation of jade stereotype

According to my preliminary research, most people hold a wait-and-see attitude towards jade, believing that jade belongs to "luxury goods" and is a product that the middle class and above will only buy. But in fact, jade prices are also high and low, and not all jade products are very expensive. The price of jade is mostly determined by its quality, of course, it does not rule out the existence of a premium, among which there are also affordable products acceptable to ordinary people.

Existing problem

At present, jade products are still relatively small, and the visual style of domestic jade brands is old-fashioned, outdated, and the product is single and has no characteristics. Most of the domestic jade brands are luxury goods, tourist souvenirs, rare collections of the route, the price is expensive. Only responsible for sales, not responsible for popular science, not suitable for promotion among young people, and lack of supporting knowledge system. Most of the sales forms are local direct sales, each producing area has its own independent publicity methods and arguments, the information between the producing area and the producing area is relatively closed, and there is no good connection between various jade varieties. The jade market is uneven, and even the merchants themselves do not have a deep understanding of jade, only to enter the industry for profit.

Most of the promotional content of jade products pay too much attention to the carving process and processing methods, the pursuit of exquisite decoration, but ignore the material and natural beauty of the jade itself, as well as the cultural value contained behind the excavation of jade.

Chinese jade infographic content assumption

Creative source

In the process of daily purchase of jade products, I often find a variety of novel varieties, when I want to

obtain more information related to it, but I do not know how to search, compare. Only some text descriptions on the Internet are difficult to correspond with the actual jade products, and because there are very similar characteristics between various jade, it is difficult to determine the specific varieties. If this information is displayed in visual form, it will be more intuitive, easy to find, and the accuracy will be improved. Therefore, I came up with the idea of designing this jade infographic.

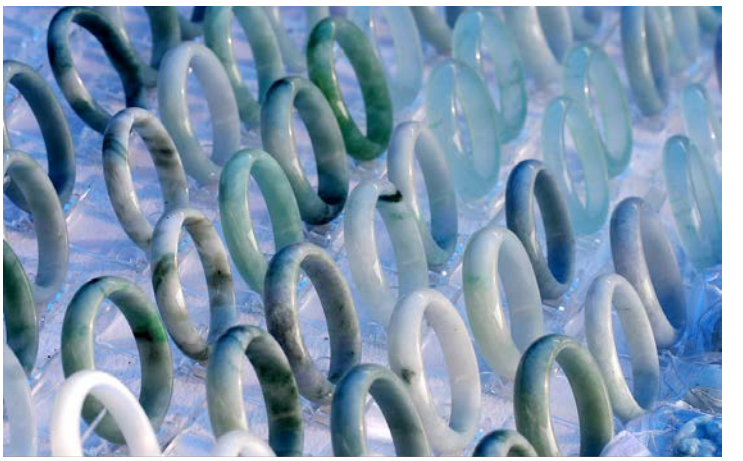

Figure 1. Different varieties of jade bracelets

Design objective

Combining traditional and modern design techniques. From the surface to the inside, from the shallow to the deep, with a variety of media extension design to assist the display of the main infographic. Explore more possibilities, expand social influence, and achieve certain social benefits.

The creation idea of jade infographic

Audience group analysis

Direct audience

The target audience of this work is young people and those who do not know jade. They belong to the potential consumer groups of jade, as long as they seize their unique cultural pursuit psychology, they can be transformed into the actual user group. Young people have a higher acceptance of modern design aesthetic style, so the style of this design tends to a flat fashion sense, hoping to attract young people and all those who do not know jade through visual design, so that jade is popular.

Indirect audience

Jade product sellers, and people who have some understanding of jade and have made purchases. At present, the domestic jade sales, involving the jade quality, cultural knowledge and other information dissemination methods are mostly word-of-mouth, or information flow software, related websites, books and so on. It is difficult for audiences to access information, information is fragmented, and there are no courses related to this. Especially in the current information age, people's time allocation has become fragmented, and fewer and fewer people can understand a thing in a large period of time, and the form of a chart covering all information can just meet the needs of this part of people. Therefore, this set of design can help merchants to publicize the advantages of jade to their customers, and consumers can learn jade knowledge more systematically through this infographic.

Affective orientation



Figure 2*. The material language of jade*

The appearance of jade is composed of multiple factors, such as shape, color, texture, texture, light and shadow, smell, etc., which are the media of people's induction, and these induction are derived from human's survival experience consciousness. The interpretation of material language is influenced by national, cultural, subconscious, climate and other factors, and each kind of jade can convey different feelings to the audience.

In the process of buying jade, people often value the "eye edge", which is actually a purchase decision made after a comprehensive judgment of the jade material information and their own liking. Jade, like people, has its own sex and appearance, and we can develop and extend more interesting forms of expression according to this characteristic. Such as claiming jade according to their own personality, online interactive quiz, test what kind of jade you are, etc., so that users have a sense of belonging, thereby increasing user stickiness.

China is not only the first country to use and mine jade, but also carries a thousand years of ancient jade culture, in the current era of vigorously promoting cultural self-confidence in the whole society, jade should also be valued. It is hoped that through this set of design, viewers can bring a new understanding of traditional culture, wake up the ancient jade culture, and strengthen our national pride.

Style orientation

The work has an overall stylish, fresh visual style that contrasts with traditional themes. It does not adhere to the inherent impression of elegance and nobility, and does not pursue the retro and complicated decorative patterns, but integrates them into the modern art style.

"Circle" is the form symbol of the Chinese nation, the circle means reunion, completeness, unity, nature, harmony, perfection. Therefore, the ancient jade products such as jade dragon, jade plate, jade bracelet and so on are mostly round, and the corners are polished to be round and smooth, which also symbolizes the gentle and modest quality of a gentleman. Therefore, in this design, more circular elements and rounded corners will be used to avoid sharp corners as much as possible. Logo graphics and subdivided small ICONS use geometric arc cutting form, the overall style is simple, more in line with modern aesthetic, easy to attract contemporary young people interested in jade.



Figure 3. Jade appreciation method -- graphic design

A narrative study of jade infographic

Two basic ways of telling a story

For thousands of years, visual design, as a discipline of conveying information, has actually been undertaking the task of telling stories, namely narrative.

Narrative methods can be divided into text narrative and visual narrative. Visual narrative also includes color, graphics, images, images and other ways. Through a variety of ways and media, we complete the process of conveying information to the audience, which is visual design. Information visualization design is a kind of visual design. For information visualization design, this feature is more obvious. It can be said that information visualization design is actually the arrangement and combination of a variety of narrative ways, and the combination of graphic and text is the most common way of information expression.

Analysis of different narrative modes

Text narration

As one of the most basic expressions of human beings, writing has always undertaken the functions of recording, communicating, exchanging and sharing. It is also the simplest and easiest way of telling a story. Therefore, in the information visualization design, text occupies an indispensable position. No matter how vivid the image is, it can not avoid the deviation in understanding 100%, and the text can narrow the gap in people's understanding of a work to the greatest extent.

Color narrative

Color narration belongs to visual narration, which uses the coldness and collocation of colors to interpret the overall temperament or mood of a work. Color is a kind of perceptual narrative mode. By mobilizing people's senses, viewers can develop more imagination of the works, so as to complete a richer understanding process and obtain some additional information.

Graphic narrative

Graphics and images are different, graphics is a kind of abstract symbol, he will simplify the complex image, abstract, shorten the gap between understanding and reality. It Outlines what an image can convey, but is faster and has a memory point.

Image narrative

Image is the most intuitive way of narration. It restores reality, and there is no threshold of understanding, that is, people of any age, any education, and any region can obtain similar information through images, and it shortens the distance between people and regions. And compared with the text, the image brings a hundred times stronger shock and impact.

Summarize

Information visualization design is to disassemble, reconstruct and finally present a theme and a story to the viewer in a kind of graphic language. It can make the complicated narrative concise and clear, and shorten the path between the viewer and reality.The jade story is presented in the way of information visualization design, taking into account the accuracy and vividness of information, which is undoubtedly a very appropriate and advanced expression in visual design.

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The evolution and innovation of Chinese handicrafts in the context of intelligence

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Abstract
The Evolution and Innovation of Chinese Handicrafts: A Perspective on Intelligence. Chinese handicrafts, integral to traditional culture, confront the dual challenges of market competition and technological erosion. This paper explores the extensive application of artificial intelligence technology, uncovering the digital transformation underway in handicrafts. Artificial intelligence not only infuses new creativity into handicrafts but also propels innovation, fostering diverse and forward-looking aesthetic trends. Examining the aesthetic trends and narratives of handicrafts through the lens of artificial intelligence, the study delves into the interaction between craft aesthetics and cultural identity in the digital era.

Author keywords
Handicraft, artificial intelligence, digital creation

Craftsmanship and artificial intelligence: the fusion of tradition and transformation in the digital age
As the embodiment of traditional Chinese culture, handicrafts bear the unique craft traditions of families and regions, conveying the spirit of craftsmanship and a commitment to detail. This substantive expression not only preserves skills but also documents diverse local folk customs and traditions. However, facing modern challenges, handicrafts are gradually losing the attention of the younger generation and are threatened by the dual pressures of market competition and technological loss.

With the widespread application of artificial intelligence technology, handicrafts are undergoing a digital revolution. Artificial intelligence not only injects new creativity and vitality into handicrafts but also brings all-encompassing innovation to the entire industrial chain. The art market in the digital age has become more open and inclusive, providing artists and designers with additional platforms for display and promotion. Simultaneously, artificial intelligence technology offers designers powerful creative support through in-depth analysis of design data, driving innovation in handicrafts and art design.

In the era of digital creation, designers and craftsmen are actively utilizing artificial intelligence technology for digital creation, seamlessly integrating traditional handicrafts with modern technology. The application of technologies such as generative adversarial networks enables the generation of unique and stunning works of art, with real-time interaction with the artist's creativity. This method of digital creation not only provides artists with more space for experimentation and exploration but also imbues artistic works with richer layers and

expressions.

Combined with virtual reality technology, artificial intelligence creates a new immersive experience for the display of art and handicrafts. Through intelligent algorithms, users can personally experience works of art in a virtual environment, promoting the digital development of art display. This immersive art presentation not only makes the artwork more interactive but also enriches the emotional communication between the audience and the artwork.

The widespread application of artificial intelligence technology has brought unprecedented opportunities to handicrafts. By providing innovative tools and methods, more efficient and precise support for the production process, and introducing new possibilities for cultural inheritance and education, artificial intelligence injects new creativity into handicrafts and propels the development and evolution of traditional handicrafts. This deep integration of digital and handicrafts will shape the new appearance of future culture.

Artificial intelligence and digitalization: challenges and opportunities for traditional Chinese handicrafts

With the rapid evolution of digital technology, traditional Chinese handicrafts are undergoing profound and complex changes. Digitalization has introduced revolutionary methods for the creation and production of traditional handicrafts. The integration of machine learning, artificial intelligence, virtual reality, and other technologies provides craftsmen with a more accurate and efficient creative platform. Although digitalization has facilitated the globalization of the handicraft market, it also presents a series of challenges.

The application of digital technology has refined and complexified the design of handicrafts, enhanced production efficiency, and diversified and enriched aesthetic expression. However, mass production and mechanization may result in the homogenization of handicrafts, leading to the loss of their unique cultural value. The ascent of digital promotion methods has contributed to the gradual decline of traditional sales channels for handicrafts, necessitating that traditional craftsmen adapt to online sales mechanisms. The rapid development of digital technology has also imposed new skill requirements on craftsmen, demanding proficiency in various areas such as digital tool operation and digital media marketing.

To achieve the prosperity and innovation of traditional handicrafts in the digital age, it is essential to flexibly apply digital technology and reconsider the value and development direction of handicrafts. Digital protection and inheritance are crucial measures to address the decline of traditional handicrafts in the context of the digital age. Digital technology can be applied in various aspects, including the archiving and recording of handicrafts, design and innovation, production and sales, as well as inheritance and education. Although digital protection and inheritance face a series of challenges, a comprehensive consideration of factors such as technology, culture, and the market can help identify a path that not only preserves the uniqueness of traditional handicrafts but also promotes their integrated development in contemporary society.

Aesthetic trends and narratives of handicrafts from the perspective of artificial intelligence

In the contemporary wave of digitalization, the intersection of artificial intelligence technology and handicrafts is bringing about profound aesthetic changes and narrative innovations. Artificial intelligence provides unprecedented creative support for handicraft design through big data analysis and deep learning. The application of algorithms can not only quickly capture art trends and user preferences but also inject more

uniqueness into handicrafts through the use of generative adversarial networks, promoting the diversification and forward-looking nature of aesthetic trends. However, this has also triggered a series of controversies about whether digital design will weaken the traditional manual creation method of handicrafts, whether the technology behind digitalization is contrary to the purity of handicrafts, and whether digital tools have changed the originality of handicrafts, which requires in-depth discussion.

In terms of storytelling, artificial intelligence brings a more intelligent and engaging narrative experience to crafts. Through natural language processing and machine learning, artificial intelligence can analyze large amounts of text and image data to inject deeper and more layered elements into the narrative of craftsmanship. Digital design tools have also enriched the narrative expression of handicrafts, and virtual reality and augmented reality technologies allow audiences to more intuitively participate in the stories of handicrafts. This change in narrative style not only enhances the cultural inheritance of handicrafts but also brings a more immersive artistic experience to the audience.

Therefore, the aesthetic trends and narratives of handicrafts from the perspective of artificial intelligence have experienced digital innovation, injecting new expression forms into the design of handicrafts and promoting closer interaction between the audience and the works. However, whether digital means are contrary to the essence of handicrafts and whether they will damage the traditional values of handicrafts still require in-depth thinking and discussion in the digital age. This fusion of aesthetics and technology is both an opportunity and a challenge, shaping the unique position of handicrafts in future cultural development.

The interaction between craft aesthetics and cultural identity in the digital era

In the digital age, the interaction between craft aesthetics and cultural identity becomes increasingly rich and complex. This interaction presents new trends in multiple dimensions, injecting vitality into traditional craftsmanship while also bringing forth a series of challenges.

Firstly, the widespread application of digital technology provides unprecedented possibilities for innovation in craft aesthetics. Advanced technologies such as computer-aided design, virtual reality, and artificial intelligence offer craftsmen and designers a more flexible and efficient creative platform. This not only pushes the aesthetic boundaries of traditional handicrafts but also elevates the craftsmanship to a more exquisite level in the design and production of handicrafts. The use of digital tools allows artists to experiment with new forms and materials in virtual space, promoting the continuous evolution of craft aesthetics.

Secondly, digital craft aesthetics have triggered global cultural exchanges at the level of cultural identity. Digital platforms provide craftsmen and artists with the opportunity to communicate directly with global audiences. Traditional cultural elements are integrated into the design through digital means, creating handicrafts with a contemporary flavor. This cross-cultural integration not only promotes the inheritance of traditional culture but also provides new ways for the diversification of cultural identities.

However, the digital age also brings forth controversies and challenges. With the widespread application of digital technology in design and production, some voices are increasingly worried about the homogenization of handicrafts and the loss of traditional spirit. The traditional hand-made process emphasizes the skills and intentions of the craftsmen, but the popularity of digital technology may cause these unique skills to be gradually

diluted.

Therefore, in the digital age, we need to balance the innovation of craft aesthetics with the protection of traditional culture. This balance requires precise guidance in the application of digital technology and a focus on the inheritance and innovation of cultural identity. At the same time, we also need to think about how digital technology can be better combined with the traditional creative method of handicraft to ensure that the uniqueness and profound cultural connotation of traditional crafts can continue to be passed down in modern society. This kind of exploration and dialogue will provide a broader space for the development of craft aesthetics and cultural identity in the digital era.

Conclusion

This article explores the evolution and innovation of Chinese handicrafts in the era of intelligence. Traditional handicrafts face the dual threats of reduced attention from the younger generation and loss of technology. However, the widespread application of artificial intelligence has injected new vitality into handicrafts. Under the trend of digital creation, designers and craftsmen use artificial intelligence to innovate. Digital technology provides opportunities for handicrafts but also brings challenges such as homogeneity and skill level requirements. Artificial intelligence changes aesthetic trends and narratives, making crafts more unique. In the digital age, the interaction between craft aesthetics and cultural identity is rich and complex. Balancing innovation and traditional protection is necessary to ensure the continued inheritance of handicrafts in modern society.

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Application of New Materials in Contemporary Clothing Design from the Perspective of Smart Wearables

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Abstract

Smart wearable devices represent a new genre of clothing that integrates cutting-edge technologies from various disciplines, such as electronic information technology, biomedical technology, and nanotechnology. They enable intelligent interaction with the human body and the environment, offering a personalized, multifunctional, and comfortable wearing experience. This paper explores the application and significance of new materials in contemporary clothing design from the perspective of smart wearables. It aims to provide insights into fostering integration and innovation between smart wearables and contemporary clothing design.

Author keywords

Smart wearables, Clothing design, Materials, Functionality

Introduction

Since the beginning of the 21st century, digitalization, mobile internet, and artificial intelligence technologies have matured, ushering in a new era of transformation for human society. Contemporary clothing design is undergoing a technological revolution and facing sustainability challenges. Smart wearable technology, along with the application of new materials in clothing design, has become a hot topic in both academia and industry. Supportive policies have promoted industry development, labor markets have catalyzed usage demands, and technological innovations have driven product optimization. Policies related to industrial smart wearables established industry and technology standards within the first five years starting from 2017, defining key development areas. With the revival of the Chinese economy, supportive policies for smart wearables are entering an accelerated implementation phase.

1.1 Definition of Smart Wearable New Materials

The concept of smart wearables was introduced by the MIT Media Lab in the 1960s. Smart wearable clothing refers to innovative products that combine artificial intelligence, cloud computing, the Internet of Things, and other technologies with garments to enable digital technology to sense, interact with, and provide feedback on human body status and environmental information. Smart wearable new materials refer to novel fiber materials

with specific functions or properties, such as conductive fibers, color-changing fibers, and biomedical fibers. The emergence of these new materials offers new possibilities and challenges for contemporary clothing design, providing consumers with more choices and experiences.

1.2 Design Value of Smart Wearable New Materials

The application of smart new materials plays a vital role in contemporary clothing design. They not only enhance the performance of clothing, making it more durable, washable, waterproof, breathable, and insulating but also improve the structure and silhouette of clothing design. Moreover, they emphasize environmental friendliness and fashion. The design value of smart new materials lies in:

(1) Enhancing quality of life, making life more convenient and comfortable while achieving intelligence.

(2) Advancing modern medicine by integrating electronic, information, and biological technologies into wearable devices, providing more diagnostic information for doctors.

(3) Driving technological innovation, not only promoting technological innovation but also providing inspiration and scientific basis for future technological development.

2 Application of Smart Wearable New Materials in Contemporary Clothing Design

2.1 Cutecircuit: T-shirt that Embraces and Feels Sound

Cutecircuit invented the world's first haptic communication smart wearable clothing, the Hugshirt, in 2002, aimed at meeting human needs for connection and intimacy. It was named one of Time magazine's best inventions in 2006. The Hug Shirt embeds sensors that capture the intensity, duration, and location of touches, while actuators recreate the sensation of touch. There are no wires in the clothing, and all conductive paths are seamlessly integrated into the fabric using woven conductive textiles.

2.2 Hexoskin: High-performance Sportswear with Integrated Physiological Monitoring

Hexoskin smart clothing provides real-time, accurate health data by integrating various physiological monitoring functions, helping users better understand their physical condition and performance.

Hexoskin smart clothing uses special conductive fibers and biometric sensors to monitor physiological indicators such as heart rate, respiration rate, calorie consumption, and sleep quality in real time. To ensure data accuracy, these sensors are cleverly embedded in critical areas of the clothing, closely adhering to the wearer's skin. Additionally, the electronic module has waterproof and interference-resistant capabilities, maintaining stable performance during washing and daily use.

2.3 Teslasuit: Smart Clothing with Full-body Haptic Feedback, Motion Capture, and Physiological Monitoring

Teslasuit is an innovative smart clothing that combines full-body haptic feedback, motion capture, and physiological monitoring.

(1) Full-body haptic feedback: Teslasuit provides full-body haptic feedback to the wearer through a technique called Electrostimulation. This technology applies a weak electrical current to muscles, simulating various tactile sensations such as touch, massage, and impact.

(2) Motion capture: Teslasuit incorporates motion capture functionality through an array of built-in sensors, including Inertial Measurement Units (IMUs) and voltage sensors, which monitor the wearer's body posture, speed, and acceleration in real time.

(3) Physiological monitoring: Teslasuit also features physiological monitoring capabilities, detecting the wearer's

heart rate, respiration rate, skin temperature, and other physiological parameters in real time. These data can be used for analyzing the wearer's health status and performance, providing a basis for personalized health management and training programs.

2.4 Coperni: Sprayable Clothing Technology with Biodegradability and Recyclability

One of the most remarkable pieces in the Coperni SS2023 collection is a white dress created by spraying a liquid fabric onto a model in real-time. This dress was sprayed from scratch in front of the audience using a sprayable technology developed in collaboration with Dr. Torres and his team at the London BioScience Innovation Centre. The technology utilizes a sprayable fiber that quickly solidifies into a fabric-like material upon contact with the skin. This fiber has excellent elasticity, breathability, and comfort and can be customized based on the model's body shape and posture. Additionally, this sprayable fiber is made from natural polymers, making it biodegradable and recyclable. Furthermore, this sprayable technology can reduce waste and pollution in the clothing production process.

3 Application Pathways and Challenges of New Materials in Clothing Design

The application pathways of new materials in clothing design primarily involve product research and development (R&D) and design innovation. In terms of R&D, the integration of smart wearable devices with technological new materials aims to develop highly intelligent clothing products that meet evolving market demands. Simultaneously, from the perspective of smart wearables, tapping into the innovative potential of technological new materials enhances the uniqueness of clothing design, offering consumers a fresh wearing experience.

However, achieving these goals presents challenges. First, there is the challenge of technological integration, which requires seamless integration of smart wearable devices with clothing to ensure aesthetics and comfort while delivering enhanced intelligence. Second, cost control is essential. While improving clothing performance and intelligence, optimizing design and manufacturing processes to reduce production costs is necessary for widespread product adoption and popularity.

Conclusion

In conclusion, the application of new materials in contemporary clothing design from the perspective of smart wearables holds tremendous potential and development prospects. In the future, we should continue to promote industry collaboration, fostering exchanges and cooperation between clothing design, new material technology, and smart wearable technology. Throughout this process, maintaining a commitment to environmental sustainability and sustainable development is essential. Attention to product lifecycle management will enable efficient resource utilization and environmental protection. As technology advances, the exploration of smart wearable new materials' application in contemporary fashion will lead to the best solutions that combine intelligence with humanity, scalability with sustainability.

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From play dress-up to virtual fashion: the expansion of digital clothing application scenarios

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Abstract

The shift in consumer perceptions of sustainable ethics and the rise of the meta-universe concept in recent years has led to a greater interest in digital clothing in the fashion industry. The paper points out that while digital clothing is well established in the field of game design with virtual representations and 3D design techniques, it has only recently been utilized as a digital production tool in the fashion industry. The thesis begins by reviewing the history of the development of clothing for game character roles and the focus on fashion systems in multi-user online games nowadays. It then provides a brief analysis of the trend of gamification in the fashion industry and concludes by stating that the boundaries between games and fashion are gradually dissolving.

Author keywords

virtual fashion, digital clothing, fashion industry, game design

Introduction

The coronavirus pandemic has further weakened the fashion industry amid ethical controversies over resource wastage and environmental pollution. To rid itself of such an unflattering social image and to seek a new way out for the industry's development, the fashion industry has opted for an active digital transformation（Särmäkari 2023). On the other hand, the gaming world embraced digital clothing much earlier. Digital apparel software such as Marvelous Designer and CLO3D, which are now widely used in apparel design and industrial production, have been used in the gaming industry for a long time. This facilitates the combination of fashion expertise with the gaming field and provides favorable support for the digital transformation of the fashion industry. In terms of theoretical research, scholars have already noted the connection between fashion and games. Thomas Makryniotis (2018) argues that digital clothing serves as a vehicle for identity, performance, and commerce and that it has the potential to be a strong link between the world of electronic entertainment and the world of fashion. Lanjun Qin (2020) argues that virtual fashion is a cultural and industrial phenomenon that emerges from the act of changing the appearance of graphic markers for games. Although this has been noted in existing studies, they have mainly focused on the study of game dress culture and the game industry. Second, in response to the current state of digital fashion in recent years, digital apparel is usually discussed only as a technological application. Therefore, based on previous studies, this paper will combine the development of digital apparel in the gaming field with the fashion industry, and briefly analyze how digital apparel for gaming breaks the

boundaries between the gaming and fashion industries.

History of Game Character Costume Development

The games industry has been an important part of the "digital revolution". They explored early on many of the paradigms that are now common in the interactive arts. These paradigms range from navigation and simulation to connected narratives, 3D world creation, and multi-user environments (Paul 2021).

Digital clothing, as a virtual product, disappears from its materiality and completes the essential change from fiber to bit (Qiaoling 2022). Typically, the inability to wear means the inability to experience. Users in the cyber world are unable to respond to the digital product by feeling the clothing product in basic ways such as touch, lacking the real experience of contact with the clothing fibers. Therefore, the visual representation through which the physical world's clothing is linked to the digital clothing on the computer screen is key to the thesis' review of the history of the development of game character clothing.

From 2D images to 3D graphics

With the development of computer graphics technology, game costumes have undergone a dramatic change from 2D images to 3D graphics in digital space. In the 1970s and early 1990s, the standard form of the medium was a flat 2D image, in which characters' costumes were mostly drawn by bitmap image editors (Makryniotis 2018). For example, the characters in *Gun Fight* (1975) used only one color, and character identities were depicted by pixel dots in the classic image of a western cowboy. In the latter 80s game *Super Mario Bros* (1984), the characters use multiple colors, and clothing and bodies are visually distinguished. *Contra* (1987) began to experiment with a three-dimensional representation of the characters, with the dots roughly divided into three sides in a flat plane, and a three-dimensional effect in a flat plane through the dark side, gray side, and light side. At the same time, the character details were emphasized in terms of muscle and clothing folds (Figure 1).



Figure 1. From left to right *Gun Fight* (1975), *Super Mario Bros* (1984), *Contra* (1987).

The game *Wolfenstein3D* was released in 1992, developed by the manufacturer id Software. Although the name of the game is 3D, it is not a true 3D game. Due to the hardware limitations of early computers, it was technically difficult to achieve true 3D, so to eliminate the large amount of computational work involved in 3D image processing, id Software utilized ray-rendering and texture mapping to make flat scenes look like 3D. the game's characters were more detailed than *Contra*, and the texture mapping allowed for a more realistic representation of the clothing materials (Figure 2). *Wolfenstein3D* was so visually stunning that major manufacturers began to transition their games from 2D to 3D.

Games generally began to adopt 3D modeling in the mid-1990s. in 1996, the first generation of *Tomb Raider* was released. At this time, 3D character modeling was quite poor, and technical limitations meant that clothing had to be modeled as part of the body and on the same surface as the character, rather than in separate layers. However,

as the sequels to this work continued to be released, the "edges" of the Lara Croft character were smoothed out, and a more human-like curvature emerged (Figure 2). 2003 saw the release of the massively multiplayer online role-playing game *Second Life*, which saw a huge step up in the level of modeling of the characters in the game. Hair was deliberately divided into multiple pieces rather than an entire polyhedron. Faces were no longer simply mapped; features and facial contours were sculpted. Clothing shows the material of the fabrics through decals. However, most of the garments were designed to be quite compact, as fabric simulation technology did not exist at this time, and despite visually mimicking the texture of the fabrics, they were still actually hard-surface objects composed of polygons (Figure 2). This factor has been limiting the practice of game clothing for a long time.



Figure 2. From left to right Wolfenstein3D (1992), Tomb Raider (1990), Second Life (2003).

Developed by a Korean manufacturer in 2009, the professional 3D garment design software Marvelous Designer makes it possible to use soft material simulation techniques, real-time garment animation, interactive design systems, and digital 3D cutting. It helps users quickly create beautiful virtual garments in the software and show the same effect as real fabrics. The software also allows for real-time costume modification and fitting. In the game *Assassin'sCreed2* (2009) produced by Marvelous Designer, the character's clothing can be produced with the character's movements and the natural movement of the fabric. The 3D clothing modeling really realized the material change from hard to soft. Not only that, but the visual representation of clothing fabrics has also improved considerably. Leather, metal, and fabric in the character show different material reflections, and leather is more difficult to wrinkle in motion than fabric (Figure 3).

Due to the continuous improvement of computer hardware function, real-time fabric simulation technology and mapping technology tends to mature, from *Devil May Cry 5* (2013) to *Red Dead Redemption 2* (2019) to *Resident Evil 8* (2022) the modeling performance of digital clothing is gradually stable. The game costumes perfectly display the draping, wrinkle effects, and details unique to various fabrics found in real clothing. Even the wrinkles and pores of the character's skin are represented in high definition(Figure 3) .



Figure 3. From left to right Assassin'sCreed2 (2009), Tomb Raider (2019), Resident Evil 8 (2022).

Fashion system in the game

In gaming, costumes can usually be divided into two main categories: those that are used purely to decorate the game character for visual aesthetic purposes. Examples include fashionable dress-up games such as *Spiral Waltz* and *Shining Nikki*, in which the player's task is to dress up a doll-like character as a representation of the off-screen player in the virtual world. The other category is used as props to upgrade or expand a character's abilities, as in role-playing games such as Fantasy Westward Journey and The Legend of *Zelda*. These types of clothing are presented to the player in the form of armor, headgear, shoes, etc., and are given attack values, defense, and other mechanics. However, with today's games emphasizing more on socialization as a feature, the distinction between the two types of costumes is blurring. For example, *Honor of Kings*, as a multiplayer online tactical competition game, does not mainly focus on dressing up, but there are also "fashion games" that deviate from the game genre. As a result, the fashion system has become a common aspect of many games today.

Purchase Methods

As the visual presentation of the game's character clothing becomes more and more sophisticated, game companies continue to introduce new character fashions. These fashions can generally be acquired in two ways: either by purchasing them directly from the mall, or by lucky draw (usually, the fashions obtained by lucky draw are of higher quality, rarer, and require more money to invest). If players want to have a unique appearance and gorgeous special effects to distinguish themselves from other players in the game, then they need to spend a certain amount of money to buy fashion. In-game purchases can be made with virtual currency, which can be obtained by exchanging real-world currency.

Product Promotion

Notably, the virtual fashion systems in these games largely mimic real-world fashion practices. They will follow the seasonal changes and launch different fashion collections, just like fashion companies in the physical world, as well as release themed outfits related to specific festivals (e.g. Chinese New Year, Halloween, etc.). In terms of advertising and sales, they will create promotional videos for upcoming new fashions and run pre-sale promotions a few days in advance. Unlike physical fashions, digital fashions do not sell out (unless the game company releases a limited edition) and are also non-returnable.

Purchase & Matching

While digital products are usually released in themed sets, they are also allowed to be purchased individually. Typically, set products include clothing, socks, shoes, and accessories, and they are tagged with different prices. This makes it easy for players to personalize their ensembles and choose what to buy. Players need this freedom because it is a means for them to show their uniqueness among the many players with similar appearances. Unlike physical world clothing, digital clothing cannot be judged by feeling the fabrics and cuts to determine their quality and price, but game companies usually categorize and price them. In the case of fashion dress-up games like *Shining Nikki*, for example, clothing is categorized into four grades: common, rare, extraordinary, and shining. The higher the grade, the higher the price and the finer and more visually appealing the costume is accordingly.

Signs of Nobility & Showcase Wardrobe

To promote player consumption, game manufacturers will give noble titles and privileges to players who spend a certain amount of money. For example, some games give free exclusive clothing to noble players, and even though these clothes may not be visually appealing, players still choose to wear them because they represent a status symbol. Meanwhile, the Showcase Wardrobe feature allows players to conveniently display their collection

of fashionable items. This interface is open to all players, and most players will choose to display their highest-quality digital clothing.

Forums & Blogs & Official Contests

Game forums and blogs have always been important platforms for some players to communicate and share their experience in fashion matching. Nowadays, many game manufacturers organize game fashion design contests, which greatly promote the participation of players. In such contests, the winners' designs are made into digital clothing merchandise. This provides a stage for gamers who specialize in game design and those who specialize in fashion design to compete together.

The line between fashion and gaming is disappearing

Fashion experience into game format

Gaming companies are leaving no stone unturned in expanding their gaming fashion systems, while fashion companies are actively providing more interactive experiences in the digital realm, developing it into a platform with gaming properties (Park, Jaehoon 2022). For example, luxury brand Balenciaga launched a fashion blockbuster called *Afterworld*: *The Age of Tomorrow* in the fall of 2021, which created a compelling and visually appealing advertising campaign with a unique futuristic style and video game format by simulating game scenarios and putting 3D digital models in new outfits.

There is also fashion software called *Drest* that combines gaming and shopping by allowing users to digitally try on physical fashion products and match them from makeup to clothing to jewelry (much like the fashion system in the game). The process of matching creates a desire to buy a product, thus combining entertainment and shopping. Fashion brands and software are incorporating gaming elements into the fashion experience, but the focus is not on the game itself, but on getting viewers to pay attention to the brand and the fashion product, engaging potential consumers in a more fun way.

Fashion products join game narratives

Purely digital fashion brands like The Fabricant offer customers a purely digital 3D clothing product. For these types of brands, the digital clothing, storyline, and digital experience are the final product in themselves （Särmäkari 2023). They create scenarios and themes that blend fashion design with animated movies, gradually refining and telling a complete and entertaining worldview through successive chapters. In this process, the clothing and the story become one, and the core of the clothing is the core of the story. In this way, the user's emotions are closely connected to the product and the brand, increasing user loyalty to the brand.

For example, in 2021 LOUIS VUITTON launched the brand game *LOUIS THE GAME* to celebrate the 200th anniversary of Louis Vuitton's birth. In the game, visual elements of the fashion brand, such as the name, logo, design, and colors, are constructed into a fairytale-like virtual world. Players can collect greeting cards with the brand's history, learn about the brand's story, and have the chance to win a digital clothing collection as they explore. This beautiful game skillfully incorporates familiar and fun brand experiences. By combining the story of a fashion brand with the game, players are enticed to voluntarily engage with the brand and hopefully become loyal consumers.

Integration of expertise among designers

The professional barriers between the gaming and fashion sectors are disappearing. Currently, in the game industry, most character art designers are proficient in utilizing Marvelous Designer for garment plate making. The modeler needs to design the garment layout, determine the division of the plate, connect the seams of the garment, as well as determine the position and articulation of buttons, zippers, and other parts. At the same

time, they need to consider how to present the fabric material of the garment in the digital environment, which requires a certain degree of expertise in garment design.In the gaming field, digital clothing technology has been developed and applied much earlier, and even in some aspects character art designers can do a better job than professional clothing designers. Conversely, in the fashion industry, today's costume designers need to learn specialized knowledge in the field of game design. This includes things like how to model a costume on the human body, understanding different mapping methods and principles to show the material of the fabric and lighting, and rendering the costume once it's finished, which were not originally part of the costume design profession.

Conclusion

The evolution of clothing for game character roles also reflects the evolution of digital clothing technology. This technology has experienced technological advances from 2D images to 3D graphics and changes from hard to soft materials. Nowadays, gaming companies increase their revenue by imitating real-world fashion systems (David Lang 2020) and enriching the players' gaming experience. At the same time, fashion companies have expanded the application scenarios of digital clothing through game formats, story narratives, and technological tools. In the past, the emergence of new technologies and tools in the development of game character costumes required designers to have certain expertise in the fashion field. Today, to master the tools of digital costume production, costume designers need to understand the basics of game design as well. It can be said that the boundaries between games and fashion are gradually disappearing.

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The "Chinese Artistic Conception" of Ceramic Product Design in the New Era

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Abstract

This study is based on the traditional Chinese philosophy of "Tao-Qi Concept", and analyzes the manifestation of "Chinese artistic conception" in ceramic product design in the context of the new era. Through design practices that involve material and craftsmanship innovation, intention expression, and emotional expression, this paper proposes a design method for "Chinese artistic conception. That is, conveying the Tao skillfully, creating things in accordance with the times, using literature to convey intentions and represent ideas, benefiting oneself and others, and embodying emotions in things. This method aims to enhance the quality of Chinese ceramic design and promote the concept of "delicious foods, beautiful utensils" by creating ceramic designs rich in "Chinese artistic conception" ,so as to tell compelling Chinese stories.

Author keywords

the New Era, Ceramic Product Design, Chinese Artistic Conception, Tao-Qi Concept

China has long been renowned worldwide for its ceramic, with kilns scattered throughout the country. A lump of clay shaped by skilled hands and refined by meticulous craftsmanship, so ceramics bear witness to the trajectory of civilization. The grandeur of the Qin and Han, the opulence of the Tang , the elegance of the Song , and the intricate details of the Qing Dynasty all left their marks.(Ye Zhemin 2006 7) The laboring people endowed Chinese ceramic culture with unique charm using their creative wisdom in different historical periods. However, influenced by the traditional Chinese philosophy of "Tao and Qi", ceramic culture has long remained in a "physical" position. With the continuous development of the artistic craftsmanship ideology, creators have sought the fusion of material and spirit while pursuing the unity of ceramic functionality and aesthetics.

I. Ceramic Design and "Chinese Artistic Conception"

Artistic Conception and "Chinese Artistic Conception"

The theory of "artistic conception" traces its origins back to ancient China, specifically the Daoist theories of "speech, image, and meaning" from the pre-Qin period. In the Chapter 56 of *Laozi*, "Those who know do not speak; those who speak do not know." In the Autumn Water of *Zhuangzi* suggests, "What can be spoken of is not the constant Tao; the names that can be named are not the constant names." Here, "thing" represents the image, which exists between speech and meaning, with speech below the image and meaning above it. This forms the theoretical basis for *Zhuangzi*'s notion that the Tao cannot be conveyed through words and that the great image

is formless.

Wang Changling, the Tang Dynasty poet, was the first people who use the term "artistic conception" in his work Shi Ge and introduced the idea of "poetry having three aspects - the object, the emotion, and the artistic conception." By the Song Dynasty, the prominent literary figure Su Shi wrote in *Dongpo's Notes on Painting*, "tasting Mojie's poetry, you will find paintings within them; observing Mojie's paintings, and you will find poetry within them." This laid the theoretical foundation for literati painting, integrating artistic conception from poetry into Chinese painting. The "Four products" in painting after the Song Dynasty placed "Leisure products" at the forefront, making artistic conception a necessary condition and evaluation criterion for top-tier artworks.

Mr. Zong Baihua defined "artistic conception" in his article *The Birth of Chinese Artistic Conception* as the crystallization of "emotion" and "imagery". In artistic expression, emotion and imagery blend and interpenetrate, giving birth to fresh imagery and opening up new realms for the world.(Zong Baihua 1981 70) For a long time, the theory of artistic conception was included in to the field of Chinese painting, with minimal mention in other art disciplines. The renowned painter Wang Mingming incorporated "Chinese artistic conception" into his work, through an analysis of the "perceptive" characteristics of artistic conception, combined with its relationship with era and theme, expressed concerns about the future development of modern Chinese painting.(Wang Mingming 2016 5) As Chinese culture has increasingly spread worldwide, the theory of the "Tao" has been widely accepted by Western societies, and the concept of "Chinese artistic conception" has become a topic of interest as Chinese paintings, dances, dramas, and films are exported. Some scholars have suggested that "artistic conception" and phenomenology's concept of "The World" has commonalities, particularly in terms of their connotations related to unity of subject and object, inherent intuitiveness, and emergence and flow. (Cao Shunqing,Cao Yifan 2019 450) Some scholars have proposed, "For socialism with Chinese characteristics to provide theoretical support for the Chinese path, it needs to inherit the Chinese context, establish a Chinese historical context for research, and consolidate Chinese artistic conceptions in terms of theoretical value."(Zhang Liqin 2008 4) "Artistic conception" has become a global concept, and in the context of the current new era, it is necessary to propose Chinese artistic conception with distinct contemporary characteristics.

The Ceramic Culture of "Harmonizing Tao and Qi"

The traditional Chinese philosophy of "Tao and Qi" is first found in the Xici Shang section of the *Zhouyi* (Book of Changes), which states "The formless is called Tao; the formed is called Qi." The ancient Chinese "Tao and Qi" philosophy reflects contemplation on the relationship between humans and objects, as well as objects and nature. Tao, in its formless state, exists on the experiential level of craftsmanship and the spiritual level of creative thought. Therefore, ceramic culture is not merely a culture of objects; it should be a culture of "harmonizing Tao and Qi."

The process of ceramic product design involves the interaction of many elements such as people, time, space, material, tool, and cultural environment. Firstly, ceramics production is inseparable from materials, as stated in the *Kao Gong Ji* (Records of Examination of Craftsmen): "Heaven has its time, Earth has its energy, materials have their beauty, craftsmen have their skill. Only four elements are combined can excellence be achieved."(Wen Renjun 2008 4) It emphasizes that creating fine objects depends on the synergy of timing, natural conditions, high-quality materials, and exquisite craftsmanship. This reflects how objects are harmonized with the time, natural conditions, materials, and craftsmanship. From a lump of clay and a pot of glaze, different ceramics are created under changeable temperatures and humidity levels, showcasing the creator's reflections and understanding of nature. Secondly, ceramic production techniques involve the flexible application of materials and nature. "Skillfully conveying the Tao" elevates perceptible skills to the level of the "Tao" and represents the emotional expression of creators using materials, harnessing nature, and demonstrating exceptional

craftsmanship in crafting objects. Thirdly, people are the creators and users of ceramic objects. The relationship between people and ceramic objects should always be led by humans, with people using ceramic objects to facilitate their lives and making the best use of these objects. Otherwise, it may lead to a loss of focus on one's goals, as the saying goes, "playing with objects leads to a loss of ambition" (from the *Shangshu Zhou Shu Lu Tuo*). Today, ceramic production has undergone significant changes with the mechanization and automation of the technological revolution. Traditional handmade ceramic processes are gradually being replaced by machine production. How to showcase the uniqueness of Chinese ceramic culture in today's era of technological change and Western cultural invasion? How can the "Tao and Qi" philosophy of ceramic design adapt positively to the development of contemporary society in the new era? These questions have triggered contemplation on the "Chinese artistic conception" in ceramic design.

II.Chinese Artistic Conception" Ceramic Design Practice

In recent years, I have led my design team to create more than ten sets of ceramic product designs. Since I entered the field of ceramic design somewhat unexpectedly, I subsequently incorporated the style of Chinese painting into artistic expression, aiming to convey the "Chinese artistic conception" in ceramic product design practice. This article selects three design works as examples: the "White vase series - Nian Ci," the "One Leaf, One Boat" tea set, and the "Landscape" tableware set. These examples illustrate three level design approaches of "Chinese artistic conception" in ceramic product design, which will provide methods and experiences for researchers and designers.

Traditionally, daily-used ceramic products have dominated the majority of the market share, while innovative design products have been limited to niche consumers. Therefore, we aim to explore new aesthetic styles from traditional culture and ceramic craftsmanship to express the "Chinese artistic conception." Traditional aesthetics involve not only literati aesthetics but also the important values of popular culture. While we recognize the value of traditional elite culture, we also respect traditional popular culture. The following three cases are based on these principles of design.

Ceramic Form Design Based on Craft Innovation



Figure 1. White vase series- Nian Ci

The "White vase series- Nian Ci" (Figure 1) was my first transition from Chinese painting creation to ceramic design. Its design concept is to express the "Zen" and I have innovated the design in terms of materials and craftsmanship. Initially, apart from the unique form, I considered other approaches: one was to use composite materials to express the form, and the other was to use floral paper decoration. Composite materials could easily achieve the desired form and were a prevalent trend in ceramic product design at the time. However, after my research, it is difficult to achieve innovation in production and cannot guarantee the long-term durability of the product. Floral paper design was the most intuitive way to express the idea, and the transition from painting to graphic design was relatively smooth. But it goes against the original intention of trying to break through my comfort zone.

Ceramic product design differs from art creation; it corresponds to a product that needs to pass inspection on a factory assembly line. The biggest challenge during the production of "Nian Ci" was coordinating with the factory. Due to the innovative "clasped hands" form, the yield rate on the production line was exceptionally low. I consulted over ten factories in Jingdezhen with my design, all of them rejected the project. After much effort and research into the porcelain-making processes in four major ceramic-producing regions in China, we finally found a factory in Tangshan that can produce. Initially, the yield rate for the main teapot of "Nian Ci" was only 10%, so I think it would be a failed design. The turning point came when I repeatedly examined the reasons for the low yield rate with the factory's technical workers and calculated the angles of the support structures and the bone powder ratio in the clay slurry based on the temperature of each kiln position. By employing some interdisciplinary knowledge, we made numerous minor adjustments and experiments in the details, and gradually increasing the yield rate to 90%.

For a product, increasing yield rate and mass production do not signify the completion of the design. With users' feedback received through sales channels, I discovered design issues with "Nian Ci". Firstly, the tea set had a strong sense of form ,so sacrificed its functional utility. While it could be displayed as an art piece on a shelf, as a Gongfu tea set, the method of handling the teapot lid posed many inconveniences to tea drinkers. Secondly, the design excessively pursued breakthroughs in form, resulting in significant costs in production. Not only did the research and development cycle been three times longer than expected, but it also increased production costs invisibly. Consequently, the market price exceeded the level of mass consumer affordability, making it a luxury item for a niche group, and it couldn't achieve the expected dissemination and popularization effect.

The 'Nian Ci' tea Set has received over ten awards, but beneath these accolades, several issues have come to light: Firstly, winning competitions do not equate to market recognition. While these honors represent academic recognition, they haven't received positive feedback in the market. Secondly, the product boasts a unique and novel design, although it can catch eyes, functional defects are still the "hard wound" of the product but its functional shortcomings remain a significant drawback. Thirdly, ceramic product design should place greater emphasis on the cultural connotations of the product itself, the types of tea associated with Gongfu tea sets, the brewing method, as well as Gongfu tea culture, Lingnan culture, and so on. Design should originate from culture and content, rather than prioritizing form to merely seeking attention.

Creative Design Based on Imagery Expression



Figure 2. One Leaf, One Boat

People's desires, dissatisfactions, aspirations, and dreams related to craftsmanship in design always intertwine with aesthetic needs and expressions, evolving over time, and are conveyed to individuals through the outcomes of design. (Li Zhengan,Wang Hede 2018 19) After summarizing many issues with the "Nian Ci" tea set, my aesthetic and craftsmanship understanding of daily-used ceramic products changes, and I began to focus on image expression. "One Leaf, One Boat" (Figure 2) is a set of personal tea wares, with a more targeted audience in mind. According to market research, I have found that the consumer group of tea sets is showing a trend of niche and private customization, with a trend of "tea duels" emerged. "Tea duels" are not a new concept; they were quite popular as early as the Northern Song Dynasty. In addition to comparing leaves and brewing level (during the Tang and Song Dynasties, it involved cooking tea), these duels also involved comparing tea utensils. The best tools for tea drinking have always been either purple sand or ceramic. Due to the scarcity of purple sand resources and limitations in color and form, ceramic tea wares becomes dominant. The design of the 'One Leaf, One Boat' tea set was influenced by popular TV series at the time, such as Lang Ya Bang, Hua Qian Gu, and Kung Fu Panda. Drawing from Sigmund Freud's psychoanalytic theory and Jacques Lacan's mirror theory, combined with childhood memories, I proposed the idea that influenced by traditional Chinese culture, there is a 'hero' living within every Chinese person. The character images of heroes in popular costume dramas and martial arts films, as well as the depictions of heroes in tea ware, can evoke the audience's innermost feelings.

The "One Leaf, One Boat" tea set consists of a lid, tea cup, teapot body, and tray assembled from top to bottom. When assembled, it resembles Mei Changsu (the protagonist of the TV series Lang Ya Bang), who wears a hat, a cloak over the shoulders, and a bamboo flute at the waist. The challenge in designing this tea set was the materialization of intention. Precise control of dimensions and proportions during 3D modeling was crucial, as any slight deviation could affect the 'hero's' demeanor and the user's grip when using it. Simultaneously, it needed to satisfy the proportion of the teapot and teacup capacities, all of which required meticulous calculations. The depiction of the hero's image on ceramic tea wares resonated with the spiritual needs of the target audience while fulfilling their functional requirements. The "One Leaf, One Boat" tea set has received positive market feedback.

Ceramic Product Design Based on Emotional ExpressionPeople's desires, dissatisfactions, aspirations, and dreams related to craftsmanship in design always intertwine with aesthetic needs and expressions, evolving over time, and are conveyed to individuals through the outcomes of design. (Li Zhengan,Wang Hede 2018 19) After summarizing many issues with the "Nian Ci" tea set, my aesthetic and craftsmanship understanding of daily-used ceramic products changes, and I began to focus on image expression. "One Leaf, One Boat" (Figure 2) is a set of personal tea wares, with a more targeted audience in mind. According to market research, I have found that the consumer group of tea sets is showing a trend of niche and private customization, with a trend of "tea duels"

emerged. "Tea duels" are not a new concept; they were quite popular as early as the Northern Song Dynasty. In addition to comparing leaves and brewing level (during the Tang and Song Dynasties, it involved cooking tea), these duels also involved comparing tea utensils. The best tools for tea drinking have always been either purple sand or ceramic. Due to the scarcity of purple sand resources and limitations in color and form, ceramic tea wares becomes dominant. The design of the 'One Leaf, One Boat' tea set was influenced by popular TV series at the time, such as Lang Ya Bang, Hua Qian Gu, and Kung Fu Panda. Drawing from Sigmund Freud's psychoanalytic theory and Jacques Lacan's mirror theory, combined with childhood memories, I proposed the idea that influenced by traditional Chinese culture, there is a 'hero' living within every Chinese person. The character images of heroes in popular costume dramas and martial arts films, as well as the depictions of heroes in tea ware, can evoke the audience's innermost feelings.

The "One Leaf, One Boat" tea set consists of a lid, tea cup, teapot body, and tray assembled from top to bottom. When assembled, it resembles Mei Changsu (the protagonist of the TV series Lang Ya Bang), who wears a hat, a cloak over the shoulders, and a bamboo flute at the waist. The challenge in designing this tea set was the materialization of intention. Precise control of dimensions and proportions during 3D modeling was crucial, as any slight deviation could affect the 'hero's' demeanor and the user's grip when using it. Simultaneously, it needed to satisfy the proportion of the teapot and teacup capacities, all of which required meticulous calculations. The depiction of the hero's image on ceramic tea wares resonated with the spiritual needs of the target audience while fulfilling their functional requirements. The "One Leaf, One Boat" tea set has received positive market feedback.

Ceramic Product Design Based on Emotional Expression



Figure 3. Landscape

"Landscape" (Figure 3) is a set of tableware designed for urban small families. Compared to "One Leaf, One Boat", this design focuses more on emotional expression. My philosophy is that the temperature of a dish mirrors the emotions of a typical Chinese family: paternal love as solid as a mountain, maternal love as flowing as water, which embodies the "landscape view" from traditional Chinese culture presented in every household. I conducted a research on the ceramic tableware market and the daily needs of families in different urban regions of China, developing a set of four dishes. Simultaneously, I conducted a research on people's living habits, and there are significant differences in eating habits between northern and southern regions. To address these lifestyle differences, I made detailed design changes, deepening the center of the dishes and widening the

edges. This design allows food immersed in soup to be slightly saltier at the dish's edges. In today's society with frequent population mobility, this design will contributes to the family harmony. So consumers may have a more harmonious life due to this detail.

At the same time, family life inevitably involve disputes arising from cleanliness concerns, such as accidentally dipping a thumb into the food while serving. In addition, one side of this set of plates resembles "mountains". In reality, this design is a clever solution to address this habitual issue, preventing people from feeling awkward while serving dishes. Compared to the previous two cases, "Landscape" takes into account not only audience needs but also adds humanistic care details, infusing the designer's attitude and emoticons into the product.

III Conclusion

These three sets of ceramic products represent three stages in my career as a ceramic product designer. It started with a focus on form, emphasizing design lines, shapes, and decorations. Then, I began paying attention to consumers' usage habits, creating creative works using imagery from traditional culture. Finally, I explored how to address existing issues with ceramic products through design and convey emotions to users through product details. Looking back at these three cases, they provide valuable lessons:

1. Ceramic product design needs to consider how consumers perceive it, how they interact with it, and how they emotionally connect with it. Uses ceramic design to express the "Chinese artistic conception" by Highly unified materials, craftsmanship, imagery, and emotions.

2. Emphasizes the user's dominance, and conducts in-depth research into cultural connotations. Develops imagery, and combines contemporaneity and functionality to manifest imagery in tangible forms, colors, and decorations.

3. The traditional Chinese philosophical concept of "Tao-Qi Concept" (the unity of the Way and the vessel) runs through the entire design process. Design is not merely the accumulation and composition of artistic elements, it is a creative process, a process of identifying and solving problems (Figure 4). This process including user analysis, product positioning analysis, theme development, material and craftsmanship planning, and marketing strategy. Designers also need to assist marketing teams in exhibition design, intellectual property applications, competition participation, and so on, using design to solve specific problems.



Figure 4. Ceramic Product Design Process

Renowned ceramic designer Zhang Shouzhi once advocated for the lifestyle of "delicious foods and beautiful utensils" (Zhang Shouzhi 2013 3). This is the requirement for contemporary ceramic designers. I transitioned from studying the artistic concepts of Chinese painting to expressing the "Chinese artistic conception" in ceramic product design. My hope is to convey the "Chinese artistic conception" to countless households through daily-used ceramic products, rather than waiting for people to appreciate them on the walls of art galleries. This was the original intention behind my career in ceramic design.

Designing ceramic products on three levels—materials and craftsmanship, imagery expression, and emotional expression—holds practical value for constructing a discourse on the "Chinese artistic conception" in the field of ceramic design. Ceramic products embodying the "Chinese artistic conception" have a healing function for the emotional pain of people in the post-pandemic era. The humanistic care conveys warmth to households through design brings. Furthermore, these ceramic products help people understand traditional culture, enhance their aesthetic taste, and boost cultural confidence. They also contribute to the dissemination of excellent Chinese culture by narrating Chinese stories and conveying Chinese cultural values through ceramic products.

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Research on the application of creative sports and casual apparel design of CLO 3D technology

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Abstract

With the emergence of virtual fashion, digitalization has become increasingly important in the realm of clothing. This has resulted in a shift towards rapid response, virtual simulation, and more personalized and comfortable customized styles. As a result, traditional design and production methods have fallen behind and become rigid. To address this trend and meet the demands of consumers, there has been a rise in three-dimensional virtual clothing design software. This paper aims at analyze the technology principles and design processes of CLO 3D software, using creative leisure sportswear as an example. Through practical research methods, this study explores various aspects of CLO 3D technology, including 2D drafting, virtual stitching, high-quality simulation, modular design, gradient color design, clothing pressure mapping, and display effects. By understanding the virtual clothing design method and design process, this research can serve as a reference for physical sample design and production. The exploration of a new model for creative design and production of virtual clothing can help young art design practitioners strike a balance between aesthetics and technology in this era of technological advancements

Keywords

CLO3D, Clothing design, sports and leisure clothing, virtual fashion

In his 20th report, General Secretary Xi Jinping emphasized the significance of the digital economy as a strategic choice to seize new opportunities in the scientific and technological revolution and industrial transformation. The digital transformation of the global economy is a prevailing trend. With the emergence of the Meta-universe concept, the integration of the real world and the network world has become more profound, leading to the emergence of the concept of virtual clothing. The fashion industry made its first attempt in 2019 with the design of the 'rainbow color' dress by Fabric Ant Design Company. Through open research and innovative development of clothing modeling software by industry experts, scholars, and research institutions worldwide, the CLO 3D technology has become a crucial component in the garment production process for fashion enterprises both domestically and internationally. However, many domestic designs companies face challenges in coordinating enterprise resources effectively. Due to different divisions of labor, their professional skills tend to be specialized,

resulting in a lack of comprehensive talents proficient in all aspects. For instance, designers excel in garment design but may lack experience in plate making and sewing. On the other hand, plate making requires time to develop design abilities and aesthetic sensibilities.The research on CLO 3D contributes to a better understanding of the garment making process, particularly for young designers with aesthetic ability. Existing literature mainly focuses on the application of virtual fitting software, the development prospects of global virtual clothing, and the current situation of traditional clothing style production. However, there is a lack of research on the application of virtual clothing software in sports leisure clothing design from a creative perspective. This paper aims at fill this research gap by exploring the feasibility of using CLO 3D software for virtual clothing design and production, specifically in the context of creative sports suit style. It investigates version design, fabric printing design, and display design to propose a new model for virtual clothing creative design and production. This research can assist young art design practitioners in embracing new technology while maintaining a balance between aesthetics and technology. (Guo Meilin, Zheng Ruiping, 2020)

An Overview of the CLO3D

summary

Under the continuous progress of virtual reality technology and electronic computer technology, the world's economic and social development is becoming increasingly digital. Meanwhile, China's garment industry is currently undergoing a crucial stage of industrial structure adjustment and design technology upgrading. In China, there are four commonly used virtual modeling 3D software: CLO 3D (Korea), Stitchery (browbeat), Style3D (Lingdi, China), and OPTITEX (Israel). Global fashion and clothing enterprises are enthusiastic about 3D design, which has the capability to import DXF plate documents for modeling and clothing design, as well as seamless synchronization and conversion between 3D and 2D versions. It also allows for exporting production documents to manufacturers. However, these software products have slight differences in segmentation and positioning. Among them, CLO 3D is the most widely used clothing 3D software with the highest acceptance and popularity. It provides designers with a comprehensive set of features to design clothes in various sizes, incorporating graphics, fabrics, decorations, color matching, styling, and realistic 3D rendering. With its extensive capabilities, designers, technologists, and pattern makers can elevate their designs by achieving true motion fits, pattern modifications, grading, and technology packages. This software enables designers to quickly express their ideas, shortening the design process and production cycle, thus reducing production costs and improving innovation vitality for related enterprises. Additionally, it helps designers convey their design concepts and aesthetics to the industry and enterprises through a visual approach. (Huang S, Huang L. 2022)

Virtual clothing design process

First of all, it is necessary to find out the style and style through the trend survey and fashion survey of design requirements through traditional design methods, and design sketches and style drawings. CLO3D basic modeling process: The first step, 2D plate creation, according to the style diagram to create a virtual plane 2D plate. In the second step, the model's body is created and stitched, and the layout around the model is adjusted by using the set-piece ball according to the model's arrangement point, and the white model is made according to the sewing skills. The third step is to adjust the physical properties of the white mold, adjust the physical properties of the fabric according to the design needs, and adjust the stretching proportion of the warp and weft yarn and skew yarn to meet the requirements of the effect drawing. The clothing pressure chart can show whether the clothing is fit and beautiful according to the number of particles and pressure between the clothing fabric and the model. The 2D window plate can be adjusted repeatedly according to the pressure chart to optimize the design. The fourth step, pattern and color adjustment, pattern stitching and pattern material, during the 2D window and 3D

window linkage can monitor the adjustment effect in real time. Finally, clothing display and rendering adjust the clothing model to the appropriate posture for dynamic or static preview. You can choose custom multi-angle or fixed front and back Angle. After confirmation, you can choose cloud rendering and local rendering for final effect export. According to the construction of the scene and the production of accessories, the model can quickly show the full elements of the show in a specific scene, truly let the clothing design wear on the "people", and realize the "move" to break the dilemma that the past designers can not be realized, so that the designer can be more realistic design.

Virtual sports and leisure clothing style design and modularization

Virtualsportsleisure clothing style innovativedesign

Sweatshirts are typically made of thicker knitted fabric and feature a round collar or hooded hat, as well as thread cuffs and bottoms. Originating in New York in the 1930s, they were initially designed for specific working groups and later evolved into sportswear due to their warmth, comfort, and ease of movement. In the 1970s, they became a symbol of subculture and rebellion with the rise of Hip-hop culture. Today, hoodies not only represent a culture or trend, but also serve as a carrier of fashion elements. They are both functional and fashionable, making them popular among young people. Therefore, using hoodies as a demonstration of innovative design can provide practical reference cases for many clothing enterprises. This particular design style draws inspiration from quantum entanglement and four-dimensional space, creating an illusionary theme. It incorporates these concepts into the design of sportswear. In quantum mechanics, when particles interact, their individual characteristics are lost, and only their overall properties can be described as quantum entanglement. This series of designs uses various connection and folding forms to simulate three-dimensional dimensions within the four-dimensional space. It distorts the structure of entanglement and incorporates linear printing and embroidery as additional elements.

A modular combination ofstyle andfabric

Molecularity is a unique design method that enables the complete assembly process of new products through the screening and combination of modules. These modules consist of elements and functions that are identical, as well as independent units with the same specifications, structures, and interchangeable functions. By dividing a hoodie into different modules, various clothing design outcomes can be achieved by combining these modules.Modular design involves fixing the style fabric type, fabric weight, textile technology, style size, and other physical attributes. In CLO 3D, the clothing plate is divided into several parts, including the predecessor, rear body, left sleeve, right sleeve, collar, left and right cap, left cuff, and right cuff. When the clothing plate is being used, the corresponding module is reconstituted and stitched together. This allows for the quick creation of a large number of styles and assists designers in completing simple designs. While modular design can be attempted for simple style designs or clothing of the same size and type, it does have its limitations. When the number of clothing style assets is limited and the number of basic plates is insufficient, problems such as a lack of variety in style and a simple arrangement may arise.Fabric module design involves fixing the design style and plate, and adjusting the fabric's physical properties to change its vertical feeling, folds, texture, layering, and fabric printing and process mapping. By transforming the fabric's physical properties, a single style can be transformed into different styles. This type of design aligns with the preferences of modern and contemporary designers for retro fashion wear and structuralism mix design. However, it requires a significant amount of material and fabric assets as the foundation for the design, providing design elements for modular design.

Virtual sports casual dress pattern print

Fabric andgraphic printfor virtualsportwear

Virtual clothing fabric and printing design principles are similar to choosing picture materials for secondary design. The fabric pattern should simulate the real fabric's light, material, weight, stretching proportion, elasticity, and deformation. It is also important to freeze the fabric to ensure stability during the recording of runway videos. The printing pattern can be selected for both sides, and continuous redesigning of the square is possible. Large image printing can be aligned on different plates and arranged separately for simulation. Finally, the mapping colors of different materials, angles, and directions can be unified or selected to be consistent with a single side. China Lingdi Style3DFabric's clothing fabric material exhibits scientific and reasonable characteristics. It can simulate most textile properties and characteristics by measuring fabric images without perspective and light source through supporting instruments. This includes aspects such as pattern printing, thickness, material texture, and vertical feeling, resulting in a high similarity to real fabrics.

Virtual sports and leisure clothing pressure chart

Stress fitnesstestfor virtualsports casualwear

The virtual clothing pressure distribution map is simulated using a transparent triangular grid pattern. The colors on the map indicate the tightness of the clothing, with red, orange, and yellow representing tight and slightly tight areas, and yellow, green, and blue representing slightly tight and normal loose areas. By analyzing the particles of the fabric and the human body model, we can identify areas of the clothing that needs adjustment. This information is helpful in determining the shape and dynamics of the clothing during the final simulated runway show (Cao Xiaomeng, 2022).In the specific example of a trouser suit, we conducted a virtual clothing stress test using a cotton40s chambray fabric (a cotton fabric with both horizontal and longitudinal elasticity). The pants were overall loose, with pressure analysis indicating approximately 50-70 KPA in the trouser head, pocket, hip, knee, and foot areas. However, the folded knee area showed high pressure, ranging from 80-100 KPA, indicated by the color red.In conclusion, we observed that thicker fabric and more layers results in greater fabric pressure. Additionally, the pressure of the belt on the hips determines the tightness of the garment, with higher pressure indicating a tighter fit and lower pressure indicating a looser fit.

Epilogue

With the widespread knowledge of the Meta-universe and the rapid development of virtual clothing and scene technology, traditional clothing enterprises can benefit from the new value points and opportunities brought by virtual clothing technology. The use of CL clothing technology, such as CLO 3D technology, can enhance designers' design abilities by integrating various elements like design research, version design, sample production, and clothing display. This technology offers simplicity and intuitiveness, and it has reached a relatively mature stage in the clothing industry, making it highly feasible and cost-effective for companies. As the internet becomes increasingly utilized, CLO 3D can accurately showcase the real wearing status of clothing, not only providing a technical method for studying clothing but also enhancing the online experience for consumers. Currently, the application of the CLO 3D system in the garment industry faces two challenges: technical level and enterprise resource level. However, with the continuous development of science and technology and the growing awareness of environmental pollution, the market will eventually choose the appropriate transformation direction for enterprises.However, the current development direction and type of CLO 3D platform is relatively limited, and its market share is concentrated. Style3D (China Lingdi) is continuously updating its content, aiming at expand its market share and influence both domestically and internationally. In the future, there may not be significant innovation in technologies such as transforming clothing color, adjusting fabric, and modifying

clothing structure. The focus will be on reducing garment costs, providing convenient fittings, and offering diversified static and dynamic displays. This will enable the integration of multiple links in the garment industry chain, allowing the creation of virtual garments that can connect the upstream and downstream industry chains. Such advancements can assist young art design practitioners in finding the balance between aesthetics and technology in the face of new technological breakthroughs. Therefore, digital transformation through research and development in the clothing enterprise is crucial for the future.

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The integration of art and technology*
—— Thinking and research on the scene in the field of art and artificial intelligence

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Abstract
With the gradual deepening of the influence of artificial intelligence technology in the field of art, the discipline of combining art and science and technology has begun to take shape. In order to enhance the performance of art in the scene and realize the good characteristics of personalization and interactivity, through the technological means of artificial intelligence, by analyzing, collecting, feeling, and mining the data of human beings in the artistic creation, it will reveal the laws of movement of the works, form a scientific and feasible plan, and develop the devices to assist the human art scene experience devices. Against the background of the development of artificial intelligence as a "new field", this paper, through the historical overview and connotation definition of the development of artificial intelligence and art, introduces the unique artistic expression language of the scenario-based application of artificial intelligence in the field of art, and explores the perfect fusion of art and science and technology with the help of art works of artificial intelligence.

Author keywords
Art and technology; Artificial intelligence; Scene application

1. Introduction
Art and science and technology are twin flowers blooming on the branches of human intelligence, and these two indispensable factors determine the degree of progress of human civilization. At present, artificial intelligence is widely used in the field of artistic scenario empowerment, for example, in the venue through the scene construction, scene resource matching and other aspects of the use of digital wisdom regulation and optimization, further allowing the service scene to be fully presented in front of the eyes of the user, and more efficient use of digital resources.

2.Research status of key technologies in the field of artistic artificial intelligence
2.1. Overview of art science and artificial intelligence related to it
Arts as a discipline in the field of humanities and social sciences, its study includes great specialties such as dance, film, fine arts, music and other disciplines. Artificial Intelligence, abbreviated as "AI" (Artificial Intelligence), is a systematic and technical science that studies, explores, and applies human methods and experiences. The field of combining art and artificial intelligence can be defined as: oriented to human artistic activities, based on artificial intelligence technology, key technologies of detection and perception, continuous and deep integration with art, and artificial intelligence becomes a booster for the development of artistic endeavors

2.2. The development process of artistic and artificial intelligence

So far more than 60 years, the development of the field of artificial intelligence of the three stages, the first stage, it has a preliminary imitation of the human brain for data arithmetic processing ability; the second stage, it is able to initially recognize the image voice, and human beings with the funny information conveyance of the wisdom of the perceptual ability; the third stage, it is able to people's knowledge and experience of the rapid learning and mimicry, with a strong learning and thinking ability.

Starting from the creation of Impressionism, with the rise and use of all kinds of cross-disciplines, physics, astronomy, archaeology and other diversified and figurative knowledge continue to enrich and build the construction of art studies. Having rapidly experienced Web 1.0 and Web 2.0, and formally stepped into Web 3.0, we are profoundly aware that technological advancement will have a drastic impact on the whole society. The inertia of the art industry is the greatest, every previous industrial revolution will trigger the decline or rise of a part of the industry, only the art seems to have a parallel track of its own, and social change echoed but not affected. Until the emergence of AI, this situation has been loosened, on October 25, 2018, the world's first artificial intelligence created the work "Portrait of Edmund Bellamy" in Christie's auction sold at a high price of nearly three million, exceeding the previous estimate of more than forty-five times, the world's first artificial intelligence works in the auction of the highest record.

3.Development characteristics of artistic artificial intelligence

3.1. The embodiment of the humanistic value in the transformation of artificial intelligence art scene

Humanities in science and technology seems to lack warmth, in fact, it is not the products transformed by artificial intelligence, itself is able to reflect the human relentless pursuit, continuous thinking and transcendence of the spirit of self proof. The vision of art creators is shifted from the inherent materials, techniques, and forms of expression to the new medium of artificial intelligence, which enriches the way of creation of artists. The fusion of art and technology creates new types of visual scenarios, which open up new visual territories for creators and experiencers. Therefore, the practice of science has always been

permeated by the six elements of "objective basis, rational skepticism, pluralistic thinking, affirmative debate, practical testing and tolerance of incentives", which has pushed human civilization into an era of prosperity and prosperity.

3.2. Traditional art regeneration in the scene of artificial intelligence art

The explosion of AI painting technology has led to a boom in AI painting at home and abroad. The Wenlan model, which belongs to China alone, has been pre-trained with 650 million weakly related Chinese graphic pairs, and it has a unique semantic understanding of Chinese, which is able to present the visual information of the national style version very well.

Utilizing the characteristics of the Wenlan model itself, the Wenlan "painting" model can automatically generate corresponding images based on the input of ancient Chinese poems. At the same time, the project team also found that Wenlan's drawing model has its own unique interpretation of profound and difficult ideas such as "Confucianism, Buddhism and Taoism", and its resulting AI drawings have been recognized by Professor Jiang Yang, a leading expert in psychology, "Wang Yangming", who has been recognized by the Chinese Academy of Sciences. Its AI drawing has been highly affirmed by Prof. Jiang Yang, a leading psychologist of "Wang Yangming".

4. Implementation mechanism of full-scene creation in the era of artificial intelligence

4.1. Application of scenario-based design

The scene becomes a bridge between reality and reality, and the art product becomes a solution to the scene,

allowing everyone to experience a relaxing and pleasant scene for enjoyment, which enhances the "positive emotions" of the psyche.In the field of scenario-based art, creators can be associated with scenarios, and the theme of creation can be placed at the core of the design, guiding the creators' behaviors, and constantly sorting, constructing, and pondering, thus realizing a new type of artwork that is created and interactively delivered. The goal of art education, under the global framework, focuses more on cultivating the development of human mind, creating art scenarios centered on human beings, and guiding the participants to swap roles within the whole scenario, thus promoting the two-way growth of art and scenarios.

Conclusion

From scene creation to panoramic creation is a relationship of progression and optimization. Its essence makes no change. Entering the era of meta-universe, virtual and reality are constantly intermingling in the human world, and immersive experiences allow people to feel more real and relevant perceptions. Between creation and experience, between virtual and reality, and between people and scenes, interaction is not limited to language and space-time.

With the evolution of technology such as artificial intelligence, a series of environments combining the virtual and the real, the pursuit of personalized services with a higher degree of matching and better experience of immersive appreciation. In the art scene-based experience, the viewer will not be bound to one scene, but multiple scenes freely through, unhindered appreciation of personalized works of art.

Express one's thanks

At the end of this thesis, I would like to thank Mr. Ben Zhang and Mr. Fan Zhang, who taught me my studies, for giving me a better understanding of artificial intelligence technology.

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Historical narration in subway station hall -- Take the exhibition wall design of Wuchang Station of Wuhan Metro Line 11 as an example

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Abstract

With the rapid advancement of urbanization, like most cities, Wuhan faces the problems of urban convergence, such as similar architectural styles and lack of discernment of infrastructure now. As a major urban livelihood project, subway not only provides convenient transportation, but also carries the functions of urban window and cultural infiltration. Therefore, Wuhan's local historical and cultural resources - the city gate building is used in the decorative wall design of the subway station hall, and the historical and cultural resources are transformed into Wuhan architectural symbols through modern design techniques, forming a new urban appearance with recognition. Provide a unique travel experience for the city's citizens and tourists, and explore a new way for the personalized development of Chinese cities.

Author keywords

Architectural symbol, City business card, Historical narrative, Subway station decoration, Urbanization

The cultural significance of station hall display wall design

The rapid development of the past few decades has created an economic miracle, but it has also left behind urban development problems such as the convergence of urban appearance and the difficulty of urban renewal. Compared with the complex and difficult improvement conditions of the above-ground landscape, the underground station undoubtedly provides a new opportunity for the city to rebuild its cultural business card.

As the downward extension of the modern city, the decoration of the underground space should echo the ground. The decoration in the station should not only be the decoration in the station, but also play an extension role in the ground landscape. For example, the Bastille subway station in France recorded the beginning of the French Revolution in the form of murals. The exquisite murals not only show people the difficult and glorious course of the French Revolution, transmit national memory and national spirit, but also suggest the site location to past visitors, so that the functional, historic and beautiful three balance.

As a public place with a huge flow of people, subway stations not only bear the functional role of dreading passenger flow, but also the display wall inside is a valuable stage for the interwoven interpretation of subway culture and regional culture. Compared with ordinary subway stations, Wuchang Station has its own particularity. It is a station that connects a huge transportation hub and three subway lines. In addition to carrying the inherent mission of guiding and channeling passenger flow in general stations, the new station hall also undertakes the

functions of introducing Wuhan, creating business cards, and supplementing the design context of the old station hall.

Element selection and station hall display wall design

The documented history of Wuhan, where the project is located, can be traced back to 770 BC, and the long history of the city's founding means a large and difficult to estimate historical and cultural heritage. Numerous historical and cultural heritages involve all aspects of people's lives, and these heritages vividly map out the face of Wuhan city in vertical dimension of time and horizontal dimension of space. However, the huge historical heritage not only brings multi-level and rich materials, but also poses a challenge to the design work: How to choose an object with enough weight to express the historical thickness of Wuhan and narrow the psychological distance with ordinary people as the starting point of the narrative.

The design team set their sights on the history of Wuchang, where the station is located. The city of Wuchang has been a military fortress since The Three Kingdoms period and has built strong walls and iconic gates. As sung in the ballad "Baishazhou Lu Home" in the early years of the Republic of China: looking at the lake wide and high, nine doors are covered with copper and iron. Nine doors, that is, Wuchang City on the Wenchang gate and other gates. For the ancestors of Wuchang and Wuhan, the building was not only a shelter from the wind and rain, but also a fortress to resist the invasion of foreign enemies. The nine gates were a symbol of authority and security. As a result, the design team chose nine city gates as prototypes.(Figure 1)

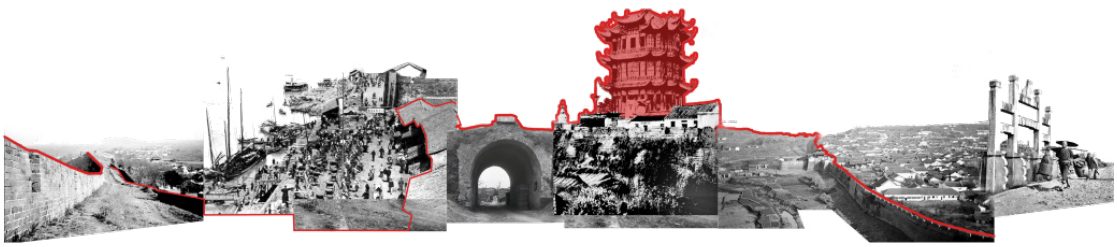

Figure 1. Concept image

Meaning and design semantics of nine gates

The nine gates are Zhongxiao Gate (small east gate), Binyang Gate(big East Gate) Zhonghe Gate (uprising gate), Baoan gate, Wangshan Gate, Wenchang Gate, Pinghu Gate, Hanyang Gate, Wusheng Gate.

Wuchang was called Jiangxia in ancient times. In 223 AD, Wu Zhusun Quan built Xiakou City on Huanghu Mountain (present Snake Mountain), which became a military castle for troops to defend against the enemy, and the history of Wuchang City wall began from then on. In 1927, the Nationalist government began to dismantle the city wall of Wuchang, except for the retention of the uprising gate as a memorial, the rest of the city wall was dismantled, and since then the ancient wall of Wuchang no longer exists. Since the construction of Xiakou City in 223 AD, it was completely demolished in 1929, and the ancient city wall of Wuchang survived in 1706. The pattern of Wuchang City developed and matured according to the city wall, so the urban pattern left by these disappeared city walls and gates still has an impact on the urban appearance of Wuchang and even the whole Wuhan.

In order to make the disappeared city wall and gate better integrate into the lives of modern people, and at the same time let modern people intuitively feel the weight of these historical relics, the design team first made a choice of design materials: the city wall was deformed, the city gate was highlighted, and the relationship between the city gate and the city wall was reflected by hierarchical carving. In the center of the work, the design

team also added a sculptural component of the main building of Wuchang Station(Figure 2), in order to suggest the location of the station to past visitors, achieving a balance of functionality, history and aesthetics.(Figure 3)

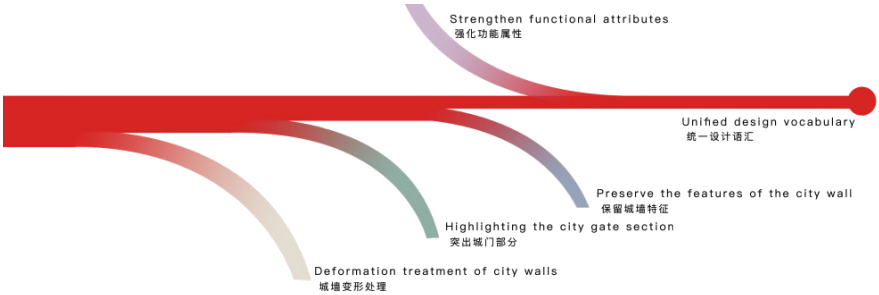

Figure 2. Design flow chart.

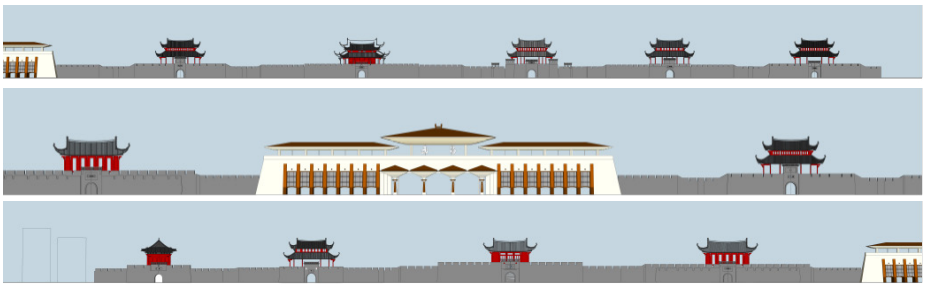

Figure 3. Design effect drawing.

Conclusion: Selection, integration and reshaping

By selecting, integrating and reshaping the form of the old city gate of Wuchang, the design team explored a design path to break the convergence of urban appearance, and used modern design language to show visitors the unique urban story of Wuhan and explore the root of Wuhan urban planning. The design ideas centering on the city culture and historical narrative not only bring a distinctive urban look to Wuhan, create a personalized city business card, and tell the grand narrative of Wuhan, but also provide recognizable infrastructure for visitors in the continuous flow of people, and use heavy historical buildings to express delicate urban emotions and skillfully meet functional needs. It achieves the design effect of "hiding skillful in clumsiness".

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Aesthetic Routine in Fiber Arts

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Abstract

The development of art, after deep thinking, is no longer lofty or represents a mysterious atmosphere, but turns to pay attention to people's life and social phenomena, and strives to bring daily life closer to and convert it to art while pursuing aesthetic height, presenting the tendency of aesthetic daily life; and fibre art, as an ancient art category, reflects the close connection between art and life, so that the aesthetic daily life As an ancient art category, fiber art reflects the close connection between art and life, so that the theme of aesthetic daily life can be embodied and hosted in solid art, and gradually enriches its connotation in the course of development.

Author keywords

aesthetic Routine, fibre arts, social life

The meaning of aesthetic Routine

With the concept of beauty and the pursuit of beauty, daily life gradually reflects a close inner connection with aesthetics, and the everyday aestheticization of aesthetics begins to be reflected in every aspect of human life, showing the aesthetic meaning of life itself. As the other side of the aestheticization of daily life, the aestheticization of aesthetics shifts the aesthetic approach of art to the needs and concerns of life and tries to eliminate the boundary between art and daily life. The creation themes, materials and display environments of various artworks have gradually developed in the direction of combining art and daily life, and many works with the aesthetic themes of clothing, household items, electronic products and even concepts of life behaviours have appeared, bringing the relationship between art and life closer and arousing people's empathy, and reflecting the development of aesthetics towards living embodies the tendency of the extension of beauty towards life, and the extension trend of various aesthetic issues in the field of daily life, and the extension trend of various aesthetic issues in the field of daily life. It also reflects that the development of aesthetics to life reflects the trend of extending beauty to life and the extension of various aesthetic issues in daily life, and the trend of extending the real world, converting "life into art" and "art into life" at the same time.

Therefore, it is not difficult to find that art is gradually moving towards life, and life is also trying to get closer to art. When art is integrated into daily life, the gradual aestheticization of daily life is also much more obvious, and it can be seen from the concept of aesthetics that it is getting closer to daily life. Of course, in the process of approaching daily life and aesthetics, aesthetic values aiming at "sensual enjoyment" cannot be avoided, which are fundamentally "non-aesthetic" standards, and consumerism in the name of "aesthetics" has become a common practice. Theories of consumerism and hedonism in the name of "aesthetics" may appear to be a liberation of the senses, but in the course of their development, they may be a reverse manipulation of human concepts and meanings. So the process of exploring and combining aesthetic everyday life is still in the process of

controlling the scope of extension under the premise of trying to break down the barrier between the two.

History of Fiber Art

Trends in Fiber Art

The development of modern fibre art is based on the development of traditional weaving art. In ancient times, fibre materials were mainly used to produce traditional classical tapestries, embroidered paintings, carpets, and other fibre artworks with luxuriant and rich patterns, mainly to cater to the aesthetic trends of the time. Later, fibre art became a separate discipline, and the International Biennial of Fiber Art in Lausanne, Switzerland, represented the development of modern fibre art in the world. During the development of fibre creation, the artworks show a development trend from flat to three-dimensional. Beginning with the three-dimensional wall hanging "Red Abakang", fibre art has seen a turning point from flat to three-dimensional. After that, various soft sculptures and fibre installations gradually appeared in the exhibition space, echoing with the ambience and lighting in the environment, softening the coldness and emptiness of the building, and opening up new possibilities for the presentation of fiber art.

Material Changes in Fiber Art

In terms of materials, traditional fiber materials are mainly cotton, linen, wool and silk, which have a soft and simple effect, and the works made with traditional fiber materials also reflect a sense of daily life in the overall effect; with the development of fiber art and the change of concepts, the natural fiber art materials are further combined with the comprehensive materials, to explore different potentials for development and changes in form. Lin Tianmiao's "Tangled" series of works uses extremely delicate silk threads to wrap objects found or created, expressing the author's inner softness and emotional release through the transformation of the surface materials of the original objects. The use of materials in modern fiber art is not only limited to the use of natural materials to express the concept of the work, but artists have gradually begun to use a variety of synthetic materials, dyeing techniques, as well as sound, light, and other multimedia technologies in their creations so that the works have a different visual and tactile sensation.

Viewer Needs of Fiber Art

Under the condition that people need to spend time to satisfy certain needs of life, fiber works require more practicality and aesthetics, and the experience of emotion is also built on this basis. People's clothing and home furnishings are based on their comfort and durability, and then a variety of decorative patterns to send emotions; and in the conditions of meeting the needs of life, the need for aesthetic spirit has become a major factor affecting the emotions, and gradually appeared "non-functional" state. In ancient China and the Western medieval period, all kinds of fiber artworks with religious meanings and mythological stories were used as the representatives of the divine mandate of the monarchy or the yearning for the past life and sentimental feelings; modern times, there are also a lot of works reflecting the social phenomena and the author's inner feelings.

Aesthetic Routine and Fiber Art

Graphic fiber art shows aesthetic daily life

Throughout the history of art development from ancient times to the present, the importance of aesthetic daily life has long been reflected. For example, the famous bronze lamps of the Han Dynasty, the Changxin Palace Lanterns, which have survived to this day, are inspired by kneeling maids of honour and focus on realistic figures in daily life, which is quite ingenious; at the same time, the decorative patterns on various kinds of fiber

handicrafts, such as silks and satins through the ages, also represent a significant manifestation of the aesthetic Routine. The Southern Song Dynasty was the peak period for the development of brushwork miniature painting, and many clothing, household goods or furniture overlay objects would reproduce elements such as flowers, birds, figures, clouds and water by sewing and embroidery, for example, Zhu Kerou's woof painting Woof Camellia Picture reproduces the beauty of camellia blossoms in full bloom on silk fabric, reflecting the artistic characteristics of the aesthetic daily life at that time.

With the derivation of fiber art and the transformation of display forms, the embodiment of the concept of aesthetic Routine has become richer. Among the many attempts at graphic fiber art, the theme of elements in nature is still more common. After observing and understanding the flowers, plants, broad leaves and natural scenery in the natural world, quilting artist Ruth DeVos has produced a series of visually appealing quilts with fine fabric pieces and meticulous quilting techniques, combined with batik, embroidery and other artistic creation methods, and the limitation of the theme has also reflected the concern for natural things and the awakening of the aesthetic consciousness of daily plants.

Of course, the aesthetic Routine in graphic fiber art goes beyond the interpretation of flora and fauna themes, as the focus on the human being itself is also an important part of the everyday aesthetic. African-American fiber artist Bisha Butler uses quilting as a medium to present portraits of people, with bright colors and mainly black figures; Western fiber artist Atrice Ertzinger uses seeds and leaves of various sprouting flowers and plants, combined with silk, organza, and wool, to create dresses, corsets, shorts, bags, and other daily objects, through her subtle observation of life and the use of locally sourced materials, demonstrating a shift in aesthetic focus to the everyday. Through the subtle observation of life and the use of locally sourced materials, they demonstrate a shift in the aesthetic focus to the every day, carrying semiotics and emotional expression with unique effects and influence.

Three-dimensional fiber art develops aesthetic Routine

The emergence of three-dimensional fiber art is a formal supplement to flat fiber art, as well as a new way of expressing aesthetic daily life. When what we see and hear in life is reproduced in three dimensions through artistic techniques, it can bring different visual and aesthetic experiences to the viewers. In a foreign textile book, fiber artist Animeko Mien reproduces Australian wildlife in three dimensions through quilting, using silk, wool, synthetic fibers and other materials to create a vivid image that guides people to pay attention to the environment and care for animals, and conveys the formation of everyday aesthetics.

People live in a rapidly developing society, and the concern for daily necessities and transportation also appears in the creation of fiber art as an important subject of aesthetic daily life, and the observation of life also reflects the trend of gradual fusion of daily life and aesthetics, as well as people's ideological values and trusts. Canadian artist Jannicke Delorier creates three-dimensional sculptural installations by sewing different fabrics and aluminium nets together. The prototypes of various hard and cold objects, such as cars, ships, poles and scaffolding, are shaped again through quilting, and the combination of aluminium nets and fabrics made of different materials subverts the limited sensory effects brought by traditional materials and reflects a different sense of aesthetics. Korean artist Yoon Soo Jin's work "Clothes Box" is a thematic interpretation of the concern for life experience, using old clothes and shoes worn by friends and relatives to expand outward, including soft fabrics, hard cement, fragile ceramics, these objects filled with suitcases to express the concept of "portable city", but also to show the busy life and people's lives. These objects fill the suitcases, expressing the idea of a "portable city", and also showing the concern for the busy life and people's inner journey, so that the aesthetic expression of the artworks is no longer detached from reality, and it is easier to resonate with the viewers to be brought into

the realization of the ordinary life.

Public Fiber Art Interpretation of Aesthetic Routine

With the increase in the number of buildings, the space for displaying art has gradually expanded, leading to the emergence of public art. Fiber art is shaped according to the proportions of the space to create large works, but also able to give the space a soft atmosphere, and when the works are combined with the space, it will make the viewer experience the emotion of immersive expression. Under such background conditions, to create artworks that meet the daily aesthetic needs of the public, there is a tendency to connect with architecture or space, pursuing the result of integrating aesthetics and daily life without detaching from real life. Lin Lesheng's large-scale fiber installation "Pavilion of Light" is made of 660 bamboo and LED lights. The strong toughness of the bamboo supports the fluorescent light tubes and is situated along the riverside of the Linshui River, which demonstrates a streamlined beauty that combines nature and humanity and is in line with the public's pursuit of and desire for daily tranquillity.

What is reflected in the aesthetic Routine is the concern for life and the evolution of beauty, no longer blindly pursuing abstract niche individual expression, but combining beauty with life to enhance and break the gap between life and art, and conducting aesthetic activities and sensations within the living space. Under the physical host of public art, aesthetic Routine is also further conveyed. For example, the artist Gabriel Eldavi, in a historical building in Como, Italy, arranges colored cotton threads in an orderly manner between the two balconies of the building's atrium, constituting two independent "rainbows", so that when the audience walks around in the building, they can experience the artwork from different spatial perspectives, and putting rainbows indoors also reflects the concern for the aesthetic Routine. Putting the rainbow into the interior also reflects the concern for aesthetic Routine.

Conclusion

The course of art development is constantly approaching the direction of reflecting life to cause feelings, nowadays life everywhere embodies the connection between art, aesthetics and people, we gradually have obvious perceptions and requirements for the beauty in life, and the aestheticization of daily life also embodies the communication between beauty and life. In the development process of fiber art from plane to three-dimensional to public art, the aesthetic daily life is also carried by the artworks to show that in the subject matter, materials, concepts of the use of daily objects as a carrier for the combination of fiber artworks, both the characteristics of the fiber, but also the embodiment of daily life, which can cause the viewer for the daily transformation of ordinary things in the art of the sense of wonder, but also show the fiber art and aesthetic daily life between the two collision sparks, so that the aesthetic daily life is also reflected in the exchange of beauty and life. It can also show the spark of collision between fiber art and aesthetic daily life, so that aesthetic daily life can become the inspiration for the creation of fiber art, and fiber art can also be used as a kind of physical art to promote the development of aesthetic daily life.

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Innovative recognition of Miao batik pattern based on image narrative

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Abstract

Traditional cultural heritage should not only be inherited and protected but also developed and innovated. Only in this way can traditional cultural heritage keep pace with The Times and fully show its value and significance. Miao batik is no exception. The Miao batik pattern is the overall display of the history and culture of Miao nationality. Miao batik has cultural attributes. For the innovation of batik, it must be based on the innovation effect of Miao culture. However, when some scholars put forward the innovative method of Miao batik patterns, they try to expand the scope of patterns and create their patterns, which are separated from the Miao culture. This paper summarizes the practical significance and narrative of Miao batik pattern development and puts forward three methods for the innovation of the batik pattern, shape reconstruction, mixed use of process, and morphological displacement of pattern. The innovation of patterns finally contributed to the formation of Miao batik into a new look.

Keywords

Miao batik, batik pattern, image narrative, innovation

Introduction

In August 2021, the General Offices of the CPC Central Committee and the General Offices of the State Council issued the Opinions on Further Strengthening the Protection of Intangible Cultural Heritage, emphasizing the support for the rational use of handicraft resources in literary and artistic creation and cultural and creative product design, so as to improve the quality and cultural connotation of the works. In June 2022, the Ministry of Culture, Tourism and others issued the Notice on Promoting the High-quality Inheritance and Development of Traditional Craft, pointing out that the innovation and development of traditional craft should be promoted to serve the economic society and the people. Follow the principle of "adhering to integrity and innovation", carry forward the creativity of craftsmen, seek the connection between traditional culture and modern life, and promote the sustainable development of traditional crafts. It can be seen that under the advocacy of national policies, the creation of traditional handicraft cultural and creative products has been carried out one after another, but the development results are generally not high. Based on the image narrative, the research uses the Miao batik as an example, in order to explore the innovative methods suitable for traditional handicraft cultural and creative products, and promote the high-quality development of traditional handicraft cultural and creative

products.

The practical significance of Miao nationality batik pattern development and innovation

1 Spread the connotation of Miao batik culture

Traditional handicrafts, their history can be traced back to thousands of years ago, have always been a favorite handicrafts. Chinese folk handmade batik craft culture, the most used, the most popular people can be regarded as the Miao nationality . Miao batik is an image of batik in southern China. It is an important part of Miao culture. They are not only decorative, but also carry the rich cultural connotations of the history, beliefs and values of the Miao people.

Innovating batik pattern is one of the important ways to realize the transmission of Miao culture. This can not only meet people's growing aesthetic needs, but also further integrate the Miao batik culture into people's lives, and promote the living inheritance of batik handicraft. In the process of innovation, by combining batik handicraft with modern technology, lifestyle and aesthetic trend, it can not only stimulate the innovation of batik cultural and creative products, but also expand the consumer market of batik handicraft. At the same time, the batik pattern innovation can promote the upgrading and technological progress of the traditional handicraft industry.

2 We will help us implement the rural vitalization strategy

In the implementation of the rural revitalization strategy, the innovation of the Miao batik pattern is of great significance to the development of rural economy, enhancing the confidence of rural culture and the training of rural professionals. First of all, the Miao area has rich traditional handicraft resources. With the help of the development of Miao batik patterns, it promotes the integration of handicraft and modern production and manufacturing, improves the modern production level and economic competitiveness of handicraft, and increases the income of handicraft practitioners. Secondly, through the promotion of Miao batik pattern products, establish local pattern cultural characteristics, enhance the confidence of rural culture and social identity, and promote the development of rural culture. In addition, the innovation of Miao batik patterns needs to involve a variety of professional skills and knowledge, covering the layout design, manufacturing process, design services and other fields. Through relevant training, it will provide a platform and resources for industry-university-research cooperation, attract and cultivate more cultural and creative development talents, and help the development of entrepreneurship and employment in rural areas.

Image narrative of the Miao batik

Narrative, simply put, is to describe the story. Narrative is an important concept in literature, semiotics and other fields, which has its specific significance, and has developed into a narratiology discipline for exploring issues related to narrative . Image narrative is a special type of narrative, which endows visual elements with narrative meaning and function. It uses visual language to tell stories, expresses meaning through images, and constructs the combination of images and narrative, thus becoming more beautiful and concise and full of artistic beauty. The most remarkable feature of the image narrative is its intuitiveness. People can quickly judge the image information, have an intuitive understanding of things, and obtain a realistic emotional experience.

1 Narrative

In the Miao batik pattern, it uses the most natural patterns to flowers, fish and birds, pomegranate bats, butterflies and so on. Among them, and to the birds and the fish are particularly prominent.

The Miao people in parts of the Qingshui River basin have a popular belief that a person has seventy-two souls, and one of them becomes a bird after death. If there is no "wandering side" in life, that is, can not change into a bird. The bird is also open the way to lead the people, it can lead the soul through the underworld hair shrugged

mountain, through the layers of hell, to meet with the ancestors. Here "bird" is associated with "visitors"; and can be together with ancestors. This means in the ancient Miao concept that the bird is the most happy mascot in the two stages of life and death. At the same time, birds are changed by people, and the soul of happy people, so the love of birds can be imagined .

Fish patterns are also extremely common. The implicit language of "fish" instead of "spouse" or "lovers" is very common in Chinese languages, especially in local ballads. Guizhou folk songs have a lot of material in this aspect. In ancient times, productive fish were used as a symbol of hope for many children. For example, in the traditional customs of the Miao people in Congjiang County, in the process of marriage, before the bride arrives at the man's home, the male family asks two young women to hold a bowl of wine and a sour fish (tied with hemp), waiting on both sides of the gate. When the bride comes to the door, the wine and fish are handed to the bride and the companion by the door respectively. The obvious meaning is to wish you a long life. When the bride returns, the man's family prepared gifts to accompany, including the cattle sent to the woman's home, the woman's family with a sour fish, hanging in the horn, it is said to be called adding cattle longevity. Here, the fish also seems to be a symbol of longevity and longevity. In the grand traditional program "Eating drum and hiding" of the Miao people in southeast Guizhou, taking Jiajiu District, the central area of the Miao people in Congjiang County, as an example, almost all the offerings of the "offering" activity included fish. The trees and vines that need to be cut down for festival activities should put fish on the tree and vine pockets, meaning that they hope that the vines will sprout again, symbolizing the population like vines. Mr.Wen Yiduo in "said fish" article: " in the concept of primitive human, marriage is the first thing in life, and transmission is the only purpose of marriage... ethnic breeding is so important, and fish is the strongest reproduction of a creature, so in ancient times to a person to a fish, in a sense, almost equal to compliment he is the best person, and between young men and women, if call the other as fish, it is equal to say: you are my most ideal mate."Many subjects have their own beautiful legends, which are obviously closely related to national consciousness and folk literature.

2 Intuitive

Most of the geometric patterns in Miao batik patterns are abstract patterns, which are usually completed with the help of basic composition elements, and the use of points, lines and surfaces to achieve a visual feeling of beauty, such as bronze drums, spiral patterns, cross patterns, back patterns and other patterns of abstract refinement of objective things. The bronze drum pattern is considered as one of the oldest folk batik patterns in Guizhou. In ancient times, gongs and drums were generally used in important occasions such as sacrifices and wars. Ethnic minorities believe that gongs and drums represented respect and nostalgia for their ancestors. The bronze drum pattern adopts a symmetrical composition, with the main pattern and the auxiliary pattern around. Because the Miao people worship the sun, they believe that the sun is the source of all things, representing hope and vitality. The central pattern of the bronze drum pattern adopts the sun pattern and radiates to the surrounding areas. The spiral pattern is the oldest and most striking kind of geometric patterns. It first appeared on the pottery in the Neolithic period, originating from the ancestral copy of the natural water patterns. Due to the different cultures and geographical locations of different ethnic groups, the meaning of spiral expression can also vary, but most of them represent the respect and memory of the ancestors.

Strategies and suggestions for miao nationality batik pattern innovation

1 Focus on national culture

The innovation of patterns cannot be without basis and cultural focus. Otherwise, it is just an impulse product guided by the formal beauty and visual impact. Such works will only attract people's attention for a while, but

will not spread forever. This is an age of images, and many of the images are actually telling a story. The elements can not be changed at will, just like a person friends posted a lot of photos of the Yellow Crane Tower building and photos of him with the Yellow Crane Tower. We knew that he was traveling to the Yellow Crane Tower. And if he changed the Yellow Crane Tower to the Teng Wang Pavilion, we would get the wrong information. If he had only posted pictures of the landscape below from the Yellow Crane Tower. We will have even less information. But when we are his roommates, we will know that he went to the Yellow Crane Tower. Because he is a student of the department of environmental art and design, the teacher assigned the homework for research. This is the background, know this cultural background we know why he went, we will know more information than others. This photo is telling us the story of him today. In a collage of his photos, we will add the photos of the Yellow Crane Tower, not the Teng Wang Pavilion. The same is true for the innovation of miao batik pattern. Understanding the cultural background of miao nationality first will provide cultural focus for innovation. It will not enable us to innovate into something alienated. There are many innovative methods, but to expand the scope of the pattern should be carefully considered. This paper introduces three innovative methods, redeconstruction of shapes, mixed use of process and morphological displacement of pattern.

1The redeconstruction of the shapes

Miao batik patterns are different, so innovation requires re-deconstructing the shape in the pattern. There are four deconstruction methods: the first is to take the traditional pattern as the design starting point and integrate new elements on the basis of the original graphics; the second is to make the original material selection, refinement and decomposition; the third is to integrate the relevant topic data, research homogeneity and reconstruct the design changes. The batik design needs to incorporate more modern and fresh elements to revitalize them. The elements and aesthetic symbols contained in the batik pattern constitute the soul of the batik design and artistic creation. The extraction, derivation and reconstruction of shapes in batik pattern elements are of great significance for the design and innovation of batik. Therefore, the correct interpretation of the emotion and culture conveyed by the element information and symbols in the batik pattern is conducive to extracting the essence and applying it to the design of the batik pattern. The recessive language types of batik pattern elements mainly include: daily engraving art symbols, blessing patterns and elements, sacrificial patterns and recessive language, physical element symbols and synthetic element symbols. Take the dragon pattern as an example, this pattern originally originated in the Yellow River Basin, and is a symbol of good war and victory. After entering the class society, it developed and evolved continuously, and became one of the representative symbols of power and rank.

2Mixed use of the process

Guizhou is a multi-ethnic community, with rich and diverse ethnic cultures and distinctive characteristics. It has a number of national and provincial traditional handicrafts such as batik, embroidery, silver jewelry, bamboo art and ancient paper making, which has laid a solid foundation for the innovative design of craft grafting and integration . In understanding and mastering the relevant process materials, function, principle, on the basis of repeated, arrangement, alternative, deformation, transplantation and other design methods, scientific and reasonable extraction and using the local intangible process elements extended with design, can break the traditional batik products inherent form, color and texture, enrich and optimize its content . Taking 2017 Shenzhen Fashion Week as an example, fashion design brand AWAKENING showed the series of autumn and winter women's wear with the theme of "call" at the new product conference. The design and production perfectly integrated the traditional clothing technology of batik, silver ornaments, embroidery and quilting, and created the clothes in line with the aesthetics of modern life. This also shows that the design method of technological integration has more effectively broadened the design breadth of batik products, and more

perfectly displayed the charm of intangible cultural heritage integration products .

3The morphological displacement of the pattern

Based on the traditional batik culture of the Miao nationality, under the premise of respecting the characteristics of the Miao nationality, according to the modern design concept. Take the classic butterfly pattern of Miao nationality as an example, the element morphology displacement. Morphological displacement, a pattern or directed movement from the initial to the end position, is a movement with size and trajectory changes. This method can use a regular design language to describe and summarize the pattern derivative process. The morphological shift method draws on the derivative method in the shape grammar, and makes the derivative rules according to the common composition of the traditional patterns, so as to change the pattern units regularly and form innovative patterns. According to the transformation type, the derivative rules are divided into displacement derivative rules, mirror flip derivative rules, zoom derivative rules and rotation derivative rules.

The morphological displacement method can generate ever-changing batik combination patterns according to the selection of basic elements and derivative rules, which not only reflects the beauty of modern design but also the inheritance and continuation of miao batik culture.

Conclusion

The Miao batik is a precious cultural heritage of the local Miao people. In the modern social environment, the miao batik cannot be limited to play more practical value and prove its charm to the audience. Pattern is the miao batik charm, for batik innovation in the environment, in the end is the batik pattern innovation, to make the relevant innovation able to conform to the nation, in line with the age, we must insist on the basis of national culture, combined with innovation method, neither lost in the context of modern traditional culture and innovation of the unique batik pattern. This paper provides a reference for the design method for the design of batik with national characteristics and cultural connotation, which is conducive to meeting the consumers' cognitive needs for the traditional culture of ethnic minorities and the activation and inheritance of traditional culture.

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Deconstructing and innovation practice of artificial fur in emotional clothing design

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Abstract

This topic begins with the investigation and analysis of the garment design of artificial fur grass, including practical operation and theoretical understanding. Committed to breaking the traditional way of thinking, and actively explore the possibility of self-innovation. The way of emotional clothing design and expression and the method of emotional experience are completely different, so there are various requirements for clothing, and we will try to create and change the basic structure of clothing, such as shape and style. Through deconstruction, reassemble and reorganize these elements to create completely new structures. In this process, modern technology and new materials are used to use artificial fur, while unique visual and tactile experiences are also used to explain the concept of deconstruction. With clothing emotion as the penetrating point, we use emotional design language to integrate and create this series of clothing.

Keywords

artificial fur, emotional design, deconstruction

The concept of artificial fur

While rising global demand for fur has created more opportunities for high-end brands, the boom has been accompanied by moral accusations of animal abuse and damaged brand reputation. As a result, some luxury brands have begun to explore the possibility of replacing natural fur with artificial fur, which can not only provide a product experience similar to animal fur, but also effectively reduce the slaughter behavior of animals. In this way also can let more consumers have value identity of artificial fur, on clothing more emotional demand, namely since Chanel designed by Karl Lagerfeld and launched in the fall of 2010 "Fantasy Furs" series, more and more top brands have been involved in the "no fur" environmental protection movement, and high quality artificial fur also gradually can completely replace the real fur, to promote the sustainable development of textiles into a new era of consumption.

The species characteristics of artificial fur

In the past, it is made of chemical fiber; now, wool artificial fur has become popular, with the development

of technology and fashion, cotton,hemp and other natural fibers are used in synthetic fur, the future artificial fur will show diverse product characteristics. Artificially made animal fur is a product category that mimics natural fur. Its unique appearance, both has the real fur appearance, such as neat hair distribution, uniform color deployment,coherent pattern design, good brightness and elastic performance, and light weight and heat preservation performance is good,can effectively discharge moisture and air circulation, prevent mold breeding and pest erosion, convenient storage character istics, price is relatively low at the same time, can be cleaned. However, it also has some shortcomings, such as a slightly weak ability to block the wind, easy to drop hair or wrap together, and the ability to withstand stress and folding. According to the different production process, the artificial fur can be divided into three types of woven, woven and non-woven fabric production.

The difference between artificial fur and natural fur

Real fur, which is made from animal fur, gives off a foul smell when burned, and the burnt solids can be easily crumbled with your fingers. Faux fur is made from artificial fur, which emits a pungent plastic smell when burned, and the solid formed after burning is very hard.This is a kind of artificial fur engraved with animal patterns, patterns and other textiles are actually similar, are regular and regular repetition, very delicate. But the patterns of real animal fur would not be so elaborate. A fur coat is generally made up of several pieces of fur, so in color and pattern, it cannot be compared with artificial fur, because natural animal fur cannot achieve the precision of color and pattern of artificial fur.

An overview of emotion and emotional design

The difference between people and animals, fundamentally speaking, is that people have rich emotions and emotions, and in all stages of human life, there are a variety of emotions, even in the same environment, everyone's feelings will be different. For animals, the concept of emotion is difficult to understand, because it is a subjective feeling that can only be manifested through human behavior. From the perspective of the field of psychology, the concept of emotion is not uniform and uncertain, it is just an attitude experience and the expression of mental state, which is a feeling, an emotion, an expression of emotion. Compared with the concept of emotion, the concept of thinking is broader, which covers rational thinking and thinking cognition. In the course of human development, emotion is an almost instinctive response that is not influenced by other thoughts, but exists before rational thought. In the study of human brain development, the brain areas related to emotion are produced earlier than those related to rational thinking. Emotion is the most intuitive way for people to treat various objective things. However, in clothing design, the design concept of emotion is different from the concept of emotion we usually say. Emotional design can bring different emotional belonging to different customers. This is because designers bring an emotional feeling to customers when designing products. In this way, they also bring better experience to consumers, not only the physical touch brought by clothing, but also more emotional experience. However, the expression of this feeling and emotion is also the subjective feeling of the designer, rather than the objective existence.

The proposal of emotional design

Donald A. Norman, A well-known American cognitive psychologist, first proposed the concept of "emotional design" and wrote in his book "Emotional Design" : "Designers and users will give products a strong emotion, for users, the importance of emotion even more than the practicality of the user, so we have to connect designers and users, find common emotions, so that users get a better psychological experience." When discussing the essence of "man", we must first start from the essence of "man", the transformation process from "emotion" to

"reason" is connected with the transformation of "reason" to "emotion". When designing all kinds of clothing, as long as the appropriate expression method is chosen, it can make the wearer, the designer and the audience have a good emotional experience, so that it can achieve the purpose of emotional experience.

The use of faux fur in deconstruction clothing

Features of faux fur deconstruction style clothing

Since the term "Deconstructivism" was introduced into the fashion circle from the field of philosophy and architecture, the deconstruction clothing it represents is significantly different from the traditional clothing style, and brings customers a new experience. This kind of fashion is known for its unorthodox, asymmetrical, lack of integrity characteristics, beyond all existing norms and rules, using the characteristics of artificial fur, shape, color, proportion and other aspects of the extreme flexibility. Parts of the area are deliberately broken or unfinished, which is surprising and thought-provoking. If done properly, it produces a proper aesthetic flaw of beauty. For artificial fur clothing, its material can achieve more shapes and beauty through deconstruction, and artificial fur can use a lot of techniques to achieve new shapes and bring new visual feelings. Under the basic concept of deconstruction, the core concept of design breaks the traditional way of thinking by emphasizing the research on the self-structure of clothing. The original appearance and combination of styles of clothing are changed, and the basic structure of clothes is disrupted and rebuilt, thus creating a unique structure.

The expression and practice of artificial fur in emotional clothing design

With the rapid progress of the artificial fur industry, modern consumer demand continues to grow, and more and more people begin to like and use this kind of clothing. For different consumers, the way of emotional expression and the way of emotional experience are completely different, so the requirements for clothing are also various, even if the same consumer in different consumption periods of clothing design characteristics are also different. Designers can divide consumers into different groups through actual investigation, and design different clothing series according to different group characteristics. Many consumers love fur clothing, but do not accept natural fur. Artificial fur has the material characteristics of natural fur, and can achieve more shapes on the basis of which, bringing better emotional experience to consumers. According to the characteristics of clothing, determine the overall design style and design direction, and then adjust and deal with the details according to the different emotions to be expressed, so as to ensure the integrity and difference of clothing, and also meet the emotional needs of different consumers. After setting the overall framework according to the different mental characteristics of customers, we need to use the material characteristics and color characteristics to define various design styles and elements to meet the diverse needs of the market. In this modern fashion creation process, the application of artificial fur is increasingly favored and adopted by designers around the world, they add contemporary design elements to create a unique visual focus, give it a new meaning, so that it shows a sense of modernity, uniqueness, fashion sense and diversified artistic taste. At the same time, while artificial fur is more modern and fashionable, it is also necessary to pay attention to the importance of creative design, which will be the main trend of artificial fur design in the future, bringing broad development prospects to the modern concept and design fashion of artificial fur, and also bringing more possibilities to our daily clothing. Artificial fur also has a value that cannot be ignored in today's market.

Sustainable development of fur clothing

On the question of who is more environmentally friendly between artificial fur and natural fur, at the current stage, artificial fur can only exist as a fabric that mimics natural fur, but it will also gradually use recycled or

easily decomposed materials like other synthetic fabrics, in order to achieve the goal of ecological friendliness of products. It cannot be ignored that the emergence of the popularity of artificial fur has also promoted the development of the green fashion concept of the industry. According to the three major themes of "conservation of animals and plants, ecological environment friendliness, green fashion", three different series have been formed. The first is bionic animal skin, mainly bionic mink, fox, wool, horse hair and so on. They use hair that mimics mammals instead of natural animal fibers to increase touch similarity, improve beauty and comfort, and essentially protect mammals; The other is made of recycled polyester, biodegradable polyester, recycled polyester, wool, bamboo fiber, fiber, etc., produced plush cloth, sportswear. According to the trend of each season, to design and produce to meet the needs of consumers for personality and fashion and beauty. In addition, it can also provide more refined personalized customized services for those consumers with specific needs. Bring more emotional experience. In view of the cruel treatment of animals and environmental damage in the fur industry, measures should be taken to reduce the loss of animals in the industry, such as the use of artificial fur that mimics the appearance characteristics of natural fur to replace real fur, and at the same time, according to the specific requirements of the design, the integration of Chinese traditional cultural skills and foreign modern clothing technology. Create a product design style that meets customer expectations and has characteristics, and always develop the deconstruction design of artificial fur in emotional clothing around the two keywords of environmental protection and sustainability, so as to bring good clothing works to more consumers.

Conclusion

Only with rich emotional experience or sufficient emotional accumulation can designers carry out continuous creation. Faux fur has made its mark in the fashion world as an environmentally friendly material. It can not only reduce the demand for animal fur, but also protect the ecological environment of animals. In the emotional clothing design, the use of artificial fur not only provides more design possibilities, but also can convey a unique emotion and style. In an environment where there is zero tolerance for natural fur, artificial fur can meet the emotional and material needs of consumers. deconstruction clothing usually adopts asymmetric structure, which is expressed through design on artificial fur clothing. Gives the feeling that one is not finished or that the appearance is accidental. The development of deconstruction appearance of artificial fur clothing is closely related to the progress of The Times and the innovation of technology, which is brand-new and tactile feeling; Among them, Mosaic technology is a good way to show the appearance of fur, which is an innovative technology to make the patterned expression of fur. In modern society, artificial fur has also developed rapidly and won the favor of the majority of designers. Under the expression of the characteristics of artificial fur, it pays attention to the emotional awareness of consumers, and conveys more emotions in the color, style and pattern of clothing. Provide more emotional experience, integrate modern design elements into the design of emotional artificial fur clothing, create a new design, give fur clothing more rich meaning, and bring more young, personalized, fashionable, emotional and diversified artificial fur clothing design.

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Ethnic Fashion Emotion
——Emotional Narration Hidden in Ethnic Behavior Patterns

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Abstract

Although the term 'fashion' appeared relatively late, the behavioral patterns or lifestyles it represents have been reflected in various aspects of people's lives since ancient times. Similarly, in the process of social development, there are many active or passive fashion behaviors, and behind these behaviors, the national emotions condensed by individuals, ethnic groups, and even society play an important driving role. Thus, a new perspective based on emotional sociology to analyze ethnic fashion - "ethnic fashion emotion" - emerged. This article will preliminarily define ethnic fashion emotion and analyze their characteristics. At the same time, it will use the clothing of ethnic groups in different regions of the world as a case study to demonstrate its manifestation in the historical process and analyze the application scenarios of ethnic fashion emotion in contemporary times. Provide new analytical ideas for interdisciplinary fashion research.

Keywords

emotional research, fashion, behavior patterns

Ethnic fashion has been a highly anticipated topic in China in recent years. It not only represents the unique traditional culture of the Chinese nation that is valued by young people but also plays an increasingly important role in the current Chinese fashion industry. The combination of ethnic elements and modern fashion showcases a unique aesthetic charm for us. Underlying this charm is a sense of national identity. This hidden and behavioral pattern of emotions conveys deep national emotions through fashion. This paper aims to explore how fashion behavior patterns in ethnic groups influence or guide people's emotional experiences, and how this influence is reflected in the fashion industry and personal behavior choices. Through in-depth research on this topic, we will gain a new perspective, which is to examine the fashion behavior patterns hidden in the field of ethnology from a psychological research perspective.

The connotation and characteristics of ethnic fashion emotion

Since Simmel interpreted fashion in a complete philosophical context, fashion has become an important component within the scope of social philosophy. From the initial pursuit of self-satisfaction in upper class

society to the concept of behavior that encompasses all populations; From the pursuit of fashion trends solely to the exploration of different cutting-edge fields in life, the content covered by fashion has become increasingly diverse. (ZHANG XIAORUI, 2010) Especially in the current era where ethnic elements have once again sparked a new trend, people have to re-examine issues such as cultural identity and national pride, and behind these issues, a spontaneous ethnic sentiment is displayed. Fashion and national emotion, two independent yet completely different disciplines, are closely linked because they share a common emotional component. This has given birth to a new research perspective to examine past, present, and future fashion phenomena, namely national fashion emotion.

The connotation of ethnic fashion emotion

The rational study of emotions is aimed at better understanding the objective laws of things (Jonathan H. Turner, 2007), and emotional research in fashion is no exception. When all members of a nation resonate with a certain thing or event, ethnic emotions arise, and this ethnic psychological phenomenon prompts members of society to reflect on their ethnic social behavior (Moya, C & Henrich, J, 2016), including social fashion behavior.

After understanding the correlation between ethnicity and fashion, ethnic fashion emotions can be defined as a sense of pride, identification, and love for the ethnic group or culture they belong to, as well as a psychological state of concern, pursuit, and inheritance for their own ethnicity or culture. （SHI HUIYING, 2007） It is usually based on the deep historical origins, cultural backgrounds, and traditional values of individuals and their respective ethnic groups or cultures, as well as their appreciation and identification with the unique charm and beauty of their own nation or culture.

The ethnic fashion emotion is expressed as the respect and inheritance of the national traditional culture, the appreciation and admiration of the national craft and art, and the love and pride of the national history and culture. It can also be reflected in the field of fashion, people's love and pursuit of national style clothing, accessories, and other fashion elements, as well as the desire for fashion expressions that reflect their national culture.

Ethnic fashion emotion are largely influenced by social, historical, and cultural backgrounds, and exhibit different characteristics in different eras and cultures. It also develops continuously with people's understanding and pursuit of fashion, showcasing the diversity and richness of national culture from different perspectives and levels.

The characteristics of ethnic fashion emotion

Ethnic fashion is usually closely related to traditional culture. In the fashion sentiment, the use of traditional patterns, colors, materials, and crafts, can reflect the respect and inheritance of traditional culture. For example, China's cheongsam, India's sari, and Africa's tribal patterns are all fashion elements with national characteristics, and the use of these elements can evoke people's emotional resonance for specific cultures.

Ethnic fashions often carry people's collective memories. Through the reproduction of historical events, national traditions, heroes, and other elements, a kind of nostalgia and respect for collective memory can be conveyed in the fashion emotion. For example, some national-style clothing designs may draw on specific periods or events in history to trigger emotional resonance on related topics.

The social expression of ethnic fashion emotion

The expression of national fashion emotion is different in different historical periods, different regions, and different nationalities. In each period, different nationalities in different regions have their own unique expression

of ethnic fashion emotion. Here we analyze through an important carrier of fashion - clothing as a starting point. Take Hanfu, the Chinese ethnic costume, for example:

In the course of thousands of years of development, from the Zhou Dynasty to the Ming Dynasty, Hanfu has always been closely connected with the cultural inheritance of the Chinese nation. The style, fabric, and color of Hanfu are all influenced by cultural inheritance, such as the elegance of the Zhou Dynasty, the majesty of the Han Dynasty, the fullness of the Tang Dynasty, and the simplicity of the Song Dynasty. These characteristics of Hanfu in different historical periods not only reflect the cultural features at that time but also express people's respect and inheritance of traditional culture. At the same time, it also reflects the aesthetic concept of the Chinese nation. The design of Hanfu pays attention to the aesthetic principles of symmetry, harmony, and proportion, and emphasizes the harmony between nature and man, as well as the realm of "harmony between nature and man". This aesthetic concept is naturally integrated into the style, color, pattern, and other aspects of Hanfu. (GE YINGYING & WANG YIXUAN, 2017) All of the above is reflected in the evolution of Hanfu in the form of ethnic fashion emotions. From the design, material selection, and production of Hanfu, to the style, color, and pattern of Hanfu, all express people's love and inheritance of traditional Chinese culture and also show people's reverence for nature, history, and culture.

In Europe, national fashion feelings have different social manifestations.

In the course of the development of European clothing, like China, it contains the essence of national traditional culture. The dress styles of different countries and regions are influenced by the local traditional culture. For example, the romantic style of France, the gentleman style of England, the luxury style of Italy, etc., are the embodiment of the traditional culture of European nations. These different styles of clothing not only meet the needs of people's lives but also reflect the European people's love and respect for traditional culture. The evolution of European clothing is also influenced by the national historical background. The characteristics of clothing in different historical periods are also different, such as medieval knight armor, magnificent robes in the Renaissance, and simple suits after the Industrial Revolution. (Hansen, K. T. 2004) The characteristics of these costumes in different historical periods reflect the European people's pursuit of lifestyle and aesthetic concepts in different historical backgrounds, as well as the inheritance and memory of history and culture.

This ethnic fashion emotion, which takes clothing as the carrier, is more of a kind of temperature from the body. The ethnic fashion emotion of different nationalities has its unique expression and cultural connotation, which reflects the history, tradition, beliefs, and life style of different nationalities. Although the national fashions of different nationalities are different, they all represent the cherishing and inheriting of their own cultural traditions, and at the same time contribute to the diversity of world cultures.

Current research issues of ethnic fashion emotion

Although the theory of ethnic fashion emotion has made some progress, there are still some immature places, mainly including the following aspects:

1. Lack of a unified theoretical framework: The current theoretical research on ethnic fashion emotion is still relatively scattered, and lacks a unified theoretical framework. This makes it difficult for researchers to systematically sort out and analyze various influencing factors and action mechanisms, and it is also difficult to provide strong support for the practical application of ethnic fashion emotion.

2. Lack of empirical research: The existing research on ethnic fashion emotion relies more on quantitative methods such as literature analysis and questionnaire surveys, and there is still a lack of empirical research on the psychological mechanism and influencing factors of ethnic fashion emotion. This makes it difficult for us to deeply understand the intrinsic nature and function law of ethnic fashion emotion.

3. The conflict between cultural relativism and cultural absolutism: In the theoretical research of ethnic fashion emotion, cultural relativism and cultural absolutism often conflict. On the one hand, researchers need to respect and appreciate the uniqueness of different national cultures; on the other hand, they also need to consider the background of globalization and multiculturalism and look for the commonalities and intersections between different cultures. This kind of conflict may lead to contradiction in theory and difficult operation in practice.
4. Tension between national identity and globalization: national fashion sentiment is often faced with tension between national identity and globalization in the context of globalization. While maintaining national characteristics, national fashion also needs to adapt to the trend of globalization and meet the diversified needs of consumers. This tension may lead to theoretical dilemmas and practical difficulties.
5. The dynamic nature of ethnic identity: National identity is a dynamic process that changes with time, and social and political conditions. However, the existing national fashion emotion theory often ignores this dynamic nature, and it is difficult to fully explain the phenomenon of national identity in different historical periods and cultural backgrounds.
6. Lack of multidisciplinary integration: ethnic fashion emotion involves psychology, sociology, anthropology, economics, and other disciplines. However, the existing theoretical achievements are often limited to a certain disciplinary perspective, and lack of multidisciplinary integration and crossover. This may lead to a one-sidedness of theoretical interpretation and limitation of practical application.
To sum up, there is still much immaturity in the theoretical research of national fashion emotion, which needs to be further perfected and expanded. Future research should try to build a more systematic theoretical framework, strengthen empirical research, reconcile the conflict between relativism and absolutism, view the issue of national identity dynamically, and promote the integration and crossover of multi-disciplines.

Conclusion

Through the in-depth study of the theme of ethnic fashion emotion, we can deeply understand the close relationship between fashion and national culture.
Ethnic fashion emotion is the cross-field between fashion and ethnic cultural emotion. Through this study, it can be found that national sentiment has a wide range of expression and influence in the field of fashion. Whether from the perspective of fashion to express the respect and inheritance of national culture, or from the perspective of national emotion to show the pride and identity of local fashion, it fully proves the complexity and diversity of national fashion emotion.
Secondly, ethnic fashion emotion has profound cultural and social connotations. It not only represents a single aesthetic orientation but also reflects the thinking and pursuit of social identity, cultural identity, and globalization. At the same time, the ethnic emotion of fashion has also promoted the development of the local fashion industry to a large extent and created huge economic value for society.
However, although the preliminary theoretical framework of ethnic fashion emotion has been constructed, it must be admitted that the field is still in its infancy and there are many unexplored aspects worthy of further study. For example, we can further study the specific expression and influencing factors of ethnic fashion emotion in different regions and nationalities; From the perspective of consumer behavior, the paper discusses how ethnic fashion emotion affects consumers' purchasing decisions and consumption experience. In addition, we can also discuss the change and development trend of national fashion emotions in different historical periods.
Moreover, what are the differences between ethnic fashion emotion and other disciplines such as social psychology, fashion emotion, national emotion, and national psychology, what are the common points, and what are the connections between them? Such topics are also important research directions and research content in

the future.

Ethnic fashion emotion is a challenging and potential research field. By digging deeper and studying this topic, we can not only improve our understanding of fashion and national culture but also provide theoretical and practical guidance for promoting the healthy development of the global fashion industry. It is hoped that future researchers can continue to explore this field and make more contributions to enrich the connotation and extension of ethnic fashion emotion.

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Collective Memory of Gen Z：VR Game Design Based on Memory Representation Function

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Abstract

This article delves into the concept of "Memory" and its representation, emphasizing Generation Z's unique experiences growing up amidst technological advancements. The VR game "Z box" is introduced, capturing the essence of Gen Z's upbringing, segmented into three interactive zones: Entertainment, Learn, and Thought. These zones represent cultural perception, information acceptance, and innovative thinking, respectively. The design incorporates nostalgic items from the early '00s, aiming to evoke emotions and foster self-reflection. The game's immersive experience is achieved through distinctive interactive media and visual cues, culminating in a representation of fleeting memories over time. This work is a novel exploration for players to have a realistic and immersive version of the Gen-Z growth environment, and also offers an objective perspective for future generations to generate emotional support and realize self-development.

Author keywords

Virtual reality; game; Generation Z.

Introduction

"Memory" refers to the collective process by which humans process, encode, store, and subsequently retrieve the material wealth and intellectual achievements they have created in specific practical experiences. Typically, the elements of memory encompass the subject of memory, the object/medium, thematic content, and temporal context. In this article, the functionality of memory representation primarily focuses on the identification of memory, the integration of memory information, and the interactive experience between the memory subject and object.

Maurice Halbwachs described collective memory as the shared past experiences of a social group, crucial for its continuity and transmission. As globalization alters cultures and spaces, the focus on collective memory grows. With the rapid cultural and spatial changes brought by globalization, collective memory and its mediums are

increasingly the focus of research, and related projects are on the rise. For instance, Salcedo's art, for instance, turns Colombian political violence testimonies into abstract sculptures. One such piece in New York's Bryank Park marked the World Trade Center disaster's 10th anniversary, prompting audience reflection. Sungkajun A collected diverse memories, presenting them via images and videos. Meanwhile, artist Rafael Lozano-Hemmer's work, "Nivel de confidence" (2015), addresses national violence and champions social justice through digital technology.

Generation Z, raised between the mid-1990s and mid-2010s, has been profoundly influenced by technology, uniquely navigating both virtual and real worlds. Emerging during the transition from traditional information to the internet era, their identities and relationships are molded by innovations like smartphones and the metaverse. Classic video games from the '00s are nostalgic symbols of their upbringing, with contemporary offerings like ark-ade VR capitalizing on this. Modern education for Gen Z focuses on personalization through tech-enabled classrooms. Their constant connectivity promotes real-time communication, content sharing, and even political engagement. Future VR technology could enable memory revisitation, offering emotional support and reflection. Our VR design immerses viewers in a nostalgic early '00s world, tailored for Gen-Z's unique experiences.

In order to reproduce the unique characters of their growth period, a VR game "Z box" is designed in this work. "Z box" includes three-aspect interactive zone, named Entertainment, Learn and Thought respectively, to present Gen Z’ s unique ways of culture perception, informat\ion acceptance, and thoughts renovation. We try to form memory flashback to help Gen-Z generate emotional support and improve self-development.

Methodology

Growth elements enhance memory recognition

One of the most important features of generation growth period is its entertainment items. To be specific, representative objects like videotapes, street games, cartoons, and computer devices, etc. utterly reflects the style of the very time. Aiming to reproduce the features, "Z box" uses many stylized items to decorate the "Entertainment" interactive room (see Figure 1), including bar phone, QQ zone, 4399 flash games, bad pop-up ads, forum and post bar, and the TV drama with the view of meteor shower, which will strike a responsive chord with Gen-Z members.

Besides, education and society elements are also taken into consideration in this game (see Figure 2), which are designed into learning and thinking process respectively. As is known, the information explosion age only indicates the mainstream learning content and weakens the learning purpose. So "Learning" room utilizes pick-up learning process to imitate the process of passively acceptance.

Meanwhile, Gen-Z has inherited and retained the weak information lifestyle from previous generation, and gradually adapted to the strong information interaction lifestyle (see Figure 3). Rapid ingestion of information flow equipped Gen Z with broad horizon and innovative thinking, which is displayed in "Thought" room through certain items such as glowing microphones and chip steps, etc.



Figure 1. The first scene.



Figure 2. The second scene.

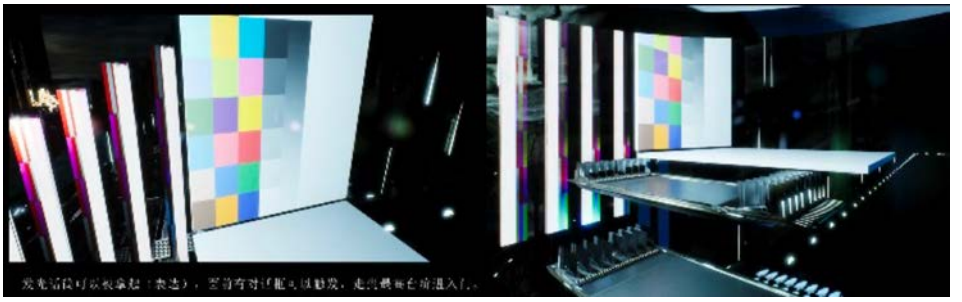

Figure 3. The third scene.

Connecting three spaces promotes memory integration

Generally, it’ s hard to simulate memory scene in interactive games due to its abstraction, which will make the participants out of role. In order to promote immersive experience, we design a blue luminous box as the memory storage carrier. Once triggered, the box will pour out the pixels flow that represents the memory springing process. Meanwhile, three different rooms are chosen as interactive zone to display storage memories. Moreover, when the game comes to the end, every objects in the scene will become particles and vanish（see Figure 4), implying that memory disappears in a long river of time and space. This visual realization method clearly distinguishes different kinds of memory in specific room and enhances players'sense of integration.

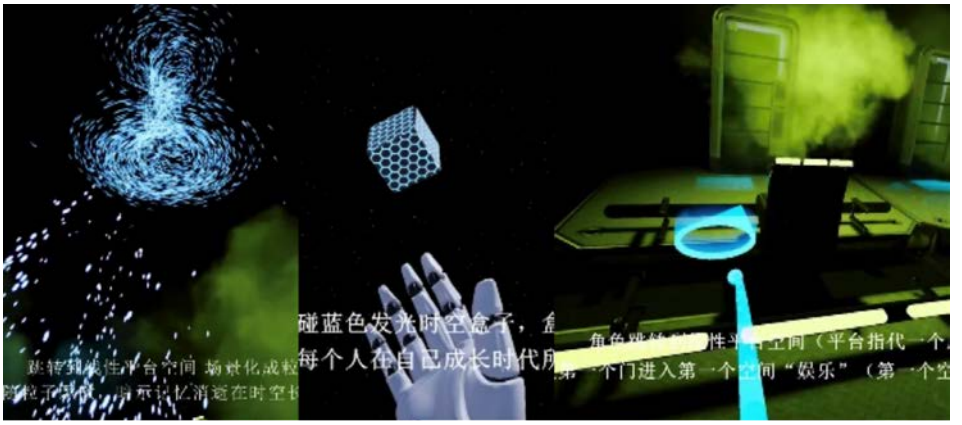

Figure 4. Pixels flow; time box; time platform.

Distinctive media intensifies the interactive memory experience

Interactivity improvement is one of the best ways to enhance participants' satisfaction and sense of experience in VR games. Therefore, we choose narration and featured items as interactive media to draw player’ s attention and guide them. Old type of USB drive, glowing pink rabbits, and background audio are designed as interactive media, in which way the participant will receive guidance and feel lots of fun.

Conclusion

the "Z box" VR game offers more than just a nostalgic dive; it underscores the fundamental principles of memory representation theory. Drawing upon the intricate dynamics of how memories are encoded, stored, and retrieved, the game intertwines Generation Z's distinctive experiences with the broader cognitive mechanics of recollection. By delving into both the collective and individual facets of memory, the VR environment enables participants to not only reconnect with their past but also to better understand the malleability and subjectivity of their own memories. The game also offers an objective perspective for future generations to generate emotional support and realize self-development.

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The Story of Fashion Color in the 1980s: An Investigation Centered on the China Fashion & Color Association

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Abstract
After the reform and opening up, with the support of the Ministry of Textile Industry of the People's Republic of China, China established the first color research institution-China Fashion & Color Association, which marked the birth of Chinese fashion color. Based on literature materials and trend color cards, this paper analyzes the narrative of fashion color in the 1980s by combing the history of the organization, establishment, and development of the China Fashion & Color Association in the 1980s.

Author keywords
Fashion color story, Popular color; 1980s, China Fashion & Color Association, China Silk Fashion Color Association

Introduction

On December 18th to 22nd, 1978, the Communist Party of China convened the Third Plenary Session of the Eleventh Central Committee and made the historic decision to shift the focus of the Party and the nation towards economic development, initiating the era of reform and opening up and socialist modernization in China. Since the onset of the reform and opening up, the Chinese fashion industry has gradually taken shape and developed, with fashion color constituting a vital segment of this industry. The China Fashion & Color Association, as the nation's premier color research institution, stands as a microcosm of China's exploration of fashion colors.

Origin: establishment of China Silk Fashion Color Association

Since 1978, China officially entered the Interstorff International Clothing Fair with the aim of expanding foreign trade orders and increasing exports. Silk has historically been a significant foreign exchange earner for China in foreign trade. However, the lack of attention to international market trends in designing color varieties and an insufficient understanding of popular colors have hindered domestic silk's competitiveness in the international market.

Concurrently, with the deepening of reform and opening up, the textile industry faced new demands and challenges within the domestic market. After the Third Plenary Session of the 11th Central Committee of the Communist Party of China, significant changes occurred in the textile supply and demand relationship. The primary contradiction shifted from quantity insufficiency to the need for better variety and quality to meet market demands. Within this historical context, the China Silk Fashion Color Association was conceived.

In the spring of 1980, following their participation in the Interstorff International Clothing Expo, Comrade Hou Zhongshu proposed to the Ministry of Textile Industry the establishment of a Silk Fashion Color Association. On

June 11, 1981, the Ministry of Textile Industry entrusted the Shanghai Silk Industry Company and Shanghai Silk Research Institute with the organize the work of setting up the "China Silk Fashion Color Research Center." On this foundation, the preparations for the China Silk Fashion Color Association were initiated. In the same year, a preparatory group for the Silk Fashion Color Association was established in Dalian, comprehensively managing the preparatory work.

On February 13-14, 1982, a preparatory meeting for the association's inaugural member representative conference was held to prepare for the association's official establishment and the hosting of the first member representative conference. On February 15, 1982, the China Silk Fashion Color Association convened its first member representative conference in Shanghai, officially founding the association.

During the early stages of reform and opening up, the country sought to boost export trade externally and stimulate domestic consumption to advance national economic development. The original purpose behind establishing the association was to serve the nation's economic development. The association aimed to employ "popular color research" as a key component in enhancing international textile trade exports. This approach would facilitate greater exports and increased foreign exchange earnings through the design and production of "marketable" textile and apparel products. Concurrently, the association engaged in domestic popular color promotion efforts, enabling popular colors to guide and bolster consumption while expanding production in the domestic market.

Communication: join the International Commission for Color in Fashion and Textiles

From July 29 to 30, 1982, at the invitation of the International Commission for Color in Fashion and Textiles Committee, the Ministry of Textile Industry sent observers Xu Ying and Yang Dan to attend the 39th International Fashion Color Conference in Paris. In February 1983, China officially joined the International Fashion Color Committee under the name of the China Silk Fashion Color Association. During this time, representative Yang Dan attended the 40th meeting of the International Fashion Color Committee, where she submitted Chinese color fashion trend predictions and provided color card samples. She also actively participated in discussions about international color trends, particularly for the autumn and winter of 1984/85.

China's entry into the International Commission for Color in Fashion and Textiles marked its formal integration into the global fashion color system. From a Western perspective, China's fashion colors began to develop in a distinctive direction, narrowing the gap between Eastern and Western color influences. The International Commission for Color in Fashion and Textiles was founded in September 1963 by France, Germany, and Japan and convened biannually in Paris. This international conference assembled fashion color experts to discuss, tailor, and publish annual fashion color information. Western European countries, especially France and Germany, held significant influence in shaping color trends within the International Commission for Color in Fashion and Textiles. This situation reflected each country's voice and role in the global market during that era.

Following China's accession to the International Commission for Color in Fashion and Textiles, it drew inspiration from traditional Chinese culture and introduced color schemes such as "Dunhuang color," "Tangsancai color," "Qingtong color," "Yungang Grottoes color," "Jiangnan-Shuixiang color," and "Chinese ethnic minority color." In the spring of 1986, during the 46th Women's Clothing Color Conference of the International Fashion Color Committee in Paris, the China Fashion & Color Association introduced the "Terracotta Warriors" women's clothing theme colors, which featured traditional cultural characteristics like golden yellow, wool white, lake blue, and raspberry red. Four primary colors for women's clothing, earthy yellow for women's clothing accessories, and six embellishment colors, including dark pink, were selected as international fashion colors for women's clothing and disseminated worldwide. Notably, these six colors constituted a quarter of the total number of international

women's fashion colors selected for the autumn and winter seasons of 1987 to 1988, underscoring China's prominent position among countries in terms of color selection (Wu Fumin, 1986).

In the context of the Western-centric international fashion color system, "Chinese style," as the "other," had long been influenced by Western fashion discourse and popular systems. The China Fashion & Color Association's participation in the International Commission for Color in Fashion and Textiles aimed to predict international fashion trends, break free from the status of the "other," and establish the subjectivity of Chinese colors. During this period, the association not only engaged in international exchanges while contributing to economic development but also assumed crucial roles in promoting Chinese traditional culture and enhancing China's global image. It also embarked on efforts to localize fashion colors in China. The widespread international recognition of China's color trend forecasting program not only showcased the profound appeal of Chinese traditional culture but also bolstered the influence of Chinese colors in the fashion world, underscoring the industry's strong endorsement of the association's achievements.

Shaping: renamed China Fashion & Color Association

The "China Silk Fashion Color Association" announced a name change in the "Fashion Color" magazine, officially renaming itself "China Fashion & Color Association" starting from October 1, 1985.

The role of fashionable colors in the textile and clothing industry was initially recognized, but its impact on other sectors became apparent early on. In 1982, following the association's release of its 1983 color trend forecast and color card, various industries enthusiastically embraced popular colors. Notably, Zhejiang Linyi Porcelain Factory expressed keen interest in popular colors, stating, "International ceramics, from decoration to color, including patterns and glaze color, must align with clothing colors. The popular colors published by the association hold significant reference value for foreign trade" (Editorial Department of this Journal, 1982).

As early as 1983, the association changed the name of "Silk Fashion Color" magazine to "Fashion Color" and officially positioned it as a signal of the association's future development direction. Although the origins of fashion color research are rooted in silk, the research and application of color trend prediction extend beyond textiles. "The Fashion Color Association encompasses work on colors, varieties, patterns, clothing styles, packaging, and decoration, forming an integral whole that complements each other" (Hou Zhongshu, 1982). Color trend prediction finds application not only in the textile and clothing industry but also across various sectors. The association's objective is to offer professional color services to diverse industries. The change from the China Silk Fashion Color Association to the China Fashion & Color Association underscores the adaptability and necessity of fashion colors in numerous industries and daily life, fostering the broader development of Chinese fashion colors.

Significance: the fashion construction of China Fashion & Color Association

The China Fashion & Color Association underwent three developmental stages in the 1980s. The first stage commenced with the association's formation in 1982, following reform and opening up, to guide production and support national economic development through fashionable colors. The second stage began in 1983 when the association joined the International Commission for Color in Fashion and Textiles, facilitating international fashion color exchanges and promoting China's image on the global stage. Drawing from traditional color culture, it constructed a distinct Chinese fashion color discourse. The third stage unfolded when the China Silk Fashion Color Association evolved into the China Fashion & Color Association. This transformation signaled the broader application of fashion colors across various fields, emphasizing the comprehensive use of color in daily life and a commitment to enhancing people's quality of life. These positioning changes within the association reflect shifts in domestic color design and fashion concepts within the broader historical context.

Since its establishment in the 1980s, the China Fashion & Color Association has been devoted to researching, popularizing, and applying international fashion colors. It has introduced new disciplines, concepts, and technologies from abroad, conducting extensive studies, exploration, and practical application within the country. Serving as a crucial organizer and facilitator in the formation of fashion colors, it provides distinct and reliable cues for analyzing the narrative of fashion color during the transitional period.

Overall, the China Fashion & Color Association, as China's inaugural specialized color research institution, holds significant value. On a practical level, the association responds to the national call for 'guiding consumption and production' by endeavoring to develop the fashion industry through the provision of publications, lectures, exhibitions, and similar efforts. It has served as a platform and offered academic support for the professionalization and theoretical development of color science. Concurrently, in the dissemination of trend colors, it directs the populace toward an appreciation of color aesthetics, enhancing aesthetic pleasure.

At a symbolic level, the participation of the China Fashion & Color Association in the international color trend predictions represents the cultural image of the nation. The annual participation in color card releases by the association contributes to showcasing the country's culture in international exchanges, amalgamating Western color theory with traditional culture to enhance the international image. The annual release of color cards by the association aids in showcasing the country's culture in international exchanges by combining Western color theory with traditional culture, thus enhancing the international image. In the 1980s, the China Fashion Color Association made efforts and attempts in practicality, professionalism, popularization, and localization regarding the development of fashion colors in China.

Conclusion

Through a case study of the China Fashion & Color Association in the 1980s, this research delved into the expression and practice of fashion colors within the Chinese context. The findings underscore that the effective utilization of fashion colors fosters a convergence among industry, academia, and research, concurrently meeting the populace's quest for a higher quality of life. The pursuit of harmonious unity between the nation and its individuals is a noteworthy aspect that industry and academia can draw inspiration from.

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Design the use of narrative as a link in the poster

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Abstract

This paper focuses on the central role of narrative in poster design, covering the definition, techniques and impact of narrative in this field, as well as the role of visual elements, text selection and color composition in narrative design. Extensive applications of narrative posters in different domains are demonstrated in detail with case studies in film promotion and brand marketing. Particular emphasis was placed on the analysis of the impact of narrative posters on the emotions and perceptions of the audience, and the promotion of technological innovation over design was highlighted. Finally, it provides designers and marketers with practical guidance on narrative poster design, as well as useful references and ideas for future design trends.

Author keywords

In design, narrative, visual communication, color use, graphic design

Narrative and poster design

1.The definition and function of narrative

Narrative is a way of conveying a story, idea, or emotion through a series of events or experiences. Use chronology, plot development, and character emotions to construct information and create empathy and emotional connections. In design, narrative is a powerful tool to give depth to a work. With narrative, designers can better communicate their message, engage the audience, and inspire emotional resonance, prompting the audience to make a deeper connection with the work. The use of story elements can excite the curiosity and imagination of the audience and promote deeper interaction and effective communication. As a result, the narrative enriches the connotation of the designed work and enhances the communication and understanding between the audience and the work.

2.Narrative techniques and elements in poster design

Narrative techniques and elements in poster design include the use of visual elements to construct a coherent storyline, the selection of images and their clever arrangement to convey a message, and the use of color, typography, and typography to express emotion and atmosphere. In addition, visual cues, plot developments, and symbolic metaphors are used to direct the viewer's vision, increase tension, and deepen the narrative level. These techniques and elements are not rigid but should be skillfully used according to the poster's purpose, audience and message delivery to create a more engaging and in-depth narrative poster design.

3.Narrative influences audience's understanding and reaction to the poster

The influence of narrative on the viewer in poster design comes from a number of sources. Narrative posters enhance audience appeal and memorability through stories, making it easier for viewers to remember and feel emotionally connected to them. The narrative element deepens the emotional resonance and triggers the

emotional response of the audience to become more involved in the message conveyed by the poster. Narrative design helps provide a deeper level of understanding, making it easier for the audience to understand the topic or content presented by the poster. It can lead the audience to think and interact, stimulate curiosity, increase interactivity, and enhance the effectiveness of information delivery.

Elements of poster design

1.The role of visual elements in narrative

Visual elements are not only fundamental to the construction of a story, but are also key to convey emotion and guide the audience's understanding. With careful layout of images, graphics and typography, the visual elements carry the expression and development of the story. In addition, color, composition, and visual effects can also convey emotion and atmosphere, injecting a specific mood into the narrative. These elements also direct the eye and attention of the viewer, creating an orderly visual path that allows the viewer to navigate the content of the poster as intended by the designer. Visual elements also carry symbolic and metaphorical functions to convey deeper meaning and information. With the use of visual elements, designers can create plot tension and expressiveness to make the poster more appealing and impactful. The use of visual elements in the narrative not only endows the work with beauty, but also connects the audience to the story, deepening understanding and resonance and making the narrative more engaging.

2.The influence of words and fonts on narrative

Text and fonts are not only media for the transmission of information, but also profoundly affect the audience's understanding of narrative and emotional experiences. Through the size, color, and arrangement of fonts, designers are able to highlight key messages and direct the attention of the audience to important elements of the story. In addition, specific fonts and typographic styles can also evoke the viewer's associations with different time periods or cultural atmospheres, adding layers and a sense of history to the narrative. Most importantly, choosing the right font and layout ensures that the text is clear and easy to read, helping the audience to better understand and absorb the narrative content. The choice of text and font not only has a visual impact, but also directly shapes the emotional expression of the narrative, the prominence of key messages, and the audience's perception and experience of the content

3.The story of color and composition

Colour and Composition They not only shape the visuals, but also deepen the narrative through emotional associations and emotional expression. Colors carry rich emotional and symbolic meanings that directly trigger emotional responses in the viewer. By choosing specific tones and palettes, designers are able to convey the mood needed for the storyline, such as warm colors that convey enthusiasm or cool colors that bring calm. Composition is an important narrative tool. With contrast, the relationship between foreground and background, and color contrast and transformation, designers can create compelling photo effects that highlight important elements of the story and guide the viewer's line of sight. The association between colors and symbols also deepens the audience's understanding of story elements, and the association of specific colors with specific symbols can enhance storytelling.

The application of narrative poster in different fields

1.Movie poster

The posters for The Shawshank Redemption Figures 1 and 2 were designed in a simple design style, highlighting the images of the main characters Andy and Red, with prison doors and walls in the background, and a blue tone to convey the repression and apathy of the prison world. The expressions and poses of the main characters

convey their inner strength and desire for freedom, inspiring emotional resonance and curiosity and anticipation from the audience for the storyline. The poster echoes promotional trailers and other promotional material, establishing a full narrative that reinforces the film's core themes and emotional layers. The "The Shawshank Redemption" poster managed to create anticipation and interest in the audience by presenting the film's core emotions and themes through a simple yet insightful design.



Figure 1 Pictures from the Internet

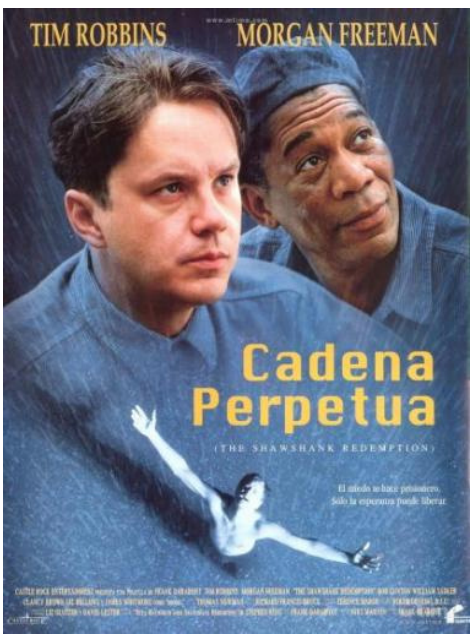

Figure 2 Pictures from the Internet

2.Brand marketing poster

Nike's "Just Do It" series of narrative posters Figure 3 and 4 not only highlights Nike's iconic slogan as a sports brand, but also focuses on the inspirational story as the core, focusing on the challenges and victories of individuals or teams in sports. The design, composition, text and visual effects of the poster were carefully crafted to convey a deeply inspiring feeling. With these narrative posters, Nike managed to elicit emotional resonance in the audience, allowing consumers to develop a deeper emotional connection with the brand. This emotional connection not only drives brand loyalty, but also motivates the consumer's personal goals and challenges. In addition, the posters are not only product promotions, but also reflect the social values represented by the Nike brand, emphasizing a positive spirit and positive energy that profoundly influences consumer awareness and attitudes toward the brand.





Figure 3 Pictures from the Internet
Figure 4 Pictures from the Internet

The in fluence and future prospect of narrative poster design

Narrative poster design has a profound effect on viewer emotions and cognition. Through narrative elements such as visual images, text and composition, it not only transmits information but also deeply triggers emotional resonance and cognitive experience in the audience. Technology and innovation are driving the development of narrative poster design, such as virtual reality and augmented reality, to provide designers with more possibilities, expand creative space, and achieve more personalized and interactive designs. In the future, narrative poster design will focus more on individualization, interaction and diversity. Technological advances will lead to virtual and augmented reality becoming a mainstream design trend, deeply integrating the viewer experience. AI techniques may automatically generate personalized narrative posters, and cross-media integration is also a future direction so that narrative posters can better convey information and emotions, giving viewers a richer experience and a sense of engagement.

Conclusion

This paper provides an in-depth discussion of the impact of narrative poster design on viewer emotions and cognition. It focuses on the key role of narrative elements in poster design and how they can be used to create emotional resonance and deepen the audience's understanding of the content through visual elements, text, color and composition..In terms of the future outlook, it emphasizes the promotion of technological innovation in narrative poster design, especially the rise of virtual reality and augmented reality technologies that will provide designers with more creative possibilities..Finally, the paper highlights the trend of diversification and individualization in the narrative poster design 9field, and suggests some recommendations for integrating across media, emphasizing individualization and deeply integrating the audience experience..These contents describe current and future trends in narrative poster design and provide valuable references and perspectives for designers and researchers.

Acknowledgments

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The Craft Cultural Activation and Protection of Architectural Historical Heritage Based on the Context of Narratology

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Abstract

In view of the phenomenon that the protection of China's architectural heritage focuses on the restoration and protection of the building itself, but is very lacking in the protection of cultural connotations, Therefore,it is proposed that in heritage protection we should pay attention to the integrity of protection, strengthen the protection of intangible cultural heritage, and develop in coordination with society.This article is based on the basic logical foundation of the discipline construction of Chinese narratology, combined with relevant theories and methods of literary disciplines, and proposes a method to explore the dynamic protection of narrative craft culture in architectural heritage from three levels: value exploration, theme mining, and spatial expression. It is an exploration of the social and cultural significance of material space structure.

Keywords

Craft culture, Spatial narrative, Conservation

Introduction

Architectural heritage is a tangible cultural heritage, among which there are many craft cultural heritages based on craftsmanship and technology, which are intangible cultural heritage. At present, my country’ s attention to architectural heritage mostly stays on the material level, focusing on architectural techniques (or decorative techniques) The craft culture urgently needs more attention.

1 Thoughts on the protection methods of architectural historical heritage

1.1 Question

Firstly, most of the architectural heritage protection in China is static protection at the material level.The most commonly used means are static displays similar to those in museums, and public participation is mainly based on viewing.This method sets up a high threshold for the dissemination of cultural heritage, and making it difficult for the public to see the full picture（Herry,2021）.

Secondly, the excessive homogenization tendency of tourism development and excessive commercial development under the banner of protection have forced the cultural value of architectural heritage to give way to commercial interests.

1.2 Solution direction

The root of the problem may be that the current domestic cultural heritage protection neglects the good inheritance of cultural connotations.The birth of each building is guided by social and cultural ideas, traditional craft culture as the medium, and specific construction techniques as means to jointly create an artistic form. The protection of craft culture belongs to the category of intangible cultural heritage protection and is also an important component of architectural heritage protection.With the promulgation of the "Intangible Cultural Heritage Law of the People's Republic of China" in 2011 and the establishment of the long-term strategy of "A country with great culture" at the national strategic level, the protection of craft culture nationwide has received more and more attention.

Domestic scholars have discussed the issue of living protection of intangible cultural heritage. By comparing tangible cultural heritage and intangible cultural heritage, some scholars have concluded that intangible cultural heritage itself has "state of vitality（SV）" characteristics, and SV protection and inheritance are consistent with The inherent development needs of intangible inheritance are suitable for active protection and inheritance.

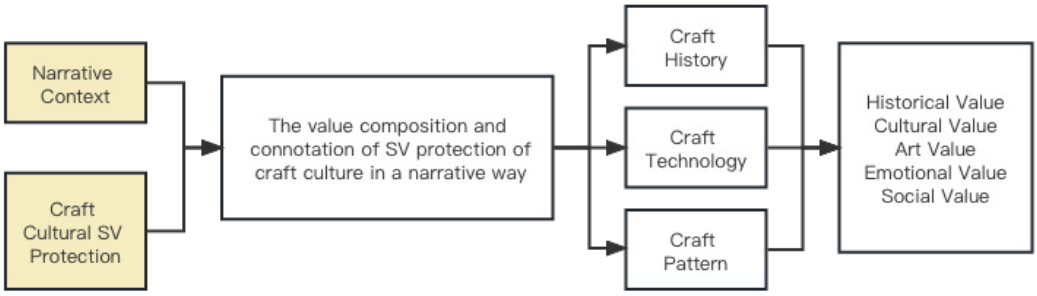

Figure 1. Discussion on the SV protection value of craft culture

2 Narrative interpretation of spatial narrative and craft culture

2.1 Narratology

Narrative is a concept first proposed in the field of literature. It refers to the act of telling and the object described, that is, narrating things.In the late 20th century, the booming spatial research finally affected the field of narrative scholarship, and the concept of spatial narrative was proposed（Dong,2012）.Emphasis on spatial narrative is the exploration of the spatiality of narrative forms, and the exploration and interpretation of stories and meanings contained in space.(Long,2008).French scholars believe that creating space is similar to narrative, and explore how urban space can become a narrative carrier of historical memory（Rendall，1984）.This is an exploration of the socio-cultural significance of material spatial structures.In short, within the broad research scope of narratology, using it as a medium, the study of craft culture in the urban historical environment is actually an overall investigation of urban space and the historical culture and daily life it carries.

2.2 Narrative Exposition of Craft Culture

Narrative is the telling of stories and events, the further description and explanation of things, and the interpretation of craft culture based on narrative. The focus is on the awakening of cultural and communicative memories.The use of spatial narrative is an important way to tell the story of craft culture（Wang,2016).Through storytelling, participants are encouraged to understand the spiritual core of culture with accurate and familiar attitudes and emotions from more aspects.Help the boring, dull and introverted craft culture to show the

tenacious, perceptive and passionate core of the humanistic spirit.

Through narrative protection strategies, we can supplement the spatial expression of craft culture itself, present craft culture with story-like spatial images, and form a systematic spatial text to show the most authentic original appearance of craft culture, which is very worthy of exploration（Figure 2）.

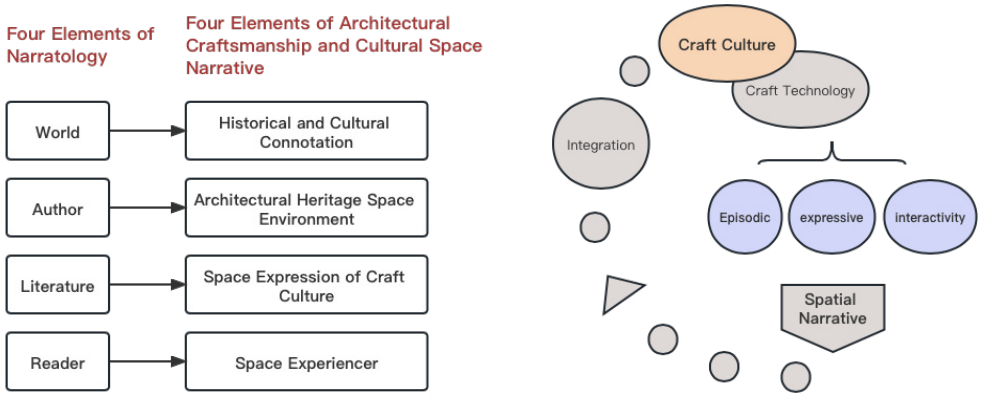

Figure 2. Analysis of the Four Elements of Narratology

Figure 3. The integration of craft culture and spatial narrative

1 Historical Narrative Expression

Historical narrative expression aims to encourage more people to understand cultural heritage with special emotions and attitudes, and to see more of the warmth and humanistic flavor of cultural heritage. Different regions have different traditional craftsmanship, and these craftsmanship techniques have affected the cultural life of people here to some extent. combined into a unique local history and culture. Ancient lacquer craftsmanship, wood carving techniques, construction techniques, metal forging techniques, etc. together constitute the development of craft culture. In the field of architecture, the craft culture involved also forms a unique philosophy based on architectural space, which also requires appropriate cultural communication channels. With the help of narrative expression, we can enhance people's understanding of the world, promote the deep integration of personal emotional experience and craft culture, and help experiencers capture emotional resonance in culture. The narrative of craft culture and history in architectural space must pay attention to spatial expression. Combining the characteristics of information brings more possibilities for spatial narrative expression.

2 Craft Narrative Composition

The most important feature of traditional crafts is that it has important historical value and craftsmanship value. The accumulation of history brings about the gradual development and improvement of craft culture. Based on the continuous iteration of society's advanced productive forces, the craftsmanship of craft culture is the most difficult part to inherit and has been ignored. This directly leads to the non-renewability of certain material cultural heritage. If craft technology may be an external expression of the spiritual world of a certain era or a certain group of people, then the things lost in the long river of time are our most precious cultural wealth.

According to the craft characteristics of craft culture, the composition of spatial narrative mainly has two key contents, namely mutuality and integration（Zhang，2019）. Under the narrative strategy, the plot, expressiveness, and interactive characteristics of craft culture are all content that needs to be paid attention. The spatial narrative method is to create value for craft culture in modern times by enhancing the readability of craft culture. This potential purpose requires There is a need for architectural interoperability between craft culture

and spatial narrative. In addition, fusion is a common requirement for both lacquer and lacquer, which prompts whether there are other possibilities for the development of deeper craftsmanship in contemporary society through narrative methods. The purpose of this in-depth interpretation is to serve as a means to activate the cultural vitality of craft culture and provide strength for its protection and inheritance（Figure 3）.

3 Craftsmanship and cultural protection construction of historical architectural heritage

As can be seen from the previous article, the craft culture contained in historical architectural heritage has multiple research values that are born around craftsmanship. The protection of craft culture is an effective supplement to the protection of historical architectural heritage. Because craft culture is easy to be ignored and difficult to inherit, we try to use spatial narrative methods to guide the living protection of craft culture. From a methodological perspective, literature-based spatial narrative research is reflected in some classic literary masterpieces, and we can obtain an organizational structure that can be used for reference, that is, value exploration-theme conception-spatial expression.

3.1 Value exploration

The spatial narrative of craft culture is a four-dimensional narrative text in which time and three-dimensional space overlap. The exploration of the value of craft culture is to sort out the clues of time and space on the basis of excavating craft story clues, studying historical archives, and sorting out craft culture background stories, paving the way for subsequent theme excavation and spatial expression.

3.2 Topic mining

The clear theme is the ideology that runs through the story from beginning to end, and contains the most essential spiritual core of the story. Narrative requires a theme, and the narrative centered around the theme includes the summary and refinement of the background story of the object being expressed, and all spatial scenes will be centered around the theme, which can maintain a high degree of consistency between the theme and the connotation of spatial expression to the greatest extent.

Secondly, the cognitive system of the space experiencer must be taken into account in the theme narrative expression method, and intersect with the cognitive system of the experiencer. Therefore, it is necessary to pre-imagine the cognition and feelings of the experiencer during the participation process. Therefore, a clever interpretation of the theme is also the key to whether the experiencer can smoothly receive the information and stimulate deep thinking. Provide a basis for the next step of spatial form deduction.

3.3 Spatial expression

According to the content of value exploration, it can be evaluated from the perspective of value status and divided into outstanding value and average value. From the perspective of conservation status, a three-level evaluation standard is established. According to this standard, the content focus and expression direction of spatial expression are guided (Table 2)

	Good	Normal	Bad
Outstanding Value	Inheritance Activation	Restorative Activation	Reductive Activation
Average Value	Adaptive Activation	Adaptive Activation	Creative Activation

Table 2: Activation Method Analysis Table

The structural model of spatial expression is space-time art with space as the theme. The analysis of narrative structure can enhance the storytelling and appeal. The spatial narrative structure with different emphasis will also make the same event present different artistic aspects. At the same time, different preservation statuses of heritage also require different narrative structures:

Linear narrative structure - emphasizes the linear narrative technique proposed in linear (corridor theory) about the architectural heritage in the same area. Pay attention to the orderly combination of scattered heritage according to thematic clues. Emphasis on the independent static museum protection model, forming an integrated linear spatial narrative text to convey the flowing historical context.

-Linear narrative structure—Emphasizes the linear narrative technique proposed in linear (corridor theory) about the architectural heritage in the same area. Pay attention to the orderly combination of scattered heritage according to thematic clues. Emphasis on the independent static museum protection model, forming an integrated linear spatial narrative text to convey the flowing historical context.

-Interspersed narrative structure—What is emphasized is the narrative method of narrating other things in the linear narrative, which is a supplement to the linear narrative structure, retains the integrity of the linear narrative structure, and establishes a complementary complex structure at the turning point. Amplify the emotional aspect of the story.

-Deconstruct narrative structure—The concept of deconstruction is splitting, emphasizing the separation and arrangement of various elements of craft culture in space, and then re-forming a consistent and three-dimensional spatial expression form.

When applying narrative structures to the protection of living craft culture, it is necessary to choose according to different narrative themes and narrative objects. There is no conflict between multiple narrative structures and can be juxtaposed together to work together. It three-dimensionally displays the social value of craft culture and highlights the positive role of spatial narrative in the protection of craft culture.

In conclusion

The protection methods of architectural heritage still need to be constantly revised and supplemented. The selection of protection methods should be based on the cultural context, and explore the activation and protection strategies of craft culture through narrative expression. This will not only help us explore the connotation of cultural heritage, It also promotes the enrichment of the spatial context of cultural heritage and elevates the protection of cultural heritage to the level of coordinated development of urban space. It has certain reference significance for solving the regional context crisis in urbanization.

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Research on the Design of Urban Intelligent Public Transport Service System Based on Kano Model

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Abstract

With the advent of the era of artificial intelligence, big data, and the Internet of Things, people's demand for public transportation systems continues to develop in the direction of informatization and intelligence, and the intelligent construction of public transportation has become an important research topic that cannot be ignored. This paper uses desktop research, literature research, field research, user interviews, questionnaire surveys and other qualitative and quantitative research methods to obtain the pain points and needs of users in the process of public transport travel. The Kano model is used according to attractive attributes, expected attributes, and basic attributes. , Irrelevant attributes and reverse attributes classify users' bus travel design attributes, use user satisfaction and dissatisfaction indicators to filter out the key design attributes that affect the user experience of bus travel, and convert them into design elements, so as to carry out bus travel in a targeted manner The service system is constructed to improve the user experience satisfaction of public transit travel.

Author keywords

Intelligent public transportation, Kano model, service design

Introduction

At present, urban buses are the main means of transportation in cities that the country advocates for "low-carbon transportation and green travel". With the active promotion of smart city construction by the country, advocating for green transportation for the people, and encouraging the priority development of green public transportation, intelligent technology services such as the Internet, the Internet of Things, big data, and intelligent scanning have been applied to intelligent transportation, making people's travel methods more convenient and efficient. However, buses usually take a longer driving time each time they depart, which is more likely to cause fatigue for drivers. Therefore, it is necessary to achieve autonomous driving of buses. In the future, higher level autonomous driving technology will create a safer, more efficient, and more convenient travel environment in the field of urban public transportation systems. The demand for the use of public transportation systems is also constantly developing towards informatization and intelligence. The intelligent construction of public transportation has become an important field that cannot be ignored, and its development has greatly improved urban traffic management, enabling citizens to receive better travel services. This topic focuses on the research of intelligent public transportation systems, improving public transportation software and hardware facilities through research on user needs, and using new technological means to better assist transportation service providers and users in obtaining information, optimizing and improving service design, promoting the resolution of transportation problems, and enhancing citizens' initiative in taking public transportation, A more comfortable and convenient

travel experience for citizens in urban public transportation life.

Theoretical Basis of Public Transport Service Design and Kano Model

The Kano model was proposed by Professor Kishio Shouno of Tokyo Institute of Technology in 1984. It is a tool that reflects the nonlinear relationship between product performance and user satisfaction by analyzing the impact of user demand on user satisfaction.According to the relationship between the demand for functions provided by Kano model products and customer satisfaction, user needs are divided into 5 categories from the perspective of user subjective feelings:

M-type basic requirements: When providing this requirement, user satisfaction will not significantly improve and will remain stable; If this requirement is not provided, user satisfaction will significantly decrease.

Type O expected needs: User satisfaction is directly proportional to the degree of satisfaction of such needs. If the demand is provided, user satisfaction will increase, but if the demand is not provided, user satisfaction will decrease.

Class A charismatic demand: If this demand is not provided, it will not have a significant impact on user satisfaction. If such a demand is provided, it will bring unexpected surprises to users and significantly improve user satisfaction; If this requirement is not provided, it will not reduce user satisfaction.

Class I no difference requirement: Regardless of whether the requirement is provided or not, it will not have a significant impact on user satisfaction.

R-type reverse demand: The relationship between user satisfaction and the degree of satisfaction of this type of demand shows a negative growth. When providing such requirements, user satisfaction will decrease; When this type of demand is not provided, user satisfaction will increase.

Research and analysis of target users

This topic conducted an interview task based on the interview outline, and identified seven users in the target user group for interviews, including two office workers, three students, and two retired elderly people. The main focus was to collect and understand the problems encountered by users in past bus travel and their imaginations on the future functions of intelligent public transportation. And the detailed data and materials recorded in the interview were organized.

After a preliminary understanding of the basic information, travel habits, and problems encountered by the target user group, establish primary and secondary user profiles to supplement and prepare for further clarification of user needs. The main user profiles are divided into professional title newcomers who frequently take the bus to work and high school students who use the bus to go to and from school, with secondary users being retired elderly people who occasionally take the bus. Summarize their motivation, lifestyle, travel habits, usage goals, and ride behavior, laying the foundation for creating user journey maps.

Kano Model Requirements Analysis

Based on the above series of studies on users, emergency evacuation, comfortable seats, adding trash cans, standing and leaning positions, public restrooms, independent spaces, blocking ultraviolet rays, ladder slowing down, storing wheelchairs, multimedia seats, charging mobile phones, sliding doors, facing the seat, video placement on the car body, motion sickness medication, facial payment, sound insulation and noise reduction, luggage storage, booking for exit, displaying geographical location, remote monitoring security There are 29 user requirements, including displaying crowded traffic, displaying seat availability, navigation routes, collecting commonly used sites, AR maps, online lost and found, detecting risks, and accurate arrival time.

This survey questionnaire was distributed in the form of an online questionnaire, covering a total of 11 days from March 15, 2021 to March 26, 2021. A total of 209 questionnaires were collected, and 14 invalid questionnaires (including those that never took the bus and those with contradictory answers to positive and negative questions) were excluded. A total of 195 valid questionnaires were received.

After obtaining the functional requirements and the types of requirements, further quantitative analysis of the satisfaction index SSI and dissatisfaction index DDSI is needed to understand the impact of the provision of this function on user satisfaction and dissatisfaction. The larger the SSI value, the more significant the improvement in user satisfaction when intelligent public transportation provides this function, and the higher the user satisfaction; The larger the DDSI value, the more significant the decrease in user satisfaction when this function is not provided, and the lower the user satisfaction [13]. The calculation formula is as follows

SSI=(SA+SO)/(SA+SO+SM+SI)

DDSI=(SM+SO)/(SA+SO+SM+SI)

According to the above formula, the satisfaction index SSI and dissatisfaction index DDSI of intelligent public transportation demand are obtained (Table 4-6). Use the two as the vertical and horizontal axes of the coordinate axes, and use the mean of the two as the critical line to create a quarter quadrant scatter plot of the Kano model.

Observing the scatter plot, it can be seen that when intelligent public transportation provides functions in the first quadrant, user satisfaction increases, and if not provided, it decreases; If intelligent public transportation provides functions in the second quadrant, user satisfaction will increase, and if not provided, it will not decrease; Whether intelligent public transportation provides or does not provide functions in the third quadrant has a relatively low impact on user satisfaction; When intelligent public transportation provides functions in the fourth quadrant, user satisfaction will not increase, and if not provided, it will decrease. Therefore, the functions in the first and fourth quadrants should be retained, and the functions in the second and third quadrants should be deleted according to the actual situation. The functions ultimately reserved for design practice include emergency escape, comfortable seats, standing and leaning, blocking ultraviolet rays, storing wheelchairs, multimedia seats, charging mobile phones, sliding doors, motion sickness medication, facial payment, sound insulation and noise reduction, luggage storage, booking for disembarking, displaying geographical location, remote monitoring security, displaying crowded traffic, displaying seat availability, navigation routes, collecting commonly used stations, online lost and found, and detecting risks 22 functions such as precise arrival time.

Design Practice of Intelligent Public Transport Service System

The interactive system of intelligent public transportation includes car software, hardware, and app software. The car hardware includes a storage cabinet and a holographic projection interface on the second floor wall, which uses human body movements for input without touching the screen. Among the functions filtered out using the Kano model, the functions distributed in the hardware include emergency escape, comfortable seats, standing and leaning, blocking ultraviolet rays, storing wheelchairs, multimedia seats, mobile phone charging, sliding doors, motion sickness medication, facial payment, sound insulation and noise reduction, storage of luggage, and display of geographical location. The functions distributed in the APP include appointment for getting off, display of geographical location, remote monitoring of safety, display of dense pedestrian flow, and display of seat availability Navigation routes, collecting commonly used sites, online lost and found items, detecting risks, and precise arrival time. Plan and describe all its functions. The combination of software and hardware in the car with the APP can better improve the user's travel experience. And create a service system diagram.

The exterior design of the carriage is generally a rectangular shape, with a rounded overall shape and simple color scheme, mainly consisting of gray white and transparent. The middle of the first floor of the carriage is

equipped with dual side automatic sliding doors, and the boarding stairs in this area can be flipped into a sloping and unobstructed passage. The carriage shell is made of intelligent color changing soundproof glass, and an operation interface is set on the second floor of the carriage, which can control the amount of ultraviolet radiation transmitted and achieve customized shading function. Firstly, sketch the external shape and deduce the shape of the vehicle's external shape. After synthesizing the sketch scheme, use Cinema 4D for modeling design and rendering the external styling effect.

The carriage is mainly divided into upper and lower layers, and a staircase is set at the left front end of the vehicle to connect the first and second layers. The distribution of seats on the first floor is relatively small. There are 6 folding chairs with different heights on the front side of the carriage, and an intelligent storage cabinet is installed below the front staircase, including the storage of motion sickness medication. The left side of the middle of the carriage is an accessible area, with two pairs of wheelchair fixing devices on the ground, and a set of sofa seats at the rear of the carriage. On both sides of the second floor carriage, there are 18 seats with charging ports arranged. In the middle of the carriage, there is a row of standing seats and handrails, and at the rear of the carriage, there are sofa seats.

The wall of the intelligent storage cabinet on the first floor of the carriage is equipped with a storage system interface. Click on the menu ball to pop up icons for storing luggage and picking up motion sickness medicine. Click on the storage luggage icon, and the storage cabinet door will automatically open to store luggage in the open cabinet. On both sides of the second floor of the carriage, there is an operation interface in the glass wall area next to each seat, which can adjust the shading of the glass in a single seat area and view real-time geographic location.

The sofa seats on the first floor are arranged in an "F" shape, making better use of the rear space of the car and allowing it to accommodate more passengers. The folding chairs at the front end of the first floor are distributed at different heights, aiming to serve passengers of different heights and increase their comfort. And when the folding chair is not in use, it is folded and placed on the wall, leaving more space for passengers to walk in the carriage. The wheelchair area on the first floor is set up at the entrance of the upper and lower doors to shorten its movement distance, and horizontal handrails are set up in the glass wall to facilitate the movement of passengers with mobility barriers. Glass handrails are installed on the stairs between the first and second floors to enhance passengers' visual experience. The second floor seats are designed to fit the human body, and fabric materials are used for the pillows and armrests to make them softer and enhance the passenger's riding experience. The standing seat in the middle of the carriage provides a place for standing passengers to rest and reliably relieve their fatigue while standing.

The information architecture of the intelligent bus app is simple and clear. The app is mainly divided into two modules, namely "My" and "Navigation". In addition, there are three modules on the homepage for viewing vehicle information, namely "Crowding Status", "Seating Status", and "Vehicle Safety". Through the homepage, you can directly search for the destination location to query the route, and then select multiple different route plans recommended by the system to view the real-time arrival status of bus stops in the route plan. You can also choose to book a stop and remind you of the arrival. After getting off the bus, if you have lost any luggage or personal belongings, you can find the lost and found module in "My" to view the corresponding lost and found information announcement of the bus route.

The overall style of the high fidelity prototype interface of the APP is simple and compatible with the bus design. White and blue are the main colors of the interface, following readability and style uniformity. The operation is simple and easy for users to learn and use.

Summary

This article conducts research on the design of intelligent public transportation under the guidance of service design theory in the environment of future smart cities. Based on user research, identify the usage needs of users for public transportation, and use the Kano model to design and practice user demand screening. Through service design, users' needs in various aspects of the public transportation system have been effectively integrated, providing people with a fast, comfortable, and convenient travel experience in urban public transportation life. There are still shortcomings in the usage process and visual experience of the app in this article, and there is still room for improvement. At present, the research on service design in urban intelligent public transportation systems is still in its infancy, and its theory and design methods still need to be continuously optimized and sublimated in service research and practice.

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Narratives of Love

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Collaborating to Build Symbiotic System Model: Spatial Microrenewal Based on Ecological Resilience

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Abstract

This paper aims to establish a paradigm of spatial micro-renewal under the perspective of urban ecological resilience, and explore the design paths of spatial renovation and renewal based on this theory in order to optimize spatial utilization strategies. After elaborating the concept of ecological resilience and its connection with spatial micro-renewal, it proposes a symbiotic spatial renewal method based on four dimensions of equality and inclusiveness, stakeholder cooperation, decentralized ecological diversity and sustainable and flexible development. Taking the micro-renewal of peacock garden of Nanjing University of the Arts as an example, the combination of resilient development and symbiotic space is explored at the three levels of relationship, function, and development elements, and the spatial renewal of biological and cultural diversity is realized through a series of tiny interventions. At a time of environmental and ecological crisis, it provides new ideas and methods for spatial transformation and renewal, and promotes the establishment of a harmonious symbiotic space between human and nature.

keywords

Ecological resilience; spatial micro-renewal; symbiotic system; harmonious coexistence of human and nature.

Introduction

Rapid global economic development is accompanied by urgent ecological and environmental protection problems, climate change leads to global warming, biodiversity decline, water crisis intensifies, urban ecological risk rises, threatening life and environment. At the moment of crisis, the harmonious coexistence of man and nature is an important part of China's modernization. In recent years, China has made remarkable achievements in urban ecological and environmental governance, but faces multiple challenges; therefore, building a healthy, green and beautiful symbiotic environment has become an urgent need for residents and other life communities. This paper focuses on urban public space, proposing a spatial renewal model based on ecological resilience in four dimensions: equality, stakeholder collaboration, ecological diversity, and sustainable development. Using the Peacock Garden as a case study, it validates the model across relationship, function, and development levels, offering a new perspective for symbiotic space micro-renewal.

Connotation and Development of Ecological Resilience

The origin of resilience is the Latin word "resilio", which means the ability of an object to recover its original state after being subjected to external forces. Ecological resilience is an important part of urban resilience and

has attracted extensive academic attention. Scholars have put forward a variety of definitions from different perspectives. Holling first defined it as the "speed of stabilization of an ecosystem after a disturbance" in 1973, and Brand summarized it as the "ability of a system to resist a disturbance and maintain a particular state". From the perspective of resilient cities, Jiang Zixuan defines resilience as "the ability of ecosystems to resist, withstand, and recover from disasters under external and internal pressures".

To sum up, This ability contributes to the harmonious coexistence of humans and nature and enhances the level of urban modernization. Therefore, this paper introduces micro-renewal and co-creation based on the theory of ecological resilience to build a symbiotic environment of openness, tolerance, ecological diversity and sustainable development, which provides new research ideas and guiding significance for spatial transformation and renewal.

Construction of spatial micro-renewal system based on ecological resilience

Introduction of Spatial Micro-renewal

Micro-renewal focuses on small-scale renovation, emphasizing a microscopic viewpoint, detail-oriented improvements, user involvement, and cost-effective quality enhancement. Integrating micro-renewal with ecological resilience optimizes economic, social, and cultural benefits, resolving spatial transformation challenges.

Spatial Micro-renewal Paradigm Based on Urban Ecological Resilience

Taking the Stance of Pluralism, Openness and Equal Inclusiveness

Pluralism means recognizing and respecting differences, ensuring equal opportunities and rights, and common benefits. Openness emphasizes transparency and openness, while equal inclusion covers the entire ecological community in the space, especially including some socially marginalized and disadvantaged groups. The secondary use of basic space can be realized through the placement of different business forms, functional replacement and functional integration, forming a more just partnership, meeting the needs of different user groups and improving the inclusiveness of the space.

Multi-stakeholder Collaboration as a Pathway

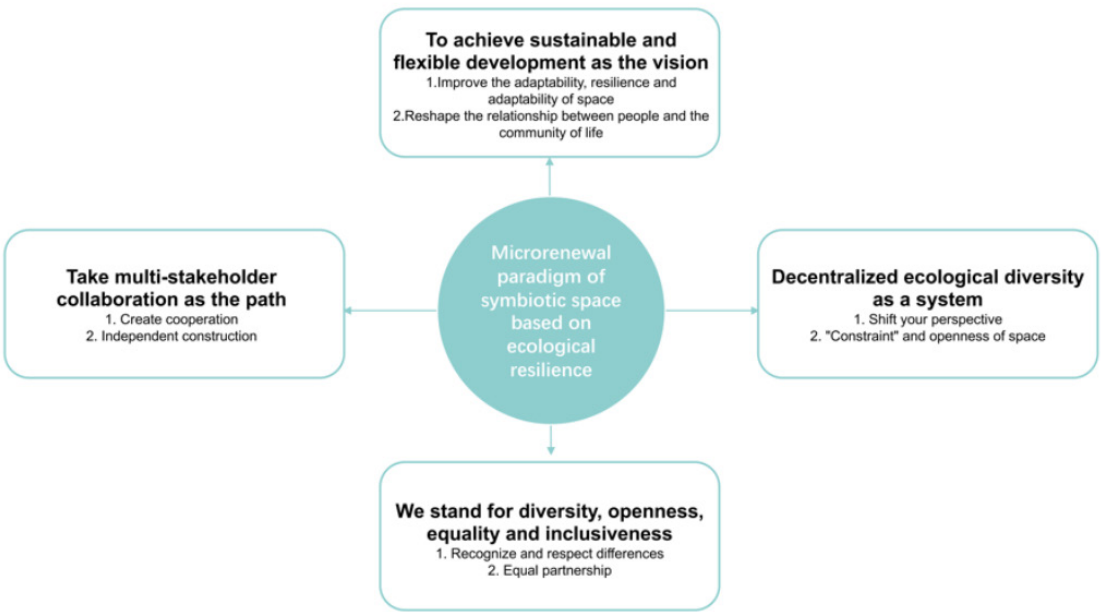
Multi-stakeholder collaboration aims to coordinate all parties, including designers, community members, the government and even other species surviving in the space, to jointly construct a new way of life. This type of collaboration employs a top-down approach on the one hand, with planned design and management to ensure that the project meets the set goals and standards. At the same time it employs a bottom-up approach, encouraging community members to participate and fulfill their own needs. This collaboration not only promotes new spatial design and planning, but also encourages spaces to move in new, more resilient directions.

Decentralized Ecological Diversity as a System

Thomas. Berry states in the most poignant and comprehensive terms, "The historical mission of this era is to reinvent humanity, together with the community of living systems, at the species level through critical reflection." This highlights the importance of creating ecologically diverse systems of species. It is possible to reshape the current shape of space through a spatially optimized nodal transformation approach. The key to this lies in shifting the perspective from considering only human beings to having responsibility for the various ecological communities living together in the same space, balancing the rights of various organisms to survive, and increasing the interactions between different species in the space so as to establish a symbiotic habitat.

Vision of Realizing Sustainable and Resilient Development

Breaking away from the traditional sustainable development goals, establishing diverse communities, social and ecological systems, and improving the adaptability, recovery and resilience of the space. For example, repairing ecological relationships by conducting various artistic and cultural innovative activities, enhancing inspirational education, and promoting synergistic development of spatial, ecological, and cultural domains. To make space an inter-organized, interdependent and diverse whole, and to reshape the intimate relationships between people, the environment and the community of destiny towards a more sustainable and resilient future.(As shown in Figure 1.)

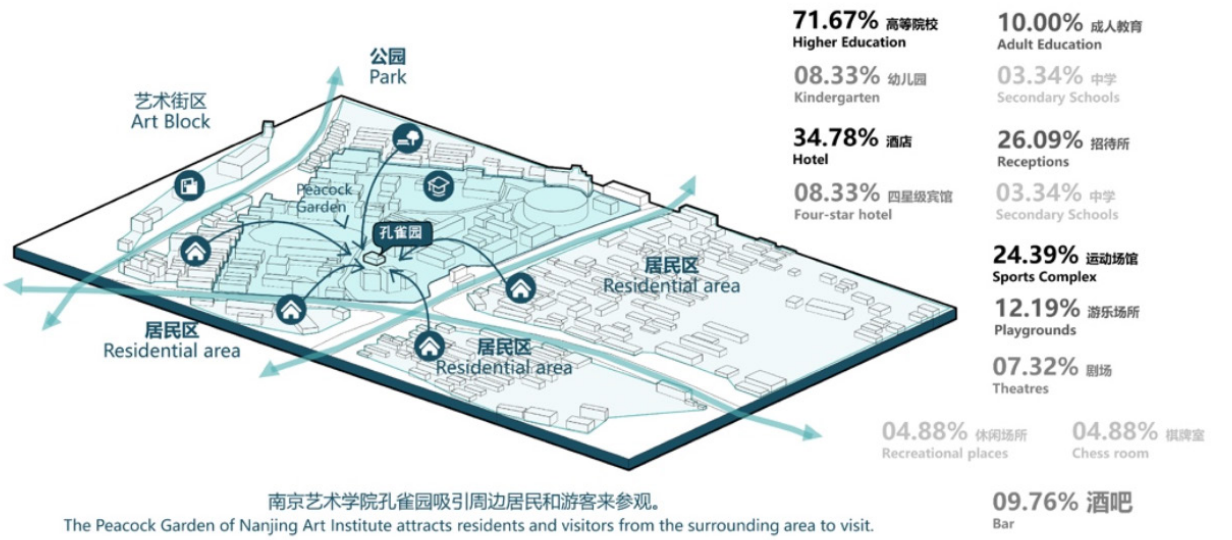


Microrenewal paradigm of symbiotic space based on ecological resilience

Micro-Renewal Design Practice in the Case of Peacock Garden

Overview of the Park

Peacock Garden is located in Nanjing Arts Institute, adjacent to the library in the north, the south gate of the campus in the south, the south playground in the west, and the south cafeteria in the east. As a characteristic and iconic place of the school, it is a place of rest and recreation frequented by teachers, students and neighboring residents. The Peacock Garden bears multiple missions, including establishing the image of the campus, conveying the spirit of art and culture, explaining the concept of campus development, and practicing the concept of harmony between human and nature and sustainable development. It not only injects vitality into the school, but also enriches the campus ecological environment. (As shown in Figure 2.)



Analysis of the surrounding area of peacock garden

Development Status and Challenges of the Campus

Development Status

The perimeter of the Peacock Park is multi-functional and rich, including a variety of activitiessuch as peacock feeding, walking, reading and self-study. There are six benches around theperimeter of the park, and many students choose to read and recite here because of its proximityto the Shaw Library. The Peacock Garden is located in a small garden on campus, and thus alsoattracts neighborhood residents who bring their children to feed the peacocks and enjoy familyfun. Students and faculty often take a walk after eating in the South Cafeteria, and tourists oftenvisit the Peacock Garden when touring the Art Museum. The demand for activities in the PeacockGarden is broadly categorized into three main groups: interactive peacock feeding, reading andlearning, and leisure walks. The artistic and cultural environment of the Peacock Garden is verydiverse and includes three main aspects: ecological culture, campus culture and communityliving culture. In summary, the Peacock Garden is a comprehensive place to experience campusculture, feel the unique charm as well as stimulate campus vitality.

Challenges

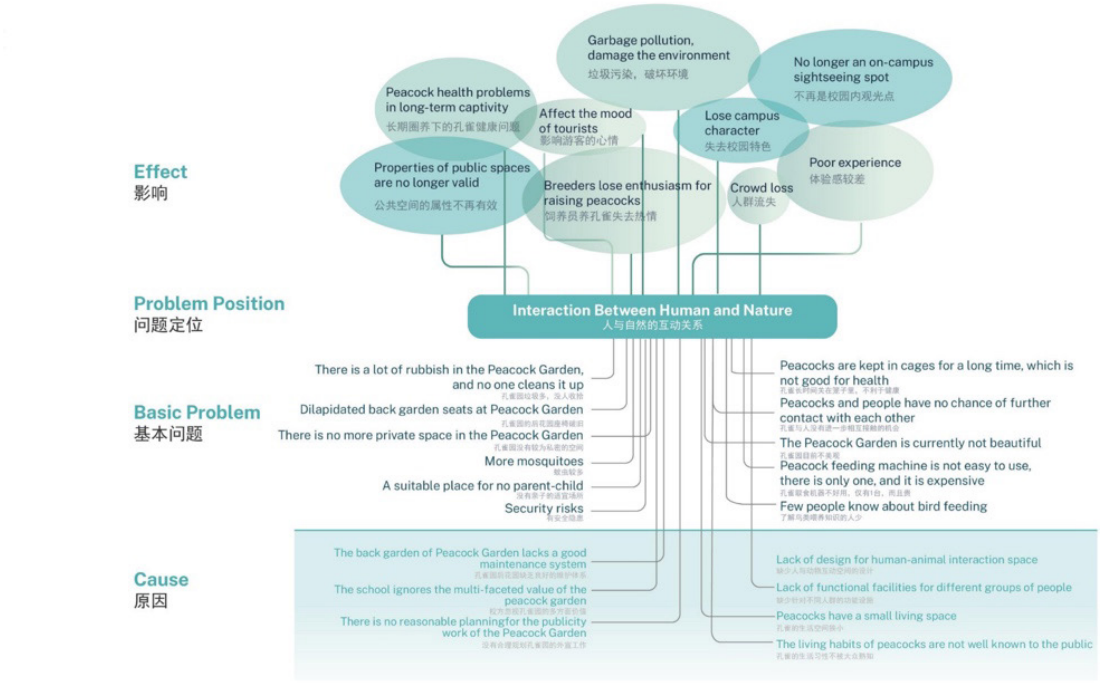
Limitations in spatial form, the peacock garden adopts the form of captive breeding, which islimited by fences and covering nets, restricting the freedom of peacocks. In addition the parklacks a space for memorization and learning and a place for interaction. Reciters can only reciteon a few chairs outside the fence and have limited interaction with the peacocks, making itdifficult to realize harmony between humans and nature. The homogenization of functionalresources, the most characteristic peacock does not occupy a dominant position, leading to thelack of vitality for the park's continued development, and the spatial structure of the situation isdifficult to be improved. Fragmentation of cultural resources protection, although Peacock Parkcarries the artistic life and place memory of the campus, its development has gradually lost itsown characteristics, lack of cultural activities and leisure interaction, and failed to fullydemonstrate the rich artistic and cultural atmosphere

of the campus. (As shown in Figure3.)



Analysis of problems around peacock garden

As a unique place of the century-old art college, Peacock Garden carries unrepeatable ecological and artistic and cultural characteristics, and is a perfect space for the integration of life and art, human and nature. Therefore, during the renewal process, it is necessary to balance the relationship between human and nature, enhance the overall value as well as strengthen the artistic and cultural exchanges to create a harmonious symbiotic space system. (As shown in Figure4.)



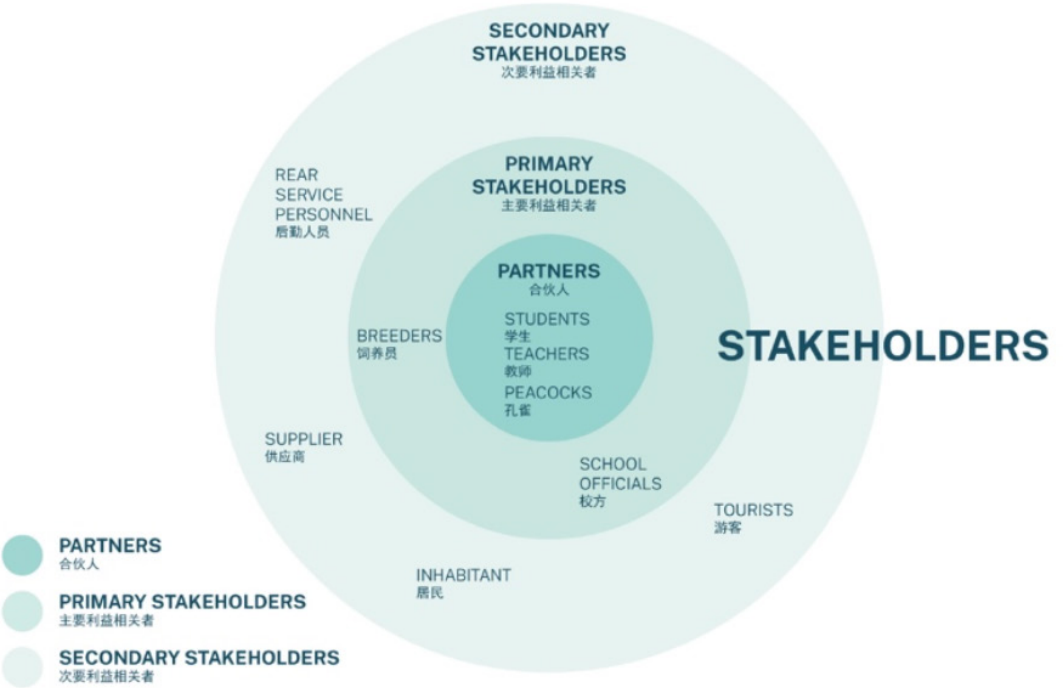
Peacock garden problem tree chart

Stakeholder Co-creation, Exploring a New Model of Symbiosis

The project organized co-creation workshops, involving three key stakeholders: peacock keepers and experts, university teachers, students, and tourists, as well as designers and design students. The keepers and experts shared their knowledge on peacock behaviors, habitat requirements, and breeding management, while also promoting awareness of peacocks and biology. In a way, these keepers assumed a role akin to that of the peacocks within this space.Teachers, students, and visitors from both within and outside the university shared their experiences and stories related to the peacock garden. They categorized the park and its surrounding spatial environment, laying a strong foundation for subsequent design planning. During the workshops, on-campus participants established connections with off-campus visitors, fostering the development of a symbiotic space. Professional designers acted as coordinators, harmonizing the needs of various stakeholders and

aligning the peacock's habitat with human activity spaces. They proposed optimal solutions for human-nature symbiosis within the urban resilience framework.

Through the collaborative efforts of these three stakeholders, a novel spatial transformation model emerged. Its goal is to execute a systematic and sustainable micro-renewal plan for the Peacock Park.(As shown in Figure5.)



Stakeholder analysis

Micro-Renewal of Public Space in Peacock Park

Relationship Elements - Change of Spatial Forms

The traditional peacock park model allows visitors to only passively view peacocks. This project proposes a brand new concept of expanding the peacock's habitat area, opening the peacock's living space to visitors, and creating a humanized and public open space to deepen the interactive experience. This change not only changes the visitors' observation perspective, but also provides a more natural living environment for peacocks. Ultimately, the integration of the peacock garden space is realized, creating a diverse and open space where peacocks and humans coexist as equals.

Functional Elements - Introduction of Multiple Attributes

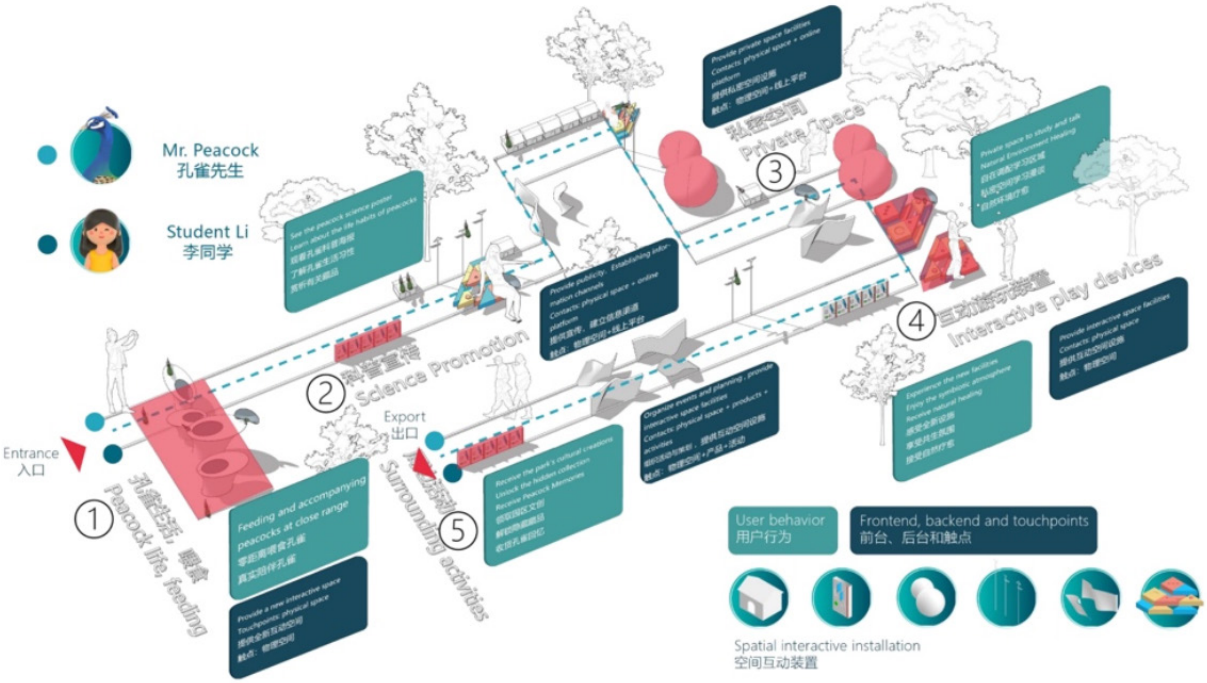
This project focuses on the fulfillment of diversified functions as well as the design of interactive peacock equipment to stimulate the vitality of the Peacock Park and thus build new spatial relationships. Taking the peacock park's most core attraction - peacock feeding interaction as a breakthrough, the project introduces independent recitation learning space, peacock feeding facilities, etc., gradually realizing the renewal of the original peacock park area, presenting a closely connected but non-interfering regional distribution. Make the peacock garden a common favorite place for human beings and peacocks, and realize the diversity of the ecosystem.

Development elements-art and culture inspiration.(As shown in Figure6.)



Peacock garden symbiosis system transformation model

Through the offline Peacock Garden Art and Culture Festival and the online sharing and communication platform, we create a service platform that conveys the concept of ecological harmony. Visitors can remotely learn about various special cultural contents about the Peacock Garden and the school by downloading the APP, and they



Flow chart of cultural activities in Peacock Garden

can also buy peripheral cultural and creative products co-branded by the Peacock Garden and designers or artists

on the APP. In addition, Peacock Garden has established a unique Peacock IP image and brand, and organized different art and culture flash mob activities from time to time, etc.. In this way, it enhances the visibility of the campus and shows the school's artistic and cultural heritage. And through the co-creation of art and culture and inspiring education, it is prompted to realize the sustainable and resilient development of the Peacock Park. (As shown in Figure7.)

Conclusion

This paper presents a spatial micro-renewal paradigm from an ecological resilience perspective, optimizing urban public space. Through the Peacock Garden case study, it validates this approach, fostering harmonious human-nature symbiosis and offering a new perspective on spatial transformation. This paradigm constructs a symbiotic system, promoting wider spatial renewal.

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Design of elderly care service system in urban villages under the background of community building—taking Tengjiazhuang Village in Rushan City as an example

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Abstract

This article uses service design and community building as the theoretical basis to explore anddesign the elderly care service system in urban villages, aiming to explore a elderly care modelsuitable for urban villages and improve the living standards of local residents.Urban villages arethe product of urbanization. In the process of transforming agricultural communities into urbancommunities, the living conditions and environment of local residents have changed. How todeal with and utilize such changes is the main content of this article. Since the target users ofthis study are the elderly, their daily elderly care needs have become the focus of the author'sresearch. By building an elderly care service system in urban villages, we can alleviate theelderly care pressure on local communities and provide the elderly with a better life in theirlater years.

keywords

community elderly care; urban villages; multi-generational mutual aid; service system design

Research background

The current situation of elderly care in urban villagesUrban villages are the product of traditional rural self-development and self-construction.Some villages and towns located on the edge of cities were classified as urban areas during thedevelopment process.The infrastructure and lifestyle of some villages and towns lag behindthose of urban areas. The reason is that the construction mechanism of urban villagecommunities has not been completely transformed, and the living model of rural communitiesstill remains.Therefore, the population structure of urban village communities is relativelysimple. Most of the children of stem families choose to go out to work, and the proportion ofempty-nest elderly people is increasing year by year.Due to the special geographical location ofurban villages, the needs of community elderly care cannot be met, and the urban elderly caremodel is not suitable for the current situation of elderly care in urban villages.According to thenotice issued by the China Development and Reform Commission on the issuance of the "KeyTasks for New Urbanization and Urban-rural Integrated Development in 2022", promoting theorganic integration of urban and rural areas has become one of the priorities of urbancommunity work in the new era.At present, China has achieved its first centenary goal, which is to build a moderatelyprosperous society in all respects. From 2021 to the present, it is the mature period of thetransformation and construction of urban villages. The transformation goal has graduallyshifted from market demand to people's livelihood needs.Therefore, the demand for theconstruction of an elderly care system in urban villages is one of the people's livelihood needs,and a clear path to its realization has not yet emerged.

Main issues in elderly care in urban villages

In the case of unequal distribution of urban and rural resources, the community elderly care system in urban

villages is almost in a blank period.Taking Tengjiazhuang Village in Rushan City as an example for case analysis and research, the difficulties and hidden dangers in elderly care in this Village are more common in urban village communities.Due to serious population loss and imbalanced population ratio, there is a serious lack of family care for the stem families in the community. Empty-nest elderly people lack family care, making their daily life a big problem.In addition, due to the poor functioning of the community elderly care service system in urban villages and the lack of coordination and management, the community elderly care is ineffective and it is difficult for elderly people over 75 years old to achieve a barrier-free life through community care.Finally, most of the families in urban villages have made a living through farming, and some elderly people do not enjoy the benefits of the national new rural insurance policy, resulting in a low popularity of institutional elderly care.

In summary, due to varying degrees of deficiencies in many aspects such as family care, community care, land care, and institutional care, the elderly care in urban villages is in the "three noes" situation of having no land to rely on, no one to support, and no regulations to support.In view of the main problems existing in community elderly care, residents' participation is used to construct the elderly care system, making full use of local people, culture, place, scenery, industry and other resources.In this way, a new path for community elderly care in urban villages can be constructed, which can serve as a perspective to re-deconstruct the elderly care system in urban villages from different dimensions.

Conditions for constructing elderly care service system in urban villages

Location advantage

Urban villages are located on the edge of cities. Although their population growth patterns and community management are different from those in urban areas, most urban villages have relatively sufficient social resources, including population mobility and the commercial value of community locations.Taking Tengjiazhuang Village in Rushan City as an example, its urban flexibility is quite high, providing low-cost housing needs and rich social business formats for the urban area.

Due to land transfer, most of the land in urban villages has been converted into houses or vacant land. Therefore, some of the land can become commercial development sites, adding favorable conditions for urban supporting facilities in the city center.Since the downtown business of Tengjiazhuang Village in Rushan City is relatively saturated, the Village selected some houses as incubators for the leasing and catering industries to increase economic construction around the urban village.In addition, the population of this village is highly constructive, and increasing the commercial richness of the community can provide more jobs, thereby returning the population to the urban village.Therefore, urban villages can retain the community attributes of traditional rural areas and use their location advantages to solve problems such as population and industry reuse in the community.

Multi-generational support

Multi-generational mutual aid originated from BEGUIEN, a single women's organization in Germany in the 19th century. The organization brought together women of different ages to live together and had clear community norms. By the 20th century, it had become a concrete measure to solve the aging problem.However, mutual aid in rural communities in China benefits from the traditional customs and farming models of agricultural communities. Community residents are mostly distant relatives or neighbors and gather together to form agricultural communities following traditional Chinese surname relationships.Therefore, urban villages can use their traditional cultural attributes to connect multiple families to create a multi-generational elderly care model.

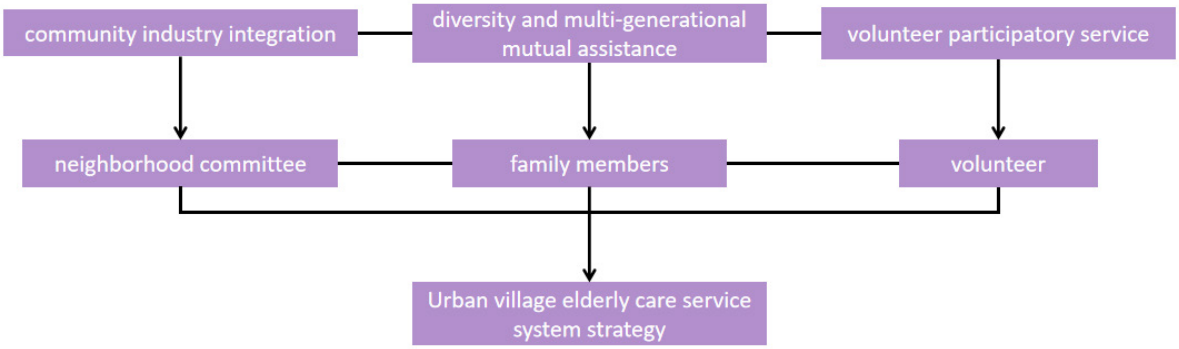
Participatory community management`

Community management in China is divided into self-management and administrative management. Self-management includes voluntary public welfare organizations and community service groups.Resident participatory management of domestic communities can make full use of resources and manpower in the community. Although the community self-control system covered by urban villages is not perfect, its construction value and possibility of implementation are high.Tengjiazhuang village in Rushan City initially had villager suggestion boxes and community charity volunteers, some of which have reference value for participatory community management.Participatory management in agricultural communities is a spontaneous behavior of residents. It can increase the participation rate and enthusiasm of residents in the construction of the elderly care system, thereby making the construction process more in line with current public sentiments.

Path analysis of the elderly care service system in urban villages

Urban village elder care service system strategy

The service system strategy for urban village elderly care is formulated based on the characteristics of agricultural community construction, and research and optimization are conducted from the five aspects of people, culture, land, scenery, and industry.The functions of the elderly care service system can not only solve the elderly care problems in urban villages, but also integrate community resources with the support of system business elements



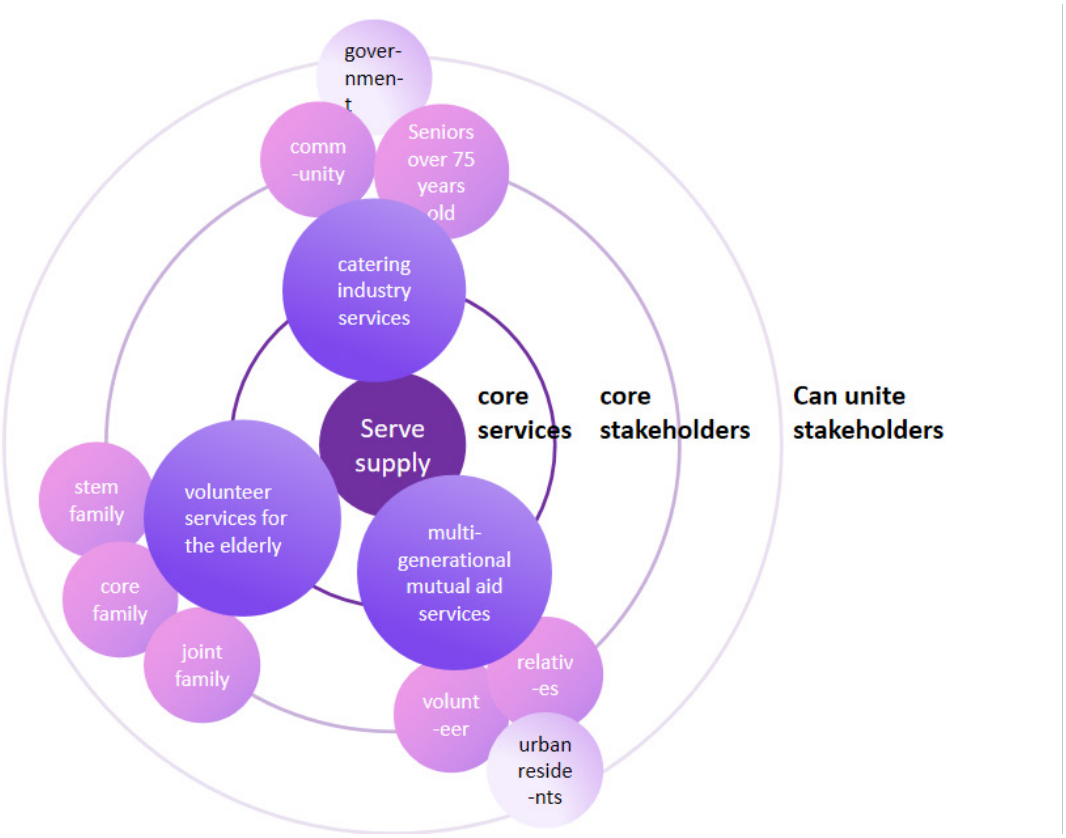
System strategy diagram.

to "transform" urban villages. The system strategy diagram is shown in Figure 1.

Since urban villages have abundant land resources and low prices, they can attract investment through community industry integration.The community will assume the role of organizer and integrate resources from the catering, tourism, real estate and other industries in the community to give full play to the advantages of local resources.Secondly, with the advantages of industrial resources and the support of relevant policies, community volunteers are recruited, with the urban village as the core and diverging to the urban area.People of different ages may be volunteers or only beneficiaries, and provide volunteer participatory services based on their own strengths and needs.Finally, because the family types and relationships in urban village communities are relatively complex, including stem families, nuclear families, and joint families, different resident groups promote the diversity of community elderly care services.Therefore, diversified multi-generational mutual aid based on the family unit can solve the complex problems of different families, thereby sharing the pressure of the families where the elderly live.

Subject relationships of elderly care services in urban villages

In this project, the subject relationships are divided based on the service design strategy and content. The core



Stakeholder map.

services include three main subjects: community catering industry services, volunteer participatory sponsorship services, and diversified multi-generational mutual aid, as shown in Figure 2.

The core stakeholders of the community catering industry services in the picture are the community and the elderly aged 75 years. The elderly can eat for free in restaurants if they meet relevant conditions, and the daily expenses of the industry are borne by the community neighborhood committee.The stakeholders it can unite with are the government system, and some industries in the community can seek preferential policies from it to alleviate economic pressure.In addition to community entities, the figure also includes volunteer sponsorship service entities, and its core stakeholders include volunteers and relatives. Relatives, as service providers, can be converted into volunteers to provide elderly care services. At the same time, if there are elderly people over 75 years old in the relatives' families, they can also be service users and enjoy the related services of other volunteers.The stakeholders that this subject can unite are urban residents, with the urban village as the core radiation area, attracting other urban residents for dining, etc.Finally, multi-generational mutual aid service subjects include different types of family groups, and different families can transfer services to each other and share services at the same time.

Evaluation of urban village elderly care service system

Compared with traditional elderly care services, urban village elderly care services are different in terms of participants, degree of government intervention, types of residents, and elderly care models.Judging from the current practice in Tengjiazhuang Village, Rushan City, the urban village elderly care system has relatively higher social satisfaction and family satisfaction than traditional elderly care.Elderly care in urban villages is mainly borne by agricultural communities. Compared with the traditional family-responsible model of elderly care,

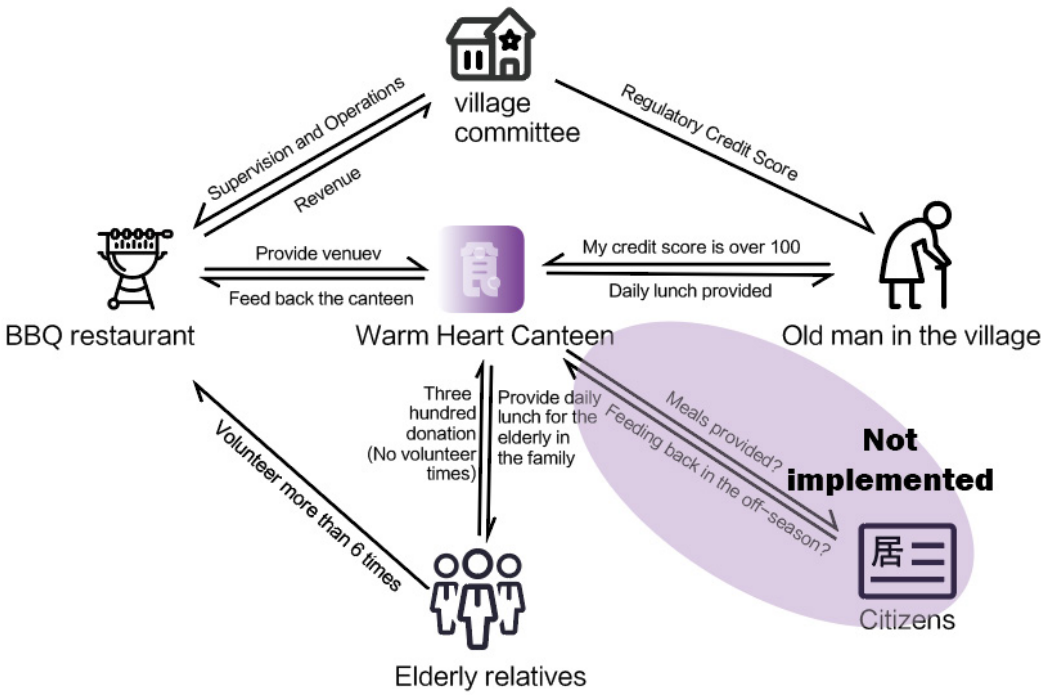
it helps reduce the financial and spiritual burden on elderly families.In addition, in terms of participants, the traditional participation of residents has gradually changed to the participation of social welfare organizations, and the types of residents have developed from single families in the past to diversified families.Because the elderly care services in urban villages have public welfare attributes, the degree of government intervention is relatively large.

At the same time, due to the weak maturity of the service system and the weak stability of the population, this elderly care model has certain deficiencies in the iterative process.On the one hand, the attribute conversion of agricultural communities takes a short time. After converting from a traditional farming industry to a community industry, it takes a certain amount of time to practice and iterate.On the other hand, different residents have different levels of participation, and the popularity of their elderly care services is not enough. Therefore, the elderly care service system should be popularized through publicity to attract more residents to participate.

Innovative practice of elderly care services in Tengjiazhuang Village

Innovative practice of elderly care service model in Tengjiazhuang Village

After the village underwent housing reform and land transfer, most residents of the agricultural community converted from traditional agricultural residences to commercial housing.Due to its relatively remote geographical location and large population loss, the permanent population in agricultural communities is small, and most of them are elderly people aged 60 years and above. This type of left-behind elderly people lack care from their families and the community.Therefore, residents, communities and the author conducted a series of participatory co-creations to identify the hidden dangers and dilemmas of elderly care in urban villages.The author found that the problems of village elderly care are mainly concentrated in three aspects: lack of people, lack of funds, and lack of system. Some elderly people are unable to take care of their own meals. At the same time, their mental health lacks corresponding guidance and treatment.



Urban (administrative village) community business transformation service system map.

In response to the above problems, the community building organization discussed converting the village's high-quality land resources into commercial land, establishing restaurants and heart-warming canteens, realizing resource feedback through commercial profits, and solving the problem of the elderly being unable to take care of themselves.The commercial format, mainly restaurants, increases employment opportunities in the village, attracts a large number of young people to return to the urban village, and further solves the problem of elderly care. The service system diagram is shown in Figure 3.

The "Warm Heart Canteen" was established by the Agricultural Community Neighborhood Committee. The village uses a "credit +" points system to link multiple stakeholders such as the elderly's family members, neighborhood committees, volunteers, migrant workers, and customers.The diagram of its elderly care service system is as shown in the figure. 75-year-old seniors with full points can enjoy free canteen meals every day, and their family members need to provide volunteer services three times a month or donate 300 yuan free of charge.The community is mainly responsible for supervising the daily points of the elderly, increasing public welfare activities in urban villages, attracting the participation of the elderly to obtain different levels of pension points, and at the same time solving the problem of lack of community activities.This service system effectively utilizes the current land and resources in urban villages, and takes advantage of the low housing prices and low commodity prices on the edge of the city to achieve a win-win service effect of business diversion and elderly care.

Iteration strategy of the elderly care service model in Tengjiazhuang Village

Some problems have been discovered during the practice of the Tengjiazhuang Village elderly care service model. The main problems are personnel management and the dining experience of the elderly.Due to the special geographical location of urban villages, most of the regular service personnel and volunteers in the community are from the same village or are related by relatives. In the process of managing the credit points of the elderly, problems of dishonesty arise.In addition, the elderly eat more meals per year and the canteen space is limited, which inevitably leads to overcrowding. The elderly have limited physical strength and energy, which may be counterproductive in some cases.

In response to the above problems, combined with the previous systematic methods, a re-optimization strategy for the elderly care system is proposed. The dishonest behavior of the elderly and their relatives will be used as one of the criteria for judging points, and corresponding bonus points will be given for honest behavior;Taking into account the lack of space and the physical strength of the elderly, the dining problem for the elderly is a grab-and-go system. The elderly only need to bring meals home to eat.The vacant tables will be open to residents outside the village to provide daily catering services to alleviate the performance pressure of other catering industries during the off-season.

Conclusion

The "14th Five-Year Plan" and the outline of long-term goals for 2035 propose that during the "14th Five-Year Plan" period, "the urbanization rate of the permanent population will increase to 65%." In the process of urbanization, the pension system and pension model of agricultural communities will be changed and iterated. It has far-reaching research significance.This article uses the theoretical basis of community construction and service design to improve the elderly care services in urban villages, while narrowing the gap between urban and rural elderly care services, standardizing and improving urban elderly care service standards, and proposes the design of the elderly care service system in this article.This article is based on the theory of community construction and service design, aiming to improve the elderly care services in urban villages, narrow the gap between urban and rural elderly care services, standardize and improve urban elderly care service standards,

thereby forming a Chinese characteristic urban village elderly care service system and promote the development of Chinese elderly care communities.

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Developing participatory design: from designer-driven to user-driven

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Abstract

Contemporary design places a strong emphasis on systematic thinking through an interdisciplinary approach. The study of design processes and methodologies has consistently been a focal point in the academic world. Participatory design (PD), which directly involves end-users into the product design process, is a design approach with significant research value and practical potential. Therefore, it is essential to grasp the relevant concepts and consider the advantages of this approach. This article delineates the challenges for PD research in two primary areas: addressing users' emotional needs and evaluating the effectiveness of PD design. Subsequently, it discusses viable solutions to these challenges.

Author keywords

Participatory design(PD); Design process(es); Design approach; Users

Participatory Design OR Co-design

Participatory design (PD) has its political roots in the U.S. labour movement and the Scandinavian codetermination laws of the 1970s, which required workers to participate in decision-making in the workshops (Nieusma, 2004) Early notions of PD can, therefore, be understood as a call for the democratization of design practices. In the 1990s, Norman's emphasis on user experience (UE/UX) in The Psychology of Everyday Things led to a focus on the design principles of user-centered design (UCD) and human-centered design (HCD) in the design community. According to literature reviews, the emphasis on "human" has become an almost universally accepted norm for contemporary designers.

Therefore, contemporary mainstream design behaviors revolve around "people". Even if design approaches, such as user experience design[1] and service design[2], shift the design focus from objects to experiences, the role of "people" in the overall design system remains a research subject for designers. Against this backdrop, PD has developed as a unique design methodology. Sanders places User-Centered Design (UCD) and PD together on a design research map, considering users as subjects and partners, respectively. According to the literature, in recent years, academics tend to use co-design to describe this type of design methodology with users as partners. However, PD and co-design are not the same in terms of the same concept due to semantic differences. PD implies active involvement and engagement of stakeholders in the design process, while co-design emphasizes the collaborative nature of the design process, involving various stakeholders, including designers,

1 Jesse James Garrett elaborates on Norman's theories in The Elements of User Experience, which transforms UX from an academic term into a paradigm that can be learned and practiced. This work is considered as a landmark in UX design.

2 The UK Design Council defines service design as : service design is about making the services you provide useful, usable, efficient, effective and satisfying, see "Design Council, Design Methods for Developing Services, Keeping Connected Business Challenge, London: Design Council, 2015, pp.4".

users, and other relevant parties, actively working together as equals. Therefore, this article will use the term PD to describe a design methodology that incorporates users into the product design system.

The advantage of user cognition in product design

Cross argues that design represents a distinct way of knowing, different from both science and art/humanities (Cross, 2006). This highlights the significance of research on cognition in the design process within the realm of design research. Taking product design as an example, PD offers a fundamental advantage by involving end users in the design process. This involvement can, to some extent, compensate for the cognitive limitations of designers which are regarded as "experts" by Sanders (Sanders & Stappers, 2014).This is because the professional knowledge of product designers primarily focuses on the application of design methods and tools. However, it is challenging for them to gain practical insights into the specific needs and experiences of individual users. Consequently, it is inevitable that certain user needs may be overlooked at the outset of the product design process. The root cause of this issue lies in the disparity between the designer's cognition and that of the user.

Yao and Huang describe the user's cognitive process in relation to a product as a procedure of information processing (Yao & Huang, 2014). In this process, the user's brain reacts to various aspects of the product, such as its shape, material, and color. These reactions are significantly influenced by the user's pre-existing life experiences and knowledge zone. User-Centered Design (UCD) methods typically treat users as research subjects. They seek to identify user needs for new products through user personas and preliminary user research. Subsequently, these needs are consolidated into product features. In these approaches, users essentially articulate their requirements regarding product appearance, functions, services, and more, rather than participating in actual design activities.

The design team collects these user descriptions through various means and interprets them, translating them into a list of product design objectives based on their own perceptions. However, this process presents challenges. It involves multi-layer (3 layers at least) information transfer, causing potential information distortion. Additionally, translation errors can occur due to cognitive differences between users and designers. Therefore, PD can be understood as a process that translates users' intracerebral responses to a particular product into tangible design elements. This approach directly involves end-users in the overall product design process, enabling them to address their product needs from their unique cognitive perspectives. This eliminates at least one layer of the information transfer process and, consequently, enhances the accuracy of defining the product design goals.

Future challenge: emotional needs & effectiveness of PD

It is worth noting that, although the theory of PD was initially proposed with a promising vision, its practical implementation has proven challenging. This challenge is particularly pronounced for small and medium-size (SMEs) and design teams with relatively limited resources. Implementing the PD approach with high quality can be particularly difficult. Here are two paths that may contribute to an improvement to some extent:

1. Emphasize the consideration of users' emotional needs during the PD process:

In the PD process, the designer team serves as guides, responsible for providing support to participants (users) in terms of design methods and tools. Their ultimate goal is to refine the solutions proposed by users into highly feasible design prototypes. Ensuring effective and efficient information exchange between designers and users during this process is of paramount importance.

Currently, design researchers are enthusiastic about applying PD to the design of products for special needs groups, such as infants, the elderly, individuals with physical disabilities, and those with mental health issues.

This is because the disparity between the user perception within these groups and that of designers is particularly evident. However, it is precisely due to the unique identities of these users that their emotional needs tend to be more sensitive. These needs are influenced by various factors, including cultural background, educational background, and physical & mental health. Failure to address the emotional needs of participants may even result in users refusing to engage in the design process.
To address this situation, drawing on interdisciplinary theories can be beneficial. For instance, Mejía's exploration of the value of Behavioral Economics theories for design (Mejía, 2021) provides valuable insights. Additionally, optimizing existing PD approaches to accommodate the emotions of specific participants, as demonstrated by Rajapakse et al.'s study proposing a "respectful design approach" for participants with cognitive or sensory impairments (Rajapakse et al., 2021), is a promising avenue for improvement.

2. Develop a comprehensive design results tracking and evaluation system:
The product design process is often depicted as a seemingly linear sequence, but in reality, most product design processes do not follow a strictly linear path. In the context of PD, the design process derived from theory should not be blindly applied. Even when the authority of designers in the process is diminished, a well-defined evaluation system that is usable, applicable, effective, and comprehensive remains essential. This system ensures a positive impact of PD on the product design.
In practical application, it is advisable to choose a common design process framework based on the organization's size, target user groups, and other relevant factors. Subsequently, these frameworks should be adapted to address specific, deeper requirements. The challenge arises from the fact that different countries/regions possess distinct cultural and economic environments. Consequently, the practical implementation of the same framework can vary significantly. Therefore, it is crucial for researchers from different countries to prioritize these diverse elements and foster academic exchange when conducting design research related to the PD design process.

In conclusion, in order to accomplish the intended effectiveness of PD, the driving force of product design must shift from designer-driven to user-driven. To achieve this transformation, product designers and design researchers should expand their perspectives and explore opportunities for innovation within the knowledge systems of various disciplines. The ultimate objective is to break the edge of cognitive and role barriers that exist between designers and users.

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E-Cafe: Smart robot-restaurant design

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Abstract

Facing lots of challenges from many aspects, catering industry in China needs new methods which are creative and efficient to survive. This article is going to introduce a design project which aims at creating a new way of catering which is based on cultural advantages of Nanjing and artificial intelligence technologies.

Author keywords

Smart restaurant; artificial intelligence; catering

Introduction

This project is based on the theory of service design and cultural advantages of Nanjing. The purpose of this project is to bring new economic forms, new lifestyles and new operating models brought about by local life by improving the quality of contemporary cultural development and exploring the new scientific and technological revolution.

This project analyzes the challenges faced by designers to cope with technological change and industrial revolution, and explores the new direction of organic integration of art and technology.

Background

The marketing of the catering industry in China is huge and dispersed these days. Cross-border players and new industries continue to emerge, increasing competition. Throughout 2012 to date, the income growth rate of China's catering has almost declined year by year, "2017 China Catering Report" shows that the life of a restaurant in Beijing, Shanghai and Guangzhou is as long as three or four years, as short as a few months. Faced with many challenges, many companies are transforming and looking for opportunities. The traditional catering industry has high cost, low profit and serious personnel turnover. And consumer habits are constantly changing, under the trend of rapid development of the Internet, the integration of online and offline new restaurants will become popular. Immersive Dining Experiences:

With the rise of experiential tourism and demand for unique dining concepts, there is a growing interest in creating immersive dining experiences that go beyond the traditional restaurant setting. The scenic backdrop of the restaurant provides a picturesque environment that enhances the overall dining experience, allowing patrons to indulge in both delectable cuisine and the natural beauty of the surrounding area. To address the challenges of managing a high volume of customers and reducing waiting times, the design incorporates a virtual reservation system. This system allows customers to book their dining experience in advance, selecting their preferred time and customizing their menu options. By leveraging technology, the restaurant optimizes table occupancy, minimizes wait times, and enhances customer satisfaction. The implementation of robotic chefs and automated cooking processes represents the integration of technology into the culinary world. Robotic chefs eliminate human error, ensure consistent food quality, and increase productivity. By embracing automation, the restaurant combines innovation and efficiency, revolutionizing the way food is prepared and served.

In summary, the design of such a robotic restaurant is driven by the desire to create immersive dining

experiences, the necessity for efficient reservation systems, and the incorporation of technology to revolutionize the culinary industry. It seeks to meet the evolving demands of customers and provide an unforgettable dining experience while optimizing operational efficiency and service quality.

Purpose

From the perspective of future development, the emergence of new restaurants will help designers deeply explore the potential needs of users. New ways of catering will continue to emerge, providing users with more high-quality, convenient and comfortable dining experience. The model innovation based on service design has promoted the healthy development of the catering industry. The primary goal of my research is to design and implement a cutting-edge robotic restaurant and intelligent dining model that leverages state-of-the-art technologies, including artificial intelligence, automation, and robotics. This innovative concept aims to revolutionize the food service industry by enhancing operational efficiency, optimizing resource utilization, improving service quality, and ultimately providing an exceptional and immersive dining experience for customers. Through an in-depth exploration of the integration of robotics and smart technologies, this study aims to contribute to the advancement and practical implementation of intelligent dining solutions in the context of the modern hospitality industry.

The purpose of designing such a robotic restaurant can be multi-fold:

Enhanced Efficiency and Productivity: The aim is to explore how robotics and automation can optimize the restaurant's operations, improve efficiency, and increase productivity. By integrating robots into various tasks such as food preparation, serving, and cleaning, the goal is to streamline workflows and reduce human labor.

Customer Experience Enhancement: The research intends to investigate how the presence of robots in a restaurant setting can contribute to a unique and memorable dining experience. This involves studying factors like human-robot interaction, customer satisfaction, and adaptation to robotic service.

Cost Reduction and Scalability: The objective is to examine the economic feasibility and scalability of a robotic restaurant model. Researchers aim to determine if implementing robotic systems can lead to cost savings in the long run, considering factors like initial investment, maintenance, and staff optimization.

Technological Advancement: The research seeks to advance the field of robotics and artificial intelligence by exploring practical applications in the food service industry. It aims to contribute to the development and refinement of robotic systems, algorithms, and sensing technologies for enhanced restaurant automation.

Overall, the research serves the purpose of exploring the potential benefits, challenges, and implications of designing a robotic restaurant to revolutionize the traditional dining experience.

Design Introduction

Our robotic restaurant aims to revolutionize the dining experience by integrating innovative technologies and providing a unique blend of convenience and aesthetic pleasure. With a virtual reservation system and a captivating scenic setting, diners will enjoy exquisite meals prepared by robotic chefs while immersing themselves in the beauty of the chosen location.

Reservation and Virtual Set-up:

Using their smartphones, users can access our app to make reservations for their dining experience. The app features a virtual set-up platform where users can create customized floor plans, select preferred seating arrangements, and even personalize the ambiance through lighting and music settings. This virtual pre-setup allows users to visualize their dining experience in advance, enhancing their anticipation and engagement.

Physical Restaurant Construction:
Once the virtual set-up is completed, our team will construct the restaurant at a picturesque location in Nanjing's scenic area. The physical restaurant will faithfully replicate the user's chosen design, incorporating elements of modern aesthetics and functionality. This approach ensures that each dining experience is unique and tailored to the customer's preferences.

Robotics and Automated Cuisine:
The highlight of our restaurant is the utilization of robotic chefs for food preparation. Equipped with advanced AI algorithms and a repertoire of culinary skills, these robots will masterfully create a diverse menu of dishes with precision and consistency. The automated cooking process not only ensures timely service but also guarantees exceptional quality and hygiene.

Scenic Dining Experience:
To enhance the overall dining experience, each table is strategically positioned to offer panoramic views of the surrounding scenic area. Diners can enjoy their meals while indulging in the breathtaking beauty of nature or architectural landmarks. The combination of delectable cuisine and captivating vistas creates a multisensory experience that transcends traditional dining norms.

Promotion and Impact:
By situating the restaurant in a popular tourist destination, our establishment serves as an enticing promotional platform for the scenic area itself. Visitors and passersby will be drawn to the novel concept, generating buzz and increasing footfall to the area. This symbiotic relationship between the restaurant and the scenic spot strengthens the overall tourism appeal and elevates the visibility of both.

A robotic restaurant with virtual reservation and scenic dining experience presents numerous advantages that positively impact people's lives, boost the recognition of scenic areas, and contribute to the improvement of the hospitality industry. This section summarizes the key benefits offered by this innovative project. By leveraging technology, the robotic restaurant offers a seamless and convenient dining experience. The virtual reservation system allows users to plan and customize their dining experience in advance, saving time and eliminating the hassle of waiting for tables. Additionally, diners can savor delicious meals prepared by robotic chefs while enjoying the beauty of the surroundings. This unique blend of immersive dining and scenic appreciation adds a new dimension to people's lives, promoting relaxation, enjoyment, and meaningful interactions with nature. Placing the robotic restaurant in a renowned scenic area like Nanjing ensures a mutually beneficial relationship. The establishment becomes a captivating attraction within the destination, drawing the attention of locals and tourists alike. As visitors flock to experience this innovative dining concept, the scenic area gains increased exposure and recognition, ultimately leading to a higher number of tourists and socio-economic benefits for the region. The restaurant serves as a promotional platform, highlighting the natural and architectural wonders of the area. Robotic chefs not only revolutionize the way food is prepared but also improves the overall quality and consistency of cuisine. The automated cooking process ensures timely service, eliminates human error, and guarantees hygienic food preparation. Customers can enjoy a diverse menu of delectable dishes, each prepared with precision and perfection. With robotic chefs, the restaurant can cater to a higher volume of customers while maintaining food quality, benefiting both the business and the customers.

Prospect and Challenges

Prospect:

The robotic restaurant project holds great potential for revolutionizing the food industry and enhancing customer experiences. With its innovative concept and cutting-edge technology, the project can attract a wide range of customers, including tech enthusiasts, tourists, and those seeking unique dining experiences. By combining automation with culinary expertise, the robot restaurant can provide efficient service, precise order accuracy, and consistent quality.

Challenges:

Despite its promising outlook, the project also faces certain challenges that need to be addressed. The first challenge is the high initial investment in acquiring and maintaining the robotic infrastructure. Robotic systems, including automated cooking, serving, and cleaning mechanisms, require substantial financial resources. Additionally, employing and training skilled technicians to operate and maintain these systems adds to the project's cost.The second challenge lies in ensuring seamless integration and synchronization between robots and human staff. It is crucial to strike a balance between the efficiency of robots and maintaining a personalized touch that only human interaction can provide. Overreliance on automation may jeopardize customer satisfaction and create a lack of emotional connection. Thirdly, concerns about job displacement in the food service industry arise with the introduction of robots.

Strategies to Address Challenges:

To address these challenges, several strategies can be implemented. Firstly, the project can explore partnerships with technology companies and investors to secure funding and minimize initial investment costs. Collaboration with technological experts can also ensure the development and maintenance of reliable and cost-effective robotic systems. Secondly, effective staff training programs can be established to enhance adaptability and proficiency in working alongside robots. Emphasizing the importance of human interaction and personalization can help strike a balance between automation and personalized service. Lastly, measures can be taken to mitigate job displacement concerns. This may include re-training and upskilling programs for employees to transition into new roles within the robotic restaurant domain. Additionally, providing opportunities for entrepreneurship or employment in supporting roles, such as robot maintenance and programming, can help mitigate the impact on job availability.

Conclusion

In conclusion, the implementation of a robotic restaurant with virtual reservation and scenic dining experience presents a transformative approach to dining and hospitality. This innovative project enhances people's lives by providing convenience, relaxation, and memorable experiences. It also brings recognition to scenic areas by acting as a promotional platform and attracting more visitors. Furthermore, the advancement of the food and beverage industry through the introduction of robotic chefs ensures consistent and high-quality culinary offerings. The future of dining is here, paving the way for improved customer satisfaction, economic growth, and sustainable development in the hospitality sector.

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Fostering an Evaluation Framework for Systematic Sustainability in Chinese Rural Public Art Programs

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Abstract

This study focus on the systematic sustainability evaluation of Chinese rural public art programs (CRPAP). The endeavor of evaluation is insufficient in existing initiatives. This research attempt to bridge the gap in the evaluation of CRPAP through making sense of systematic sustainability, finding out pertinent literatures and case studies of evaluation. The value of systematic sustainability suggested plural and temporal traits of the evaluation of CRPAP. The selected literatures and case studies offer transferable knowledge for developing a tailored evaluation framework for CRPAP, such as methodology, complexity, workflow, structure and dimensions, while certain site-specific factors must be tailored to fit the specific rural Chinese context. The primary objective of this research is to serve as a catalyst for fostering broader discussions and engagement in the critical domain of CRPAP systematic sustainability evaluation.

Keywords

Chinese Rural Public Art Programs (CRPAP); System; Sustainability; Theory and Practice; Evaluation

Introduction

Public art represents a systematic approach to art that empowers it to interact with both space and the public. The concept of "relational aesthetics" [1] is a key attribute of "New Genre Public Art" [2], which emphasize the interconnectedness between public art and various aspects of its surroundings. Therefore, critiques and assessments of public art should be carried out systematically, considering aspects such as spatial, regional, and temporal relationships, interactive experiences, the awareness, and behavioral changes it evokes.

Since 2007, the beginning of Chinese Rural Public Art Program (Qu, 2023), public art in China started to serve for Chinese rural regions in a systematic manner. "Programs" are organic collections of actions that possess internal systematicity. Chinese rural public art programs (CRPAP) are good samples for practitioners to learn about art in relation to systemic ecology. Firstly, differing from urban public art programs driven by administrative and capital forces, Chinese rural public art especially possesses characteristics of the "Relational Aesthetic", enriching its complexity nature. Secondly, practitioners of rural public art projects are often urban academics and professionals, certain disadvantaged rural areas harbor unique or sensitive social, economic, and cultural fabrics. These situations demand artists scrutinized systematic research and practice in the real rural contexts, through which artists are likely to circumvent mistakes such as outsider's gaze, patronizing attitude, abrupt interventions, cultural misappropriation, and gentrified "constructive destruction" (Qu,2023).

However, there is a disregard of evaluating the systematic sustainability of Chinese Rural Public Art Programs (CRPAPs). It stems from a dearth of theoretical underpinning and evaluation frameworks specific to this nascent field in China. Additionally, assessing the nebulous value of impacts and the inherent complexity of evaluation processes pose significant challenges. Moreover, the requirement for specialized research to gauge long-term, temporal performance, a key facet of "sustainability," further complicates the issue. Nevertheless, a meticulous

evaluation effort holds the potential to yield valuable insights for the development of more sustainable strategies. This research endeavors to address the existing gap in the evaluation of CRPAP by making sense of systematic sustainability, and finding out pertinent literature and case studies of evaluation. The primary objective of this research is to serve as a catalyst for fostering broader discussions and engagement in the critical domain of CRPAP systematic sustainability evaluation.

Making Sense of Systematic Sustainability in Chinese Rural Public Art Programs

Systematic Organization

System thinking will help with the internal organization of CRPAP, to form an effective system. This was also stressed by the founder of "Art Village Construction" (艺 乡 建) Chen Jiong. He stated, "The distinctive feature of my rural revitalization efforts is the systemic nature. I might not excel in various specific fields compared to experts, such as building houses, managing business, designing products, etc. However, my work is more like a integrated battle tank, the power of the system is formidable."[3] Within limited resources, the systematic organization of segments within CRPAP ensuring a rational arrangement of resources, and reciprocal benefits across interventions; therefore, yields systemic value and maximize impacts. According to Ludwig Von Bertalanffy [4], the founder of general systems theory, systems are typically dynamic and complex, observing them requires flexible and comprehensive approaches, such as typology mapping and data visualization, these methods are worthwhile for the evaluation of CRPAPs.

Socio-economic Sustainability Concerns

Considering issues of economic sustainability, various art festivals often exhibit a flash in the pan phenomenon [5], with promising beginnings but lackluster outcomes. For instance, the "Daojiao New Art Festival"(道滘新艺术节) was held for two sessions, "Bishan Project" (碧山计划) started in 2011 was halted in 2016, and the "Longli International New Media Art Festival" (隆里新媒体艺术节) declared a suspension after running from 2016 to 2018 (Li, 2021). Many so-called rural art festivals are simply migrating urban art festivals into villages, depending remarkably on investment or governments' support. When the capital is abundant, the events may run well; however, when the funds retreat, many of the programs fail to self-sustain or leave lasting effects.

Socio-cultural Sustainability Concerns

The prevailed "urbanizing the countryside" mindset was being extensively criticized. Some CRPAPs "stem from an urban bourgeoise perspective looking down on traditional rural culture, fulfilling of idyllic countryside fantasies. These gentrified expressions are isolated from the real rural life". [6] Although urbanization was considered "development" in China in more than one century, the rural areas play imperative roles in the countries' development that cities cannot substitute (He, 2022). [7] Urban and rural areas functions in relative different ways, so that socio-cultural differences such as lifestyle, aesthetics, measure of value, social relations are all kept distinctive accordingly. Rural development should not be a mere imitation of urbanization, art interventions should not only focus on the criteria of art; instead, it should enhance the distinct characteristics of rural areas by responding to unique attributes of the rural sites (Chen, 2020). [8] Otherwise, the rural areas would be mal-represented, and their unique cultural assets are undermined.

Ecological Sustainability Concerns

Rural areas often lack the infrastructural support found in urban regions, some of public art format may be suitable in common places but not for rural areas. For example, for digital media installations, it may often

require extra consistent power supply, which may add burden to local ecology. Additionally, many rural public art projects are charitable and event-based, leading to questions about the sustainable maintenance, functionality, and value continuation of the remaining art spaces and artworks after the periodical end of programs. While ideologies and praxis of ecological sustainability can be observed in certain CRPAPs. Certain approaches are adopted for creation of artworks, such as Re-design, Reduce, Re-circulate, Recycle, etc. For example, "Yang Deng Program" (羊磴计划) migrate the artwork "Policeman" to different places and make multiple senses. In "Yu Bu Lu Cun" (雨补鲁村), Hu Quanchun constructed a ground well that made of local stones, it is environmental friendly, long-standing and functionable. Systematic evaluation should also nurture the creative reflexivity nature of art, rather than disciplining that.

To summarize, the aforementioned concerns have succinctly outlined the challenges in enhancing the systematic sustainability of CRPAP, it has illustrated the need to carefully assess and critique not only mono-facet instant performance, but also the plural impacts and time-based properties. Systematic considerations involve integrated evaluation of multiple dimensions including Ecology, Culture, Economy, Aesthetic, etc.; while the evaluation of sustainability performance should consider timeline and tendencies.

Literature Review of Evaluation in Art and Design

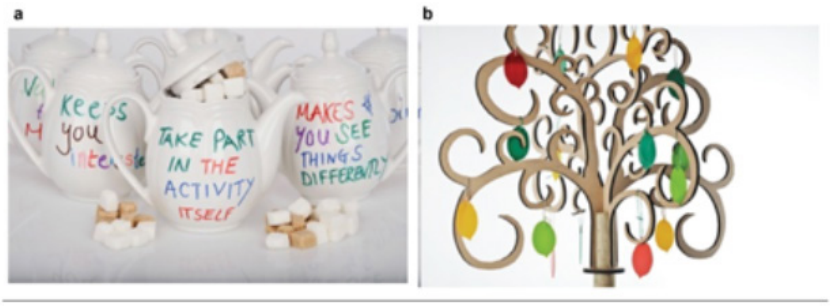
Although artistic practices in Chinese rural areas appears to be very lively and prosperous, the lack of an evaluation mechanism became a prominent problem. Hu Quanchun, professor from the Central Academy of Art, stressed this problem in an interview. "How well are these activities actually being carried out? How should the significance and value of these events or projects be judged? Without the reference of an evaluation mechanism, such activities can easily be carried out because every approach seems reasonable. But in reality, what are the stakeholders feedback? What are the impacts in local context? What are the breakthroughs? How do they differ from similar works domestically and internationally? It would be relatively better if experts could come together to form an evaluation group. [9]

Numerous research studies, primarily from UK sources, have explored and discussed the evaluation of art programs, each with its specific focus. These experiences serve as valuable references for the advancement of CRPAP evaluation.

"Participatory Public Art Evaluation Approaches to Researching Audience Response" [10] concentrates on the evaluation of public artworks with a primary emphasis on the viewing experiences, takeaways, and responses of audiences. By examining three distinct cases of public art evaluation, the paper underscores diverse methodologies for gathering audience feedback data, including the utilization of social media, on-site volunteer observations and surveys, and periodic audience surveys. The choice of these methods can be tailored to suit the specific requirements of the organizers.

"Participatory evaluation for large-scale arts programmes challenges, adaptations and unexpected shifts in culture" [11] is research report, conducted by Staffordshire University's Get Talking team, evaluates community-based art projects undertaken by Appetite. It represents a long evaluation period of one year, employing Participatory Action Research (PAR) methodologies. Creative techniques have been employed
during the consultation process, offering compelling and highly engaging mechanisms for involving communities in discussions about art, simultaneously aid arts organizations in being attuned to local needs and interests (see Figure 1). However, the sustained duration of the evaluation program raises concerns about workload and the well-being of the researchers involved.

Figure 2. Examples of creative consultation techniques used during Appetite's Taster Menu (Source: intervention by Nicola Winstanley and Sarah Nadin, photographs by Jenny Harper). (a) Quali-tea pots; (b) Arts wish tree



Creative Techniques of Evaluation

"Evaluation in participatory arts programmes" [12] is a report of selection of approaches, models and methods of evaluation developed across Creative People and Places, which is an umbrella program that consists of a couple of parallel sub-programs like Appetite mentioned in the last literature. Different evaluation of sub-programs formed a integrated systematic flow of evaluation, which is providing a good source of reference for the evaluation of CRPAPs. The structure follows evaluation tools, collaborative evaluation, quantitative and qualitative methodologies, creative qualitative evaluation in action and outputs, and data management system such as CRM data management system.

"Arts-based approaches to public engagement with research" [13] commissioned by Cambridge University and conducted by RAND Europe, presents a rapid review focused on gaining systematic insights into the practical functionality and effectiveness of arts-based approaches. It combines literature reviews with expert interviews. The study acknowledges the inherent challenges in evaluating such initiatives but offers valuable guidance, including insights on the timing and staging of evaluations, tailoring evaluation methods to specific contexts and stakeholders, and considering diverse impacts and outcomes for various stakeholders. Additionally, the report underscores the integral role of evaluation within interventions, spanning from conception to production, delivery, and evaluation itself. It highlights the intricate interplay between evaluation processes and intervention strategies.

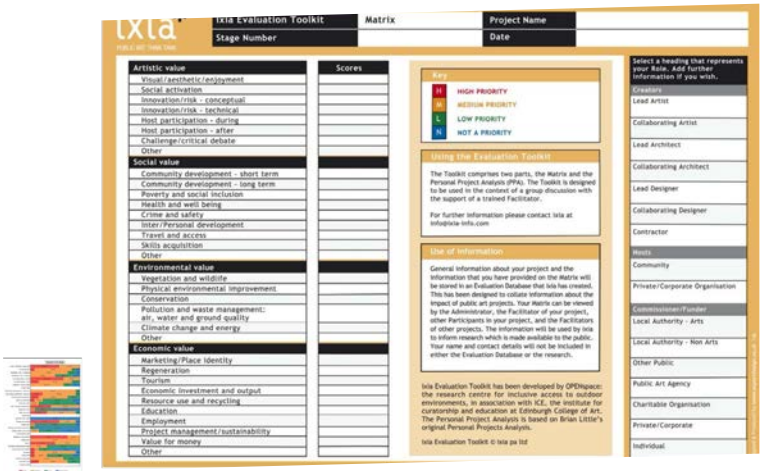
Conclusion

Overall, these selected literatures collectively contribute valuable insights for the advancement of CRPAP evaluation, including diverse methods for collecting audience feedback data, with an emphasis on audience experiences and takeaways; meanwhile, the use of creative techniques in consultation, and challenges of long-term evaluation are to be considered. There is an integrated systematic flow of evaluation on artistic public engagement, as well as a systematic picture of arts-based research program with evaluation plays an important dynamic role, stressing the timing, plurality, and necessity of evaluation process. These sources collectively offer a rich foundation for enhancing CRPAP evaluation methodologies and strategies.

Precedents of Systematic Sustainability Evaluation

"Public Art: A Guide to Evaluation"[14] published by ixia, the UK's public art think tank, is one of the most comprehensive and systematic evaluation toolkits. This guide emphasizes that evaluation is a part of the learning process. The framework for assessing artworks includes usage methods, time points, stakeholders, purposes, values, and the establishment of indicators, as well as defining standards and other practical implementation

details. Evaluation of individual projects focuses on scales that measure the experiences and expressions of artists and organizers, encompassing factors like control, autonomy, difficulty, and project progress.
The dimensions and methods of this evaluation framework offer reference for generation of the new framework, it's important to note that this did not originate within the context of Chinese rural public art, and the dimension of sustainability also requires further expanded research (Figure 2).



ixia Evaluation Toolkit

"The Art of Achieving Sustainability" [15] examines the horizontal comparisons of community impact among different artistic interventions in urban renewal, using social impact, economic impact, and environmental impact as the main dimensions (see Figure 3). This approach aims to compare the feature and impacts of various actions rather than judge them as superior or inferior.

Table 1. Axis of action by Sustainable Development Dimension.

Axis of Action	Sustainable Development Dimensions		
	Environmental	Social	Economic
a Local Social Fabric		x	
b Stimulus to the Creation of Other Facilities and Services	x	x	
c Building Rehabilitation and Urban Rehabilitation	x	x	
d Value Creation			x
e Job Creation			x
f Workspaces Creation			x
g Promotion of Cultural Activities		x	
h Contribution to Local Tourism	x		x

Sustainability through Art: Axis of Action by Sustainable Development Dimension

"Incorporating Artistic Thinking into Sustainability"[16] explores the incorporation of artists' individual traits and their expressions in the creative process as the assessable subjects. The critical thinking, perfectionism, uniqueness, novelty, and passion of artists contribute to positive effects like environmental and social awareness,

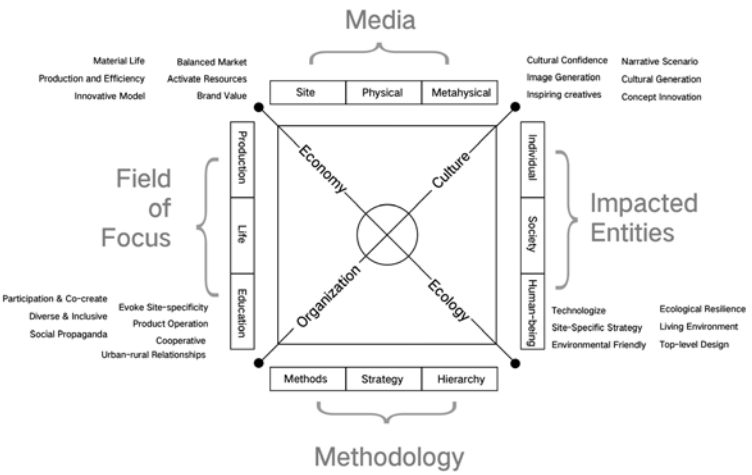
gradual-paced renewal, extended product lifecycles, new lifestyles, organized civic behavior, and more (see Figure 4). This perspective allows artists to be the focal point of evaluation.



Fig. 1. Linkage between artistic thinking and sustainable value.

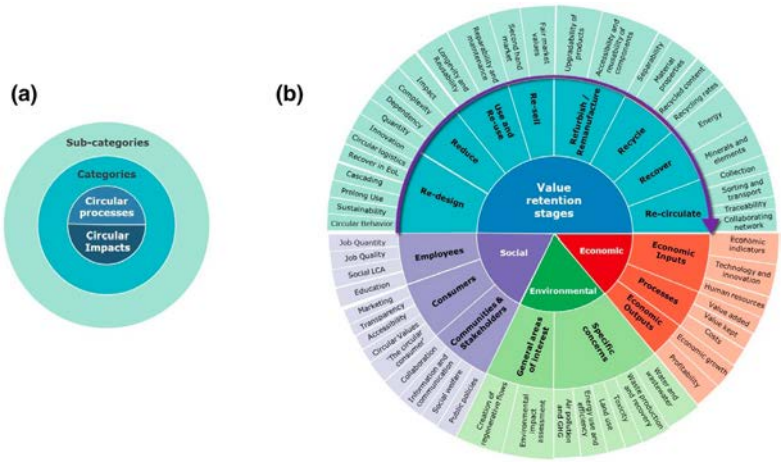
Linkage between artistic thinking and sustainable value

The Beautiful China Research Institute of China Academy of Art published research on over three hundreds of art practices related to the "Beautiful China" initiative from the past decade. This research establishment of the first national "Beautiful China Case Library". [17] (美丽中国案例文献库) In order to convey the rural area revitalization cases more effectively, they have created a "Case Portrait" using the "Four Quadrants and Box Grid" for each case (Figure 5). The four quadrants are: "Economic, Cultural, Organizational, Ecological" dimensions. The "Box Grid" are twelve items under the hierarchy of media, methodology, field of focus, and impacted entities. These prompts form a comprehensive portrait framework, help to quickly introduce case studies to audience. Dimensions



Four Quadrants and Nine-box Grid (Originally by "Beautiful China Case Library", English version interpreted by the author)

intersecting with demands formed correspond approaches, guiding pathways to future interventions.
This portrait framework offers a holistic set for "systematic sustainability evaluation," but some of the terminologies are confusing. Additionally, it primarily focusses on communicating rather than impacts measuring, it also does not specifically assess the sustainable performances. Evaluating "sustainability" requires considerations of cycles, utilization, and various sustainable dimensions. Subsequent research will be built upon this framework and the identified keywords, with a focus on incorporating sustainability dimensions to the evaluation.



A Theoretical Framework for Circular Processes and Circular Impacts Through a Comprehensive Review of Indicators

The framework "Theoretical Framework of Circular Processes and Circular Impact" (see Figure 6) is the output of a detailed analysis of 298 documents about Circular Economy (CE). [18] Although circularity does not equal to sustainability, it exhibited time-based sustainable thinking. The alignment of process and impacts (see (a)) laid basic structure for the evaluation of systematic aspects and sustainability performance of CRPAPs.

Conclusion

Overall, the provided case studies offer transferable insights for evaluating the systematic sustainability of Chinese rural public art programs, encompassing aspects such as framework structure, toolkit design, dimensions, metrics, and indicators. Nonetheless, the generation of new framework requires further integration and refinement of these case studies, and merge systemic and sustainability considerations into a comprehensive framework. Additionally, customization is needed to accommodate various stakeholders, art genres, and program stages within public art initiatives. Lastly, the framework must be organically integrated and validated within the specific rural Chinese context.

Discussion

In conclusion, this article has shed light on the multifaceted challenges and opportunities entailed in assessing the systematic sustainability of CRPAP. Emphasizing the importance of comprehensive evaluation, it underscores the need to consider diverse facets and the enduring impacts of these programs. The reviewed literature has contributed valuable insights encompassing audience feedback data collection, innovative evaluative methodologies, the dynamic interplay of evaluation within program interventions, and the intricacies of long-term assessment. The case studies provide applicable knowledge for crafting a bespoke evaluation framework

for CRPAP, encompassing structural elements, dimensions, and indicators. However, it's crucial to adapt certain aspects, such as stakeholder categorizations, artistic genres, and research methodologies, to align with the unique context of rural China.

Furthermore, this article signals the potential for refining CRPAP evaluation methodologies. It underscores the need for a comprehensive framework that accommodates diverse stakeholders, art genres, and program stages. The future of CRPAP evaluation lies in continued integration, refinement, and validation, ensuring the systematic sustainability of these rural initiatives.

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Intellectual Property Rights: A Guarantee of Value Creation in Design

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Abstract

Design is inseparable from the economic system. From the neglect of design in the classical economic model to the fact that design has become the driving force of innovation under the current knowledge economy paradigm, intellectual property rights are the key connection point. No matter at the micro level of enterprise management or the macro level of national policy, intellectual property rights are an important guarantee for the creation of design value.

keywords

design; Intellectual property rights; economic system; value

introduction

Contemporary design has referred to a fairly large field both in practice and in theory, and its interaction and mutual influence with economic activities are becoming more and more profound, firmly embedded in the production-consumption chain. As early as the end of the 19th century and the beginning of the 20th century, several commercial designers such as Christopher Dresser and Arthur Silver emerged in the UK, and commercial enterprises such as Liberty.Co, which took advantage of design innovation to create commercial success. Entering the 21st century, in an economic environment where technology is increasingly innovative and the market tends to be liberalized and fully competitive, design is gradually becoming a new growth point for innovation and is increasingly becoming the core competitiveness of enterprises. At the same time, design reflects the image and competitiveness of a country, and a considerable number of countries have formulated design policies as a national policy to promote national development, such as the United Kingdom, Finland, Japan, and other countries. At the same time, the protection of the value creation of design has become a top priority, and one of the ways is the protection of intellectual property rights. This paper will focus on the important role of intellectual property rights in the process of design value creation from the perspective of economics. First, a microeconomic model will be used and explain why intellectual property protection is important to design from a theoretical perspective. Secondly, an empirical study on the export of Chinese cultural products will be conducted (also using the method of economic research). The case will reveal that the improvement of intellectual property protection can promote the export, and intellectual property protection can become a quantitative index and evaluation standard for designing policies. Finally, it will further discuss the value creation of design under the current knowledge economy paradigm, and intellectual property rights will become an important development point for open innovative companies.

Design and Economic Systems: Why has design been neglected?

John Heskett, the famous design historian and economist, once experienced an embarrassing incident when, at a seminar hosted by Heskett, he tried to suggest that design could have a positive impact on export

competitiveness. The US financial officials who had been in contact with him at the reception in Washington politely and decisively walked away. [1]Why was design not valued in the context of the time when it tried so hard to explain the value it was adding or trying to create?

In the classical economics, there is a matrix that divides the attributes of goods, as shown in Table 1. In short, if one person can use it and others can also use it, we call it "uncompetitive"; if one person can use it and others cannot use it, we call it "competitive". "competition" is a key criterion to distinguish between public goods and private goods. In addition, there is another dimension of distinction between public goods and private goods, which is called "exclusivity". The so-called "exclusivity" refers to whether an employer can conveniently exclude other users when a product is used, if it can be easily done, it means that it has "exclusivity", and if it is not convenient to do, it means that it does not have "exclusivity". For example, the fish in the fishpond, first, it is "competitive", a person catches a fish, others cannot catch this fish, so the fish is "competitive". But the boundaries of the pond are so long that it is actually very difficult for us to keep other fishermen away, and then we say that the fish in a pond are not "exclusive".

	exclusivity	Non-exclusive
competitive	clothes, cars, stationery	fishponds, groundwater, forests
non-competitive	cable TV, pay ware, copyrights	radio, open-source software, science, sunshine, public roads

Table 1. competitiveness and exclusivity

In capitalist societies, most notably the United States, where exclusivity is at the heart of the economic system and continues to consolidate and expand its boundaries, the enforcement of exclusivity is becoming an increasingly important issue, with the emergence of devices such as photocopiers and scanners undermining the ability of software, music, and book publishers to have complete exclusivity over content and publications. There have been efforts to strengthen laws and regulations to safeguard intellectual property rights. It is clear that products that are simultaneously competitive and exclusive are the most economically valuable to commercial enterprises, while examine the situation of design at the time: to a certain extent, the output of design was clearly visible and easily reproducible. For example, a new idea from a famous fashion designer would be sold in major clothing chains and on the streets around the world within two weeks of its debut at a special fashion show in Paris, Milan, London, or New York. Even a licensing system can be made to protect a design, only minor modifications to form, pattern or color can circumvent the system. [2]The product or graphic design of a country or company can also be widely imitated by competitors. Designs, like sunlight and public roads, have essentially no possibility of exclusion and can be obtained at close to zero cost, and thus have little economic value according to the theoretical framework of economics, which largely explains why U.S. economics generally recognizes no potential value of promoting design in public policies. The main reason for the neglection of the role of design in the economy is due to the inadequate protection of property rights in design. Next, a specific case will be used to demonstrate the importance of intellectual property rights and the fact that intellectual property rights can be used as a quantitative indicator of the incorporation of design into economic policy.

	exclusivity	Non-exclusive
competitive	clothes, cars, stationery	fishponds, groundwater, forests
non-competitive	cable TV, pay ware, copyrights	design, radio, open-source software, science, sunshine, public roads

Table 2. competitiveness and exclusivity（including design）

Protection of property rights: a quantifiable design system

This section will analyze China's exports of cultural products to RCEP countries (Regional Comprehensive Economic Partnership) using empirical analysis in economics to illustrate the role of property rights protection in influencing the value created by design in exports.

First of all, we introduce the gravity model in the economics model, choose the RCEP member countries as the analyzed countries, and introduce the institutional environment, including institutional quality and institutional distance factors into the gravity model (focusing on the institutional environment) to verify the impact of the institutional environment of the importing countries on the export of Chinese cultural products. The specific measurement model is as follows:

where the subscripts c and i stand for China and RCEP member countries, respectively; $culturetrad_{cit}$ denotes the volume of China's cultural product exports to RCEP member country i in period t; IQ_{cikt} denotes the institutional

$$\ln \text{culturetrade}_{cit} = \alpha_0 + \alpha_1 \ln \text{GDP}_{it} + \sum_{k=1}^{4} \beta_k * \text{IQ}_{cikt} + \varepsilon_{cit}$$

environment of RCEP member country i in the kth dimension in period t; a total of four institutional indicators are included (the degree of freedom of property rights protection, trade freedom, monetary freedom, and

	Non-standardized coefficient		standardized coefficient	t	p	VIF	R^2	adjustedR^2	F
	B	standard error	Beta						
Constant	5.986	3.894	-	1.538	0.13	-	0.872	0.848	F (11,58)=36.003, p=0.000
PR	0.022	0.01	0.291	2.347	0.022*	6.999			
GI	-0.025	0.013	-0.326	-1.889	0.064	13.481			
MF	-0.041	0.046	-0.134	-0.889	0.378	10.36			
TF	0.018	0.02	0.067	0.884	0.38	2.617			
lnGDP	1.13	0.079	1.023	14.271	0.000**	2.334			

Table 3. Results of data analysis

government integrity.)(All the data used in the econometric analysis are summarized in the appendix.)

Here, we only examine the institutional factor of property rights protection.The value of the regression coefficient of property rights protection (PR) is 0.022 (t=2.347, p=0.022<0.05), which means that the property rights protection will have a significant positive impact on the export of cultural products. The freedom of property rights protection of importing countries has a significant impact on China's cultural products export, and the higher the freedom of property rights protection, the more China's cultural products export, which is related to the characteristics of cultural products. Therefore, it is necessary to further explain the freedom of property rights protection. Rongjun Zhou (2020) found that there are relatively large differences in the impact of intellectual property protection among the six subcategories of cultural industries. The impact of intellectual property protection on the export of cultural products such as cultural and natural heritage is not significant, but it is significant for the export of five categories of cultural products, including performances and celebrations, arts and crafts, books and newspapers, audiovisual and interactive media, and design and creative services, i.e., [3] the better the protection of intellectual property rights, the more the products are exported, which suggests that an increase in the level of intellectual property protection can help to strengthen the export of the above five categories of cultural products. This shows that the improvement of the level of intellectual property protection helps strengthen the export competitiveness of the above five categories of cultural products.

Through this case, we learn that for cultural industries such as arts and crafts and design and creative services, increasing IPR protection can help to enhance the export competitiveness of the former, which echoes the problem of the previous section, that goods with competitive and exclusive attributes are the most valuable in classical economics. The design was in a opposed position in the historical context, non-exclusive and non-competitive, and could be copied and difficult to transform into an exclusive good, hence the dilemma. However, by increasing the protection of property rights in design, the exclusivity of design can be enhanced, moving it to the upper left of the matrix, and along with the increasing sophistication of intellectual property rights, economics may need to revise the value-creating role of the design. At the same time, it can be seen that PR protection can be incorporated into more macroeconomic policy as a quantitative indicator of design policy, and intellectual property right becomes a bridge between design and economics.

Conclusion: Application of intellectual property under new paradigm

Looking at the field of design today based on Thomas Kuhn's paradigm theory, design is undergoing a "paradigm shift" along with the change in economic model from industrial economy, to experience economy, to knowledge economy. [4]The knowledge economy is a knowledge-based, brain-based economy, and the World Design Organization (WDO)[5] defines design as a strategic problem-solving process that drives innovation and business success through creative products, systems, services, and experiences. Design is the conception, creativity and planning of manufacturing, process equipment, management and marketing as well as all kinds of products and services, and it is the systematic thinking of discovering problems, analyzing problems and solving problems. Design is an innovative creation that transforms information, knowledge and technology into system solutions and realizes value. It can be seen that design is gradually becoming the core force of value creation under the paradigm of knowledge economy. Open enterprise with design as the core has become an important innovation mode in the knowledge economy era. Compared with closed innovation, open innovation breaks through the traditional organizational boundaries, integrates knowledge resources inside and outside the organization, and greatly improves the efficiency of enterprise knowledge innovation. Open innovation emphasizes the flow and use of knowledge, and the economic value of knowledge needs to be guaranteed by the intellectual property system. [6]In the future, design-centered innovative enterprises should not only systematically look at and apply design, place it in a broader economic context, and maximize the value it creates; they should also integrate intellectual

property management into every link of the operation and development of the enterprise, so that the flow of knowledge and its protection can complement each other and promote the development of knowledge. It should also integrate intellectual property management into every aspect of enterprise operation and development, so that knowledge flow and knowledge protection can complement each other and promote the virtuous circle of knowledge.

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Appendix

1. China's exports of cultural products to RCEP member countries

Unit : $ billion

country	2016	2017	2018	2019	2020
Japan	331.25	344.84	357.38	326.93	328.19
South Korea	341.32	360.45	376.38	380.51	367.48
Cambodia	3.77	4.96	5.97	9.77	10.22
Malaysia	82.04	104.66	127.16	145.45	166.71
Singapore	112.48	113.91	121.02	138.39	154.83
Thailand	87.22	93.03	97.21	95.89	111.87
Vietnam	124.84	196.61	238.72	312.66	412.56
Brunei	0.58	0.55	1.35	0.34	0.34
Indonesia	58.02	65.18	84.59	91.35	85.16
Philippine	45.22	51.71	65.89	82.36	83.37
Burma	15.76	17.52	18.94	19.20	15.51
Laos	2.47	3.41	3.41	2.69	2.70
Australia	63.89	78.19	88.43	93.07	98.18
New Zealand	6.60	7.24	7.79	6.72	7.45

2. RCEP National Institutional Index

Country	Series code	2016	2017	2018	2019	2020
Japan	PR.EST	80.0	89.4	86.0	84.1	86.6
Japan	GI.EST	76.0	86.1	79.2	78.0	80.5
Japan	MF.EST	81.2	83.0	85.4	85.9	84.4
Japan	TF.EST	82.6	82.6	82.3	80.0	80.0
Cambodia	PR.EST	25.0	42.4	36.0	37.4	43.1
Cambodia	GI.EST	21.0	12.8	17.7	16.7	14.8
Cambodia	MF.EST	78.1	81.0	79.7	79.4	74.8
Cambodia	TF.EST	72.2	80.3	80.3	65.4	65.4
South Korea	PR.EST	70.0	77.8	79.4	79.3	82.5
South Korea	GI.EST	55.0	67.3	49.9	50.5	67.5
South Korea	MF.EST	82.6	84.0	83.9	82.0	82.1
South Korea	TF.EST	74.6	79.5	80.4	80.4	80.0
Malaysia	PR.EST	55.0	85.3	83.8	84.1	86.5
Malaysia	GI.EST	52.0	51.8	54.8	55.4	49.4
Malaysia	MF.EST	84.5	85.3	85.6	78.6	81.6
Malaysia	TF.EST	81.4	81.2	87.4	82.0	82.0
Singapore	PR.EST	90.0	97.1	98.4	97.4	96.8
Singapore	GI.EST	84.0	87.9	91.2	95.1	92.4
Singapore	MF.EST	81.8	84.3	85.2	85.3	85.6
Singapore	TF.EST	90	90.0	90.0	94.8	94.8
Thailand	PR.EST	40.0	51.3	48.6	53.7	59.5
Thailand	GI.EST	38.0	40.7	34.7	36.4	43.4
Thailand	MF.EST	70.9	72.9	75.5	75.2	74.0

Thailand	TF.EST	77.6	82.8	83.1	83.0	83.0
Vietnam	PR.EST	15.0	49.7	46.4	49.8	52.6
Vietnam	GI.EST	31.0	24.6	30.4	34.0	33.8
Vietnam	MF.EST	70.6	76.0	75.4	68.9	68.2
Vietnam	TF.EST	83	83.1	78.7	79.2	79.6
Brunei	PR.EST	30.0	62.5	56.6	64.0	69.8
Brunei	GI.EST	60.0	40.9	45.4	43.7	49.6
Brunei	MF.EST	76.8	76.1	75.1	76.5	77.1
Brunei	TF.EST	85.2	89.1	89.1	84.0	85.0
Indonesia	PR.EST	30.0	48.3	49.3	52.2	59.8
Indonesia	GI.EST	34.0	44.7	42.8	39.5	37.2
Indonesia	MF.EST	74.3	74.0	81.6	77.4	78.4
Indonesia	TF.EST	80.4	80.5	80.5	79.8	80.8
Philippine	PR.EST	30.0	49.2	45.0	48.7	54.6
Philippine	GI.EST	38.0	38.7	34.4	30.9	38.7
Philippine	MF.EST	77.7	80.6	76.3	69.6	66.9
Philippine	TF.EST	76.4	76.4	80.7	78.2	81.6
Burma	PR.EST	10.0	23.0	32.5	34.7	32.5
Burma	GI.EST	21.0	29.6	28.2	30.6	31.5
Burma	MF.EST	70.0	65.4	67.6	69.6	77.5
Burma	TF.EST	74.2	74.2	70.9	70.8	70.8
Laos	PR.EST	15.0	35.3	34.1	38.8	42.5
Laos	GI.EST	25.0	32.6	33.1	33.5	32.0
Laos	MF.EST	71.3	70.2	76.0	78.5	76.8
Laos	TF.EST	58.6	74.6	56.6	81.8	82.0
Australia	PR.EST	90.0	81.7	78.7	79.1	82.8
Australia	GI.EST	80.0	74.8	77.4	79.9	89.3
Australia	MF.EST	85.2	86.4	87.4	86.6	86.2

Australia	TF.EST	86.4	86.2	86.2	87.6	88.2
New Zealand	PR.EST	95.0	96.1	95.1	95.0	93.3
New Zealand	GI.EST	91.0	89.9	95.7	96.7	93.9
New Zealand	MF.EST	88.1	90.1	90.0	87.5	87.0
New Zealand	TF.EST	87.2	87.4	87.4	92.4	92.2

Love Extension: AIGC Interprets and Sustainably Reconstructs Fashion Design Systems

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Abstract

At present, the reality world is constantly merging with the virtual world, people's emotional expression is also gradually extended to the digital world. There is the development of digital technology and the expansion of virtual scenes. As a mature artificial intelligence digital generation technology, AI Generated Content (AIGC) is used in various industries, including fashion industry. Furthermore, the emergence of human-computer interaction forms new paradigms of recording, learning and re-creation. Fashion design is an important element in both the real world and the virtual world. Given the advances in technology and increased consumer attention to hot topics such as virtual worlds, there is a need to re-examine its composition and boundaries. Through literature research, case study, focus group interview, categorization and comparative analysis, this paper focuses on the new definition and new characteristics of fashion design in the virtual world from the perspective of AIGC. AIGC-based fashion design principles (design relevance principle), methods,(parametric design method, perceptual design method, and experience design method), technologies, and the development process are proposed. Finally, it is verified and optimized through design practice. This study aims to provide theoretical support and practical reference for sustainable fashion design in AIGC era and promote its wider and deeper integration in fashion design practice.

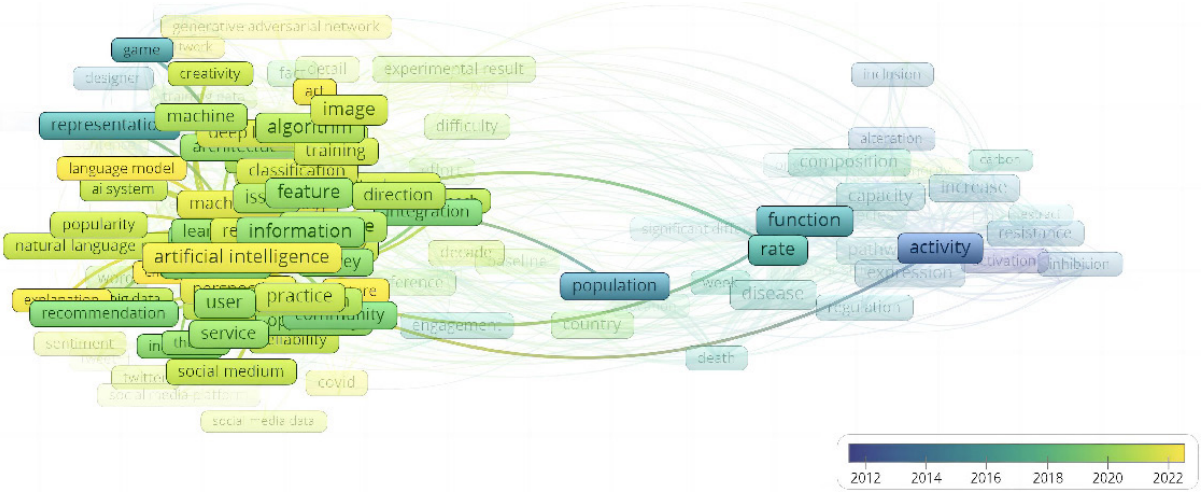
Author keywords

AI Generated Content (AIGC); Sustainable Fashion Design; Design Methods; Adaptive Design; Innovation Design; Virtualization Design

Introduction

2022 is known as the first year of the fashion metaverse[1], while 2023 is considered to be the year when technological progress really accelerates. With the development of technology in the field of AI Generated Content (AIGC)[2], there is a new living space for human-machine coexistence, with more popular human-machine communication. As the interweaving of culture[3-4], aesthetics[5] and innovation[6], fashion design not only shapes the expression of individuals[7], but also has a profound impact on the values and lifestyles of society[8]. According to Han Yan' s Toward Intelligent Design: An AI-Based Fashion Designer Using Generative Adversarial Networks Aided by Sketch and Rendering Generators, the traditional fashion industry relies heavily on designers, and the talent and vision of designers can have a major impact on innovative designs[9]. Zhao Lihuan showed in Big Data and Digital Design Models for Fashion Design that consumers' demands for fashion design, virtual try-on and personalized fashion design change the pattern of fashion design and fashion consumption[10]. In Prospects of Sustainable Fashion Design Innovation, Rajeev Kumar believed that with the diversification of contemporary social economy, politics, and culture, fashion design that abides by the principle of " people-oriented " is rapidly moving to a wider field[11]. However, fashion design in AIGC lacks in-depth research. As shown in Figure 1, relevant documents in the core database of Web of Science are retrieved

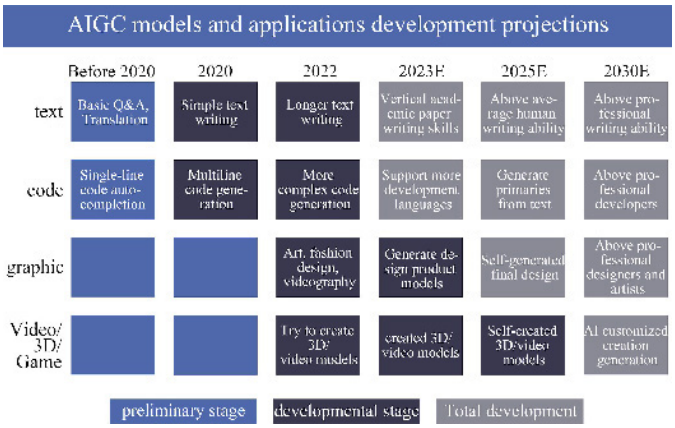
by means of keyword combinations. With "AI Generated Content" and "design" as the keyword combination, all documents included before August 8, 2023 were searched. After manual sorting and screening, a total of 208 results were obtained. Through the quantitative analysis of the VOS viewer software platform, relevant literature data is displayed in the form of visual map network in accordance with the time axis attribute. As shown in Figure 1, the color of the nodes from dark to light represents the data information from long-term to recent on the time axis. This paper focuses on the interpretation of fashion design and the sustainable reconstruction path in AIGC.



Visualization of the AIGC network of knowledge graphs.

Basic connotation and characteristics of AIGC

AIGC (AI Generated Content) is a product based on the fusion of GAN, pre-trained large models, and multimodal technologies to find laws through existing data and form relevant content through generalization capabilities[12]. From a design perspective, AIGC is an enabling technology that serves content-related scenes and producers through high-quality, high-freedom, and low-threshold generation[13]. However, in the field of fashion design creation, AIGC is still in the primary stage of exploration, and there is still much room for improvement in the creation ability, as shown in Figure 2.



AIGC model and application development projections.

Interpretation of AIGC in fashion design

AIGC Intervention in Fashion Design

From Dior's chatbot, Burberry's RFID warehouse management method, PRADA's customized marketing solutions to LOUIS VUITTON's real-time demand forecasting and inventory optimization; from the fashion weeks in London, Milan, New York, and Paris to the social media and shopping sites that reach consumers directly, more and more luxury and fashion brands are taking an open stance to embracing AI technology and looking for possible directions of empowerment in all processes of the industry chain[14]. As shown in Figure 6.



Design products of Fashion Brands under AIGC.

Core competencies of fashion design in AIGC

AIGC consists of three core capabilities: migrating real-world content to the digital world[15-18] (twinning capability), establishing digital and real-world content interoperability and assisting in real-world content generation[19-20] (editing capability), and ultimately evolving from digital mimicry to real-world creativity comparable to that of human beings[21-23] (creation capability).

Bottlenecks in the development of AIGC in fashion design

First and foremost, the creativity of AI models is limited, making it difficult to fully mimic the unique aesthetics and creative thinking patterns of human designers. AI is constrained by the limitations of existing data when creating content, thus making it difficult to break out of established design paradigms, resulting in works that may lack originality and breakthroughs. Second, fashion design involves complex emotional, cultural, and historical factors that are difficult for algorithms to fully capture.

AIGC Sustainable Reconstruction of Systemic Elements in Fashion Design

Sustainable Reconstruction of Fashion Design in AIGC

Experts in the relevant fields were invited to form panels to participate in open-ended interviews about product requirements. Before the start of the interviews, the results of the Vosview Knowledge Graph evaluation and analysis were presented to the panel as the base material to enhance the comprehensiveness of the interview information. In this study, we summarized the basic information of the interviewees and initially organized the interview audio data. Then, we applied the rooted theory research method to code and econometrically analyze the data to obtain the specific results in Figure 4. To ensure the validity of the demand elements, demand keywords that were mentioned 6 or more times were retained for entry (6-9 times for sub-core coding, 10 or more times for core coding), and vice versa were deleted. The weight of the number of demand word frequencies

Primary	Word	Number	Secondary elements	Word	Enter or not	Weighted
Core Technology	85	A1	Chat GPT	17	Yes	20.00
		A2	Technology	10	Yes	11.76
		A3	Internet	3	No	3.53
		A4	Neural Network	5	No	5.88
		A5	Digital Twin	11	Yes	12.94
		A6	Midjourney	4	No	4.71
		A7	Deep Learning	12	Yes	14.12
		A8	Artificial Intelligence	19	Yes	22.35
		A9	Virtual Native	4	No	4.71
Creative Designs or Thinking	87	B1	Virtual Idol	4	No	4.60
		B2	Virtual clothing	7	Yes	8.05
		B3	Fashion Forecast	8	Yes	9.20
		B4	Digital collection	3	No	3.45
		B5	Digital Interaction	11	Yes	12.64
		B6	Virtual Fashion	12	Yes	13.79
		B7	Virtual 3D Design	8	Yes	9.20
		B8	Digital Design	11	Yes	12.64
		B9	Virtual dress fitting	4	No	4.60
		B10	Digital Art	13	Yes	14.94
		B11	Assisted design	6	Yes	6.90
Reality to virtual social values	51	C1	Sustainable Design	12	Yes	23.53
		C2	Fashion Industry Upgrade	11	Yes	21.57
		C3	Cultural industry upgrade	4	No	7.84
		C4	Circular Economy	5	No	9.80
		C5	Enhancing labor efficiency	5	No	9.80
		C6	Creators' Economy	8	Yes	15.69
		C7	reduce costs and increase	6	Yes	11.76

Research Methods for Rooted Theory Specific Results Information.

over the total number of word frequencies was recorded as the Demand Importance Score.

We had 9 experts score the screened codes out of a total of 100 points (as shown in Figure 5). After the panel of experts finished scoring, we analyzed the weights of the scores of the 9 experts using the informative weighting method in SPSS (as shown in Figure 6).

No.	Expert1	Expert2	Exper3	Exper4	Exper5	Exper6	Exper7	Exper8	Exper9	score
A1	92	88	93	93	91	92	85	89	92	90.53
A2	81	83	81	89	79	81	80	82	84	81.98
A5	91	90	95	90	92	93	92	87	89	91.15
A7	79	82	85	87	79	80	86	83	90	83.28
A8	95	94	96	92	90	95	93	92	91	93.16
B2	80	83	82	85	83	88	89	84	81	83.84
B3	91	91	93	90	88	91	89	90	94	90.72
B5	89	92	93	91	94	91	92	89	90	91.27
B6	86	90	88	89	92	91	87	96	94	90.13
B7	81	85	72	80	89	79	75	87	84	81.12
B8	91	92	91	91	93	95	95	93	92	92.56
B10	72	83	81	84	77	85	85	76	85	80.57
B11	94	98	91	93	95	96	96	91	94	94.16
C1	95	95	97	94	95	93	97	92	96	94.99
C2	81	83	85	75	73	84	79	80	77	79.66
C6	73	81	77	80	80	79	72	75	82	77.37

Expert scoring and composite scores.

	average	Standard deviation	CV coefficient	Weights
Expert 1	85.941	7.445	8.66%	13.14%
Expert 2	88.471	5.363	6.06%	9.19%
Expert 3	87.765	7.207	8.21%	12.45%
Expert 4	88.118	5.600	6.36%	9.64%
Expert 5	87.294	7.200	8.25%	12.51%
Expert 6	88.529	5.949	6.72%	10.19%
Expert 7	87.118	7.219	8.29%	12.57%
Expert 8	86.824	5.982	6.89%	10.45%
Expert 9	88.941	5.782	6.50%	9.86%

Calculation of the weighting of expert scoring information.

Analysis of factor data

We obtained the final evaluation scores of the word frequency scoring by 9 experts through the informativeness weighting method. We designate the ones with a score of 87.58 or more as the core high-frequency vocabulary, and the ones with a score of 87.58 or less as the sub-core high-frequency vocabulary. Fashion design in AIGC is a new ecology of symbiosis between reality and virtual generated by the integration of various new technologies. We focus on the analysis of high-frequency vocabulary under the first-level elements, and strive to propose a more universal and sustainable reconstruction plan for the development of fashion design under AIGC.

Sustainable Reconstruction Path of Fashion Design under AIGC

Establishment of a fashion design industry based on core technologies

With the increasing depletion of global resources and the intensification of environmental problems, the waste of resources and environmental pressure brought about by the traditional fashion design model are becoming increasingly significant[24]. Against this backdrop, the digital era has given rise to the booming development of Artificial Intelligence (AI) technology, and we have gained access to industry professionals through focus group interviews to capture keywords for exploring the core technologies for sustainable reconstruction of fashion design under AIGC. Technology is increasingly able to drive creative decisions today[25]. In the traditional creative process, designers usually face the problem of creativity exhaustion and lack of novelty inspiration. However, as an innovation in the field of natural language processing, Chat GPT technology provides designers with a virtual intelligent assistant that extends the boundaries of designers' thinking and also opens up new possibilities for creative decision-making. Digital twins connect the physical world with the virtual world, providing designers with a platform to simulate, test and optimize their designs. By learning from a large amount of data, deep learning enables fashion design to more accurately meet the personalized needs of consumers.

At present, the fashion design industry chain under the AIGC is still incomplete and shallow technologies are emerging. This will create risks and bubbles in the fashion industry. The key to resist industrial risks lies in the formation of a healthy industrial chain, ecological chain and value chain, and the avoidance of missing links and "bottleneck" technical problems. Therefore, it is necessary to subvert the original development model of the fashion design industry. Through the deep integration with the new concept of fashion design under AIGC, build a new mode of fashion industry development based on new technology, and create a digital intelligent platform for the industry. Improve the supply chain channel of the fashion design industry and build a complete new system of AIGC fashion design operation.

AIGC Enables Multimodal Digital Design Content Generation

In the face of numerous consumer demands for fashion products, designers should also gradually utilize the ability of fashion forecasting and thus design fashion products that are more in line with the public's aesthetics. Fashion forecasting is the process of predicting future fashion trends using data analysis and AI technology. AI Generated Content analyzes massive amounts of fashion data and extracts consumer needs and preferences, helping designers more accurately grasp fashion trends. Digital interaction technology, on the other hand, brings designers, consumers and brands closer together. Through virtual reality and augmented reality technologies, consumers can interact with designers and participate in the design process, thus realizing more personalized and customized designs. Led by AI Generated Content, innovative design and creative thinking have become the core of sustainable reconfiguration of fashion design. Innovative thinking requires breaking through traditional ways of thinking, actively exploring new fashion paths, integrating sustainability into every design process, and promoting the sustainable development of the fashion industry.

AIGC catalyzes a new ecosystem of sustainable fashion design from virtual to real worlds

The development of sustainable design has become an inevitable trend in the evolution of the fashion industry. In the virtual

world, AIGC provides designers with unlimited creative possibilities, thus promoting the generation of innovative designs. Designers can create various combinations of environmentally friendly materials, circular economy and efficient production through the virtual design lab, integrating sustainability into every design detail. The social value of virtual-to-real is to reduce costs and increase efficiency. Through AIGC, designers can quickly create samples and prototypes in a virtual environment, which not only reduces production costs, but also shortens the design cycle and reduces the consumption of resources. At the same time, the digital production process can also optimize the supply chain, reduce energy and logistics costs, and promote the sustainable reconstruction of the fashion industry under AIGC.

Conclusion

The sustainable reconfiguration of the fashion design path with AI Generated Content as the core technology perfectly integrates innovation, environmental protection and personalization of design. From technology-driven creative decision-making and the innovative integration of digital twins, to resource optimization by deep learning and the promotion of circular economy, these core technologies provide new ideas and solutions for the sustainable development of the fashion industry. However, realizing this path requires the combined efforts of fashion designers, technology companies, governments and consumers. Through this core technology-driven path of sustainable reconfiguration, the fashion industry will usher in a more innovative, eco-friendly and sustainable future.

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Qian Xuesen or Benjamin H. Bratton: A Systems Study in the Organizational Model of TikTok Company

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Abstract

The digital phenomena and digital platforms that have emerged in the past decade cannot be described with small and medium systems. This paper compares and combines the thinking logics of Qian Xuesen's complex mega-system and Benjamin H. Bratton 's stack system to study the TikTok company as an object. The study finds that the case of the TikTok company can be divided into six layers: capital layer, organizational layer, driving layer, tool layer, user layer, and business layer, to understand and deconstruct the stacked megastructure structure, providing a method reference and research path for other digital objects and digital platforms.

Author keywords

TikTok company; the stack; Qian Xuesen; complex mega-system; digital platform.

Introduction

The digital age is characterized by typical system features, and systems, serving as a universal perspective of observation, offer diverse choices. Current research on digital objects usually draws from the methodologies of the "Old Three Point Theory " (systems theory, control theory, information theory) and the "New Three Point Theory" (mutation theory, synergy theory, dissipative structure theory). [v] However, megastructure structure systems are essential in interpreting the essence of the big data era. This article will attempt to interpret the complex phenomena of the digital age from a mega-system perspective.

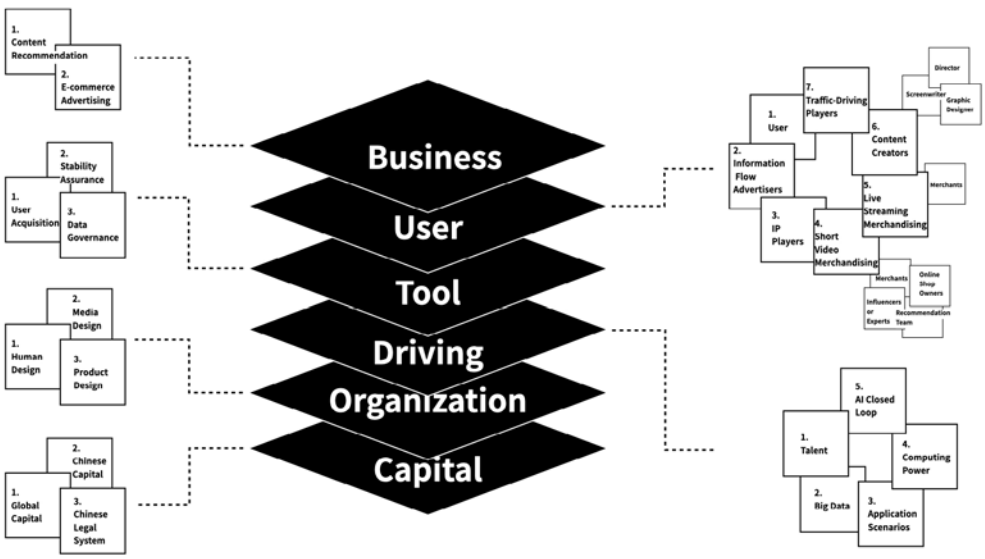
I. Qian Xuesen and Benjamin H. Bratton: TikTok Company as a Mega-Structure System

The academic community presently recognizes two typical structures of such systems: the first being Qian Xuesen's complex megastructure system, and the second being Benjamin H. Bratton 's stack system. [Figure 1]



Qian Xuesen's complex megastructure system, and Benjamin H. Bratton 's stack system.

Qian Xuesen proposed the methodology of the complex megastructure system, emphasizing a comprehensive integration forum transitioning from qualitative to quantitative. This approach has also acknowledged the complexity of the research subject - humans, indicating that individual wisdom is insufficient to address complex mega-system problems, and a collective intelligence integration is necessary. The fundamental principle of the comprehensive integrated method is to amalgamate various scientific theories from different disciplines with human experiential knowledge, focusing on leveraging the overall and integrated advantages of the system. [2]
In contrast, Benjamin H. Bratton believes that a kind of stack geography has emerged in the digital age, which vertically stacks spatial layers, distinguishing it from modern political geographical maps. This model locates users, software interfaces, access addresses, cities, clouds, and the earth in a comprehensive platform and a megastructure, stacking them vertically.[3]
This article dialectically incorporates the thinking of Benjamin H. Bratton 's stack geography, selecting TikTok, one of the most influential Chinese companies globally in recent years, as the research subject. It has delineated six layers based on its actual development path, applying Qian Xuesen's integrated thinking at each layer, concluding that TikTok functions as a stacked megastructure with various nested systems internally. [Figure 2]



The stacked megastructure system of TikTok Company.

II. Capital Layer: The Financial Capital Constitution of TikTok Company

This section delineates the financing history of TikTok and the intricate relationships among financing institutions. It categorizes the investments of the global digital capital in China from 2001 to 2022 into four phases. Underlying these phases is the global expansion of American digital and financial capital in the neo-liberal era, interwoven with China's continuous improvements in digital infrastructure and legal regulations through the accumulation of industrial capital. This scenario indirectly reflects China's clear thinking and strategizing in the "cloud leadership" digital configuration amid the new round of global competition.
On one hand, this layout manifests through encouraging domestic capital to enter the investment market via refining financial policies and corporate laws, such as the revision of the "Partnership Enterprise Law"[4] in 2007 and the launch of the Growth Enterprise Market (GEM) in 2009, which laid the market foundation and legal

protection for the development of local PE/VC. On the other hand, it demonstrates through the curb of internet finance and internet mobility companies going overseas for listing to safeguard citizen assets and data security. Taking Didi as an example, on July 21, 2022, the Cyberspace Administration of China imposed a fine of 8.026 billion yuan on Didi Global Inc., based on laws and regulations including the Cybersecurity Law, Data Security Law, Personal Information Protection Law, and Administrative Penalty Law. [5] This reflects China's considerable consideration under the megastructure system for the financing and listing of internet capitals.

III. Organizational Layer: Human Resource Design of TikTok Company

As of 2023, TikTok's parent company Byte Dance has over 110,000 employees worldwide. To comprehend how these human resources are integrated into highly efficient business operations through design, we can analyze it through the construction of a small-scale three-layer system, namely: human design, media design, and product design.

Human Design

This pertains to shaping behavior cognition and organizational roles. For instance, posters bearing slogans such as "Ego Creates Blind Spots" and "Deferred Gratification" [6] are displayed in every office globally, effectively counterbalancing the sense of accomplishment brought about by rapid growth.

Media Design

This involves enhancing information accuracy and writing efficiency through the cross-utilization of images, diagrams, and documents. Tools such as Lark Documents and Lark Miaoji allow work information to synergize across time and space.

Product Design

This dimension refers to the organification of individuals in the organization through digital tools like Lark. For instance, the TikTok company has adopted Google's Objectives and Key Results (OKR) working method and formed an internal consensus on "Context—not Control".

Through the design across these three layers, human resources from different countries and cultural backgrounds can be assembled more easily like computer modules, facilitating more stable and efficient organizational collaboration. [7]

IV. Driving Layer: AI Lab Digital Model of TikTok Company

The study investigated and viewpoint analysis of key figures in the TikTok company's AI Lab, uncovering the more crucial core resources hidden beneath anonymous style symbols and functional product designs. For digital companies, this kind of resource possesses more enduring competitiveness.

TikTok's AI Lab has inherited the research accumulations of Microsoft Research Asia (MASR) and Baidu's U.S. deep learning laboratory, securing an absolute advantage in application scenarios through entertaining product forms, the imperfections of China's digital policy, and a vast population base. This trigger other resources in the small resource model, including talent, big data, computing power, and a closed-loop AI system.

Under this resource model, products, core technologies, and many research areas stimulate each other, encompassing fields such as computer vision, natural language processing, machine learning, voice & audio processing, data & knowledge mining, computer graphics, systems & networks, information security, and engineering & products.

For instance, under this digital resource model, the red packet interactive technology for the 2021 Spring Festival Gala was shortened from 90 days to 27 days, facilitating the advancement of server hardware technologies such as AI chips, cloud servers, and data governance capabilities through business promotion.

V. Tool Layer: User Acquisition and Governance of TikTok Company

Under the premise of the inherent driving forces of artificial intelligence technology in the AI Lab, the diversity of tools has become a critical application link for the platform to maintain continuous user engagement. On the one hand, continuous updates to tools applied at the middleware stage offer technical assurances for data governance, data security, response speed, and stability. On the other hand, elements such as the recommendation system and large model compression capabilities have become vital in directly enhancing product vitality, generating popular topics, and increasing the user base.

For example, the AI real-time face-swapping tool utilizes "data label algorithms" to carry out online collaborative compression distillation across the "model + data" dimensions. In contrast, the "Cut the Same Style" feature in Viamaker（A TikTok editing tool） uses CV technology to determine whether there is any rendering error, addressing compatibility and code update issues, thereby solving problems of lack of reference in short video creation and users feeling a lack of participation and entertainment. These tool applications, which have grown on the foundation of AI underlying technologies, have become crucial links in acquiring users and managing data.

VI. User Layer: Digital Labor Structure of TikTok Company

Numerous scholars have interpreted and critiqued digital labor from a Marxist perspective, [8] but the digital labor on TikTok involves multiple groups, each having distinct divisions of labor. The most numerous groups comprise short-video users who provide platform data feedback through watching and distributing short videos of daily life, forming the main body of the platform's data. Players involved with information flow advertisements, IP players, short video promoters, traffic attracting players, and live broadcasting teams constitute parts of the ecosystem connecting commercial behaviors. This part of the business model manifests through the creative contents of content producers (including scripts, movies, and graphics) serving as media carriers.

These entities comprise the fundamental roles at the forefront of a consumer closed-loop scenario, their labor generating data within the platform. [9] This data is a crucial element for the platform to undertake commercial activities.

VII. Business Layer: Content & E-commerce Advertising Model of TikTok Company

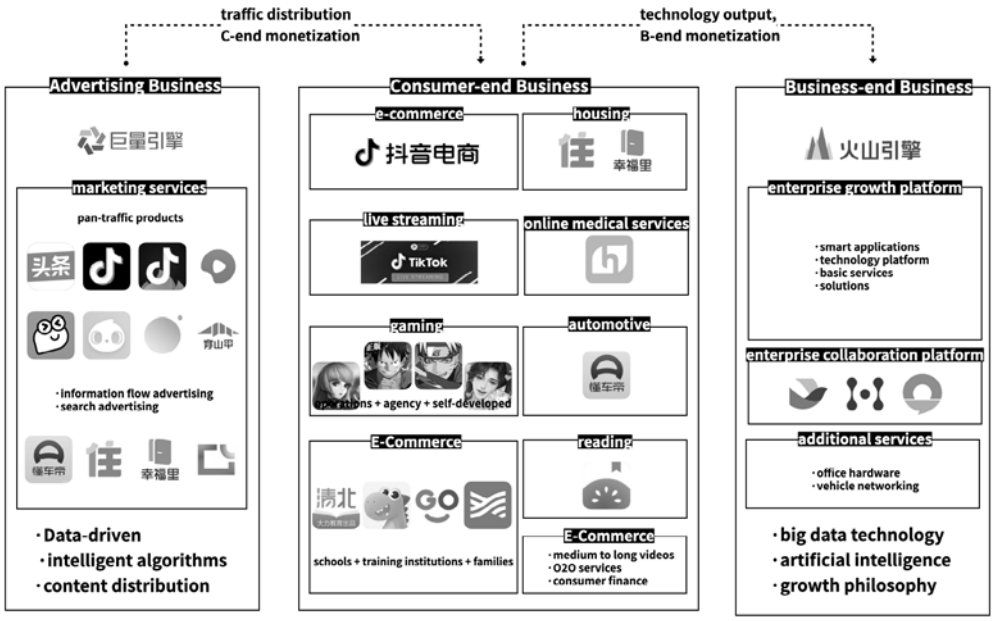
In 2022, the total revenue from internet advertising in China was approximately 680 billion yuan, with TikTok (known as TikTok in China) accounting for about 28%, nearly 200 billion in market share, which is equivalent to Suzhou's annual fiscal revenue in 2022. We can delve deep into the advantages and development strategies of the TikTok platform through a series of formulas.

A pivotal point to note is that TikTok's business model, which integrates content and e-commerce, is the primary reason for its massive advertising revenue. When users are engaged with content recommended by TikTok' s algorithm, their data is simultaneously utilized in computational advertisements, striving to translate the data into tangible consumer actions. TikTok retains essential data, such as behavioral, payment, and preference data, harnessing personalized content services via its recommendation system to attract a vast user base and prolong usage duration.

The dual-engine profit-driving ability distinguishes TikTok from other internet companies, embodying e-commerce advertising prowess akin to Alibaba and Amazon. This allows it to apply perpetually optimized data in the

e-commerce sector, affording greater profits to investors with lower marginal costs. Advertisement sequencing also involves stages of personalized recommendations, necessitating the delineation of search intentions, user interests, and preferences. Although users can enjoy content free of charge, they are served with advertisement messages. The platform promotes ads based on relevance and interest, targeting revenue generation as the principal objective.

In this business framework, actions such as video viewing and consumer behavior data on TikTok are utilized for future model training to enhance predictive accuracy. The platform nurtures a cyclical growth of advertising revenue by continually nourishing content recommendations and ad businesses with billions of interest data. Subsequently, TikTok capitalizes on its accumulated algorithmic expertise and favor from capital ventures to rapidly extend its reach into other domains, preparing for data monopolization. [Figure 3] This monopolistic stance induces an inequality in the rights and obligations between TikTok and the users as well as content creators. Although the latter group lacks the freedom to choose services and purchase products, TikTok has availed relevant consumer preference information to paid customers (advertisers), facilitating them to push advertisements that heighten the probability of product sales. Thus, a bilateral market has emerged relative to advertisers and users (including content creators) on the TikTok platform, establishing a dynamic where TikTok provides a highly customized target audience for advertisers while offering a space for creation and consumption for users and content creators, albeit in an unequal relationship. [10]



TikTok Company's product matrix and business modules.

Conclusion and Discussion: Integrating Qian Xuesen and Benjamin H. Bratton, or Stack Mega-Structure

The TikTok company is not only a stack-style multi-layer logic, but also a Qian Xuesen-style multi-layer system nested logic. Only by combining these two logics can we understand its complexity and mega-structure. This paper divides the TikTok company into six layers: the capital layer reflects the changing relationship of global digital capital absorbed by TikTok under Chinese government policies; the organizational layer reflects the process from individual employee design to media design and then to product design to improve work efficiency; the driving layer shows AI becoming the underlying driving force of TikTok's technology; the tool

layer shows the application of AI technology and the acquisition and governance of users; the user layer reflects the digital labor in content production and business transactions in the ecosystem of the TikTok company; the business layer shows the business model of TikTok company where content and e-commerce jointly form a bilateral market. Digital platforms cannot be purely multi-layered stacks in a state of purity; they can only be a mixture of components. Other digital platforms are hybrid systems formed by combining six layers in different concentrations, proportions, and nesting relationships. Therefore,this six-layer division is both a requirement for the stack mega-structure model and a necessity for understanding digital enterprises and complex platforms.

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Research on systems thinking assisting the sustainable development of contemporary environmental design

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Abstract

As the global knowledge networks came into being, human settlement environment issues have become increasingly tense and complex. How to systematically deal with contemporary human settlement environment issues and their sustainable development is worthy of public consideration. Through literature review and historical research, the article finds that the sustainable development of contemporary environmental design requires comprehensive consideration of the international sustainable development goals and the development needs of contemporary environmental design. Therefore, sustainable environmental design involves three major aspects: ecology, economy, and society. It has a wide scope and includes a wealth of informations. Its comprehensive development cannot be separated from the help of systems thinking. After exploring the historical development of sustainable environmental design, the article combines excellent cases at home and abroad to analyze the specific application methods and strategies of systems thinking in the construction of beautiful countryside, shared housing, and smart cities.The important value of the application of systems thinking in contemporary environmental design is further reinforced. Systems thinking is not only benifit to the sustainable development of contemporary environmental design, but also conducive to enhancing the systemic thinking and overall awareness of environmental participants.In order to promote the construction of a green lifestyle, the expansion of international design vision, and the development of Chinese design and Chinese wisdom.

Author Keywords

Environmental design; Sustainable development; Systems thinking

Introduction

With the continuous improvement of human needs, environmental design issues have become increasingly tense and complex. Such as sick building syndrome, environmental air pollution, shortage of ecological resources, waste of building space, and vicious social competition. In China, environmental design is a design profession that focuses on human settlement environment, including urban design, landscape and garden design, architecture and interior design, etc. It plays a leading role in solving social problems, promoting economic growth, and improving environmental quality. Environmental design should actively assume the responsibility of promoting sustainable development. In the face of new contexts and new challenges, how to systematically deal with contemporary environmental design issues and their sustainable development is worthy of public consideration.

1 Basic understanding of sustainable environmental design

1.1 Concept of sustainable environmental design

In 1987, Mrs. Brentland proposed that "sustainable development is a development that can meet the needs of contemporary people without compromising the ability of future generations to meet their needs".In 2015, 17

goals of sustainable development were formally established at the United Nations Sustainable Development Bee Conference, including no poverty (the primary goal), good health and well-being, quality education, affordable clean energy, sustainable cities and communities, etc. , these goals aim to completely solve the sustainable development problems in the three dimensions of ecology, economy and society in a comprehensive way by 2030[1]. Sustainable development goals are the common goal of all humanity and the entire industry. China is a country that attaches great importance to sustainable development. Every stage of my country's development has profoundly implemented sustainable development strategies, such as the construction of ecological civilization (2005), the strategy of building a beautiful China (2012), and the construction of humankind. Community of Shared Future (2015), "Dual Carbon" Strategy (2020), etc., these can provide directions for the development of sustainable environmental design in the new era.Combining the related contents of sustainable development and environmental design , this paper proposes the concept of sustainable environmental design is a human settlement environment design, which is compatible with multi-dimensional sustainable development in ecology , economy ,and society. It can meet the needs of contemporary people and provide the healthy and happy life of future generations. It strives to explore a sustainable environmental design development that is in line with China's national conditions from multiple dimensions such as ecology, economy, society, and technology.

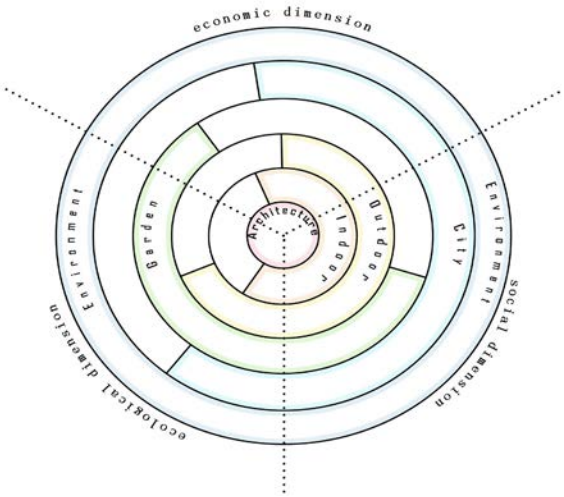

Figure 1. Analysis chart of sustainable environmental design research categories

1.2 Research scope of sustainable environmental design

Inspired by the United Nations Sustainable Development Goals and the connotation of environmental design in the new era, the research scope of sustainable environmental design can be expanded from three dimensions: ecological, economic, and social (Figure 1). First of all, ecological sustainability is the basis of environmental design. It is necessary to consider the healthy development and virtuous cycle of the relationship between indoor, architectural, outdoor, urban, garden and other microscopic human settlement environments and their macroscopic human settlement environment, and the normal operation of the natural ecosystem should not be harmed during the entire design process. Secondly, economic sustainability is the prerequisite for environmental design. "Cost" and "benefit" are often regarded as the main limiting conditions of environmental design. Unsustainable economic development can easily aggravate the gap between the rich and the poor, social

inequality and other undesirable phenomena. Only by exploring a new economic paradigm and breaking the traditional centralized economic structure can we provide long-term guarantee for a better living environment. Furthermore, social sustainability is the core of environmental design. Its development pays attention to fairness and democracy, and needs to create equal opportunities on the basis of respecting basic rights and cultural diversity, thereby promoting the construction of a harmonious society that is inclusive, united, healthy, and safe. Finally, in the face of complex development background and dynamic requirements, sustainable environmental design needs to take into account and balance the development of the three major dimensions of ecology, economy, and society. They are mutually based and interact with each other. Due to the wide variety and rich content of sustainable environmental design, which has obvious characteristics of intersection and integration. So systems thinking plays an important role in it.

2 The path to growth of sustainable environmental design

Awareness affects action, and action determines results. In the field of design, design thinking often plays a leading role. That is, design thinking affects design methods, design methods guide design behaviors, and design behaviors create design results. Throughout history, influenced by different design thinking, sustainable environmental design has shown different design behaviors and design results at different stages.

2.1 Enlightenment period: Led by green thinking

Design dominated by green thinking is a design that emphasizes the use of low environmental impact materials and energy, that is, "green design". This design principle is the well-known "3R" principle: Reduce, Reuse, Recycle. This stage lasted from the 1970s to the 1990s. The representative work is the Duisburg Landscape Park renovated by the German designer Ratz in 1989. The renovated park retains the historical traces of the original factory to the greatest extent and utilizes the old "Waste" and vegetation reshape the park landscape, such as grinding old red bricks to make red concrete, cutting old iron plates to make square paving, etc., which not only reduces the demand for new materials and new energy, but also achieves the effective use of waste materials. Recycle and reuse. In addition, harmless design, dismantling design, durability design, degradable design, etc. have also been included and become important strategies for green design [2]. However, at this time, green design still focuses on the environmental impact of degrading materials and components. It is a "post-process intervention" behavior that treats the symptoms but not the root cause and cannot fundamentally solve the problem of conflict between economic development and the environment.

2.2 Development period: Led by ecological thinking

Design dominated by ecological thinking is a design that focuses on the complete cycle process, that is, "ecological design". This design concept is mainly derived from the understanding of natural systems and reference to ecology. It not only pays attention to the design results, but also pays attention to environmental issues in all aspects of the design process, which is a kind of "intervention in the process" behavior. This stage lasted from the 1990s to the early 21st century. The representative work is the Menara Tower designed by Malaysian architect Yang Jingnwen in 1992. The building architecture combines the "bioclimatic skyscraper" theory and design methods, both inside and outside the building. Both adopt dual-climate treatment methods, so that green plants are cultivated in a spiral shape on the concave platform of the building, and the sustainable integration of ecological building technology and humanities is cleverly combined to create a pleasant and livable ecological building. Compared with the early green design, the design led by ecological thinking has a wider scope of consideration and a wider span. However, both focus on the material level and lack comprehensive

consideration of non-material aspects such as social issues and business models, so it is still difficult to achieve comprehensive development of sustainable environmental design.

2.3 Maturity period: Led by Systems thinking

"System" comes from the Greek "sýst ē ma", which means gathering and complexity[3]. Systems thinking is not only a way of thinking that focuses on the interaction between individuals and their associated factors [4], but also an effective tool for solving complex collections of things and environmental relationships.Design led by systems thinking is a comprehensive design based on a complete cycle process that pays attention to material and non-material considerations, that is, "system design." It is use- and result-oriented, aims at happiness and satisfaction, and its focus shifts from designing " things" to designing "solutions". At the same time, "system design" is also good at incorporating the economic sustainability concept of "use not owning" and the social sustainability concept of "everyone is equal" and "respect and friendship" into the design scope. It belongs to a "service and sharing" level. The intervention behavior is more in line with the current requirements of sustainable environmental design development. This stage lasts from the beginning of the 21st century to the present. The representative work is Amsterdam Schiphol Airport Terminal 2 that used Philips lighting services in 2011. Following the system thinking of "lighting as a service", the airport only pays for the lights used, and the lighting equipment The ownership of the company remains with Signify (renamed Philips Lighting). In other words, during the period of lighting use, enterprises must assume a series of responsibilities for lighting equipment, from design and installation to maintenance and management, to ensure the quality of products and services to the greatest extent, so that they can provide users with high-quality lighting experience while also saving money. The "three-party win-win" situation has promoted the sustainable development of the space lighting environment.

3 Cases of systems thinking assisting sustainable environmental design

Sustainable environmental design needs to integrate the three dimensions of ecology, economy, and society at the same time, and their allocation proportions often change due to changes in site characteristics. For example, rural areas are mostly located outside cities and towns, with beautiful natural scenery, and are suitable for ecologically sustainable development. Of course, sustainable economic and social development is also important. The comprehensive construction of each site is a systematic project that takes into account multiple dimensions.

3.1 Focus on ecological sustainability：Transformation of beautiful rural landscape systems

Rural landscape is an ecosystem that integrates people, space, time, function, and region [5]. Erdu Village is located in Fuling District, Chongqing City and has a thousand-year mustard culture. Fuling mustard can be found all over the world, so it enjoys the reputation of "the hometown of mustard in the world". The landscape renovation of the village needs to thoroughly implement the three aspects of "livability, industry, and harmonious". In terms of "livable" construction, modern public convenience service infrastructure has been reasonably retained and improved, and the living environment has been localized and characterized, such as the construction of a mustard-themed cultural wall, a mustard cultural square, and a smart and pleasant corridor ecological toilets; repairing roads, circuits, communications, water conservancy, etc. In the construction of "suitable industries", actively add employment places affiliated to rural characteristic industries and rural cultural and educational spaces, such as building industrial science parks, rural art festivals, rural farmhouses, agricultural experience parks, dama gas stations, digital vegetable gardens, and rice field sketching Base etc. In the construction of "harmony and beauty", we must respect the regional ecology and folk customs to the greatest extent, strengthen

the dissemination and inheritance of local culture, and always maintain the exchange and sharing between urban and rural areas. The landscape renovation of Erdu Village is a comprehensive development platform of "industry + cultural tourism + green ecology" (Table 1.). It cleverly integrates systematic strategies such as promoting local characteristics, prospering the industrial economy, and sustaining the ecological environment.It further contributes to the beautiful wish of the integration of urban and rural areas.

Erdu Village · Comprehensive Development Platform	
Development areas	Specific project content
Culture and Tourism	Mustard Culture Art Wall, Mustard Culture Plaza, Smart People' s Gallery, Art Park, Field Theater, and Convenient Public Facilities……
Industrial expansion	Farmhouse, rural teahouse, agricultural experience park, digital vegetable garden, industrial science park, farmer's market, mustard research base……
green ecology	Mining and transportation of local materials, recycling and utilization of old waste materials, protection of ecological and natural environment, collective economy, collaboration and sharing……

Table 1. Erdu Village Comprehensive Development Platform Project Analysis Table

3.2 Focus on economic sustainability：Innovation in urban shared residential space

Shared housing is a new way of living derived from the concept of sharing economy. Its essence lies in the systematic integration of offline idle housing resources, and through the digital online platform, more strangers can understand the situation and needs of idle housing resources, and to obtain a more personalized and economical sustainable configuration. Guangzhou's "boundless community" is a multi-functional joint residence that integrates co-working, co-living, and co-gathering. It breaks traditional boundaries and organizations and integrates work, life, vacation, entertainment and other lifestyles (Figure 2). The shared room type of Shanghai Vanke Port Apartment is a typical family-friendly residence. It consists of 2-3 bays. Multiple groups of residents can share the kitchen and activity space, allowing users to save money without reducing the quality of living,and to enhance interpersonal interaction. The "Students at Home" project in Milan is a way of providing accommodation in exchange for home care and social services. That is, elderly people who have empty rooms at home are provided with accommodation space, and students who are willing to live together can move in at a low price, but the prerequisite is that the elderly are provided with accommodation. Daily care and companionship can not only reduce students' financial and life pressure during their studies, but also cultivate their social responsibility awareness and service capabilities.The innovation of shared residential space is a re-examination of a new lifestyle and the psychological dimensions of interpersonal "trust", "friendliness" and "care" in the new social environment.

3.3 Focus on social sustainability：Construction of a smart city system



Multi-functional joint housing plan of Guangzhou's "Unbounded Community"

Smart city is an innovative urban planning model with the core of promoting sustainable social development. Its design concept is to implant artificial intelligence into every corner of the urban community, through social, economic, ecological, technological aspects of collaboration and symbiosis improves people's lifestyles. Its construction content includes smart governance, smart transportation, smart medical care, smart education, smart economy, smart energy, etc. As the world's largest sustainable city, London's smart city construction experience is worth learning from. In 2018, the Mayor of London launched a roadmap for Shared Smart London, which contains some of London's smart city projects, such as the London Database Platform for free sharing of information, the British Technology City that supports public funding of old streets, and the promotion of using waste as Smart London plan for resources, London interviews to discuss and collect opinions fairly, pathfinder to help visually impaired people move safely, sensing London sensors to determine air quality and personal health activities, idle tower bridges to prevent road vehicles from being stranded, preventing air pollution With Hyde Park testing to protect community well-being, urban innovation centers dedicated to future city construction, etc. [6], these contents run through many fields such as user-friendly services, data analysis sharing, smart street connectivity, digital transformation leadership, and city-wide collaboration. In addition, London has the world's most advanced low-carbon emission and energy-efficient transportation system, with comprehensive coverage above and below ground. Underground transportation is equipped with WiFi connections, intelligent road management, bicycle rental and other services; the above-ground transportation is equipped with license plate recognition functions, which can greatly reduce traffic jams during peak hours and is conducive to the sustainable development of the urban environment.

Conclusion

System thinking has a global view and strong sense of integration, strong balance and collaboration capabilities, and focuses on process service. It is conducive to the construction of a symbiotic, shared and empathetic environment and the generation of innovative designs.Today's era is undergoing many changes such as "innovation-driven", "cross-integration" and "green living", and social, ecological, economic and other healthy development issues are becoming increasingly complex. In the context of the ever-changing times, the design field urgently needs to tap its own potential, expand its potential connotations, and find timely and appropriate

concepts and methods to meet new contexts and new opportunities. Sustainable environmental design is an innovative strategy based on the past, suitable for the present, and developed for the future. Sustainable environmental design based on systems thinking is pragmatic and efficient, inclusive and innovative [7]. It is not only committed to the integration of material and non-material development fields such as beautiful countryside, smart cities, and shared communities, but also helps to improve design Participants' awareness of system construction and comprehensive development will help create a green and healthy environment, expand international design horizons, and improve the quality of Chinese design.

Acknowledgments

Firstly, I am very grateful for my doctoral supervisor, Professor Heping Zhan, for his continuous guidance and support.Secondly, thanks to my master's supervisor, Professor Yinbing Yang, to provide the cases for the paper. Thirdly, I would like to express my sincere gratitude to the 2023 International Alliance of Art and Design Schools (Cumulus) and China Central Academy of Fine Art (CAFA) for organizing the cross-border academic exchange activities.Finally, I am deeply grateful to the Nanjing University of the Arts (NUA) and many relevant evaluation experts for giving me the chance to share my paper and interact with everyone.

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Research on the Service System of Intangible Cultural Heritage Museums: A Case Study of Nanjing Qinhuai Intangible Cultural Heritage Museum

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Abstract

The intangible cultural heritage museum serves as a pivotal place for individuals to learn about intangible cultural heritage. The design of the service system plays a crucial role in influencing the cultural dissemination and enhancing the user experience of the intangible cultural heritage museum. Taking the Nanjing Qinhuai Intangible Heritage Museum as an example, this article approaches the analysis of the user journey map, touchpoints, and pain points from the perspective of service system design. Building upon the case of the Nanjing Qinhuai Intangible Heritage Museum and integrating user needs analysis, this study delves into the future directions of innovation and development for intangible cultural heritage museums. The ultimate goal is to improve the user experience, facilitate the better conveyance of intangible cultural heritage, and promote the more dynamic inheritance of intangible cultural heritage in the digital information era.

Author Keywords

Intangible Cultural Heritage; Service System; Nanjing Qinhuai Intangible Cultural Heritage Museum; User experience.

Introduction

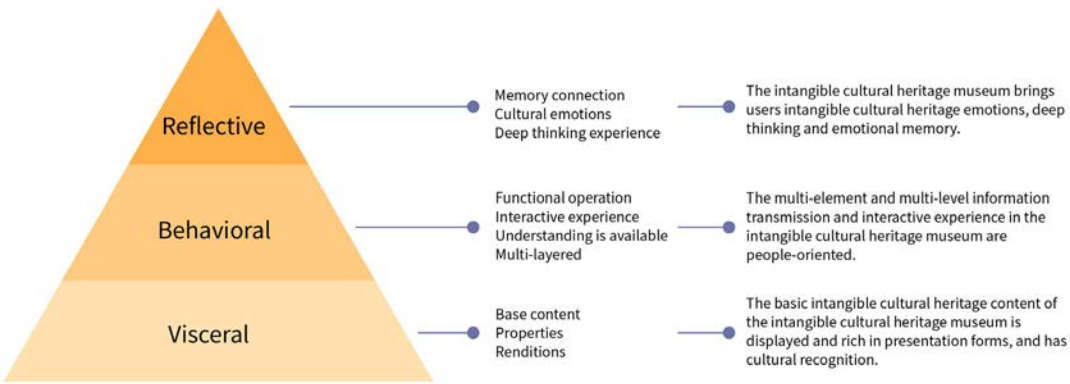
This article takes a service system perspective to analyze the design of service systems within intangible cultural heritage museums. Taking the Nanjing Qinhuai Intangible Culture Heritage Museum as an example, the research examines its service processes, touchpoints, and pain points. Combining modern design thinking, this article proposes innovative directions for the future service systems of intangible cultural heritage museums. This research aims to improve the user experience and foster socio-cultural connections, thereby offering theoretical insights for the future innovation of service system design in intangible cultural heritage museums.

Service System Design of Intangible Cultural Heritage Museums

The Intangible Cultural Heritage Museum is a place for intangible cultural heritage display, research, and interactive experience. The preservation of intangible cultural heritage not only relies on the expertise of inheritors but also necessitates the active involvement of the wider public in its continuation and promotion (Beeho, 1997). With the advancement of science and technology, the intangible cultural heritage museums offer the public a more vivid and immersive experience of intangible cultural heritage (Khan, 2021), inviting people to actively participate and engage with the world of intangible cultural heritage (Falk, 2016). In doing so, individuals can truly feel the unique charm of Chinese traditional culture, avoiding a one-sided output of intangible cultural heritage and passive reception of information by the public.

Systems thinking is a perspective that comprehensively considers the relationships between the whole and its parts, as well as the whole and its external environment, based on the characteristics of systems (Bijl-Brouwer, 2020). The service system design of intangible cultural heritage museums is of great significance for user experience and better dissemination of culture. Through

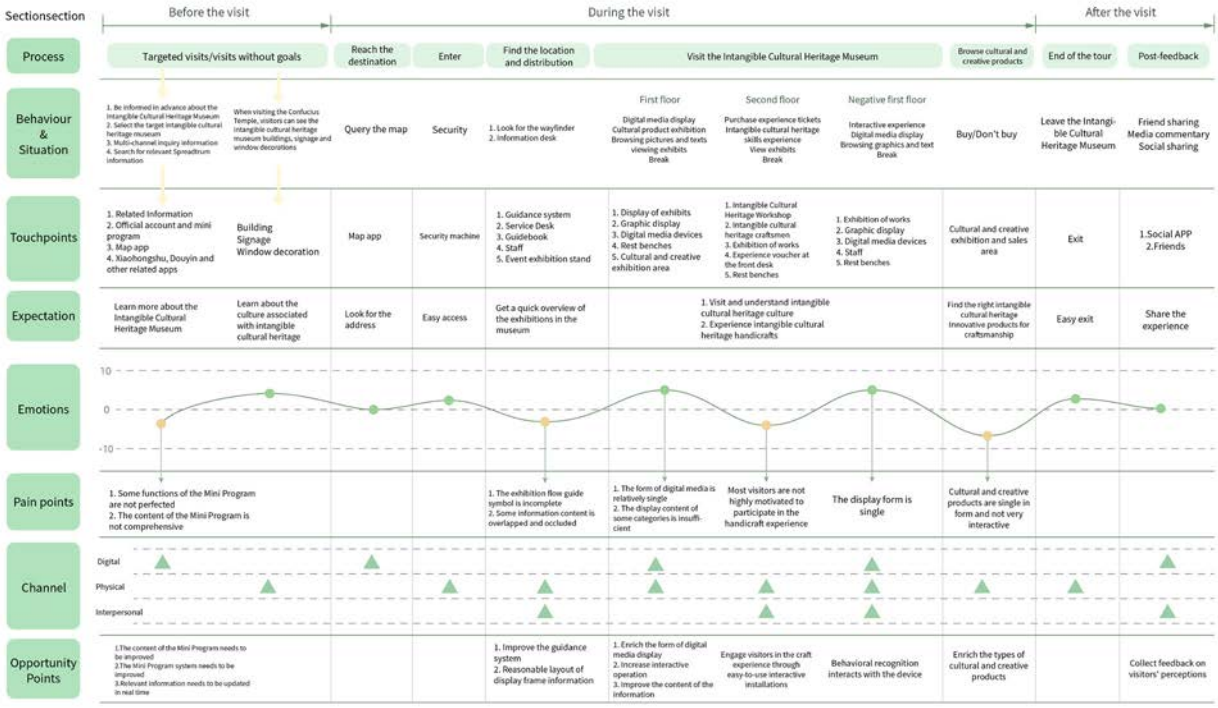
thoughtful design, it aims to provide users with efficient and high-quality services while enhancing the user experience. Donald A. Norman proposed three levels of design: the visceral level, the behavioral level, and the reflective level (Norman, 2005). The author analyzes the correlation between these three levels and the user experience of intangible cultural heritage museums (Figure 1).



The three levels of intangible cultural heritage museums.

Service System of Nanjing Qinhuai Intangible Culture Heritage Museum

Nanjing Qinhuai Intangible Culture Heritage Museum is the largest comprehensive intangible heritage experience center in Jiangsu Province. Located at 21 Chaoku Street, Nanjing, it covers a total area of approximately 7,400 square meters. The museum integrates the exhibition, interactive experiences, culture exchange, and innovation activation. It serves as a cultural landmark and an experiential space representing Nanjing's Qinhuai culture. Nanjing Qinhuai Intangible Culture Heritage Museum is not just an exhibition space but also an experiential center aimed at revitalizing intangible heritage. It conveys



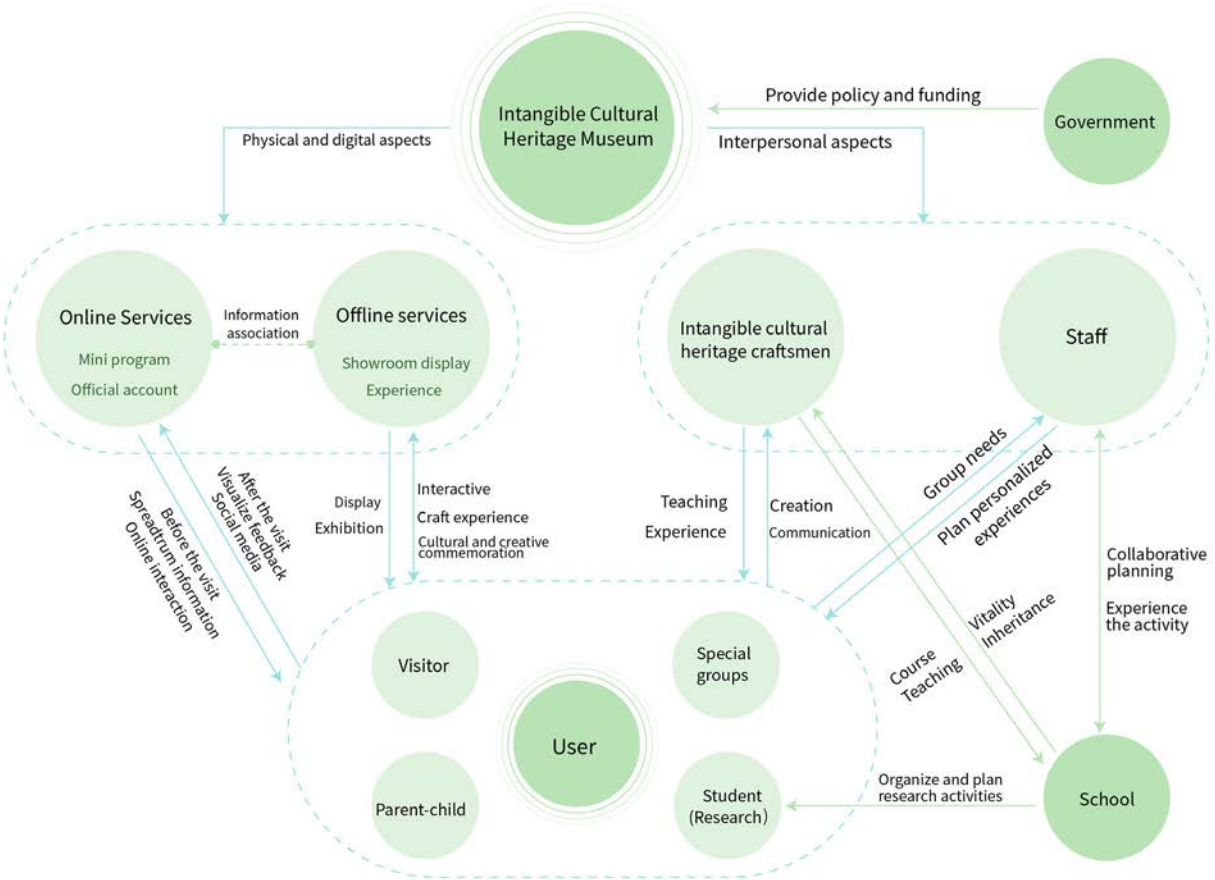
User journey map of Nanjing Qinhuai Intangible Cultural Heritage Museum.

Qinhuai intangible cultural heritage to the public through various means such as heritage research and learning, cultural and tourism activities, and experiential teaching.

Based on relevant research, the primary visitors to the Qinhuai Intangible Culture Heritage Museum are tourists from the Confucius Temple Historical and Cultural District and students who visit the museum for educational purposes. Located in the Confucius Temple Cultural Street in Nanjing, the Qinhuai Intangible Culture Heritage Museum benefits from a rich traditional cultural atmosphere and serves as a "living room for intangible heritage" where people engage in interactive exchanges with traditional intangible cultural heritage. The excellent cultural and tourism environment provides the center with a profound cultural heritage and a continuous stream of local visitors. These visitors often include tourists exploring the Confucius Temple area, who also take the opportunity to visit the Intangible Heritage Center and gain insights into Nanjing's intangible cultural heritage through vivid exhibitions and experiences. Through on-site observations, surveys, and interviews with staff, this research analyzed the user journey map of the Qinhuai Intangible Heritage Museum from the perspective of visitors (Figure 2). The analysis covers tages，touchpoints, emotional curves, pain points, and channels throughout the visitor's journey, and it identifies corresponding opportunities (Stickdorn, 2011). Overall, the visitor experience at the Intangible culture Heritage museum is positive, but there are some pain points, mainly related to information gathering before the visit, interaction during the visit, limited enthusiasm for participating in hands-on craft experiences, and a need for greater diversity in cultural and creative offerings.

Service system optimization

User experience in intangible heritage centers is a process constructed based on user needs and emotional experiences. By



Service system diagram design of intangible cultural heritage museums.

analyzing the pain points of and considering the overall situation of intangible culture heritage museums in China, this article proposes three suggestions to optimize the service system of intangible cultural heritage museums.

Optimization of the Service System

Service design is a systematic design thinking approach that establishes bridges between the resources of intangible heritage experience centers, users, and relevant stakeholders to achieve value co-creation with all parties involved (Ryan, 2013). Guided by service design thinking and the principles of user-centeredness and human care, and incorporating the application of modern intelligent media and information technology (Norman, 1998), the service system is constructed (Figure 3). This optimization of service touchpoints between users and the intangible heritage center enhances the user experience and contributes to the co-creation of intangible cultural heritage preservation and development (Chayutsahakij, 2002).

Optimization of Service Touchpoints

Enhancing the interactivity and interest of intangible cultural heritage museums through touchpoints optimization can attract the curiosity of users of all ages and let them appreciate the charm of intangible cultural heritage in the interactive experience. (Pekarik, 2004). In the context of the 5G era, smart services are particularly important for creative displays and user experiences in intangible culture heritage museums (Norman, 2014). These enhance visitor engagement and provide a deeper experience of intangible heritage culture (Stogner, 2010).

Realization of Socio-cultural Values

Considering social and human care, intangible culture heritage museums can utilize artificial intelligence to optimize participation for special groups, making it convenient for them to visit and experience. The museum can personalize the design and planning of specific user groups' experience activities and content based on individual characteristics. By integrating intangible heritage knowledge, cultural education, user experience, and intelligent care, these museums not only provide users with more precise and comfortable cultural services but also promote the dissemination of intangible heritage culture and the expansion of its social influence.

Conclusions

The traditional heritage of intangible cultural heritage is a topic that is currently being collectively discussed and pursued by various sectors of society. This article takes the Nanjing Qinhuai Intangible Culture Heritage Museum as a primary case study and employs service system design thinking to analyze the exhibition background, service processes, service touchpoints, and pain points. Through the integration of information from the Nanjing Qinhuai Intangible Culture Heritage Museum and the analysis of user needs, this study explores the innovative development directions of service systems in intangible culture heritage museum. It proposes three optimization directions: service system optimization, service touchpoint optimization, and the realization of socio-cultural value. The optimization of service design of intangible cultural heritage museums not only enhances user experience and participation enthusiasm, but also promotes the inheritance of intangible cultural heritage culture.

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Study on traffic calming as soft power of city -- A case of streets in Shanghai's historical and cultural district

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Abstract

In order to address the issues of fairness, safety, efficiency, and environmental benefits in the urban development process, which have been deviating from these standards in certain areas. Specifically, in and around historical and cultural districts, where the aging population and schools are located, we aim to sort out the process of traffic calming development and compare it to current research hotspots. By doing so, we hope to propose a strategy for transforming the traffic calming in these streets, with the aim to improve the quality of the urban living environment and enhance the city's soft power.

keywords

Shanghai Historical and Cultural District; traffic calming; Shanghai's soft power is improving; Historic district renovation; Traffic equity

Urban development has experienced a shift from a pedestrian-driven, vehicle-driven, and people-and-vehicles separate model to a model of coexistence between people and vehicles. This brings about multiple transformations: in values, policies, regulations, technical standards, and design methods. In the new stage of urban construction land development from incremental expansion to stock, the rapid expansion of urban arterial network and the increasing number of cars have brought new series of problems,These issues include the potential for transportation to deviate from sustainable goals of fairness, safety, efficiency, and environmental friendliness. At present, the negative impact of urban motor vehicle traffic is increasing, which has a significant impact on residents' lives, leading to a lack of city identity and belonging, and affecting the attractiveness and competitiveness of the city.

The Content and Development of Traffic calming

The traffic calming strategy mainly focuses on living streets, and through a combination of direct or indirect measures, weakens the negative impact of motor vehicles on the quality of the street environment, improves driving behavior, and optimizes the safety environment for pedestrians and non-motorized vehicles, especially vulnerable groups such as children and the elderly, to improve the safety, feasibility, and livability of the streets[1].

In the revitalization, renovation, and utilization of historical and cultural district, traffic calming strategies can help improve the negative impact of traffic on the destruction of historical features, especially considering that the age composition of residents in historical and cultural district is mainly elderly, improving road safety is very important (Figure 1).

As a measure of sustainable urban transportation planning, traffic calming is considered one of the most effective methods[2].Traffic calming measures can reduce the speed of motor vehicles in order to achieve safe travel, and

their effectiveness has been proven through practice in multiple countries (Figure 2)

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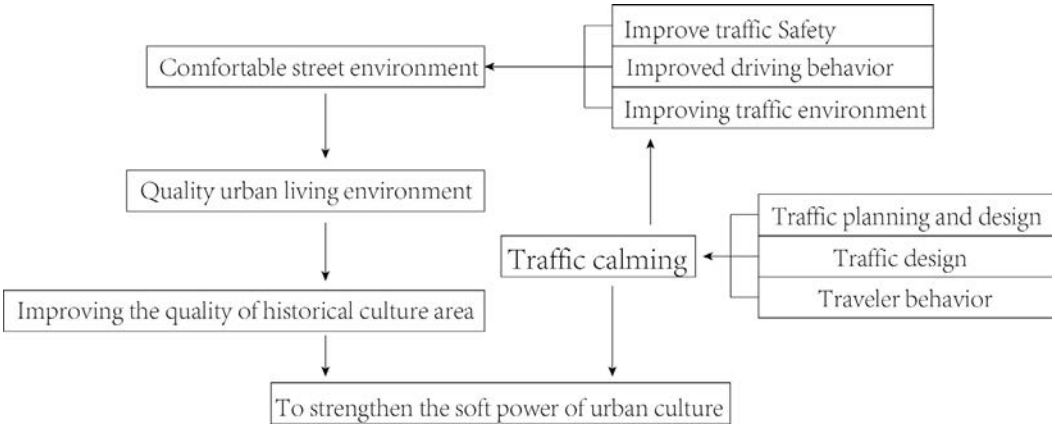


urpose of traffic calming



Traffic signs for traffic calming in different countries

Review and Article, the timeline is 2006-2021. The total number of articles is 241, and irrelevant articles are manually screened. The final total number of articles is 182. The focus of foreign research mainly includes traffic calming, traffic calming measures, pedestrian crossings, built environment, road safety, physical behavior, walking, pedestrians, speed, health, schools, risks, air pollution, impacts, etc. (Figure 3).

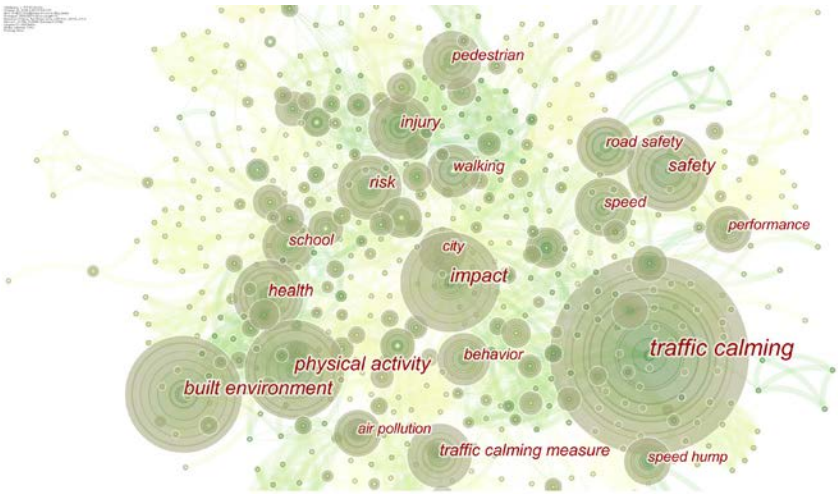
The Enlightenment of Traffic calming on the Revitalization and Utilization of Historical and Cultural District

The modern urban transportation system adopts a spatial division approach, often for private transportation

use, which has a strong negative impact on traditional urban blocks. A single transportation function squeezes traditional multi-functional living space, compresses the vitality of the block, and causes land tension. The long-term experience of traffic calming in European and American cities has great reference significance for China, especially for Shanghai, an international metropolis. From the perspective of the 12 historical and cultural districts in the central urban area of Shanghai, as the representative area of the new and old space succession, due to the different socio-economic and era background in different periods, different dynamic mechanisms affect the space succession law, bringing about the difference between the new and old space. In the historical and cultural district where the new and old are intertwined in the city, special attention should be paid to the creation of living spaces and the quality of living environments for existing residents, reducing the factors that erode daily life functions, returning streets to residents, and improving their sense of regional identity and belonging. Due to the fact that many roads in historical neighborhoods are listed as "never widening roads", the current situation of historical neighborhoods cannot be changed at the planning and construction level. The design can only be updated in small areas to make them more in line with modern transportation and lifestyle. This article mainly discusses five aspects: weakening road separation, redistributing streets, encouraging active travel, increasing driver attention, and establish the calming area.

Weakening road separation and limiting vehicle speed

Limiting the speed of vehicles is originally an important means of regulating the right of way through calming measures, but due to safety considerations, space division has allowed for the speed of vehicles, which has instead become a component of road safety hazards. Transforming rigid road partition guardrails into partially obstructed functional partitions such as green or public areas can reduce drivers' evaluation of road safety and



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improve their attention to street conditions.

Reassign streets and clarify driving conditions

For people who often choose to drive for daily travel, one-way traffic can weaken their understanding of road structure. In the historical and cultural district of Jiangwan in Shanghai, due to the one-way restrictions of many branch roads, it is difficult for people to find the correct path based on memory. Although one-way traffic restrictions can reduce the complexity of street traffic, they may distract drivers' attention while driving. Due to

restrictions on one-way traffic, drivers' attention to the road surface may decrease. Unidirectional streets can increase pedestrian safety risks and give drivers a false sense of safety, leading to danger[3].

Encourage proactive travel and cut parking spaces

Sharing bicycles has encouraged more cycling and improved the coordination between bicycles and public transportation[4].There are two issues that need to be addressed, one is to clarify the parking location of bicycles, and the other is to improve the safety index of urban bicycle riding. The parking location of bicycles can be selectively used as one of the measures to narrow streets, which not only reduces vehicle speed but also improves calming measures.

Increase driver attention and reduce accidents

In the research, it was found that accidents frequently occur at the intersection of Zhenghua Road and Guoshun Road in the Jiangwan Historical and Cultural district in Shanghai. The reason for this is that the two intersections are too close together, and immediately after passing the traffic light at the first intersection, they will intersect with vehicles at the second intersection. Under accelerated conditions, it is difficult to avoid accidents. In this case, it is necessary to renovate the second intersection and reduce accidents through physical means, such as adding intersection signs or raising the intersection.

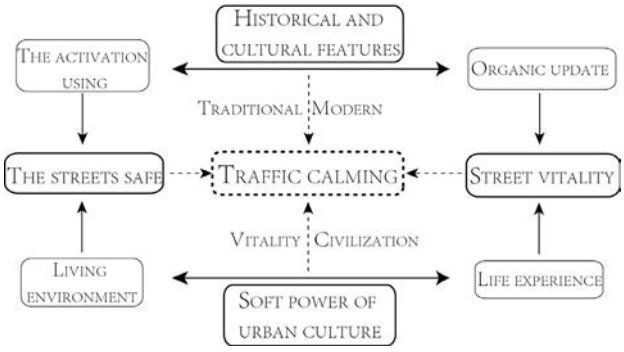
Establish the calming area and enhance citizen awareness

It is recommended to delineate the scope of traffic calming in a unit manner, and the size of the unit should not be too large[5].It is best to use the living blocks around the living community as a unit, with a diameter of no more than 400m. At the same time, it is also necessary to avoid dividing urban main roads or secondary roads with a large number of traffic routes into the calming area[6].

Improving the Quality of Historical and Cultural District and the Soft Power of Cities through Traffic calming

As a material carrier of Shanghai's distinctive culture, the historical and cultural district in Shanghai has been renovated and transformed into an important image feature of the city, which plays an important role in enhancing the soft power of urban culture (Figure 4).

In the perception experience of the quality of sound and scenery in historical and cultural districts, natural sounds have a positive impact on the creation of calm and harmonious sound scenes, while construction and traffic sounds have a negative impact[7].



chematic diagram of the relationship between historical and cultural district, traffic calming, and urban soft power

Compared to large-scale streets, people pay more attention to the street environment and quality, and yearn for a sense of belonging in the community and a comfortable and rich street life. The impact of urban form on behavioral activities has been widely studied, and the results indicate that the denser the urban structure, especially when mixed in close proximity to each other, the less dependence on cars. The historical and cultural district is an urban form with a density high enough to support public transportation services and encourage higher levels of walking and cycling. However, during the on-site inspection process, due to the lack of dedicated bicycle lanes, mixed pedestrian and vehicle traffic, and mixed motor vehicle and bicycle traffic, residents' choice of walking or cycling mode of transportation has been reduced. A calming strategy can help alleviate these contradictions. In response to the aforementioned issues, the article proposes the following suggestions (Figure 5)

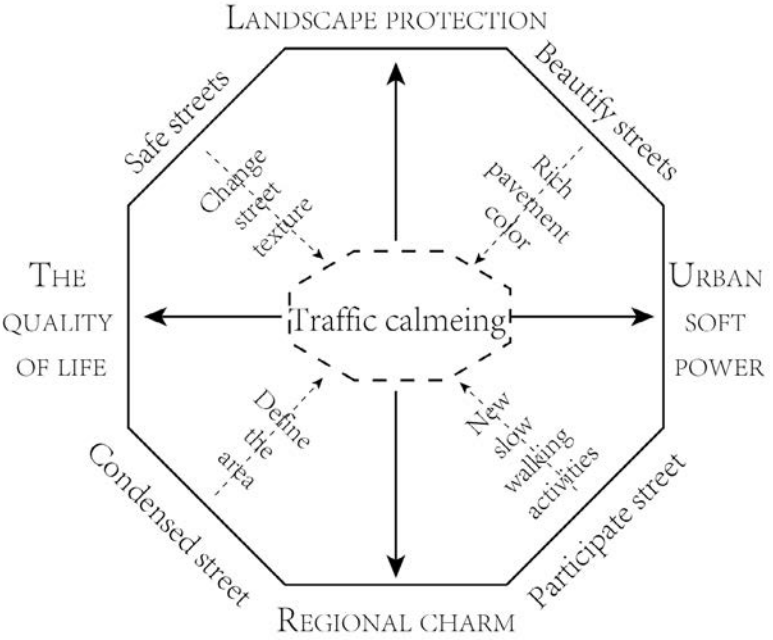
Changing Street Materials

The pavement texture of the street floor can strengthen or refine the spatial effect. You can choose a unified and continuous pavement to control the overall feeling of the street, or you can choose to change local materials to enhance the aesthetic quality and visual richness of the block, enhance the driver's attention, and present the temperament of an outdoor living room to meet people's needs for staying and playing.

Specific ground paving and pillars are also ways to enhance the sense of domain. For many pedestrian communities, changing the paving method to show that this is a more private or suitable area for pedestrians, in order to better identify outsiders. In addition, different paving methods can also help clarify the scope of the street and inadvertently turn from outside to inside.

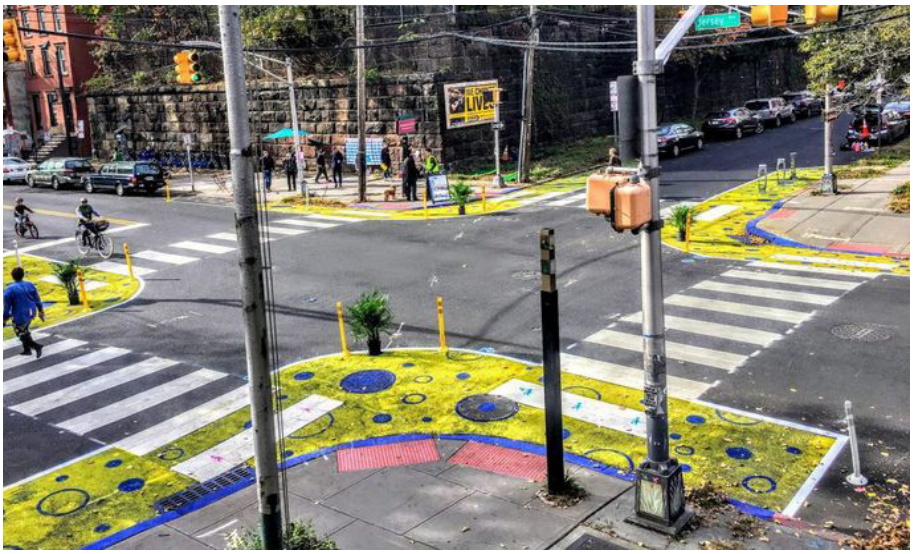
Rich road surface colors

By creating visual excitement points, it enhances the driver's curiosity, attracts their attention to the surrounding environment, and reduces driving speed(Figure 6). The color renovation of road surfaces mainly focuses on pedestrian crossings, sidewalks, and bicycle lanes[8].Its main purpose is to improve the overall image of the street, and to add unfamiliar design content in familiar street spaces, providing residents with a vibrant and fresh living experience and enriching daily life scenes.



Schematic diagram of the value dimension of traffic calming design strategy

By visually distinguishing functional differences and highlighting urban design details such as pedestrian crossings, it is beneficial to improve the safety of pedestrians and non-motorized vehicles, improve the environmental visual literacy of people with reduced vision and cognitive abilities, and combine cultural based



Schematic diagram of rich road surface colors

colors and design themes to support cultural diversity and liven up urban space.

Clear regional scope

The creation of unique places at street entrances and exits can effectively remind drivers that they are about to enter special areas, which can become one of the strategies for calming the street.

This difference can be distinguished by physical facilities, which can strengthen people's sense of belonging to the community, establish a clear sense of responsibility and ownership, and enhance people's enthusiasm for acting bravely and interfering in crime. This can not only increase passenger flow, but also enhance the local sense of security and belonging.

Add slow moving activities

In the process of refined street governance, the supplementation of public furniture has been improved in historical and cultural district, and traffic calming measures can help promote communication activities. In specific festivals or solar terms, special areas can be designated for pedestrian and non-motorized vehicle traffic only, which not only brings richer living scenes to surrounding residents, but also enhances people's awareness of sustainable travel. Finally, the intricate sounds in the city are also very detrimental to the travel of visually impaired people. The tranquility measures in traffic calming strategies can help improve the inclusiveness of streets and can also be one of the ongoing research topics in the future.

Conclusion and gratitude

Traffic calming measures help to meet people's diverse and multi-level needs for a better life at the block level (Figure 7).Aiming at the specific target area of Shanghai's historical and cultural district, a strategy of calming street traffic is proposed on secondary roads in cities with high levels of aging and around schools, in order to improve the quality of life of residents, increase their living scenes, and improve their street participation.

The combination of traffic calming strategy and historical and cultural district is a new attempt, and street protection cannot only be carried out from the perspective of basic maintenance of the current situation, one size fits all walking, and the prohibition of motor vehicle entry. The article proposes four renovation strategies: changing street materials, enriching road surface colors, clearing regional scope, and slow moving activities. However, due to the complexity and particularity of different blocks, there is no single fixed design strategy.

Finally, I would like to express my sincere gratitude to those who provided patient answers during the investigation process. It was your sincerity and patience that contributed to the improvement of this article.

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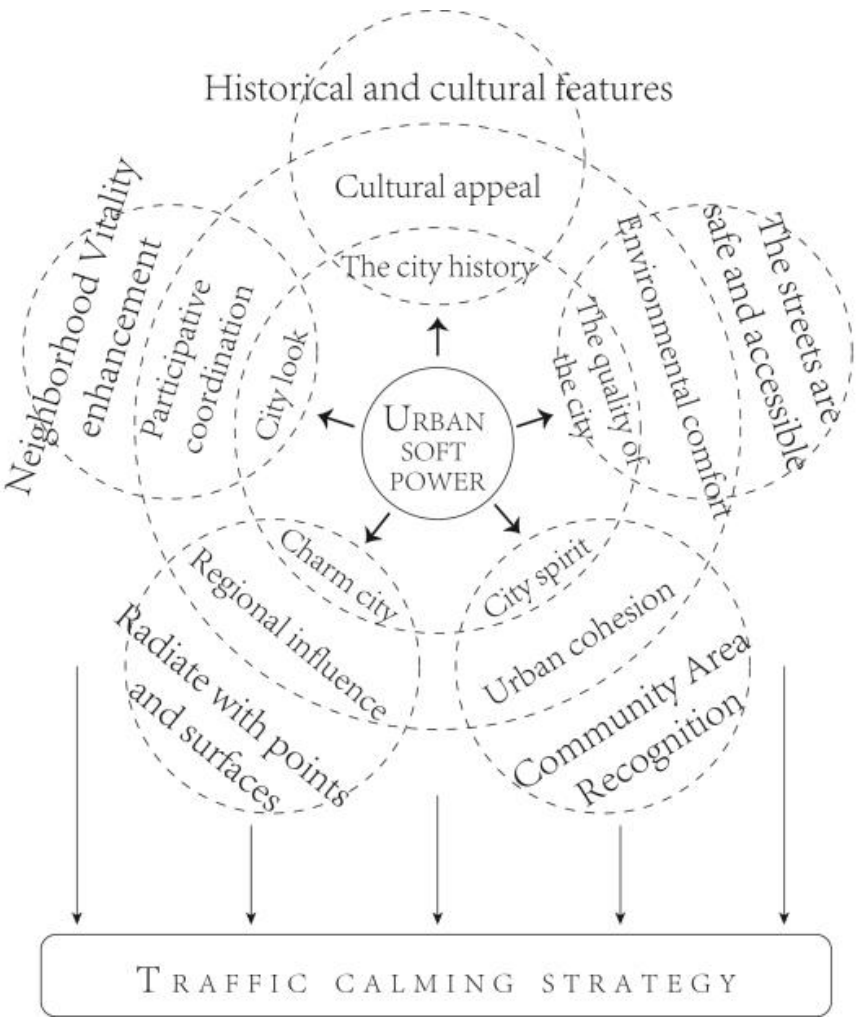

The Five Rings Relationship Diagram for Traffic Calming Design

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Surreal extensions of the design system

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Abstract

This paper explores the relationship between artificial intelligence (AI) and surrealism from the standpoint of architectural space. It aims to analyze the systematic generation of surreal architectural spaces with the help of AI, focusing on four key aspects. Firstly, the use of multimodal AI in spatial generation showcases qualities reminiscent of surrealism, such as spontaneity and automaticity. Secondly, AI's ability to replicate pre-existing elements expands the boundaries of surreal architectural space in the digital era, leading to heightened ambiguity and juxtaposition. Thirdly, AI fosters creativity and transcendence by enabling users to freely explore and engage with the design process, thereby embodying the essence of surrealism. Moreover, the incorporation of AI in hyper-real architectural space holds significance in terms of creation and transcendence. By mapping architectural work to users' imaginative freedom and advancing the design workflow, AI technology plays a crucial role. Finally, the realization of hyper-real architectural space relies on transformation and iteration facilitated by the AI-enhanced design workflow outlined in this research paper. In summary, this article contributes to the trajectory of AI-driven design by examining the formation of surreal architectural spaces within the AI domain. It offers a cross-disciplinary approach that fosters inventive thinking and provides surreal extensions of the design system.

Keywords

ARTIFICIAL INTELLIGENCE, SURREALISM, ARCHITECTURAL SPACE, DESIGN SYSTEM

Introduction

The emergence of the Surrealist movement in the early 20th century was a response to the perceived inflexibility of European politics and culture. This movement quickly gained prominence in Western literature and creative circles. However, it is important to note that while Surrealism had a profound impact on literature and art in the Western world, its influence on the realm of architecture was less direct. Architects were not actively involved in Surrealist endeavors during this era, as the movement perceived architecture as symbolic of order, limitations, and bureaucratic structures, aligning with prevailing rationalist tendencies in the field. Nonetheless, surrealist architectural spaces emerged through the works of artists like Giorgio de Chirico, architect Frederick Kiesler, and others, as well as their influence on design practice. These artistic expressions featured dreamlike and uninhibited architectural representations, gaining recognition and becoming highly sought after.

The expression of surrealism in architectural space aimed to liberate individuals from the mundane and uniform modernist architectural forms. It sought to recreate the essence of architecture by emphasizing elements such as imagination, subconsciousness, memory, and individual spirit. However, due to the lack of a comprehensive knowledge framework and viable methods of realization, most surreal architectural spatial concepts remained confined to verbal or pictorial forms. By studying the generation of surreal architectural space under the perspective of artificial intelligence, we may be able to trace the source of inspiration of the subject's cognitive

and spiritual worlds under the encirclement of technology, and then expand the systematic consideration of design thinking under the interdisciplinary vision and complex social context.

Automation and Spontaneity

In a hypothetical scenario, imagine an architect who possesses the ability to rapidly produce an artistic representation of a church or skyscraper in the distinctive aesthetic style associated with Salvador Dalí. This feat can be accomplished within a brief timeframe of under one minute, using either a single image or a limited set of phrases as the primary input. This concept of architectural automatism and spontaneity is facilitated by the utilization of multimodal AI models.

The term "multimodality" originates from the Latin words "Multus" (meaning many) and "Modalis" (meaning mode). Initially employed in the realm of perceptual psychology, it served to elucidate the amalgamation and interaction of individuals' diverse sensory perceptions. Multimodality refers to the phenomenon of integrating and mutually influencing various sensory impressions among individuals.

The primary objective of artificial intelligence (AI) has consistently been to attain the cognitive capacity of humans to effectively navigate intricate situations and comprehend diverse forms of data. However, conventional unimodal AI systems often struggle to fulfill this requirement. As a result, there has been a growing emphasis on the transition towards multimodal AI, which has become the focal point for future advancements across numerous industries. In response to this change, a wide array of diverse multimodal AI tools has emerged.

Multimodal artificial intelligence (AI) refers to the integration of disparate data obtained from many sensors and inputs into a unified model. This approach involves extracting and merging crucial information from several modal sources, enhancing the overall performance of the system. Multimodal models can effectively include a diverse variety of input for various cognitive activities, such as perception, reading, and reasoning, enabling the provision of more intelligent solutions.

Within the realm of neuro-linguistic models, such as Midjourney, DALL·E, and Stable Diffusion, expansive platforms exist that enable the generation of image content from concise textual inputs. Architects have the capability to extract diverse multimodal prompts from their intuition or imagination, rooted in their pre-existing knowledge base. This facilitates the rapid acquisition of a substantial array of architecturally relevant images. During this process, AI algorithms can independently utilize their internal rules, patterns, and expertise to produce distinct creations, enhancing the productivity of task generation and diminishing human participation. The contemporary process of intelligence formation, rooted in multimodal AI, reflects the automatism and spontaneity that Surrealism emphasizes.

An exploration of surrealist architectural styles may help designers better understand the connection between multimodal AI and architectural design. Similar to the inputs and outputs of multimodal AI, surrealists tend to extract multimodal information in an automated and unconscious way, creating a hallucinatory architectural experience through the expression of forms, colors, lights, music, and more. In fact, specific practices have visualized the connection between the two. For example, architect Andrew Kudless has realized his surreal architectural fantasies since the 1990s by visualizing the use of fabric in architectural design through Midjourney. Unlike traditional algorithmic design tools, Kudless likens this type of multimodal AI to an intelligent version of the old-fashioned sketchbook, where designers can quickly produce a plethora of creative forms by simply typing in vague ideas and textual concepts. Patrick Schumacher, head of Zaha Associates, describes the advantage of Midjourney and other text-to-image generation tools as their ability to provide intuitive design references and make a real difference in the design process during the stage of conceptualization and fantasizing about the shape of a project. At this point, the connection between multimodal AI and the surrealist mode of creation

arises, as the elimination of the need for rational tinkering and arithmetical processing allows users to achieve the unconscious, multimodal, automated narratives advocated by the surrealists in the creative process. Moreover, the characteristic ambiguity and ability of multimodal AI to juxtapose multiple readymade elements can further help people understand the characteristics and connotations of surrealist architectural space.

Ambiguity and juxtaposition

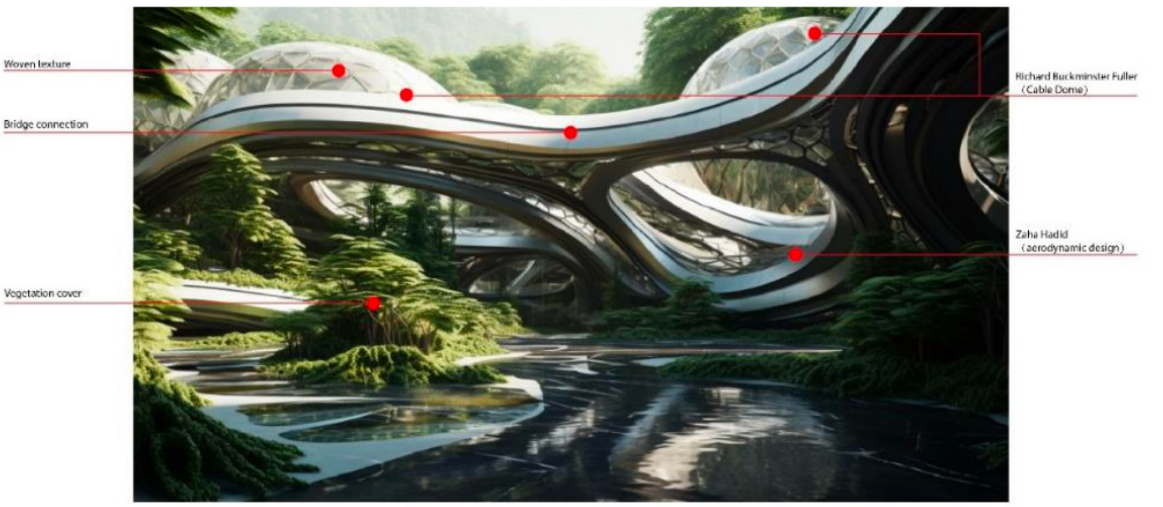
Surrealists believe in the complex and ambiguous relationship between human consciousness and reality, which can be expressed through irrational and unconventional means. Ambiguity and juxtaposition are key elements in Surrealism and can be explored in contemporary architecture. These concepts are used to create imaginative dream scenes, evoke emotions in viewers, and shape a romanticized future. Architects incorporate ambiguity and juxtaposition in architectural painting, home design, interior design, and building design.

Giorgio de Chirico, an Italian painter, blended fantasy scenes with architectural memories in his work "A Melancholy and Mysterious Street." The composition included flying red flags, classical buildings, and abandoned carriages, blurring the line between reality and the virtual world. Meret Oppenheim integrated surrealism into home design with her artwork "Object," which wrapped coffee cups, plates, and spoons in animal fur, creating a juxtaposition of materials and imagery. Marcel Duchamp, Max Ernst, and others used symbolic objects like dense sacks and dead leaves to create surrealistic interior decorations, blurring the viewer's perception of space.

Architects such as Le Corbusier and Enric Miralles have also been influenced by surrealism. The Longchamp Church features irregular planes and metaphorical curved roofs, while the Scottish Parliament Building resembles petals, both transcending reality through the use of ambiguity and juxtaposition.

However, defining or conceptualizing surreal buildings or interior spaces can be challenging for most designers. In the digital age, artificial intelligence (AI) offers new possibilities for generating surreal architectural spaces. AI models grounded in machine learning share similarities with surrealism, incorporating ambiguity and juxtaposition into their learning and generating mechanisms.

Fuzziness primarily manifests in the system's comprehension of the objective reality and is evident in the process of generating images through dimensions such as fuzzy details, fuzzy authenticity, fuzzy consistency, and fuzzy semantics. As a result, the output results exhibit plausible illusory characteristics. Furthermore, the manifestation



An architectural image generated by Midjourney

of juxtaposition mostly arises from the impact of the user's subjective cognition and sensory perception on the artificial intelligence system. The utilization of multimodal information, including text, images, videos, etc., allows artificial intelligence (AI) to efficiently extract features from numerous input objects using Convolutional Neural Networks (CNNs). This process enables AI to perform post-processing and optimization, resulting in the generation of creative outcomes through the juxtaposition of existing elements. Using the architectural image produced by Midjourney as a case study, inputting textual prompts related to Zaha Hadid, Buckminster Fuller, bridge connection, woven texture, and vegetation cover resulted in an AI-generated image capturing the enigmatic and contrasting qualities of a surreal architectural space.

Consequently, this technique enhances the potential for creating surreal architectural spaces. Using the architectural image produced by Midjourney as a case study, the author inputted textual prompts including Zaha Hadid, Buckminster Fuller, bridge connection, woven texture, and vegetation cover. Subsequently, the AI algorithm efficiently generated the image with exceptional fidelity, effectively capturing the enigmatic and contrasting qualities of the surreal architectural space depicted in the illustration (Figure 1).

AI's incorporation of ambiguity and juxtaposition enhances architects' creativity and allows them to surpass the confines of reality. By considering the intricate and unpredictable nature of objective reality, AI integration in architecture contributes to the emergence of surreal architectural spaces with innovative and transcendent value.

Creativity and Transcendence

Surrealism introduced a theoretical framework for analyzing architectural space, captivating imaginations with its unique environment. Prominent figures like Dalí, Kistler, Gehry, and Bofil contributed to this phenomenon through their use of exaggerated stylistic elements, visionary concepts, diverse materials, and unexpected structures.

Implementing surrealism's abstract logic in architectural design presents significant challenges due to various restrictions. The potential impact of technology on surrealism's semantic extension should be critically examined. Artificial intelligence (AI) has facilitated the transformation of imaginative thoughts into tangible architectural designs, incorporating spatial elements such as shapes, materials, and colors. Architectural space, embraced as an art form, can convey individuals' creativity and emotions within a surreal framework.

Integrating irrational expressions into rational design systems poses a significant challenge in creating surreal architectural spaces. Overcoming this requires exceptional imagination and extensive subject knowledge. This study proposes a novel approach by incorporating AI techniques into the design workflow and system integration. Inspired by surrealism principles, the methodology aims to create architecturally bizarre settings emphasizing simplicity and intelligence.

The process consists of four primary steps. In the initial phase, relevant characteristics of surrealist artworks and users' perceptions of ideal architectural settings are documented. This yields valuable datasets for subsequent picture production. The system employs ChatGPT, an AI technology, for data exploration and design visualization, enhancing information alignment with architectural descriptions.

Textual information is further enhanced using a large-scale AI platform like Midjourney, based on a neural linguistic model. This enables rapid generation of imaginative and abstract visual representations of architectural environments. Midjourney efficiently produces substantial quantities of creative content.

During the design review and feedback phase, the designer curates relevant photos and creates visual compositions aligned with user requirements, leveraging their professional expertise and design intuition. In the concluding stage, the designer utilizes the curated photos for partial modeling. These images are reintroduced into the AI tool for iteration and optimization, resulting in imaginative and feasible surreal architectural space

designs.

The advent of digital technology and the information age has facilitated the emergence of irrational surrealism, transcending stylistic limits through the utilization of AI. This artistic movement introduces formal changes within architectural space. The AI-enhanced design workflow, involving cooperation across multiple platforms, effectively transforms architectural visions into tangible outcomes through a process of transformation and iteration.

Transformation and Iteration

This paper explores the irrational qualities of surreal architectural space and draws inspiration from Juan Miro's abstract painting "Dutch Interior No.1", a significant work in surrealism. This artwork is derived from a piece by the Dutch painter H.M. Sorgh, titled "The Lute Player" (Figure 2). It utilizes artificial intelligence (AI) to envision and iterate the architectural space, examining the parallels and distinctions between surreal artists and AI in their artistic endeavors. The study investigates the potential for AI to generate surreal architectural places.



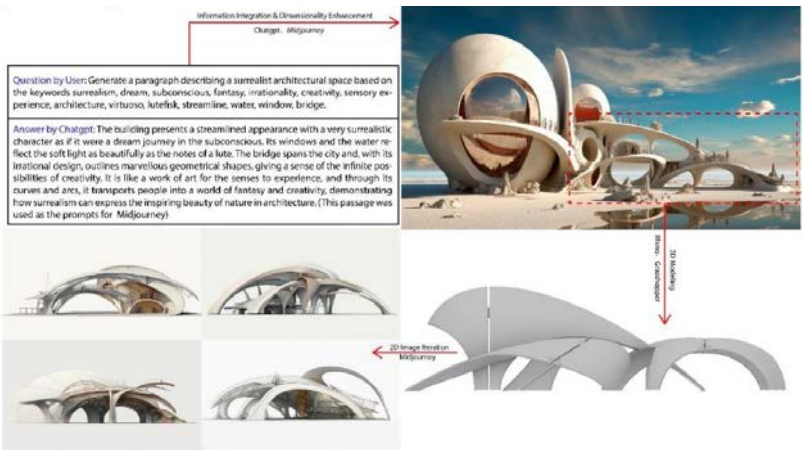
"The Lute Player" and "Dutch Interior No.1"

In the initial step of the AI-enhanced design workflow, the compositional structure of "Dutch Interior Scene No. 1" is extracted, along with the underlying intentions behind the inclusion of windows, bridges, and water surfaces in the painting. Surrealistic attributes such as dreams, the subconscious, fantasy, irrationality, creativity, sensory experiences, and verbal descriptions are incorporated as keywords. The architectural design of the building evokes surrealist dreamscape imagery, creating a streamlined aesthetic that elicits fanciful contemplations from the subconscious mind. It combines illogical components with imaginative elements, resulting in a distinctive and immersive sensory experience.

The interplay between the sleek structural elements and the melodic tones of the lute within the building creates a harmonious fusion. The manipulation of space reflects the undulating nature of water surfaces, while the windows transmit light, shadow, and captivating vistas. Bridges facilitate seamless transitions between areas, inviting individuals into a realm reminiscent of surrealistic art. The structure embodies a captivating synthesis of artistic disciplines, showcasing the symbiotic relationship between architectural elements and the surrounding milieu.

In the subsequent step, the textual data is entered into the Midjourney platform, generating a substantial quantity of imaginative images depicting bizarre architectural environments. Software tools like Rhino and

Grasshopper are used to refine the photos and models, leading to the development of an initial 3D digital model. The generated images are then reintroduced into Midjourney for further iteration and optimization. This process enhances creative thinking, fosters exploration of surreal architectural settings, and expands the potential for practical application (Figure 3).



An AI-based design workflow

Conclusion

In an era characterized by heightened rationality and advanced data technology, the utilization of artificial intelligence has emerged as a prominent subject of discussion within academic and industrial spheres. Furthermore, the interplay between art and technology has witnessed a deepening link. Nonetheless, when individuals find themselves captivated by the intellectual capabilities and effectiveness of artificial intelligence, it is crucial to acknowledge the potential risks associated with depersonalization, a consequence that Nietzsche aptly recognized, stemming from the convenience afforded by technological advancements. Hence, it is imperative to underscore the resurgence of spirituality and the vitality of the human subject. By conducting experimental investigations into surreal architectural space from the lens of artificial intelligence, it is possible to partially address the absence of personal emotion in the digital era. Building upon this foundation, there is potential to revolutionize the design workflow and even the design system through an interdisciplinary approach. Consequently, it becomes imperative to reevaluate the organizational, technological, and ideological frameworks within contemporary design.

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The Digital Turn in Community Governance: A Path Based on Digital Place-making

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Abstract

One of the key elements of community governance is the degree of public participation in decision-making processes. The use of place-making to convey meaning, increase community cohesion, and promote public participation has become an important part of contemporary public space planning, design, and practices.

Driven by technology, the way people interact with public space and the way meaning is constructed is gradually changing. Digital place-making utilizes technology and media to combine the shaping of the physical environment with place-making and cultural identity and to allocate social resources more rationally. It has the potential to enhance the degree of public participation and the refinement and accuracy of decision-making, to provide strategic and methodological support for community governance, and to promote the digital turn of the governance model.

This paper focuses on the specific content and key elements of digital place-making, taking the United Kingdom as an example to analyse the path mode, mechanism and main features of digital place-making in its community governance, and to reflect on its experience and future scenarios as a path for community governance.

Author keywords

digital place-making; community governance; community development; public participation

1 Introduction

Community governance generally refers to the process of participation and decision-making in dealing with public affairs of the community in order to achieve community well-being and broader development goals (Totikidis et al., 2005). One key element is the level of community members' participation in the decision-making process. Increasing the sense of place in a community and promoting public participation through place-making have become integral components of contemporary community planning and development practices (Madanipour, 2006; Friedmann, 2010).

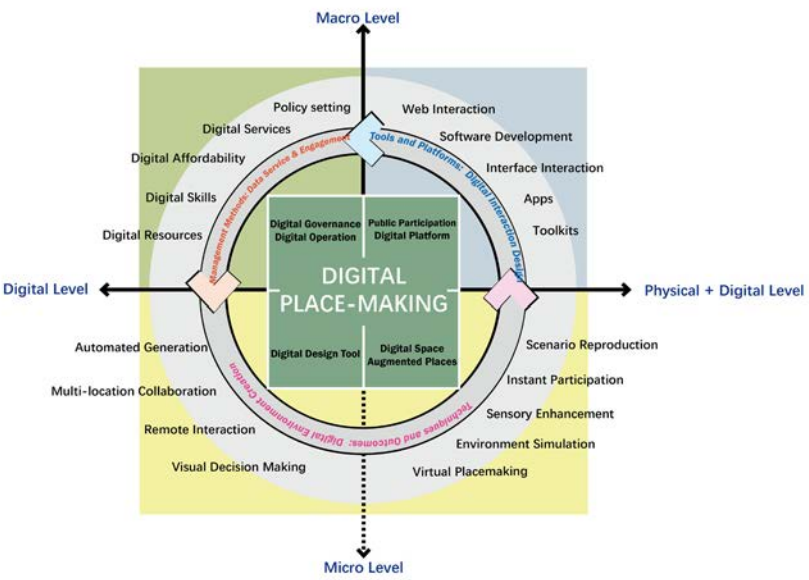
Place-making is often considered to have originated from research and related practices developed since the 1970s by Jane Jacobs and William H. Whyte, among others, who emphasized 'the social and cultural importance of lively neighborhoods and attractive public spaces' (Jacobs, 2016; Whyte, 1980). It involves creative actions for daily life, cultural identity, dissemination, and social interactions that occur in public spaces within cities.

Since 2000, digital development has led to a gradual transformation in the physical nature of cities and communities. A wide range of technological innovations across various domains has contributed to the increased utilization of digital tools, interfaces, and platforms in place-making processes. Unlike the traditional community consultation process that primarily provides feedback to the government, digital place-making considers people

as co-creators of community and city development (Foth, 2017). It plays a pivotal role in facilitating dialogue among communities, governments, businesses, civic groups, and non-profit organizations.

2 The Content of Digital Place-making

"Digital place-making" is an emerging form of place-making supported and implemented by digital technologies and media architectures (Tomitsch, 2016). In recent years, urban construction has gradually shifted from the previous emphasis on regional master planning to locational interventions that improve places and address specific spatial issues through the use of digital technology interventions, engaging the public in interactions with spatial stakeholders and facilitating social interactions, a process known as "digital place-making" (Hespanhol et al., 2017). Digital place-making is also the process of using digital technologies or media to shape human-centred place experiences during design and implementation. This process creates more meaningful public spaces by augmenting physical places with site-specific digital-based services, products, or experiences (Figure 1).



Content and realization route of digital placemaking

2.1 Digitalization of management methods

Digital technologies have changed the ways in which organizations of all sizes operate. Governments, administrations, and other organizations rely on digital technologies and tools to collaborate and manage, co-constructing a model of social governance for place-making that improves the effectiveness of governance and service delivery in public affairs.

Since the beginning of this century, governments and organizations in most regions have relied on large amounts of data and complex information system networks for administrative operations and decision-making (Dunleavy et al., 2006). Digital technologies in areas such as the Internet, cloud computing, databases, and computer-supported collaborative work are widely used. The digitalization of management methods and tools saves administrative costs and simplifies the governance process.

With the change in public management mode in the digital era, digital governance can be understood as a framework involving digital strategies, digital policies and digital standards for the digital presence of institutions or organizations (Welchman, 2015), which constructs new digital governance rules and rules of conduct.

2.2 Digitalization of participation tools and platforms

The transformation of social interaction and communication in the digital age has led governments and administrations to explore new participatory tools for gathering citizens' views. Planning professionals use digital technologies and a variety of applications to connect and interact with citizens (Evans-Cowley, 2010), such as tools for mobile devices, location-based services, and virtual interactive applications. This includes the more widely used social media tools that are integrated into community-centred place-making to encourage public participation, collaboration, and transparency (Fredericks & Foth, 2013), reshaping the participatory place-making process.

Digital social networks and media have created platforms that help people engage in place-making and urban planning, where people from different backgrounds construct, share, and exchange ideas. Place-making is redefined in this interactive social network.

2.3 Digitalization of place-making techniques and outcomes

The digitalization of place-making techniques is manifested through design and decision-making tools. These include environment simulations, which use interactive virtual environments to support collaboration (Champion, 2015); design automation, with predictions of possible design outcomes (Sugihara & Yu Ichi Hayashi, 2001); and visual decision-making tools, which support creators to discuss and make decisions using digital devices and drawing on visual information (Kunze et al., 2012).

One of the purposes of place-making is to create a "sense of place", which is closely linked to people's needs, including well-being, security, and a sense of direction (Aravot, 2002). By creating a sense of place through digital design tools and instruments based on objective context, design motivation, and future vision, designers fundamentally enhance or change people's experience of public space and optimize the way it is experienced (Hespanhol, 2018). The means and outcomes of this sense of place creation support people to build stronger connections to their community or urban environment in shared public spaces by enhancing the sense of place in physical spaces.

3 Pathway models of digital place-making in community governance in the UK

3.1 Policy basis

At a national level, the UK government published the Government Digital Strategy (2012) in November 2012, which has since responded to the renewal and transformation of governance pathways and approaches. The policy intends to transform how government departments and local agencies deliver services to citizens through digital governance and creation, and to improve how government develops policy and communicates with the public.

At a national policy level, the UK's Ministry of Housing, Communities and Local Government published an updated version of the Planning Practice Guidance in October 2019. It is clearly stated that, "In addition to traditional verbal and written methods, local planning authorities and applicants can consider using digital methods to effectively engage communities in the design process. Digital models of proposed development schemes and their surroundings can help to visualize concepts and impacts, including the wider effects of development." The guidelines also point to the use of social media, emphasizing their effectiveness in targeting particular groups, such as online design and gaming platforms that can be used to engage younger audiences in exploring spatial design (Ministry of Housing, Communities & Local Government, 2019).

At a local level, many British counties and cities have also published corresponding local policy or strategy

documents that reflect their respective digital governance needs. For example, Newport, Wales, requires councils to adopt Digital by Design principles in key strategic areas, while noting that the focus should remain on the community services provided rather than on the technology that supports them (Welsh Government, 2015). Croydon, in a related document, calls for the establishment of a digital council comprising community representatives and technologists, as well as the development of a plan for collaboration between the community and third parties (Croydon Council, 2019). Therefore, the policy adjustments and updates establish a preferred option for digital place-making to play a role in community governance.

3.2 Governance of participating subjects

Driven by policy, the UK government promotes community governance through digital place-making, allowing third parties such as the public and private sectors, as well as for-profit and not-for-profit organizations, to collaborate and participate in community public affairs.

The government provides financial support to third parties, including special financial allocations, as well as policy support such as tax and interest rate reductions. At the same time, it offers information and communication technology services and deploys data-sharing tools to share information and data with third parties and other partners. In the governance process, government departments (public sector), social institutions (research groups), commercial companies under the market mechanism, and urban communities form a horizontal participation model involving mutual assistance and cooperation among multiple actors.

In addition to government departments, third-party organizations such as research institutes, non-profit organizations, and commercial companies are also major participants and practitioners of digital place-making. Many universities have set up digital research centres or creative R&D departments, which are supported by charities, research associations, or local councils. Many commercial companies, especially technology companies under the market mechanism, contribute to the development of community creation through innovation in the digital field.

3.3 Organizational approach

Along with the deepening of the process of sharing digital resources, the organizational system composed of various governance subjects tends to be networked and flattening, and governance has become a process of cooperation and interaction. The Ministry of Housing, Communities and Local Government established the Local Digital Collaboration Unit in 2018 to support the nationwide Local Digital Movement to provide quality public services for community governance.

Government departments are building capacity in community governance to improve the efficiency of their organizational systems. For example, since 2010, the Local Government Association has been promoting the innovative use of digital tools and encouraging residents to use them for community building and the transformation of public services. Specific initiatives include the online provision of local and community-related open data resources and the development of learning modules with the Open Data Institute to support policymakers and residents in sharing, integrating, and comparing data for further use and analysis in the digital place-making process.

In specific community activities, local governments are usually not directly involved in implementation, relying more on local community organizations or their partners to handle community governance matters.

In summary, under the guidance of policy and driven by technology, the UK promotes and develops digital place-making as a pathway to community governance, gradually forming a digital model of collaborative participation by multiple actors. Government departments and third parties explore new forms of partnership in collaboration,

share digital information and services, and coordinate interventions, which promotes the realization of community governance goals.

4 Characteristics of the model

4.1 Emphasizing digital equality and inclusion

In the governance process, the UK government emphasizes digital inclusion and accessibility, as reflected in "full participation in society in terms of economic, social, cultural, civic, and personal well-being… where all individuals, independent of their socio-cultural and socio-economic backgrounds, have equal opportunities to engage with ICT" (Helsper, 2014). The government aims to ensure that everyone in the community has equal access to the benefits of digital place-making.

Many populations, including children, the elderly, individuals with disabilities, and those from lower economic backgrounds, may lack the capacity or ability to use the community's digital infrastructure or engage in the process of expressing their needs. In response to this phenomenon, the government published the policy paper "Government Approach to Assisted Digital" (2013, December 4), which calls for active collaboration among the public, private, and voluntary sectors to transform the way they work. It aims to develop a model of digital assistance that opens the public sector up to responding to the needs of the community and its residents, facilitating the design and construction of community services together.

4.2 Research-driven multi-actor collaboration

The exploration of digital place-making by digital research groups and collaboration with multiple actors such as local governments and enterprises are primarily research-driven and play a pioneering role in innovating the model of community governance, generating new forms of participation.

Higher education research institutions and various sectors involved in digital place-making have also actively engaged in interdisciplinary cooperation to establish a certain consensus in community governance. For example, the Bristol+Bath Creative R+D project, a partnership between the University of Bath, the University of Bristol, the University of the West of England, and Bath Spa University, in collaboration with the charity Watershed Centre for Digital Media, collaborates with cultural organizations and commercial companies in the region. They work to connect the research field with digital businesses through interdisciplinary research. One of the research projects, the Future Places Toolkit (Clarke, 2020), can be applied at various stages of governance, combining guided community planning or transformation initiatives with an augmented reality (AR) application to facilitate discussions about the community's future among different sectors and community residents.

4.3 Digital Citizen Engagement

Public participation has become an integral part of community governance. Digital technology allows the public to fully understand the design and decision-making process. The use of video tours, digital models, virtual reality, and other forms of expression, rather than traditional drawings, improves participants' understanding and engagement. Additionally, the use of social media, such as Facebook, blogs, community forums, and other interactive platforms, as well as location-based applications, provides easy access to relevant information about the community, allowing individuals to express their views and opinions. This enhances the understanding of stakeholders and professionals in the community and improves their ability to interpret and respond to planning and decision-making.

With the COVID-19 pandemic shifting more communication from physical to online spaces, the UK government launched the COVID-19 Challenge, which encourages the use of data and digital tools for governance. The London

Borough of Camden and Middlesbrough Council have partnered to develop a planning notification platform based on the research project 'Digital Place-Based Engagement.' This platform informs users of new planning proposals, urban regeneration projects, and provides relevant advisory services in a timely manner online (Local Digital, 2020).

4.4 Balancing community needs with business interests

The goal of community governance is not simply the transformation of the community environment and space, but the renewal of the overall state of the entire community in decision-making and handling community affairs. This involves the mutual coordination of the interests of different subjects in the process. Many communities have integrated, balanced, and promoted the interests of businesses and the overall needs of the community under the market mechanism through digital place-making to achieve a win-win situation for stakeholders.

For example, in the Porth Teigr community redevelopment project in Cardiff, Calvium, a research-based business organization in the field of digital innovation, was jointly commissioned by well-known developer igloo and the Community Foundation to intervene in the development cycle of community and commercial space through digital place creation. This intervention spanned different stages, from planning and construction to management and maintenance, and demonstrated collaborative interaction with community stakeholders (Morrison, 2017). This included customizing the interactive platform for multi-party discussions, simulating the types of services and experiences that the future community will offer through creative installations, such as AR telescopes, interactive street furniture, and digital community maps. Once built, enhancements to the digital infrastructure and the enrichment of the experiential aspects of commercial spaces further enhanced public engagement. As a result, the Porth Teigr community has become a thriving, mixed-use neighbourhood.

5 Conclusion

5.1 Experiences of digital place-making in community governance in the UK

(1) Guaranteeing diverse and inclusive participation.

The government provides extensive technical assistance and training to residents through policy guidance, the public and private sectors, and local groups. This aims to minimize the adverse impacts of digital policies on disadvantaged groups. While increasing the popularity of digital technology applications in the community, it also ensures digital equality, enabling community residents to choose appropriate communication channels based on their own needs.

(2) Emphasizing the collaboration of multiple subjects driven by technology and methodology research.

On one hand, the government provides financial and policy support to establish a collaborative community for governance research, ensuring that each study contributes to scientific progress. On the other hand, with a focus on research oriented towards new technology and methodologies, universities, research institutions, third-party organizations, and other entities are encouraged to connect information and engage in interdisciplinary collaboration to stimulate innovations in governance models.

(3) Promoting digitalization to help build community capacity and expand participation methods.

Various departments and organizations fully utilize digital platforms and media to gather timely feedback from community residents and convey it to the relevant governance bodies. This approach reduces information communication barriers caused by the traditional community organizational system's time and space constraints, resulting in an efficient interaction mechanism. Through the creation of a live online participation environment

and offline activities, community organizations and residents can enhance their knowledge and governance skills. This in turn boosts the competitiveness of community members and improves their ability to engage in community affairs.

(4) Maintaining the balance of interests under the market mechanism.
The British government has established a cooperative mechanism to coordinate real estate enterprises and digital business organizations, reflecting a commitment to safeguarding interests and guiding enterprises toward social responsibility. By strategically utilizing digital technology, companies can bring about smarter transformations and renewals of public spaces within the community. While addressing the community's needs and pursuing comprehensive benefits, they establish a diversified, mutually beneficial economic environment for various groups.

5.2 Implications for Community Governance in China
In the context of the global shift into the digital age and the promotion of governance reforms, coupled with China's own development of community governance, attention should be directed toward the following aspects:

(1) Accelerating the construction of information and communications technology and establishing a digital participation system for multiple stakeholders.

(2) Promoting the design of a digital governance system and enhancing the articulation mechanism between top-down administrative entities and bottom-up community autonomy.

(3) Actively conducting interdisciplinary research and practical initiatives to optimize the new paradigm of professionalized community service provision.

Overall, digital place-making has transformed the way people engage with others and participate in community affairs. However, digital technology alone cannot fully support community governance. We must not lose sight of our value judgements and humanistic concerns, and we should be cautious of the negative impacts of gentrification. As a pathway to community governance, digital place-making helps communities connect with their residents, fostering inclusive public spheres where individuals feel a sense of belonging. Innovations in governance methods contribute to the stability and progress of both the community and the city as a whole.

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Yuan dynasty imperial porcelain "dragon pattern" evolution and design system research

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Abstract

Purpose of the study of the Yuan dynasty imperial porcelain "dragon pattern" evolution of the law, so as to explore its design system of normative requirements, the value of the contemporary porcelain industry. Methods using design management, design art, cultural relics and literature combined with each other, field research methods, through a large number of view of cultural relics and literature, cultural relics against the literature and mutual argumentation and verification. From the history of the Yuan dynasty and the development of porcelain, design system connotation and porcelain production institutions, imperial porcelain "dragon pattern" evolution and design system, analyze the evolution of its Yuan dynasty imperial dragon pattern evolution and characteristics of the "dragon pattern" evolution and design system specification requirements. So as to explore the development law behind things. The results of the dragon pattern, in the yuan dynasty as a representative of the power of political decoration on porcelain, clarify its evolution of the law, so as to explore the evolution of the law of the design system, the historical development of the dragon pattern, the dragon pattern composition, artistic characteristics, etc., from the design of the design system to analyze the evolution of the dragon pattern of the law of the subsequent ceramics of the break and identify the forgery of the generation of a strong basis for a certain amount of research value.

keywords

Yuan Dynasty; imperial porcelain;dragon pattern; design system

Introduction

About the image of the dragon (Figure 1) Northern Song art theorist Guo Ruoxu pointed out that: "the painting of the dragon, folded out of the three stops (from the head to the neck, the neck to the waist, the waist to the tail, too), divided into nine like (horns like a deer, the head is like a camel, the eyes are like a ghost, the neck is like a snake, the belly is like a mirage, the scales are like a fish, claws are like an eagle, palm is like a tiger, the ear is like a cow, too). The dragon is a legendary deity, a symbol of the authority of the ancient Chinese feudal emperors. Dragon pattern is one of the classic motifs of Chinese ceramics, dragon pattern appeared very early, as pottery decoration in prehistoric times has begun to use.

The dragon pattern porcelain of Yuan Dynasty even pushed the art of dragon pattern to a higher peak. This study will take the Yuan dynasty imperial porcelain "dragon pattern" as the main body of research, between the systematic organization of the research results in this field, so as to further study the historical and cultural

background of the Yuan dynasty, the production of imperial porcelain dragon pattern, management institutions, varieties of types, as well as the evolution of the imperial porcelain dragon pattern and the design of the system for a comprehensive exposition of further understanding of the aesthetic interest of the Yuan dynasty dragon pattern decorations. Yuan dynasty dragon decorative aesthetic interest, clear dragon decorative pattern development, as well as understanding of the Yuan dynasty different ethnic groups, religious cultural exchanges will play a role in promoting. Finally, by combing the imperial porcelain dragon pattern formation of institutional norms and thus the subsequent development of porcelain industry and the impact. Many scholars have studied the dragon pattern of the Yuan dynasty, and part of the stay in archaeology, cultural identification, historical value of the research aspects of the argument, in this regard, from the design system level to analyze the evolution of the design of the Yuan dynasty "dragon pattern" design, so as to analyze the design thinking, design practice, design management, design changes in the law of change of institutions and historical change has a certain research It has certain research value and significance.



Figure1. Image of a dragon

1 The background of the development of porcelain making in the Yuan Dynasty and the meaning of the design system

Yuan Dynasty is a very important historical stage, Genghis Khan (1162-1227), he unified the chaotic Mongolian steppe, established the Great Mongolian State, perfected and created some basic national systems. , just take the porcelain industry as an example, the Yuan Dynasty government attaches great importance to the Jingdezhen porcelain industry, in Jingdezhen, Jiangxi Province, the establishment of the Fuuliang Porcelain Bureau, the unified management of the Jingdezhen porcelain industry, "the Yuan Dynasty government's initiative, so that the scale of production of Jingdezhen porcelain industry in the Song after the general expansion of the porcelain industry, to the Yuan Dynasty, the porcelain of the social status of porcelain to further enhance the basis of the use of porcelain in the life of the society had become popular, and the philosophy of allegory and the manifestation of the objects constituted two levels of understanding. During the Yuan Dynasty, porcelain production continued at the Jingdezhen kilns, the Magizhou kilns, the Jun kilns, the Huo kilns, the Longquan kilns, and the Dehua kilns. Among them, Jingdezhen kilns in the porcelain production process has made new breakthroughs, first of all, the use of "binary formula" ceramic stone and kaolin method, so that large porcelain firing is quite powerful, firing temperature increased, the object deformation is reduced. Secondly, the firing of blue and red glaze, so that the Chinese painting techniques, especially Chinese painting techniques and porcelain technology with "Chinese style" and "Chinese style" are integrated with each other, so that the underglaze colored porcelain has a new stage of development. Finally, the colored glaze high temperature firing success, thus ending the Yuan Dynasty before the porcelain glaze to imitate the jade-based situation.

System, broadly interpreted, is the norms of human interaction. The word "system" in ancient Chinese has a broader meaning, mostly including rules, guidelines, customs and other meanings. Ancient "design system" is usually manifested in the context of "charts, genealogies, sayings, examinations, archives, objects" and other

embodiments. Xiong Yielding scholars in her theoretical monograph that the study of the design system is the exploration of the "statement", and its ultimate goal is to explore the institutional discourse belonging to the design, such as the ancient emperor's oracles, imperial decrees, edicts, etc. The design system is the most important element in the study of the design of the system. The "design system" is not a single concept or definition, but a group of concepts, which is hidden in the "norms, standards, and principles of creation", and at the same time, the design system is also a state of relationship. From the point of view of design, what we study is the system, in other words, the design system is actually shown through the recognition and inheritance of the psychological value before and after the creation. In the process of unknowingly making things, people will produce a kind of pattern, standard, paradigm and rule called "ritual", which is a kind of recognition and inheritance of people's behavior.

2 Yuan dynasty imperial porcelain "dragon pattern" porcelain production organization

Porcelain used exclusively for the emperor referred to as "imperial porcelain", the study of the Yuan dynasty imperial porcelain "dragon pattern" design system first need to understand the Yuan dynasty porcelain institutions, the Yuan dynasty set up bureaus, hospitals and other specialized agencies, the management of the various trades into the craftsmen of the craftsmen, indicating that there is a set of system in the Yuan dynasty Complete, the division of labor and cooperation of porcelain production institutions.

2.1Yuan dynasty imperial porcelain "dragon pattern" production organization

Yuan dynasty is a period of centralization, the emperor and the government is a top-down relationship, on the one hand, the government to listen to the emperor's instructions and issued to implement, on the other hand, the government to obey the orders and re-allocation of the part belonging to the strict management of this from the Yuan dynasty porcelain industry, the Furuang Porcelain Bureau is the local government to manage the porcelain industry in order to ensure that the production and management of imperial porcelain. However, the production of porcelain needed to be interconnected from the living beliefs of the people at that time and with the preferences of the emperor. Yuan dynasty imperial porcelain production production is very strict, the general palace institutions used by the "Taixi" paragraph, "imperial" inscription, and many Yuan dynasty government agencies used "pivotal" paragraph, "East guard" paragraph, "xiantai public" paragraph and other paragraph inscription characteristics. Yuan dynasty palace production porcelain and official institutions production porcelain, are Yuan dynasty government will be subordinate to the palace painting bureau to its production, based on the pattern of decoration provided by the Furang Porcelain Bureau for its production.

2.2 Yuan dynasty imperial porcelain "dragon pattern" management organization

"Furang porcelain bureau" is the Yuan dynasty in jingdezhen in charge of burning porcelain official institutions, this is the first Chinese history of porcelain industry management institutions, belonging to the will be made of the hospital, the main responsibility is for the court, the aristocracy refining porcelain, the official set up special control of porcelain burning institutions in the local area, indicating that the official porcelain this status of the increasingly rising The importance of the management of the craft products. From the Yuan Dynasty, the government to protect the raw material demand for official porcelain, began to monopolize this high-quality porcelain clay. In addition to the real official kilns, private kilns for the official firing of porcelain, the need for official officers to the official needs of porcelain quality, shape, glaze, decoration and other items conveyed to the private kilns, and supervise the implementation of such requirements. Yuan dynasty in jingdezhen set up floe liang porcelain bureau, is the pottery management of the official color is increasingly strengthened proof, also

shows that jingdezhen in the porcelain industry in the country is increasingly rising for the status of the center. "Pivot House" that is, the Privy Council, is the Yuan dynasty central government in a very important institutions, those in the oval glaze porcelain molded with "Pivot House" characters, can be confirmed for the Yuan dynasty Privy Council with porcelain institutions.

2.3 Yuan Dynasty Imperial Porcelain "Dragon" Painting and Design Organization

Yuan dynasty imperial porcelain "dragon pattern" is an important part of the process of porcelain decoration on porcelain, then you need to figure out those painting institutions and design institutions, in order to create a higher standard of fine porcelain for the emperor's exclusive use. The emperor's personal favorite, the emperor's aesthetic, the emperor's supreme authority will further affect the development of porcelain production!

The Yuan Dynasty did not have the setting of the Academy, only in the Ministry of Works, set up Van image lifting Division, the tube of the Buddha image painting and wood carving, etc.; in the General House of Painting Bureau. Yuan dynasty rulers attached great importance to the artisans and skills, so the Yuan dynasty court painting artisans and design institutions, especially the court painting institutions are very complex, there are affiliated with the Ministry of Painting (Van image lifting division), there are affiliated with the Metropolitan Department of painting bureau, there are affiliated with the painting bureau under the General House of Painting. Can be seen, the yuan dynasty full-time painting institutions system is complete, and painting craftsmen are mainly engaged in the Palace of making affairs, one for the metropolis of the royal building decorative frescoes, paintings and drawings of the Buddha and other architectural decoration projects; the second will be made of the House of paintings into the manufacture of various types of imperial kings used for the imperial apparatus "to describe the color of all kinds of systems" and other apparatus creation activities. On the one hand, the Bureau of Painting and Painting provided the design of the "for the Imperial" ware, "to palm tracing of the color samples", on the other hand, through the decoration of the finished ware to reflect the system of orders, that is, brocade into the text (decoration), in order to declare the function of the forbidden guards.

Yuan dynasty will be made under the painting bureau "for the different kinds of color making" design institutions, its "imperial" ware of ornamentation and color norms, standards, etc. necessarily by the painting bureau "depicting all the colors of the sample system", which is the painting bureau to implement the design system of the imperial ware. Is the design system of the Imperial Ware implemented by the Bureau of Painting. The Furang Magnet Bureau for the "for the Imperial" and the burner will certainly implement a number of "sample system". Therefore, the Fuuliang Magnetic Bureau for the "for the Imperial" firing must follow the painting bureau to describe the "different kinds of hundred colors made of" sample system, that is, the relevant decorations and color specifications embodied in the design system, based on these perspectives to see the design system of the Yuan dynasty imperial porcelain, we are on the painting bureau, the Fuuliang Magnetic Bureau Based on these perspectives on the design system of the Yuan dynasty imperial porcelain, our attention to the Painting Bureau, the Furang Magnet Bureau and other design institutions is necessary.

Comparison of the "History of the Yuan - Hundred officials four" will be made of the court article can be seen, its into the maker should be to the rule of three years (1323) will be made under the jurisdiction of the Bureau of carving wood, drawings counting the material will be the Bureau of painting. More importantly, the literature also embodies two points: First, Beiping Wang Yingtang enshrinement, offering and entertaining the ware according to the emperor Yingtang hierarchy supervised manufacturing; Second, walnut bowls, plates, ivory spoons, chopsticks, nanmu table and all things are required in accordance with the drawings "sample system" re-created for the King of Beiping Yingtang into manufacturing. It can be seen that the will be made into manufacturing "for the Imperial" vessels from the shadow of the Hall and other systems, materials and materials, drawings and

samples, etc. are followed by a series of design systems, so here the "sample system" is the "Porcelain Bureau of Fuuliang "palm firing when followed by the Yuan dynasty imperial porcelain design system.
In summary, the Yuan Dynasty Fuuliang Porcelain Bureau to follow the Bureau of painting "kind of system", such as the Ming and Qing Jingdezhen Imperial Ware Factory to follow the "official", which may be in addition to the Fuuliang Bureau, in addition to other famous kilns at the same time on the porcelain is not seen on the cause of this type of ornamentation.

3 Yuan dynasty imperial porcelain "dragon pattern" evolution of laws and features

Regarding the visual image of the "dragon pattern", it as an iconic symbol, such as by the dragon head, body, dorsal fins, tail, claws, etc., through the ages and unchanged, with relatively fixed characteristics. The "dragon" decoration reflected in the Yuan Dynasty Jingdezhen porcelain, whether from the form of composition, or with the combination of other decorations, there are still some differences. Dragon horns, dragon claws, dragon head of the dragon pattern changes in each period are not the same. This evolution, not only inherited the imperial porcelain decoration combination system and paragraph inscription system, but also inherited the canon, entry, forbidden and other Yuan dynasty "different" decoration of the canon. And these yuan dynasty imperial porcelain on the shape and decoration, must be painting bureau, floe liang porcelain bureau in accordance with a series of design system and into the manufacture of "for the emperor" of the machine.

3.1 Yuan dynasty imperial porcelain "dragon pattern" in the north and south of the kilns in the evolution of porcelain

Yuan Dynasty is an important stage in the development of China's porcelain, starting from the Song Dynasty down to the Ming Dynasty, porcelain kilns in the north and south have a certain influence, the main kilns in the north and south, on the basis of the previous generation, still continue to produce traditional varieties. North to magnetic state kiln, jun kiln as the main representative; South to Longquan kiln, Jingdezhen kiln as the main representative; and the yuan dynasty porcelain "dragon" decoration also appeared in the north and south of the frequency of porcelain kilns on the greatly increased mainly to the white ground black flowers, oval glaze, blue, glaze, red, red glaze, and so on, there is a large number of dragon decorations. Yuan dynasty porcelain vessel type common pots, jugs, bottles, plates, bowls, etc. There are a large number of "dragon pattern" decoration in different parts of the decoration.

3.1.1 Porcelain kilns in the northern region

Magnetic state kiln: ware type to the jar, mainly (see Figure 2), characterized by heavy body, color is richer than the pure white ground black flowers, brown and brown-yellow both, decorated with flowers, figures, dragons and phoenixes, curly grass pattern is more common, and the "dragon pattern" in the ware often to "open light forms". The "dragon pattern" often appears in the "open form" on the artifacts.

magnetostructural kiln (esp. in China)	hallmark	magnetostructural kiln (esp. in China)	hallmark

	Dragon's body: stout Dragon body: fine scale pattern Dorsal:with fins Dragon Claw:Three Claws Limbs:elbow hair is short and plentiful		Dragon's Mouth:slightly open,showing teeth Head: angular slightly upturned Brunette hair: back flow Body: Flutter Scale
decorated pot with dragon pattern Umezawa Memorial Museum, Japan	Head: Open mouth and spit out tongue. Sideburns: flowing back, round eyes	decorated pot with dragon pattern Collection of the Palace Museum,Beijing	

From the above artifacts, the magnetism kiln artifacts "dragon" basic features are: head with horns, bristles, eyes open, open mouth, tongue and teeth, body scales, back fins, dragon claws have three claws and four claws of the points, the overall decorative style is more rugged, the performance of the technique, the first fine brush strokes, the first paintings after the scratch carving two ways of expression.

Jun Kiln: The main type of ware is the large bowl, and there are also jars, plates, basins, bottles, stoves, etc. The moonlight white and sky blue glaze is decorated with purple and red spots. The moon white and sky blue glazes are decorated with purple and red spots, which are the most exquisite in porcelain. The glaze is applied many times, resulting in a heavy glaze layer, and is decorated with appliqués, stacked molding, and other techniques.

Figure2. Characteristics of the "Dragon Pattern" of the Magizhou Kiln

3.1.2 Porcelain kilns in the southern region

Longquan kiln: the type of jade pot spring vase, stacked dragon bowl, four system of flat vase, lotus leaf lid jar, convex dragon plate, double ear three-legged stove, etc., decorative techniques have decorative methods are also very rich, there are carved flowers, printing, applique, relief, brown, red spots decorated with applique is the most common.

From the above Longquan kiln porcelain (Figure 3) can be seen, wares on the "dragon" decorative evolution of the basic features are open mouth and tongue, head horns, body scales, back fins, elbow hair is short and more, the tail has a fish-shaped, Ruyi shape, pointed tail, from the dynamic point of view of the walking dragons, dragons, such as the back of the head.

Jingdezhen kiln: In the Yuan dynasty Jingdezhen kiln, there are official, civilian, reflecting the concept of hierarchy and different life interests. Yuan dynasty in jingdezhen set up floe liang porcelain bureau, porcelain varieties more become richer, to blue and white, glazed red, oval glaze, red glaze, glaze, color, blue and white porcelain and other successive varieties of all appeared "dragon pattern" (Figure 4). In porcelain decorative techniques have painting, gold, hollowing, pile powder, point color, and other techniques. To "dragon pattern" for the decoration of artifacts modeling jars, bottles, bowls, pots, plates, high-footed cups, boxes and other artifacts modeling.

Longquan kiln	hallmark	Longquan kiln	hallmark

 decorated platter with a dragon pattern Topkapi Palace Collection, Turkey	Dragon Head: Horned Sideburns: front flowing Dragon's Mouth: Open Dragon body: scaly Dorsal:with fins Dragon Claw: Three Claws Legs:short and abundant elbow hair Dynamic:the dragon body rolls over	 decorated platter with a dragon pattern Guangdong Provincial Museum	Longkou: showing teeth Top of the head: horned Mane: backward flowing Body: Scaly with two wings Limbs: with elbow hairs short and numerous Dragon claws: four claws Tail: flower and leaf-shaped Dynamic: Flip

blue and white porcelain	hallmark	blue and white porcelain	hallmark
 A Yuan blue and white vase with dragon design and cover	Longkou: Zhangkou Palate: whiskers Dragon's Horn: Deer-shaped Mane: backward flowing Neck: Fine Neck Dragon claws: four claws Dorsal: with fins Dragon body: scaly	 Yuan blue and white dragon design large-mouthed prunus vase	Dragon's Mouth: Open Spit: show your teeth Lower palate: short whiskers Upper Lip: Cocked up Eyes: round Head: Horned Body: Scales Dorsal: with fins Dragon claws: four claws
 Yuan blue and white vases with dragons and elephant ears (pair)	Longkou: Zhangkou Tongue: Spitting Eyes: round and open Head: Horned Dragon claws: four claws Dragon body: scaly Large scale pattern, drawn using the white-out method.	Yuan blue and white jade pot spring vase	Dragon's Mouth: Open Mouth Dew: Tongue Palate: whiskers Head: Antlers Dragon body: scale pattern Dorsal: with fins Eyes: round Dragon claws: four claws Elbow hairs: three

Figure3. Longquan kiln "dragon pattern" features

 Flat vase with dragon design in blue and white	Longkou: Zhangkou Tongue: Spitting Mane: Upward floating Palate: Shubo Dragon Claw: Three Claws Dragon's body: scales grid-like, five elbow hairs.	 Yuan blue and white four-system flat vase	Longkou: Zhangkou Tongue: Spitting Eyes: round and open Head: Horned Palate: whiskers Mane hair: two dragons, one floating in front and one floating in the back Dragon Claw: Three Claws Elbow hairs: four

Through the above Jingdezhen kiln production of dragon artifacts, "dragon pattern" has standardized the evolution of the trend, first of all, the dragon's head features show a small head and thin neck, the dragon's mouth is generally open, spit out the tongue, at the same time the upper jaw is larger, the whiskers have a long and short, the mane of hair fluttering, there is a floating and floating back of the points, the dragon body has scales, scales were fish scale, divided into thick and thin points of the Dragon's The back of the dragon has fins, most of the fins are neatly arranged, the body of the dragon is slightly thicker, the elbow hair or legs have two, three, four, the elbow hair is a wide and long band, the dragon's claws have three, four, five claws, to three claws mostly. In the performance technique there are double hook and solid two kinds of painting method, the dragon's tail is generally long and thin tail, the dragon's body has flame pattern, the form of robust and fierce, cloud travels in all directions, pattern in different certain amount of (Figure 5) the dragon shapes also occurs in a decorative evolution.

Figure4. Characteristics of Jingdezhen kiln "dragon pattern

Decoration of "dragon pattern" on different shapes								

3.2 Yuan dynasty imperial porcelain "dragon pattern" in different parts of the evolution of porcelain

Yuan dynasty imperial porcelain "dragon pattern" of the dragon claw in the number of changes, reflecting the kiln system, the central political power and people's practical status. For this reason the Yuan dynasty

imperial porcelain "dragon pattern" dragon claw protruding changes reflected in the porcelain design system is particularly important.



Figure5. Dragon decoration on different porcelains

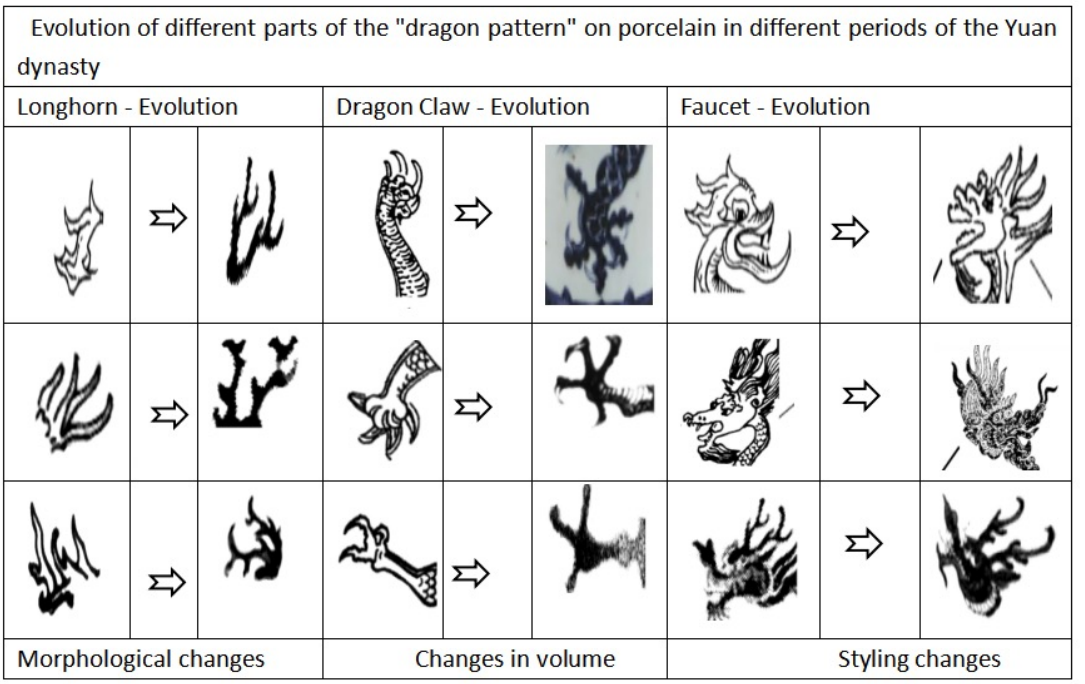

Figure6. Evolution of the dragon pattern with dragon horns, dragon claws and dragon head

This figure can be seen in the Yuan dynasty imperial porcelain dragon pattern evolution in the dragon horn, dragon claw, dragon head in the occurrence of the evolution of the law, the dragon horn of the modeling of some like antlers, some using a double structure, some using heavy color single hook. Dragon head modeling eyes to the mouth and then to the jaw have different style laws, and the dragon claw in its number of changes, there are three claws, four claws, five claws, and for the then Yuan dynasty several claws of the dragon used by different people have a more stringent system specification.

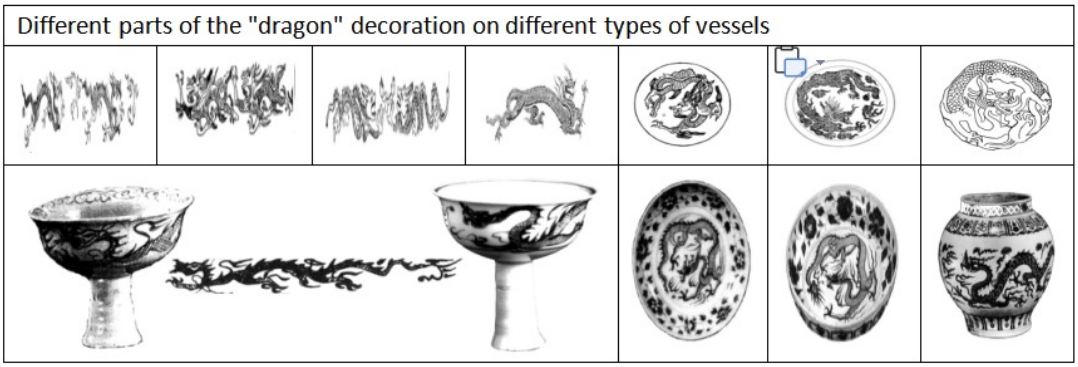

Figure7. Dragon motifs on different porcelains, different parts of the mounted

4 Yuan Dynasty Imperial Porcelain "Dragon Pattern" Evolution and Design System Connection

In the preceding section of the yuan dynasty imperial porcelain style inscription system, decoration combination system of research can be seen, "jade" paragraph high-footed cups, "Taixi" paragraph oval glaze printing plate as the yuan dynasty court porcelain sacrificial vessels, are molded with double-horned five-clawed dragons as the main ornamentation appeared in the cup, plate of the prominent position, both its pattern size, location, form, number system, etc. are reflected in compliance with a certain design specification characteristics. Cup, plate of the prominent position, whether its pattern size, location, form, number of systems, etc. are reflected in compliance with a certain design specification characteristics. Therefore, it is necessary to further proof of the Yuan dynasty imperial porcelain "dragon pattern" is how to follow the design system? Its imperial ware clothing "different" decoration and how to ban? How are the two related?

4.1 Yuan dynasty imperial porcelain "dragon pattern" of the canonical system

Yuan dynasty due to the supremacy of imperial power, so the emperor used the imperial porcelain is also very authoritative and institutionalized, the yuan dynasty has issued the "yuan canon chapter" "to the yuan article frame" "the great yuan through system" "through the system of the article frame" and so on the canon, recorded a lot of ware with the yuan dynasty related to the article frame, forbidden, these about the yuan dynasty all colors of the use of artifacts of paperwork forbidden on the yuan dynasty design institutions into the creation of the imperial ware service to be followed by designing system, at the same time, these rules and prohibitions are also the officials and people of all colors to comply with the law.

4.2 Institutionalization of the use of "dragon motifs" on Yuan dynasty imperial porcelain

"double horns and five-clawed dragon pattern" in the "yuan canonical chapter" refers specifically to the "different" decoration, Mongolians, color people, Han people, South people are prohibited "different" decoration, visible its "imperial" nature is obvious. About the "two horns five-clawed dragon" paperwork ban is also the Yuan dynasty imperial porcelain follow the design specifications, according to the Yuan dynasty imperial porcelain design regulations, can see the "Tong system rules" in two major prohibitions: one is prohibited the use of two horns five-clawed dragon ban, the second is the use of gold with the ban, it can be seen, the "Tong system rules" of the two horns Five-clawed dragon forbidden, artifacts decorated with gold system in the Yuan dynasty has its special meaning, forbidding the order of each of the famous things to recognize, or to five-clawed, or to the

dragon and phoenix, or to the gold and silver, or to the number of systems, there is a way to be "so don't up and down, and Ming, and so Wei also. Therefore, it can be further clarified: double angle five-clawed dragon forbidden about, artifacts decorated with gold system is the Yuan dynasty design institutions into the imperial porcelain to follow the design system. such as Yan You six years, the Empress Dowager Yi decree on the criminal wearing "five claws and two horns of dragons and phoenixes cummerbund and other patterns," the imperial tattoos are still vigilant, specially ordered to be made for the hospital "for the emperor" made when it should be "strictly prohibited to rule with ", further evidence of the yuan government on the double angle five-clawed dragon pattern, dragon and phoenix pattern of the importance of the visible YanYouYi years double angle five-clawed dragon pattern, dragon and phoenix pattern has been clear is the yuan emperor's logo. This shows that the ban from the pattern, number system, color, text and other aspects of the ban about more detailed.

According to the previous section can be seen in the Yuan dynasty imperial porcelain design system is mainly reflected in two aspects: one is the imperial porcelain (sacrificial vessels, stationery) paragraph inscription system, decorative combinations system; the second is to the "general system of Article frame" recorded in the "different" Article frame, "artifacts decorated with gold" prohibited, that is, for the into the Yuan dynasty imperial porcelain follow the design system. Therefore, the implementation of the Yuan dynasty imperial porcelain design system and operation is inseparable from the official design institutions in the Yuan dynasty - Fu Liang Magnet Bureau, Painting Bureau and other institutions. Therefore, clarify the institutional functions of the General Administration of the House and the road gold and jade craftsmen, it is extremely important to understand the characteristics of the design institutions and how to implement the imperial porcelain design system.

Conclutions

The evolution of dragon motifs in different periods of the Yuan Dynasty and the institutional norms show that dragon motifs were originally used as a symbol to show a sense of strict "authority", while the "strict" meaning of the dragon motifs on vessels is fading. The dragon pattern has now become a decorative motif, with free color matching and the ability to decompose its overall form. It also suggests a weakening of the authoritative self-identity.

Porcelain dragon symbols and users of porcelain on the dragon in a sense, is the ancient dragon worship consciousness or say dragon culture in porcelain decorative art. Different porcelain dragon pattern on its symbolism is not exactly the same. Porcelain dragon symbolism is closely related to the user's status and porcelain function. Analyze the dragon pattern porcelain, will be divided into three levels: one is the imperial tribute porcelain, used for the imperial family; two is the offerings of Buddhist temples and Taoist monasteries for the ware; three is the folk life with porcelain utensils. In the hearts of ancient people, the emperor that is the true dragon son of heaven. The advance of the times, the development of civilization, the concept of change, the dragon pattern has a simple to complex, from religious to artistic, from casual to standardized development and the development of a pluralistic process.

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Oriental Whimsy: A Study of Augustus II's Collection of Imitation and Influence on Chinese Ceramics in Germany

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Abstract

The collection and imitation of Chinese ceramics by Augustus II of Germany was a fascinating example of the convergence of art and trade, artefact and taste, and Eastern and Western culture, and of the impact of Chinese ceramics on the world. Augustus II's imitation of Chinese porcelain was the second stage in Europe after the Medici family's imitation of Chinese porcelain, and Meissen ceramics successfully cracked the Chinese porcelain code, the first to develop European hard porcelain, a major milestone in the history of world ceramics, witnessed the contribution of Chinese ceramics to the world. The Meissen Chinoiserie ceramics have become a powerful testimony to the intersection of Eastern and Western cultures. This paper combines documentary sources with physical specimens, and uses pictorial and comparative studies to analyse the means and motivations of Augustus II's collection of Chinese ceramics, to explain his imitation of Chinese ceramics in terms of materials, techniques and decoration, to explore the relationship between the Chinoiserie and Rococo styles of German Meissen ceramics, and to reproduce Chinese ceramics. The history of 18th century Meissen ceramics under the influence of Chinese ceramics.

keywords

Augustus II；Meissen Germany；Chinoiserie；Rococo style；collectible imitation

Introduction

Both Portugal and Spain, as well as Italy, France and the Netherlands, never produced porcelain in the true sense of the word, the so-called hard porcelain, in their early imitations of Chinese porcelain. The heyday of European porcelain was the time when the Europeans really fired hard porcelain. On the one hand, they constantly studied Chinese export porcelain, and on the other hand, according to the various information collected, the Germans were the first to obtain the secret of hard porcelain, thus giving Europe a real sense of porcelain （Jiang Jianxin，2022）. In the early 18th century, Augustus II, in order to improve the porcelain-making capacity of the Meissen porcelain factory, collected a large number of Chinese ceramics, and in his eyes Chinese ceramics, as a luxury product of the great Eastern powers, not only represented wealth and affluence, but also showed a ruler's knowledge of foreign countries and their products.

Although Augustus's Chinese porcelain collecting programme had been underway earlier, it was only in 1714 that a system of porcelain collecting began to be established using records, and a palace inventory in the National Art Collection in Dresden details all the objects furnished in Augustus II's Dutch palace, showing that by 1727 Augustus II had nearly 25,000 pieces of East Asian porcelain （Doenges Willy， 2016）. The number on the inventory helps to identify the items in the palace inventory, and the number is usually inscribed or painted on the porcelain base. The unique association between these porcelains and the inventory helps to date the wares

and prove their provenance, information that not only provides insight into Augustus' collecting principles but also provides important data for the study of the 'Chinoiserie' of Meissen ceramics. This paper builds on this data to further investigate the collection and imitation of Chinese ceramics by Augustus II and the relationship between the 'Chinoiserie' and Rococo styles of Meissen ceramics.

Augustus II's collection of Chinese ceramics

Augustus the Strong II (1670-1733) (fig.1), Elector of Saxony and King of Poland, was obsessed with Chinese porcelain and in 1717 he exchanged 600 ‘Saxon dragoons’ for 151 pieces of Prussian blue and white porcelain. In 1717 he traded 600 'Saxon dragoon' soldiers for 151 pieces of Chinese blue and white porcelain belonging to Friedrich Wilhelm I, the King of Prussia. Such was the fervour that Augustus II's porcelain collection amounted to 35,798 pieces（Jiang Jianxin，2022）, all of which were collected in his Japanese palace, about half of which came from China and Japan, while the Chinese porcelain was mainly Jingdezhen, Dehua white porcelain and Yixing zisha pottery from the late Ming to early Qing dynasties.



Figure1. Augustus II

When Augustus II bought the Dutch palace (now known as the 'Japanese Palace') in 1717 with the intention of making it a porcelain palace, there was a long history of using special palaces to display East Asian porcelain in European courts. Amalia of Solms-Braunfels, the Prince Consort of Orange, was a pioneer of this fashion, using porcelain to decorate the halls of Huis ten Bosch palace around 1634, making it the first palace in Europe to be decorated exclusively with porcelain （Ruth Sonja Simonis，2020）, and later the European royal family began to popularise the aesthetic fashion of decorating palaces with oriental elements. The aesthetic fashion of decorating palaces with oriental elements began to take hold. It is likely that Augustus II was impressed by such lavishly decorated palaces when he came into contact with royal courts across Europe during his travels from 1687 to 1689, and as a member of the Wettin dynasty, he grew up knowing that he was a member of one of the oldest noble families in Europe, and was therefore aware of the importance of showing off his wealth and wealth through the display of exotic and rare He grew up knowing that he was a member of one of the oldest noble families in Europe and was therefore aware of the importance of demonstrating his wealth and power through the display of exotic and rare art. The expansion of Augustus II's horizons and the formation of his values during his teenage travels contributed to his fascination with Chinese porcelain and Oriental culture. In addition, in 1709 he visited the porcelain palaces of Oranienburg, Caputh and Charlottenburg, all of which impressed Augustus the Strong and inspired him to have a desire to build a porcelain palace to match, or even more majestically He had a desire to build a porcelain palace to rival, or even more majestic than, the one in Charlottenburg. It was not until 1717 that Augustus acquired the Dutch palace in the new town of Dresden on the north bank of the Elbe from Field Marshal Heinrich Jacob von Flemming, and it became the place where Augustus kept his East Asian porcelain and Meissen porcelain.

By the time Augustus became Elector of Saxony in 1694, Chinese porcelain had been present at the Saxon court for over a century, first originating as a gift from Ferdinando I de' Medici, Duke of Tuscany, in 1590, who gave at least 14 pieces to Christian I of Saxony (Christian I) of Saxony, eight of which have been preserved to this day （Elisabeth Schwarm, Japanisches Palais zu Dresden，2014）.They are small objects-Chinese porcelain dishes of

various shapes and decorative effects. Considering the long history of porcelain's presence at the Saxon court, the question arises as to when Augustus II the Strong began systematically buying porcelain to build up his collection. The “Schatullenrechnungen”(box invoices) are an important resource for investigating the private expenditures of Augustus the Strong, and these invoices, which record the funds for art acquisitions, were mainly managed by Georg Peter Steinhäuser, President of the Privy Council managed. As only invoices from 1705-1718 still exist, it is difficult to make a comprehensive assessment of art expenditure before or after this time period. However, some valuable information can be found in these invoices, such as the acquisition of 'valuables, fashionable accessories and porcelain' for 3734 silver coins (Reichstaler) in 1705（Elisabeth Schwarm, Japanisches Palais zu Dresden，2014）. Augustus the Strong consumed a large amount of money in 1705 for his expensive porcelain collection. Ruth Sonja Simonis, a researcher at the Dresden Porcelain Collection, argues that 'from around 1700 Augustus II began to buy Chinese porcelain in large quantities from various sources'（Ruth Sonja Simonis，2020）. The date around 1700 is plausible in the light of Augustus's 'box invoices'.

In 1716, shortly before Augustus acquired the Dutch palace, Peter Robert Taparelli, Count of Ragnarsko, an Italian officer, was sent to Amsterdam and The Hague to find and buy porcelain from private dealers. Over the next two years, nearly 2,000 pieces of porcelain were purchased with the help of local dealers and shipped to Dresden. The documents of these purchases, which still exist today, date from 1716 to 1718 and consist mainly of letters, invoices and shipping documents relating to the purchase of porcelain by Count Ragnarsko for Augustus. The letters reflect the types of porcelain the king wanted and the plans he made to acquire the rarest and most valuable items. There was a sudden surge in his ceramic collection during this period（Samuel Wittwer，2004）and although plans to decorate the palace with porcelain may have motivated the sudden increase in acquisitions, it was clearly not the only reason for Augustus' large expenditure. Improving the porcelain-making capacity of the Meissen porcelain factory to emulate or even surpass Chinese porcelain can be seen as another factor in stimulating Augustus' demand for Chinese porcelain. This is confirmed by a letter sent to Augustus by Ragnarsko: ‘I have found eight pieces of fine porcelain which will exercise Meissen's ability to imitate and create'（Ruth Sonja Simonis. 2020）. It is thus clear that Augustus II collected Chinese porcelain in the hope that the potters at Meissen would improve their own porcelain-making skills by imitating Chinese porcelain. There is no doubt that Augustus II's relentless purchase of Chinese porcelain laid an important foundation for the early development of the Meissen porcelain factory and the formation of a ‘Chinese style' in Meissen ceramics, thanks to Augustus's fervent obsession with Chinese porcelain.

Augustus II's imitation of Chinese ceramics

Porcelain from China was highly sought after in 18th century Europe as a rare and exotic luxury item. Augustus's rich and varied ceramic collection provided an important source of inspiration for the young Meissen porcelain factory. Some of these ceramic models were precisely reproduced by Meissen, while others inspired modellers and painters to create freer interpretations. Augustus wanted Böttger's stoneware and porcelain products to emulate not only Chinese and Japanese models of form and decoration, but also to be designed according to popular (baroque) taste. As a result, Meissen's fusion of exotic oriental elements with late Baroque European decorative styles led to the emergence of Chinoiseries. The Chinoiseries are not entirely Chinese, but a European style that incorporates Chinese culture.

From experiment to profession: Augustus II's imitation of Chinese ceramic materials and techniques

During the reign of Augustus II, no effort was spared in purchasing Chinese porcelain. Although Saxony had rich deposits of silver and the Elector's coffers were very full, the cost of pomp and circumstance was still high.

Augustus II, in an attempt to circumvent the economic imbalance caused by the high price of imported Chinese porcelain, like many European rulers of the time, bet on the alchemists to succeed in deciphering the mysteries of porcelain. To this end, he summoned the young alchemist Johann Friedrich Böttger to Dresden in 1702. With the assistance of the mathematician and physicist Ehrenfried Walther von Tschirnhaus, Böttger systematically studied the relationship between the various materials and carried out a series of tests on the firing properties of Saxon clay. Finally, in November 1707, after many years of experimentation, Böttger succeeded in producing red-brown stoneware (Böttger porzellan), a material that is somewhere between earthenware and porcelain. Although stoneware is not really porcelain, the mastery of the process meant that Böttger had already mastered the technology needed to produce white porcelain and only had to replace the red clay with white kaolin to find the final piece of the porcelain jigsaw.On 6 June 1710, Augustus the Great established the Meissen porcelain factory.

Meissen's fine stoneware was easy to mould and was suitable not only for tableware but also for portrait work. Initially, modellers explored the potential of this new material by taking moulds from Chinese and European ceramic models, and in 1713 Augustus asked Meissen to produce a chess set of red stoneware and white porcelain, with a red group of figures of the German army and white figures of the Roman army. Fig.2 This small statue, commissioned by the king and made by the Meissen potter Kittel d.Ä.George, is 10.9 cm high, 6.3 cm wide and 4.7 cm deep, and depicts King Augustus following the pattern of portraits of rulers popular around 1700. Although Bottger again promised the king a chess piece in ceramic in 1715, the remaining pieces were ultimately not completed. In terms of its material properties, Bottger stoneware is comparable to Chinese stoneware, with a dense, hard, high-temperature firing and a surface that glows like a precious stone. It is easy to see that the effect of the red stoneware developed by Boettiger is derived from the effect of the Chinese Yixing zisha ware, which Augustus collected and had Boettiger imitate. The stoneware developed by Meissen in 1707 was not influenced by pottery from other European countries, but was a direct copy of Yixing Zisha pottery.

In 1713, the Meissen factory began mass production of white porcelain, which soon surpassed stoneware in popularity with buyers. As the development of glazes and painting colours was still at a bottleneck at this time, the initial white porcelain, like stoneware, was dominated by relief and piled decoration techniques. However, since the creation of Meissen's white porcelain, the king was ambitious to make the porcelain colourful, and most of the white porcelain fired between 1712 and 1715 was decorated in gold or silver (figs. 3-4), and as the formula for Chinese colourful porcelain and colour glazes had not yet been developed for this period, under the influence of Chinese enamelled porcelain Meissen had the fired porcelain tires made by a goldsmith and used the enamelling process to colour them, and it is conceivable that this decoration was somewhat more beautiful at the time than we see it today, as unlike gold, silver reacts with the surrounding



Figure2. Augustus II stoneware (front and side)

air, causing the thin layer of silver metal to turn black. These are the products of early experiments in the development of Meissen colours.

The rich use of colour in Meissen ceramics is due to Johann Gregorius Höroldt, who came to Meissen from Vienna in the 1920s, about a year after the death of Bottger, and was appointed chief decorator of the Meissen porcelain factory in 1720, commissioned by the factory committee to develop new colour formulas for glaze painting. During his tenure he not only improved the quality of Meissen's porcelain tiles, but also succeeded in developing



Figure3. Gold coloured cup and saucer



Figure4. Silver coloured cup and saucer



Figure5. A white porcelain jug tube with a yellow ground



Figure6. A turquoise ground vase

stable underglaze cobalt blue and underglaze copper red as well as many overglaze colours such as crimson, vermilion, green, yellow and purple. by 1731 the Meissen porcelain factory could already produce different overglaze colours to enrich the white porcelain effect （Huang Zhongjie， 2012）. The principle of decorating white porcelain with a coloured ground comes from Chinese porcelain, where the colour ground is brushed to reflect the fine patterns in the open composition on the white porcelain tyre. Whether it is turquoise, blue, yellow, green, purple or peach, Holroyd has tried to use it as a base colour for decoration. A characteristic feature of this white porcelain jug cylinder on a yellow ground, fig. 5, is its bright yellow background. As early as 1723, Holroyd succeeded in developing a yellow pigment that could be applied flat to the glazed foil. The turquoise background

of the vase in Fig. 6 was inspired by Chinese grey-green glazed porcelain, a colour developed by Holroyd at Meissen in 1726, and the turquoise colour is also known as sea green, and the colourful figures and landscape motifs in the vase are an imitation to Chinese porcelain. Remarkably, the Meissen porcelain factory still carefully preserves each of the colour recipes developed by Holroyd to this day, and the Meissen Porcelain Museum displays some of the colours for viewing (fig. 7).

Celadon porcelain from China dominated the European market in the 17th and 18th centuries. It is therefore not surprising that Augustus the Great pressed for Meissen to fire a beautiful underglaze cobalt blue pattern. However, this proved to be technically challenging. Bottger made various attempts, such as applying pigments to already fired pottery, but the unglazed surface of the pottery was rough and porous, which would have made painting difficult. There was also a risk of the porcelain tyre breaking when it was subjected to a second firing at around 1,300 degrees centigrade. As a result, the results of Meissen's blue and white porcelain firing were inconsistent at first; sometimes the blue and white design was well defined and a rich, dark blue, while in other cases it appeared pale and blurred, or the body cracked and the colour flowed over the shards. Although Meissen introduced underglaze blue and white porcelain as early as 1717, it was not until 1733 that he was able to consistently fire lustrous blue and white designs.However, as early as the 1720s, Meissen was supplying the king with the vessels and porcelain sculptures he requested with blue and white decoration, and it was this repeated experimentation and imitation that led to Meissen's maturation of the art of blue and white porcelain.



Figure7. The colour storage room at the Meissen porcelain factory

Around 1730, Rodolphe Lemaire, a Parisian merchant, ordered a large number of copies of Chinese and Japanese porcelain from Meissen. The improved porcelain making in Meissen at this time made it possible to confuse imitations of East Asian porcelain with the real thing, which gave him a business idea: to resell Meissen's copies as East Asian originals in France for a huge profit. With the support of the Saxon Minister of the Interior, von Hoym, he secured an exclusive contract with the Meissen porcelain factory, and between 1729 and 1731 Meissen supplied Le Maire with thousands of copies of East Asian porcelain. At first, the copies produced by Meissen were not specifically marked. When Augustus the Strong explicitly demanded that all Meissen porcelain from now on be stamped with the exclusive crossed swords mark, the potters behind the scenes at Hoym and Lemaire painted them in enamelled blue in thin lines on the glaze (fig. 8), rather than the customary underglaze in lapidary colours (fig. 9). In this way, the Meissen brand mark could be polished off again after leaving the factory. Indeed, the best connoisseurs of French ceramics were initially fooled by these forgeries. When this was revealed, the fraud was put to an end by the powerful Augustus in 1731, and Hoym and Lemaire were arrested and a commission of inquiry set up. The porcelain left in Saxony was confiscated and incorporated into the royal collection （Femke Diercks In Cooperation with the Rijksmuseum Provenance Team，2022）. Many porcelains in the East Asian style with enamelled blue crossed swords and palace numbers painted on the bottom can still be seen in Dresden today. At the time, this anecdote of imitation and forgery brought great recognition to the young Meissen porcelain manufactory and helped it to make a breakthrough in Paris, the main European market for luxury goods. It is thus clear that the initial imitation of Chinese ceramic materials and techniques by the Meissen porcelain manufactory led to a rapid improvement in the quality of the ceramics and laid an important foundation for the subsequent branding of ceramics with



Figure8. Enamelled blue crossed swords symbol



Figure9. The blue and white crossed swords logo

elegant design and royalty.

Imagining a distant land: Augustus II's imitation of Chinese ceramic forms and decoration

Reproduction of ceramic forms

In the early days of the Meissen porcelain factory, Augustus urged Meissen to reproduce the Chinese ceramic statues in stoneware and porcelain. A direct comparison with the originals would have verified the pressing question of whether Meissen could match Chinese ceramics in terms of material workmanship, and at the time, comparing Meissen ceramics with the products of the best porcelain-making countries would certainly have tested the quality of its own products. In addition, the fact that model ceramics were much more difficult to shape than everyday wares provided better evidence of Meissen's maturity and mastery of the properties of the clay. Thus, Augustus the Strong took the Chinese model of the statue in fig.10 out of the vault with the rest of the Chinese porcelain and brought it to Boettiger in November 1709, shortly before the factory was established, so that he could cast and turn it in plaster （Femke Diercks In Cooperation with the Rijksmuseum Provenance Team，2022）. Bottger initially produced the Guanyin stoneware in imitation of the Yixing zisha pottery effect, and later also produced white porcelain in the same form (fig. 11).



Figure10. Guanyin stoneware



Figure11. Guanyin white stoneware

This Guanyin stoneware vessel, one of the first models from the Meissen porcelain factory, is 37.3 cm high, 11.3 cm wide and 10.1 cm deep. The Meissen reproduction is somewhat smaller than the original because of the loss of moisture during firing. She became one of the most popular saviours in the Chinese Buddhist faith. Her name means ‘the voice that perceives the world'. Her restrained posture, with her eyes downcast, her hands folded and her feet on auspicious clouds, exudes calmness and goodness. Europeans are fond of the Chinese Goddess of Mercy, whose loving and sacred form has led them to associate the image of the Virgin with her. Although the religious beliefs of the two are different, there are similarities

in the feelings conveyed to the viewer by the artistic images, and from this one can sense the convergence of Eastern and Western cultures, where art knows no borders.

As well as imitating the Chinese Buddhist image of Guanyin, the Meissen porcelain factory also made an imitation of the image of the cloth-bagged monk. This large-bellied, smiling monk in loose monk's clothing was worshipped in Chinese folk belief as a god of good fortune （Willy Doenges，1907）. In the inventory of the Royal Collection, the ceramic statue of Meissen Bubu is described as a 'pagoda, used for offering incense'. In the language of the time, 'pagoda' referred both to the 'pagan' temples of China and India and to the 'deities' worshipped there. Meissen produced the statue with a hollowed-out interior, the intention being to facilitate firing and also to add the function of incense burning to the religious ritual of the Buddha's incense spilling out of the open mouth of the cloth-bagged monk. In the early years of the Meissen porcelain factory, the cloth-bagged monk figures were made in stoneware and porcelain respectively (figs. 12-fig. 13), and although both figures are modelled after similar Chinese ceramic forms, there are some variations in the reproduction. On the one hand, the sculptural detail on the figure's abdomen and the rich folds on the robe reveal a paradigm of European artistic representation. On the other hand, the figure is recorded in inventories of the period as having an 'open mouth', which was considered by Europeans to indicate an uncontrolled person（Cassidy Geiger, Maureen，1996）. It is clear from this that the Europeans, not understanding Chinese Zen Buddhist culture, misinterpreted the laughing Maitreya Buddha as an open-mouthed monk who could not control himself. However, this did not detract from the high popularity that the Maesen cloth-bagged monk ceramics enjoyed for a period of up to twenty years. According to reports of Meissen's work from 1722-1728, Meissen made more than1,600 ceramic statues of the same kind in this period alone（Kohler Robert，2008）.



Figure12. Bougainvillea stoneware



Figure13. Bougainvillea white stoneware

After more than twenty years of imitation and study of Chinese porcelain sculpture, Meissen ushered in the period of large-scale sculpture in the 1730s. This period is known for its numerous large sculptures in the baroque style, a transformation triggered by Augustus' orders to fill the Japanese palace in Dresden. between 1730 and 1736, the modellers Johann Gottlieb Kirchner and Johann Joachim Kaendler created a large number of simulated ceramic animal sculptures, which are the same size as real animals. To study the forms of these animals, Kirchner and Kaendler either copied Augustus' art collection or travelled to the sanctuary of Moritzburg to sketch them, and the only knowledge of exotic animals such as elephants and rhinoceroses came either from word of mouth or from paintings. Their bizarre forms, which can be seen today at the entrance to the Meissen Porcelain Museum, are the result of the creativity of Kirchner and Kendler, whose realism and accuracy in modelling is unparalleled. To this day, the emergence of replica-sized ceramic animal sculptures from the flames of the furnace remains a breathtaking event. It is undoubtedly due to Meissen's initial reproduction of Chinese model ceramics that he was able to develop his own skills on the one hand, and his own artistic expression and vision on the other, before he was able to complete these large ceramic sculptures and embark on his own creative journey.

Imitation of the five-colour porcelain decoration, colour and composition

Chinoiserie reflected the image of life in the Far East constructed by Europeans, stimulated by imported luxury goods and travellers' travelogues, who imagined it as a life of leisure, harmony and abundance, and who saw distant China as a country of plenty. On the one hand, the European ‘Chinoiserie' of the 18th century inevitably had certain common features, as it stemmed from the attempts of imitators to replicate the striking oriental world portrayed in Chinese ceramics, lacquer and silk. On the other hand, due to differences in regional culture and artistic level, the ‘Chinoiserie' represented by the Europeans differed considerably from the originals, for

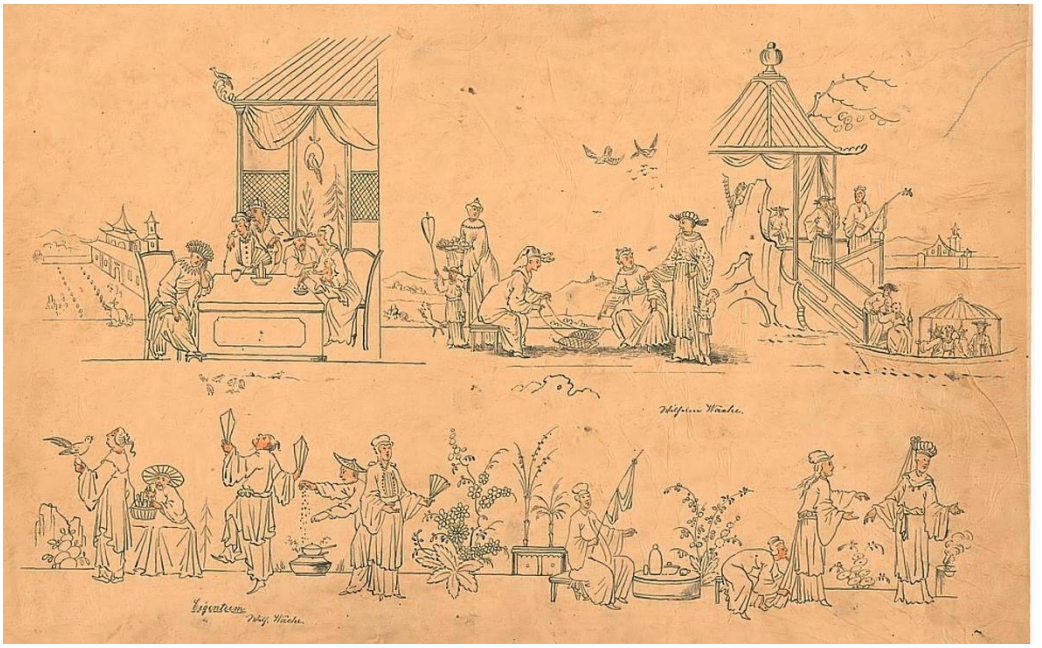

Figure14. A page from the Maxon Holroyd Chinoiserie Atlas

example, the Chinese ceramic decorative compositions used the scattered perspective of Chinese painting, which was not understood by the artists of Meissen before the arrival of Holroyd, who were adept at using focal perspective in two dimensions representing three-dimensional space. Thus, in imitating pictorial Oriental scenes, the decorator reduced them to characteristic formulas of haphazard scaling and orderly placement. The pavilion-like buildings are drawn out of proportion to the figures, the animal figures are out of proportion and the individual figures are placed randomly.

After joining Meissen, Holroyd imitated Chinese porcelain decoration and adapted it to European tastes, guiding other painters to adapt the decorative motifs on Chinese porcelain from the Augustus Collection to create Chinoiserie with a European twist. With his rich vision of painting, his love of painting and his diligence, Holroyd was known throughout Europe for the hundreds of fine Chinoiserie paintings he created under his skilled hands. Before decorating the ceramics, Holroyd sketched in sketches, which included plants, birds and other animals, figures in exotic costumes and more. Thousands of Höroldt's valuable designs are included in the I modelli di Meissen per le cineserie Höroldt (Meissen Höroldt Chinoiserie Patterns), a collection of drawings that can be regarded as an important testimony to European porcelain painting（Cassidy Geiger, Maureen，1996）. Höroldt's decoration of Meissen ceramics shows Europeans imagining everyday scenes in distant China: well-dressed people playing the qin and playing music, drinking tea with good friends, busy training birds and

animals, buying goods in the marketplace, etc. (fig. 14).

Chinese porcelain provides Maxon with a decorative vocabulary from which Maxon's decorators select and reorganise patterns to express them in an innovative form. This form is a combination of Chinese and European elements, and underglaze and overglaze painting. An example is the wine glass with lid (fig. 15), produced by Meissen in 1725, which is 22.5 cm high and 15.7 cm in diameter. This ornate wine cup consists of a metal lid and a porcelain cup with a white porcelain body depicting a number of figures playing by a pond. The decoration and technique suggest that the design is derived from the 'Famille verte' ('green series') porcelain （Gordon Campbell，2006） of the late 17th and early 18th centuries in China, i.e. the colourful porcelain. Translucent green enamels dominate the scene, together with alum red, yellow, blue and black. The base and rim of the cup are decorated with two continuous bifurcated borders to enrich the scene. The botanical design incised on the gilded lid echoes the similar design in the painted band around the decorative border of the mouth. The decorative border on the mouth of the cup is not only large, but also rich in design and colour, incorporating coloured four-petalled flowers in a diamond pattern, overlaid with a C-shaped leafy curl pattern. The double-line borders of these motifs are painted internally in an underglaze cobalt blue, suggesting that the position and size of this border must have been determined prior to the firing of the overglaze designs. The interplay between the underglaze blue and the overglaze gold shows exceptional delicacy and luxury, which seems to suggest that Meissen intended from the outset to fire a special piece, rather than just a piece for everyday use. The large size of the glass further confirms this hypothesis, based on the fact that the Cana wedding seal depicted in the centre of the lid suggests that the glass may have been made specifically as a gift to celebrate a wedding.



Figure15. Wine glass with lid

The Chinoiserie scene on white tyres is composed in a scroll-like manner, with a large lotus leaf dividing the scroll into three scenes. Accompanied by the gaze of the pair in fig. 15-1, it is easy to see that the focus of the scene appears within the frame on the right. fig. 15-2



Figure15-1. Painted wine glass design



Figure15-2. Painted wine glass design



Figure15-3. Painted wine glass design

depicts the mischievous child standing on a giant snail, holding a red tassel in a playful manner. To the left of the child is presumably his father, with his left hand raised to prevent the child from falling and his right hand holding a paper kite like toy. Figure 15-3 is more playful, depicting a snail perched on a lotus leaf and a man standing on one leg on the stem of a lotus leaf holding a plume in his hand trying to touch the plume on the hat of a man sitting on the bent leaf stem. The combination of lotus leaves, lotus flowers, children, elders and snails creates a fantastical scene of playfulness in a pond. On the whole, Meissen's painter clearly imitates the shapes and colours of Chinese porcelain decoration, using lines of varying thickness to show the texture of different objects; dots within the closed lines to show variations in light and darkness; and the colouring follows the rule of 'colour according to type'. The imitation of colour and form is relatively simple, but the strong lines of Chinese porcelain painting are not achieved overnight, so the lines painted by Meissen are uneven in thickness, and the 'dots' in the design are inconsistent, and not applied with a central stroke, making them seem very random. It is clear from this example that Meissen's decoration of Chinese porcelain is not an exact replica, but rather incorporates traditional Western motifs, uses open-light compositions, and cleverly uses underglaze blue and white with vibrant overglaze colours, combining porcelain-making and gilding techniques to create a 'Chinese style' that is pleasing to the European viewer.

The influence of Meissen ceramics' "Chinoiserie" on the Rococo style

The Rococo movement was born in France as a counter to the baroque style represented by Louis XIV's Versailles palace, and gradually the movement became associated with the powerful Madame de Pompidou, mistress of the new King Louis XV （Susie Hodge，2018）. Rococo art is characterised by soft colours, curving lines and natural, relaxed themes. The imitation of Chinese ceramics by Meissen ceramics accelerated the spread of Chinese ceramics and contributed to the formation of the Meissen "Chinoiserie" in Germany, which played an important role in the development and flourishing of the Rococo style in Germany.

The fit between the material qualities of ceramics and the Rococo style

Unlike the structure and order found in human society, porcelain is adept at expressing the freedom, lightness and elegance of form, personifying a rhythm that contradicts its nature （Kimball Fiske，1943）This Rococo quality exuded by porcelain allows one to understand Semper GottfriedSempers' view that "the Rococo style owes its origin to porcelain ..... The Rococo style was brought to France from Dresden, and the decisive factor in the formation of the Rococo style owes its origin to the early porcelain style of Meissen." （Gottfried Semper，2014） This absolute view is patently fallacious, yet there is a convincing fact in its argument that the Rococo style coincides with the characteristics of Meissen's early porcelain. For an art as elegant, serene, light and full of decorative beauty as the Rococo. The wonderful consistency between material and style makes the Rococo style seem to have been created specifically for porcelain, giving the early porcelain pieces created by Meissen a whimsical and artistically compelling quality. Jacob von Falke, a German-Austrian cultural and art historian, said of Chinese porcelain: “Essentially, the Chinese art form is also Rococo.” （Jacob von Falke，1883）It is clear that Falke's statement is based on the lavish handicrafts sold to Europe during the Ming and Qing dynasties in China. The European Rococo style was a courtly art form, and the exquisite Chinese ceramics sold to Europe during the Ming and Qing dynasties also had a courtly tone, and the porcelain created and fired in Europe in the 18th century in imitation of China naturally belonged to the courtly art. The Rococo style coincided with the artistic characteristics of Chinese export porcelain.

To this day, almost every home, East or West, has ceramic tableware or furnishings, and the popularity of the porcelain-making process has not hindered the artistic appeal of ceramic products, an appeal that no other

material can match. A master etching, or even a good photograph, needs to be printed on fine paper if it is to have any artistic value. This is not the case with porcelain, and one does not need to stand in front of the work of Meissen or other reputable porcelain factories to realise the fascination that this material exudes （Doenges Willy，2016）. Even ceramics made from lesser porcelain materials can be made to exude artistic charm through careful design of form and decoration, making us marvel that this highly expressive art was made from natural mineral materials. The Zhouli-Kaogongji (The Rites of the Zhou) states that the rule of design is that 'materials have beauty'（Zhou Gongdan，2022）and that knowing the properties of materials is the only way to produce good work. As there are no straight lines in nature, ceramics made from natural materials are naturally suited to rounded forms.

Maxon ceramics contribute to the German Rococo style

Around 1720 was both the time of the rise of Meissen Chinoiserie ceramics and a watershed between the Baroque and Rococo styles（Francesco Morena，2009）. The influence of Chinese porcelain on naturalistic subjects such as flowers and animals should not be underestimated, especially as Augustus the Great asked the Meissen porcelain factory to produce naturalistic ceramics for the hunting lodge, and the influence of the East is evident in the decoration of Meissen ceramics, culminating in the Holroyd porcelain paintings and the Candler animal porcelain figures（Klaus Karl, Victoria Charles，2020.Hunting was an important event in the Saxon court year, and in 1722 hunting-themed ceramics were included in the task list of the Meissen porcelain factory, where ceramic vessels decorated with hunting motifs and porcelain figurines of animal figures were used to decorate Augustus the Great's hunting lodge. Fig.16 Painted teapot depicting a figurative hunting scene with a natural landscape. From the late 18th century onwards, Meissen moved away from these dramatic hunting themes to focus on wild animals and birds, depicting them in their natural habitat in rich colours, thus representing the natural idyll of the forest. Since then, these nature-themed ceramic vessels have become an essential element of the table. In addition to these pictorial representations of natural themes, hunting themes continue to play an important role in Meissen's design vocabulary today. A striking example of Meissen's enduring passion for hunting is the modern hunting-patterned candlesticks by Jorg Danielczyk, which were launched in 2004.

As early as 1713, Meissen's work at this time was unpainted, having been inspired by the incised flowers in Chinese ceramics and decorated with embellished flowers on the newly invented white porcelain (fig. 17). The vase's abdomen is edged by two parallel rows of laurel leaves above and below, between which the surface is covered by a highly delicate and sinuous arrangement of vine tendrils and fruitful flowers. The Meissen porcelain workers did not use the same incised technique, but rather decorated it in a piled-up manner. The change in decoration implies two things: firstly, that the incising process was undoubtedly difficult for the Meissen porcelain workers, who were not yet mature enough to master the clay; and secondly, that it was easier to create a three-dimensional effect by using a pointed instrument to apply the decoration to the porcelain. Although the two decorative techniques are different, the subjects are both flowers, fruit, butterflies and other naturalistic themes. This type was actually a precursor to the rococo floral motif of Meissen in 1739, who set a new aesthetic and technical benchmark for porcelain design with the Snowball Blossom in just 30 years, opening the way for all other European porcelain manufacturers（Oliver Impey，1977）. After the death of Augustus II in 1733, although Meissen's Chinoiserie designs came to an end, the subsequent Rococo style products are clearly closely related to Chinoiserie ceramics. Thinking about the continuation of this theme in Meissen ceramics, it is easy to think that the luxurious European style promoted by the French royal family was profoundly influenced by the Chinoiserie, and that Meissen ceramics of the period were the material vehicle for this aesthetic influence.

From the 1720s to the 1750s there was a proliferation of porcelain factories on the European continent. The



Figure16. Painted teapot with decorative details



Figure17. Vase and decorative details

reputation of the Meissen porcelain manufactory had reached its zenith due to the increasing quality and artistry of its ceramic production at this time. To other ceramic producers, Meissen ceramics stood for excellence and beauty, and its products were copied by almost every porcelain factory on the European continent at the time （Maria Gordon Smith，2000）. This phase of Meissen was most exemplary and influential with the work of the two decorators, Holroyd and Candler, whose Chinoiserie ceramics featured Oriental fantasy scenes that were not only influenced by Chinese art, but also absorbed the spirit of Rococo art, as is evident from the Jean Bérain-style curling pattern painted on the wine glass in Figure 15. The Bérain style, typified by the trailing vine pattern, provided a prototype for the development of French Chinoiserie and became the basis for the Rococo art style. The French court painter Jean Pillement also played an important role in influencing the spread of the Rococo style, so was Pillement inspired by the work of Holroyd? Although there is no direct evidence of this, the answer should be in the affirmative. In the early days of the Meissen porcelain factory, King Augustus II, in order to demonstrate the strength of his country, presented Meissen ceramics to other noble courts as gifts for diplomatic propaganda, and also sold the latest production at the annual Leipzig Fair （Pagodes et dragons，

2007）. Meissen became the envy of all European countries, including France, which only succeeded in firing hard porcelain in 1767. As Louis XV's court painter, Pillham certainly had the opportunity to familiarise himself with the work of Holroyd. More notably, the two artists shared many characteristics and had a similar approach to confronting Chinese art, not only in terms of the similarity of their decorative subjects, but also in the way that both demonstrate the artist's skill in creative imagination and artistic expression. This may explain why later French and English porcelain manufacturers, recognising the strengths of Meissen's ‘Chinoiserie' ceramics, so readily embraced Pillham's design style.

“The Elector of Saxony, who was spying on the throne of Poland, could not help but follow closely the King of France, who was likely to provide them with support and financial assistance, and seeing that Louis XVI had added Rococo decoration to Versailles, he hastened to do so.”（Fang Long，2021）From this background it is clear that the Saxons actively absorbed the Rococo art style. "Chinoiserie taste reached its zenith in Venice in the 1750s, with several pieces that brilliantly exemplify the refinement and luxury of the Chinese style. The Chinoiserie spread to every artistic discipline, from frescoes to lacquer, from fabrics to ceramics, perfectly complementing the expensive and rare Oriental goods. From the mid-17th century onwards, as the French influence waned and neoclassical styles began to dominate, Venetians were drawn to the German Rococo style and elements of Chinoiserie began to appear."（Francesco Morena，2009）It is clear that Meissen's ‘Chinoiserie' ceramics both absorbed the spirit of Rococo and contributed significantly to the development and flourishing of the Rococo style in Europe.

Conclusion

Augustus II's collection of Chinese ceramics was intended to demonstrate wealth and power through the display of exotic and rare works of art, as well as the desire to improve Meissen's porcelain-making capabilities by imitating Chinese ceramics and thereby outperforming his competitors. At the request of Augustus, Bottger succeeded in producing reddish-brown stoneware with the first European white porcelain, and Holroyd developed a stable underglaze cobalt blue and underglaze copper red as well as many overglaze colours. The initial imitation of Chinese ceramic materials and techniques by the Meissen porcelain factory led to a rapid improvement in the quality of the ceramics and laid an important foundation for the subsequent branding of ceramics with elegant designs and a royal air. In addition, Meissen copied Chinese ceramic shapes and decorations. To test the quality of its own products, Meissen copied Chinese ceramic statues, improving its artistic expression and developing its artistic vision, eventually ushering in the 1730s, when the period of large-scale sculpture began its own creative journey. In his decorative imitations of Chinese ceramics, Maxson, under the direction of Holroyd and other painters, copied the decoration, colour and composition of the five-colour porcelain, imitating the decoration of Chinese porcelain and adapting it to European tastes, adapting the decorative motifs on Chinese porcelain from the Augustus Collection, incorporating traditional Western motifs, adopting an open composition, and cleverly using underglaze celadon with vivid five-colour overglaze, combining The combination of porcelain-making and gilding creates a Chinese-inspired decoration with a European twist. The imitation of Chinese ceramics by Meissen ceramics accelerated the spread of Chinese ceramics and contributed to the formation of the Meissen ‘Chinoiserie' in Germany, which played an important role in the development and flourishing of the Rococo style in Germany.

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Cultural Narrative Re-encoded: The Speculative Design of Nanjing City Wall

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Abstract

UNESCO's "Cities, Culture, and Creativity" initiative advises practitioners and policymakers to promote innovative urban cultures through culture and creative industry, which also inspires more progressive engagements with urban cultural heritage. Arguably, speculative design can facilitate this agenda by contextualizing the role of a heritage in emergent global issues, therefore having the heritage re-interpreted for unprecedented cultural imagination.

Taking the highly recognizable Nanjing City Wall as an example, this paper argues that the current conservation agenda need to consider more than merely preserving the physicality of the cultural heritage, but to also continue the equally important cultural narrative through speculative design. By placing it in a speculated environmental crisis, the paper proposes a new way of re-connecting the city wall with Nanjing's urban environment, speculatively constructing a survival wall system to sustain future urban functions.

Under the framework of research-through-design, the design proposal aims to generate new understanding of the city wall's covert characters of interiority, mediativity, and corporeality, which can be further applied in museum settings for public education. In this way, the seemingly inert historical remnant regains its contemporary meaning by involving the pressing issue of climate change, through which its cultural narrative and symbolic image are promptly iterated.

keywords

Nanjing City Wall; Cultural Heritage; Environmental Crisis; Speculative Design; Re-encoding; Cultural Narrative; Public Education

Introduction

Since more than 650 years ago, Nanjing City Wall of Ming dynasty underwent many historical conflicts and has become a highly recognizable cultural heritage nationwide (Du, 2021). In the past several decades, great effort has been put into the application for UNESCO cultural heritage, in which originally destructed parts were repaired to restore the city wall's historical image (Ma, 2010).

The effort of restoring the wall to its historical wholeness, however, tends to fixate a historical image of the city wall, leaving the cultural connotation of this ancient infrastructure at risk of becoming outdated and stereotypical. To enliven the city wall in a creative manner, conservationists and designers can refer to the UNESCO document: Cities, Culture, and Creativity (CCC), which advises policymakers and practitioners to value the spatial, economic and social benefits brought by culture and creative industry (UNESCO, 2021).

Taking Nanjing City Wall of Ming dynasty as an example, the following proposal argues that speculative design could be an adequate tool to invigorate the infrastructural heritage as part of the city’ s creative asset. Before delving into the co-evolution of city wall and future urban system, a particular interpretation of the city wall is given first, upon which the narrative of speculative design proposal is constructed.

Three Covert Facets of the City Wall

Not to be fooled by its colossal facade and material heaviness, the Ming City Wall is more nuanced than it appears to be. Based on fieldwork investigation, three covert facets of the city wall are inducted, which are interiority, mediativity, and corporeality.

As a military infrastructure, the city wall is often recognized as a colossal barrier and could be easily misunderstood as being solid. However, there used to be complicated interior space in some parts of the wall for storing goods and moving soldiers, some of which were later transformed into air-raid shelters in preparation for modern warfare (figure. 1). These facts constitute the first covert facet of the city wall: its interiority, which inspires some new adaptations for other possible usages after expanding this hidden space.

The second facet of mediativity originates from the city wall’ s political function in history. During its construction phase, the imperial court of Ming dynasty spared no effort and resources, which successfully established this military



Figure 1. The exterior, interior and inscription of Nanjing Ming city wall

infrastructure as a symbol of the solid political power (Zhang, 2016). To achieve an extraordinary level of state control, each wall brick was inscribed with the information of manufacturing location and responsible officials, so that its origin could be accurately traced (figure. 1-4). In another word, each brick becomes a medium that documents social mobilization and solidifies state control in history. This historical functionality constitutes the

coined term “mediativity”.

Corporeality, the third facet, extends from the previous two. On one hand, it responds to the cavity space in the thick wall, humanizing the city wall as a body without organs. On the other hand, it recognizes the historical fact that, the engineering wonder was a result of massive labor input and could be viewed as an index of collective muscle power (figure. 2).

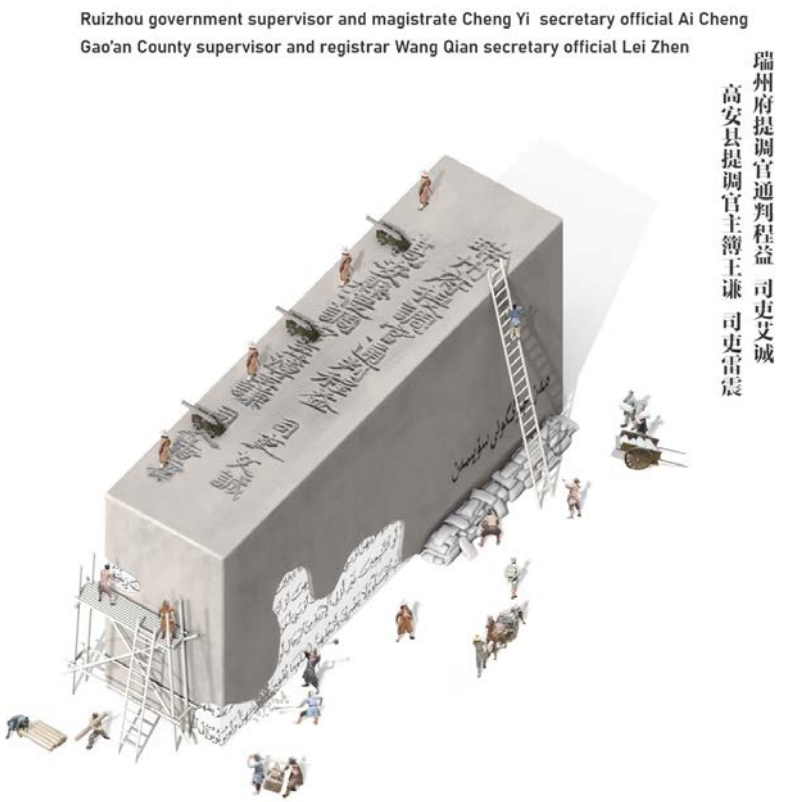

Figure 2. Nanjing City Wall as the medium that solidifies state control over collective labor

The interpretation of interiority, mediativity and corporeality transcends the iconic appearance of the city wall and allows for an alternative understanding of the wall’s innate qualities in its cultural narrative. Supported by the analysis conclusion, the following proposal is not meant to be a design description, but rather an encoding process that integrates multiple aspects of the wall for composing a renewed narrative.

Environmental Fiction and Design Response

Narrative Setup: An Astronomical Disaster

As shown in the Time Cards of figure 3, the city wall is set to endure a crash by an imagined asteroid and reconstructed to adapt to grander climate change (ICOMOS, 2021). The setup of asteroid crisis is crucial, as the extreme condition interrupts the original development trajectory and gives room for new possibilities. Figure 4 presents the scenario of evaluating the astronomical accident, in which "accident location" stretches around the turning corner of the city wall's eastern part. In history, imperial cities and palace areas were once located in different places inside the current city wall, while complicated metro and road systems are planned near the disaster scene (Chen & Luigi, 2013).

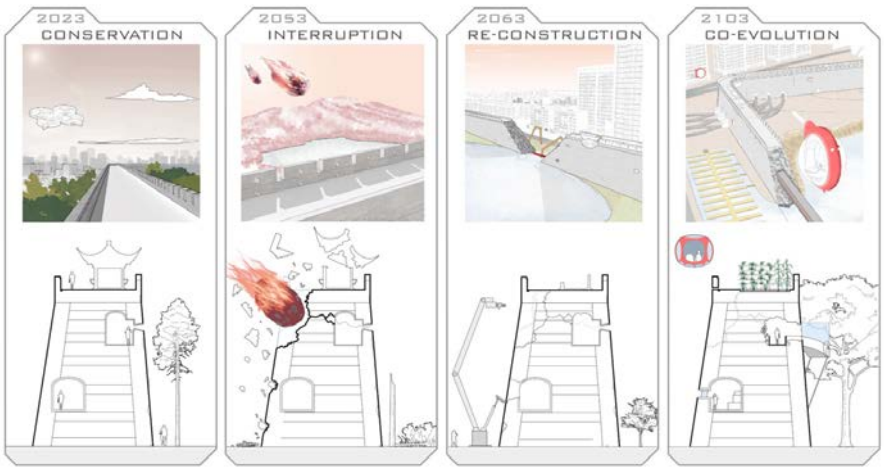

Figure 3. Time Cards: the future of city wall in design fiction

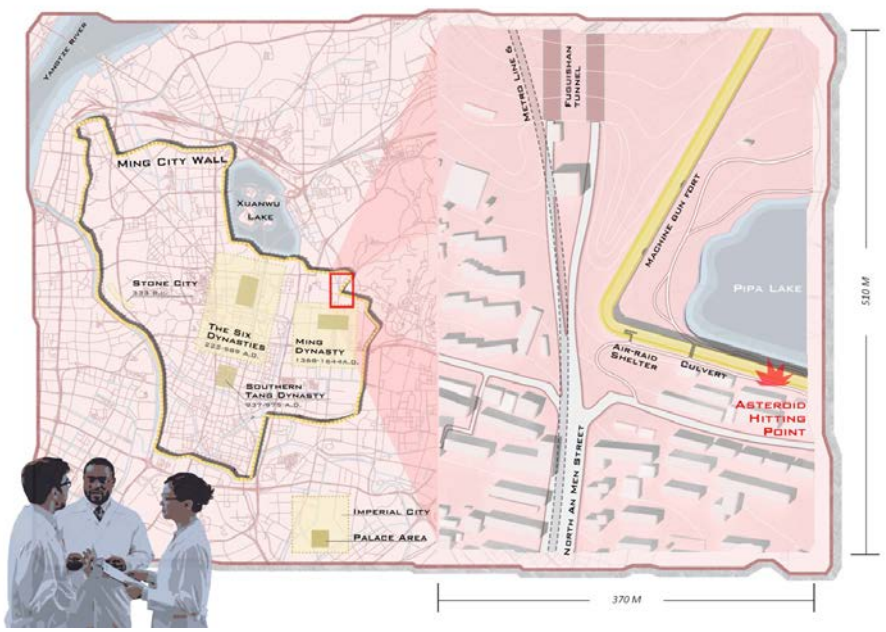

Figure 4. Evaluation meeting: accident location in the historical city of Nanjing

The setup of

environmental crisis requires the design proposal to re-structure the system of city wall for the purpose of human survival. The Time Cards assume that Chinese cities would undergo a high-tech trajectory, but the energy supply would remain unstable due to the volatile environment. In result, a paradoxical situation emerges: the broken city wall is repaired by robotic arms, while autonomous aerial vehicles (AAV) fly in the sky, but local residents still need to use the interior space of the city wall as the low-energy-consumption locale for living. This predictive scenario lays out an apocalyptic world view that is mixed with some optimistic tone, which is made possible by the seemingly inert cultural heritage.

Design Deduction: Towards a Survival Wall System

Spatially, the city wall is considered foremost for its thickness. As shown in figure 5, sectional models are used to understand how the internal wall space could be reconfigured to serve for the survival of future urban residents. Three types of internal space are designed for different purposes: the internal junctions for transportation

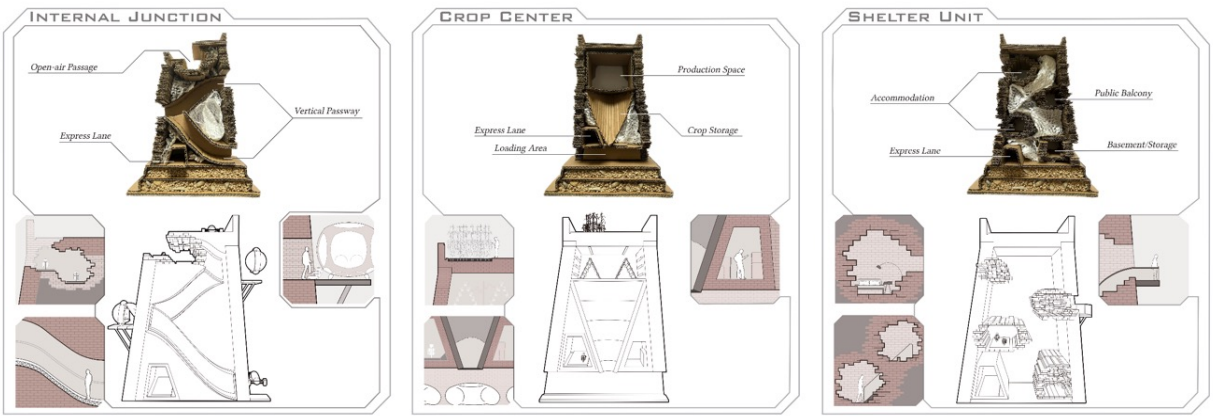

Figure 5. Sectional models that test the city wall’ s interior spatial design

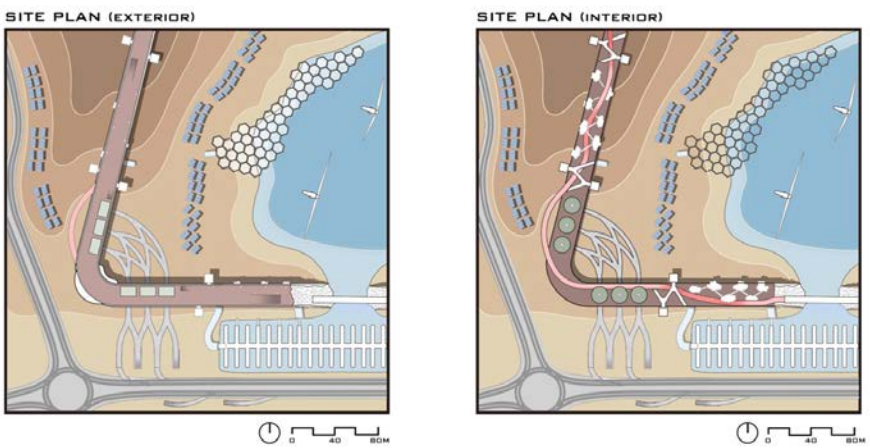

Figure 6. The exterior and interior plans of a new survival wall system

exchange, the crop centers for food production and storage, and the shelter units for refugee accommodation. These spatial types are connected with exterior networks to form a new “survival wall system” (figure.

6). It is noteworthy that, the bold experiment of internal space is not some unprecedented invention, but a continuation of what was found in the existing tunneled space on site (figure. 1). The assembling process of the new city wall re-involves its innate interiority, and the spatial programming in sectional models actualizes corporeality at individual scale.

Regarding the long-term environmental situation, it is assumed to deteriorate from today's global warming crisis. The currently humid climate of Yangtze River Delta (where the city of Nanjing is located) is predicted to be significantly dryer than it is now, while sandstorms attack the city more and more frequently. In figure 7, the larger aerial view shows how city-wide advanced transportation system, agricultural facilities and energy units could be connected with the city wall under aforementioned environmental assumptions. Besides above-ground operations, the new infrastructural system would also actualize a new relationship with the existing geology and underground networks (figure. 8). Here, the blasted notch is not restored to its original look. Instead, a bridge is built to partially expose the internal space.



Figure 7. The survival wall system in connection with future urban networks

Reality Check: The Echoes of Existing Urban Components

The city wall bridge is not designed out of a whim, but a deliberate response to renovation project nearby. About one kilometer away, part of the city wall once collapsed after a heavy rainstorm and was later added with an adjunct bridge structure (figure. 8). By doing so, the design fiction would maintain a referential connection with the real world, and different possibilities could be assembled in one place to exemplify simultaneously the complexity of the city wall in a cubism-like manner.

This sort of referential association also expands to other places in the city. Figure 9 maps out how enveloped areas inside the city wall are connected by the survival wall system, with which a shielded protective system is established. Transformed into a thread that plugs into other places to sustain urban functions, the city wall once again becomes an active infrastructure that maintains social order amid environmental crises.

Discussion

Potential Application for Virtual Reality

There has been quite some effort in digitalizing the city wall to make the conservation project more intellectual

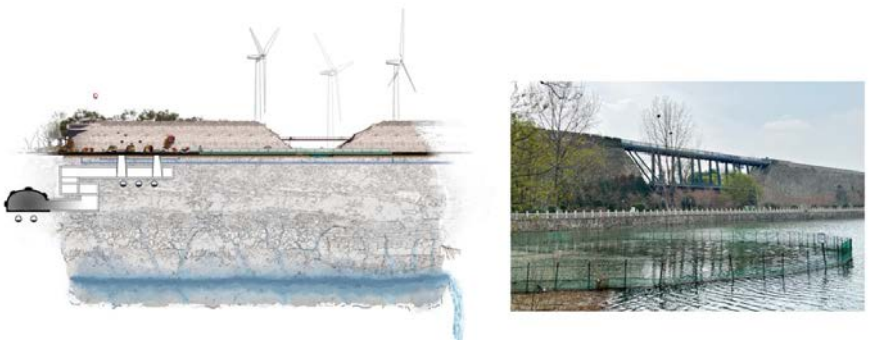

Figure 8. Underground connections and the resemblance of bridge design



Figure 9. Shielded protective system connected by the new city wall

and refined, which primarily concentrates on documentation, oral history recording and tourism management (Jin, 2019). As a complement to the digital archive, if the design fiction is evaluated to be convincing and meaningful, speculative scenarios have the potential to be developed into a virtual reality (VR) environment for enriching museums' digital experience (figure. 10). Similar visualization work of preservation in climate change had been done in Wong's studio for Point Neighborhood community, which was applied to VR experience in the community event of Projecting Change (Wong, 2021).

For this engagement project, visitors can witness how exacerbated climate conditions would shape future urban environment by walking around in the virtual space. Labeled information points are placed for touching to unfold mysterious space in the new city wall. Along with other displayed historical knowledge in museums, this VR experience foregrounds the pressing environmental issues of today and invites audiences to imagine the city wall in its wildest possibility. In this case, the mediativity of city wall is achieved in the interactive interface

between visitors and the designed virtual space, in which this covert character is re-encoded by the information technology of today. Although the technology used here is not unprecedented, its design content, however, is innovative in terms of communicating knowledge and deepening our understanding of the city wall. In this perspective, speculative design is important for culture and creative industry to generate educational values.

The Agency of Speculative Design in Cultural Narrative

In my opinion, the niche of a cultural heritage stands in its reception by the public. As a physical object, cultural heritage itself is not the purpose. What matters is how the past, future and symbolic condition of a conserved



Figure 10. The VR application of speculative scenarios

project are received and understood by general audiences. In coping with environmental crisis, the speculative design situates the city wall in an unprecedented context, which constructs an abnormal narrative that could capture new symbolic implications for the heritage as well as public attentions. By bridging the future and the past, it also sets the city wall free from its prescribed domain of discourse and opens up a more spontaneous field for cultural imagination.

Frequently, speculative design presents progressive narrative that challenges the audience to reconsider possible futures (Dunne & Raby, 2013; Yelavich & Adams, 2014; Bina et al., 2017). This design agency coincides with the agenda of UNESCO’ s Cities, Culture and Creativity initiative, in which one of the six enablers in the document emphasizes the influence of digital environment for invigorating urban culture (UNESCO, 2021). It may add extra value to the practice of historical conservation by viewing a cultural heritage as the protagonist in a design fiction. To actualize it, more work needs to be done in researching local knowledge and designing scenarios that respond to fieldwork discoveries.

Epilogue

Through the re-encoding process, the design proposal exemplifies the feasibility of updating the city wall’ s cultural meaning to be a creative asset. More than a petrified remnant, Nanjing City Wall could contribute to the contemporary discussion of imminent environmental challenges. If the coronation of a cultural heritage recognizes its historical value for today, speculative design would be today’ s effort to annotate the cultural narrative for tomorrow.

Acknowledgement

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Perception of Cultural Ecosystem Services in Ceramic Cultural Landscape : An Integrated Analysis of Textual and Image-based Online Reviews

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Abstract

Online reviews are increasingly emerging as a valuable source of information for evaluating cultural ecosystem services (CES). They offer an intuitive way to understand tourists' perceptions, which can assist managers in optimizing services. However, existing research has focused on separately analyzing either text comments or image comments, and integrated analysis of both is still relatively uncommon. This study focused on Taoxichuan Creative Industry Park in Jingdezhen, integrating both textual and image-based online reviews as data sources to facilitate a comprehensive investigation of visitor perceptions. We employed various analytical methods including word frequency analysis, semantic network analysis, image clustering to identify CES and investigate the relationships between CES and ceramic landscape elements. The results showed that: (a) the semantic network of Taoxichuan's text comments presents a structural characteristic as "multi-center, multi-level". (b)With the overall evaluation having the most significant perception of recreation and tourism value, followed by aesthetic value, sense of place, and cultural heritage value. (c)Text comments tend to emphasize the touring experience, while image comments place a stronger emphasis on the visual perceptions during the tour. Based on the results of semantic analysis, we selected three groups of similar landscape nodes for comparative analysis using the Semantics Disambiguation Method to find out the reasons for the differences in online comments. Overall, this study demonstrates how the online comments can provide information for management strategies, facilitating the identification of cultural ecosystem services and their structural characteristics, ultimately optimizing the management of the scenic area.

keywords

Cultural ecosystem services; Online review; Social media data; Semantic analysis

1 Introduction

Cultural Ecosystem Services (CES) refer to the non-material benefits that people obtain from ecosystems through spiritual satisfaction, cognitive development, recreation, and aesthetic experiences. CES serves as a vital pathway through which landscapes enhance human well-being; however, its intangibility poses challenges for quantification[1-3]. According to the Millennium Ecosystem Assessment (MEA) report, CES is related to the values of recreation and tourism, cultural heritage, aesthetics, sense of place, spirituality and religion, education, inspiration, and landscape elements[4]. Both natural

and constructed landscapes can create harmonious landscape spaces through the arrangement of landscape elements, providing people with a wealth of cultural ecosystem services. The generation of these services is determined by people's interaction with the environment, based on their perceptions and judgments[5]. The perceptions of the public towards urban parks are based on the emotional connection between humans and nature[6].Related studies have been discussing the importance of the physical attributes of landscapes in people's perception of ecosystem services. Some environmental features, such as plant, water features, buildings, and public facilities, are considered closely related to the perceived quality of the landscape space[7].Tourism, recreation, and other human-environment interactions may play an important role in the protection and sustainable development of ecosystems and cultural heritage[8].With the rapid development of network technology and tourism e-commerce, online comments on social media are becoming an important source of information for evaluating the cultural ecosystem services[9-11]. Tourists share their travel experiences through online comments, generating a large amount of authentic and effective data[12,13]. Online comments have a fast transmission speed and wide range, and post-trip evaluations are truthful and timely. They provide comprehensive feedback on tourists' demands for tourism resources, environment, and cultural services, which affects other tourists' decisions on destination selection, revisit, and recommendation[14]. Moreover, they can help managers and decision-makers to improve the quality of scenic environment and CESs. Therefore, studying and identifying the perception of CESs through online comments is an effective way to promote regional cultural output and city brand establish[15].

Traditional surveys and interviews are time-consuming and labor-intensive, and they also present certain challenges in interacting with people[16]. Online reviews publicly available on various platforms like Ctrip, Google Maps, Dianping are a form of user-generated data that can address the limitations mentioned above and hold significant potential for assessing landscape quantitatively, including landscape perceptions, preferences, cultural ecosystem services, and sense of place[17,18]. Scientific research based on big data has theoretical significance and practical prospects for both tourists and tourism management[19]. Compared with social surveys, it is more cost-effective and convenient to collect data through big data techniques such as storage, mining, and semantic analysis[20], which have been applied to study various aspects of tourism, including product evaluation[21-23], tourist perception[24], and emotional profiling[25,26]. Scholars have already incorporated text information from online comments into their classification of cultural ecosystem services (CES)[27]. Dunk et al. argued that geotagged photos and metadata shared on social platforms are important sources of information about tourists' perception of cultural ecosystem services, which can convey users' motives, viewpoints, experiences, perceptions, or symbolic meanings[28]. When image information is difficult to recognize, online comment tags can be used to classify and supplement image information[29]. Elisa Oteros-Rozas et al. conducted content analysis of online image reviews from five different regions in Europe and found a positive correlation between the diversity of landscape features and the diversity of cultural ecosystem services[30].Alexander Dunkel and his colleagues visualized landscape perception for applications in landscape and urban planning, and analyzed that online image data may contribute to a balanced evaluation of perceived landscapes. This provides a basis for better integration of public value into the planning process[31]. Pedro Clemente and his colleagues used the species distribution model Maxent to combine CES observations with biophysical and infrastructure variables, and utilized social media photos to simulate the spatial distribution of people's preferences for cultural ecosystem services in coastal areas[32].

The aforementioned studies have involved analysis of both textual and visual data. However, they still exhibit certain limitations. First, the majority of studies regarding landscape perceptions and preferences tend to concentrate solely on a single method. There is still a dearth of research that combines the analysis of online textual and visual comments. Online textual comments reflect tourists' summaries and generalizations of their experiences after a visit, while online image comments capture the moments when tourists are attracted to certain landscapes during the visit. Online comments can effectively record tourists' perception of the ecosystem cultural services provided by different landscape elements, and express the interaction between tourists and landscapes, which is crucial for landscape design[33-35]. Second, thus far,there has been little systematic research on how people recognize CES in the ceramic cultural landscape. Third, existing studies have focused on the process and outcomes of tourist perception, but have not conducted detailed analysis on the issues reflected by the results. Based on this background, our specific objectives are to:

(1)Integrating both textual and image-based online reviews from tourists as data sources, and employs methods such as frequency analysis, semantic network analysis, image semantic segmentation, and image clustering analysis to identify CES in ceramic cultural landscape;

(2)Exploring the relationship between the perception of ecosystem cultural services and the elements of ceramic cultural landscape through word frequency analysis in online reviews;

(3)Comprehensively discuss the structure of the Taohuaxi ecosystem cultural services;

(4)Using the Semantic Differential(SD) Method to conduct more detailed analysis on landscape nodes with significant differences in evaluation, in order to explore the reasons for the differences.

2. Materials and Methods

2.1. Research area

The overall area of the Taoxichuan project covers 2 square kilometers, which is located on the site of the Universe Porcelain Factory established in 1954. The project has preserved 22 old factory buildings and their architectural features, and transformed the two most important smelting workshops into the Taoxichuan Ceramic Museum and Art Museum. The coal-fired tunnel kilns and traditional round kilns on the original production line, as well as three chimneys more than 60 meters high at both ends of the kiln house, have also been preserved. The project features the Ceramic Industry Heritage Museum, Art Museum, Tao School Education Research Base, Yi Space Innovation and Entrepreneurship Platform, International Studios, Grand Theater, and cultural-themed hotels and shared apartments. The project has successfully achieved the transformation of ceramic industry heritage to cultural and creative industries. At present, the Taoxichuan demonstration area is fully operational, while the Min Porcelain Factory site is still under construction.

In terms of data acquisition, we used Dianping, a popular local lifestyle and transaction platform in China, as the source website for reviews of Taoxichuan. Dianping is also the world's earliest independent third-party consumer review website[36-38]. Compared with other online travel platforms such as Ctrip and Tuniu, we found that Dianping has the highest number of online reviews and the most detailed content regarding Taoxichuan. The abundance of textual and photographic reviews provided ample data for sample selection. Using Python technology, we crawled and extracted a total of 1082 valid textual reviews and 5332 images from January 2020 to December 2022. Additionally, we conducted offline satisfaction surveys during the National Day holiday in 2022 to address specific questions and particular scenic nodes in Taoxichuan. A total of 112 valid questionnaires were collected, and

the satisfaction levels of three specific scenic nodes were thoroughly investigated. These results were used as supplementary data for online reviews to facilitate the analysis of existing issues in Taoxichuan.

2.2. Data collection and research methods

This study combines text analysis with image analysis to explore the cultural service structure of Taoxichuan. It takes five main steps to complete the entire analysis in our study: (1) data collection; (2) word frequency analysis; (3) semantic network analysis; (4) image analysis; and (5) comparison analysis of landscape nodes based on the SD method. Through comparison, we found that there are differences in the evaluation of similar landscape nodes in Taoxichuan. Therefore, we used the SD method to analyze the fundamental reasons for these differences. The whole research framework can be found in Figure 1.

In terms of text analysis, we used ROST Content Mining System User Manual Version 6.0(ROST CM 6.0), developed by Shenyang of Wuhan University, as a text mining tool to effectively extract and classify relevant high-frequency words for research. In addition, we utilized the semantic network analysis function within the ROST CM 6.0 to construct a high-frequency word co-occurrence matrix, in order to explore the correlation between landscape elements and cultural services. Finally, we used the software for data visualization, further exploring the semantic network relationships within the comment texts.

In terms of image analysis, we first manually screened the images and deleted those with unclear information. Then, we used the image semantic segmentation technique based on the convolutional neural network (CNN) of transfer learning to segment the effective images into different ceramic cultural landscape elements and classify them as metadata for research[39,40]. Based on this, we manually classified the images to ensure the accuracy of the results. The frequency of landscape elements appearing in effective images can provide an interest indicator for visitors to the site.

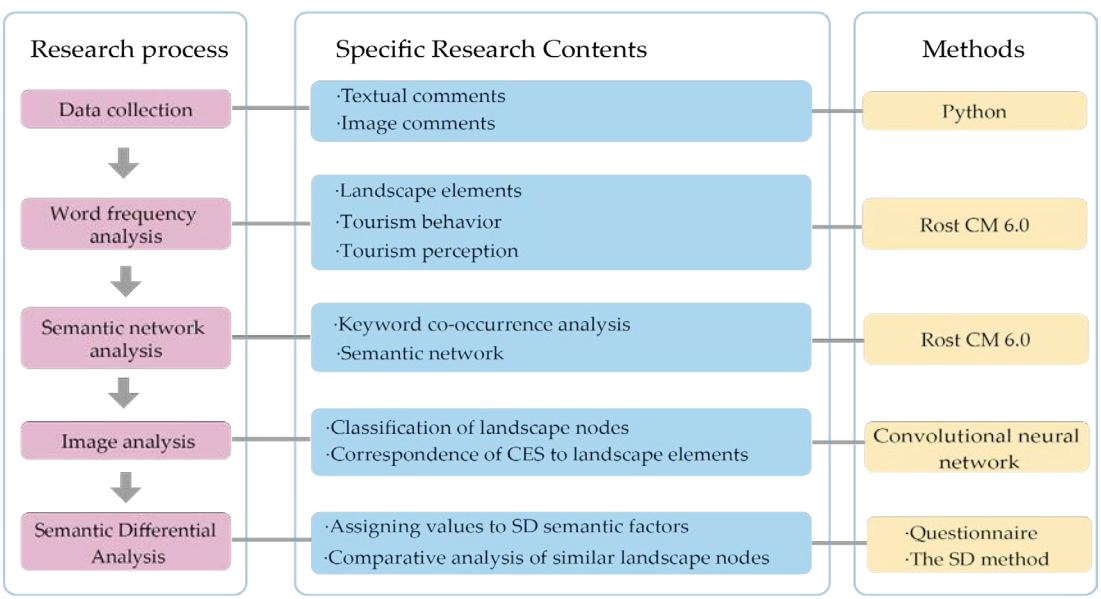

Figure 1 . The technical framework of this research.

Through the comparative analysis of textual and visual data, we can identify variations in the cultural service evaluations among similar landscape nodes in Taoxichuan. Based on these findings, in conjunction with SD semantic analysis, a questionnaire survey was conducted with visitors. Respondents were asked to evaluate a control group of similar landscape nodes. A total of 267 questionnaires were collected, including 84 local residents and 183 out-of-town tourists. After comparing the data from interviews and questionnaire surveys, we aimed to uncover the fundamental reasons for the score differences between landscape spots.

3. Results

3.1. Word frequency analysis

Bulleted lists look like this:We used ROST CM 6.0 software for frequency analysis of network comments, and identified 94 effective high-frequency words after screening. These high-frequency words were further classified into three categories: landscape elements, tourist behavior, and tourist perception. Specifically, there were 32 keywords related to landscape elements, 44 keywords related to tourist perception, and 18 keywords related to tourist behavior(Figure 2).

3.1.1. Landscape elements

The high-frequency keywords of landscape elements can be divided into two categories: cultural

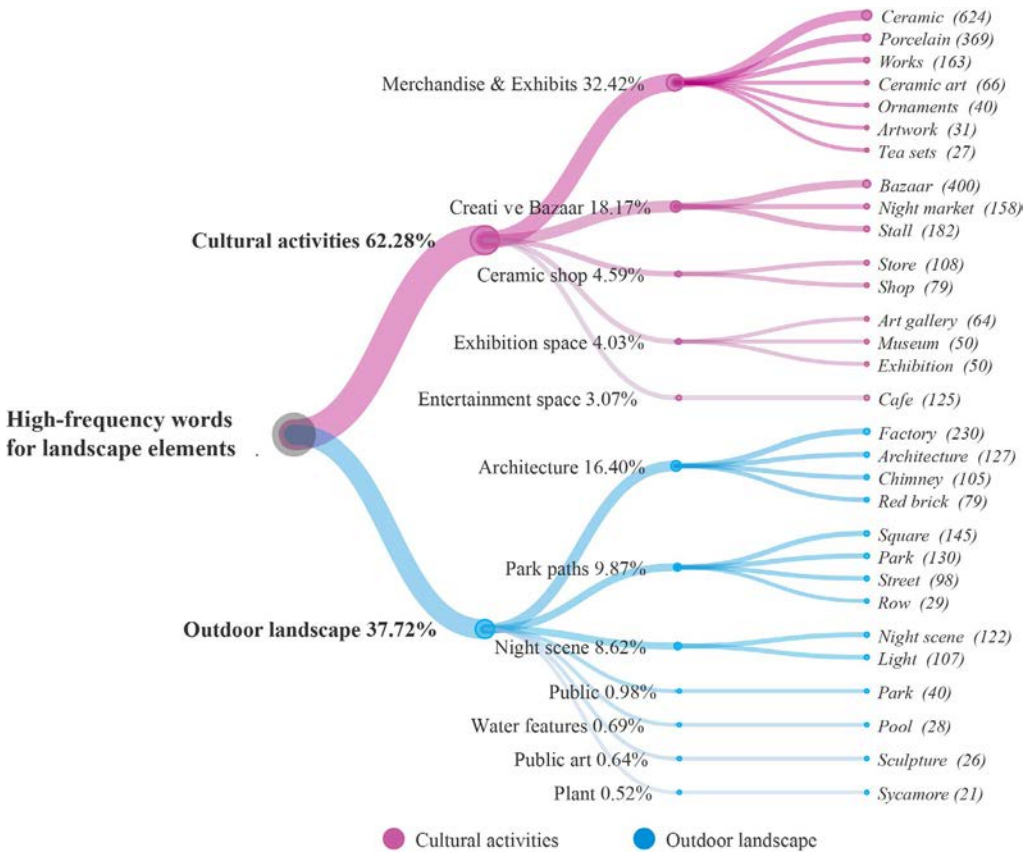

Figure 2 . Analysis of high-frequency words for landscape elements.

activity elements and outdoor landscape elements (Figure 2). Landscape elements related to cultural activities have a higher frequency than outdoor landscape elements, accounting for 62.28% of the total frequency. Cultural activity elements include mainly ceramic products and exhibits, ceramic bazaar, ceramic shops, exhibition spaces, and entertainment spaces, covering cultural activity spaces such as the Taoxichuan Creative Bazaar, ceramic shops, art gallery, and museums, as well as ceramic-based crafts and a few other artworks displayed in the spaces. The landscape elements related to "ceramic product and exhibits" are the most attention-grabbing for tourists, reaching 32.42% of the total frequency, with the highest frequency of keywords related to ceramics, such as "ceramics," "porcelain," and "pottery." Tourists mention that "Taoxichuan, as a relatively new scenic area, has really good planning, and the whole building is very distinctive." "From daily necessities to candlestick ornaments, all kinds of creative works are dazzling." The creative bazaar, as one of the cultural activity spaces, has a significantly higher frequency of key terms compared to the other three types of spaces. This indicates that the creative market has left a profound impression on visitors in various cultural activities, and the landscape elements of goods and exhibits mainly made of ceramics are the most popular among visitors. Although there are comments mentioning "art gallery" and "museums", the frequency is relatively low in comparison.

Outdoor landscape elements include architecture, park paths, night scenes, public facilities, water features, public art, and plants, covering all types of landscapes and supporting public facilities within the park. Among them, building landscapes are the most attention-grabbing, followed by park path landscapes and night scenes. Water features, public art, and plants receive relatively low levels of attention. Among the landscape elements, the keywords "factory", "square", "park", and "architecture" have a relatively high proportion, reflecting visitors' deep impression of the industrial heritage culture of the overall landscape of Taoxichuan.

3.1.2. Tourism behavior

The high-frequency keywords of visitor behavior can be divided into two categories: recreational behavior and aesthetic behavior(Table 1). Recreational behavior keywords include "checking in", "strolling around", "travel", "leisure", and "shopping", accounting for 70% of the total frequency, which is much higher than that of aesthetic behavior. Keywords such as "check in", "strolling around", "tourism", and "leisure" reflect that sightseeing is the main activity in the park, while keywords such as "choosing", "shopping", "buying", and "selecting" indicate that purchasing ceramic products is a secondary activity for tourists in the park. The frequency of keywords related to aesthetic behavior is relatively low compared to recreational behavior. Therefore, it can be seen that the main purpose of visiting the park is for recreational and leisure activities, and aesthetic behavior occurs during the recreational process. Visitors are motivated to visit for sightseeing, relaxation, and to appreciate the aesthetic value of the landscape. The aesthetic appreciation of landscape needs to consider these factors, which can be enjoyable and provide subjective comfort to people[41].

Table 1. Analysis of high-frequency words for tourism behavior.

Tourism behavior type	Frequency	Percentage	Tour behavior (frequency)
Recreational behavior	749	70%	Check in(198), strolling around(123), travel(76), leisure (66), choosing (45), shopping (43), parking (43), taxi (34), walking (34), buying (31), jogging(31), selecting (13), resting (12)
Aesthetic behavior	320	30%	Photography (182), experience (52), feel (45), visit (23), appreciate (18)

3.1.3. Tourism perception

User-generated data shared by visitors on social media offer valuable insights into how individuals perceive cultural landscape during their recreational experiences, including preferences, emotions, and opinions[42,43].The high-frequency words used in tourists' perception of the tour reveal their overall impression of the Taoxichuan and reflect its core features(Table 2). The prominent features perceived by tourists are the artistic and cultural atmosphere, as indicated by frequently occurring words such as "art," "culture," "literature and art," and "design." Despite being an industrial heritage park, keywords such as "industry," "history," and "heritage" do not appear frequently. Words such as

Table 2. Analysis of high-frequency words for tourism perception.

Tourism behaviour type	Frequency	Percentage	Frequency of tourism perception
Cultural feature	998	32.89%	Art(213), culture(180), literature(118), design(108), industry(80), craft(73), morden(67), history(44), heritage(34), tradition(42), commerce(39)
Positive emotions	1898	62.56%	Creative(247), various(157), beauty(134), feature(131), satisfy(131), lively(124), worth(77), cheap(75), interesting(70), multifarious(60), exquisite(58), convenience(50), original(49),abundant(48), cute(43), funny(37), unique(34), stunning(31), good-looking(31), fun(29), neat(29), fashionable(29), happy(28), surprise,(21), glorious(20), quiet (20), pretty(20), unique (18), cozy (16)
Negative emotions	138	4.55%	Not much (50), unfortunately (41), not understanding (27), regret (20)

"creativity," "diversity," "beautiful," and "distinctive" reflect the diversity and interest of various ceramic handicrafts in the market and ceramic shops. Words such as "worthwhile" and "fun" reflect the tourists' positive and relaxed overall experience of the tour, while words such as "clean" and "comfortable" reflect their evaluation of the park environment. The proportion of negative emotion words such as "not many," "a pity," "not understanding," and "regret" is relatively small. The above analysis indicates that regarding the perception of the tour, Taoxichuan outputs contemporary art and

ceramic culture to tourists through various cultural activities, while using the original environment and architecture of the porcelain factory as a carrier to disseminates industrial culture to tourists. Tourists' perception of cultural ecosystem services in Taoxichuan is greater than that of the park environment itself.

3.2. Semantic network analysis

During the process of word frequency analysis, a single high-frequency word can reflect the characteristics of an object, but it cannot reflect the deep-level structural relationships[44]. Semantic network analysis can intuitively reflect the relationships between elements through the semantic relationship network. In this study, we conducted keyword co-occurrence analysis on text comments using ROST CM 6.0 and generated a semantic network structure to explore the association between cultural ecosystem services, which can more intuitively illustrate the structure of cultural services in Taoxichuan[45]. After screening, we obtained 26 pairs of effective word pairs, which were divided into four categories of cultural ecosystem services: recreational and touristic value, aesthetic value, sense of place and cultural heritage value, and educational value(Table 3) .

From the perspective of recreation and tourism value, the key landscape elements are mainly ceramics, factory buildings, and markets. The co-occurrence behaviors and perception keywords such as"lively," "jogging," and"walking" are all related to recreational activities, and their co-occurrence frequency reaches 45.49% of the total frequency. Therefore, it can be seen that landscape elements such as ceramics, factory buildings, markets, and squares are highly correlated with recreation and tourism value.

From the perspective of aesthetic value, the key landscape elements include ceramics, night view, lighting, and art museums, among others. The co-occurring behavior and perceptual keywords, such as "art," "good-looking," and "exquisite," visually reflect tourists' perception of aesthetic value. The co-occurrence frequency reaches 22.22% of the total frequency, indicating a significant correlation between these landscape elements and aesthetic value.

From the perspective of sense of place and cultural value, the key landscape elements are mainly industrial buildings, architecture, ceramics, and squares. Keywords such as "transform", "feature", "culture", and "heritage" reflect tourists' perception of industrial cultural heritage, and the co-occurrence frequency of keywords is consistent with that of aesthetic value.

From the perspective of educational value, the main landscape elements are ceramics and markets. The co-occurring keywords are mainly "culture", with a co-occurrence frequency of 10.06%. Compared with other categories, the association between ceramics, markets, and educational value is relatively low, and tourists' perception of educational value is also relatively low.

From the analysis, it can be seen that the landscape elements "ceramics," "market," "factory," and "square" are most closely associated with recreation and tourism value, with a diverse range of related landscape elements, and tourists' perception of these CESs is most significant. The landscape elements "ceramics," "lighting," and "art museum" are closely associated with aesthetic value, and tourists' perception of this type of CES is significant. The landscape elements "factory," "architecture," and "square" are closely associated with the sense of place and cultural heritage value, and tourists' perception of this type of CES is significant. "Ceramics" and "market" are associated with educational value, but this type of CES has a relatively single landscape element, and tourists' perception of it is not as significant.

Table 3. Co-occurrence and classification of keyword.

Values of CES	Frequency	Percentage	Frequency of tourism	Perception	Frequency
Recreation and tourism value	520	45.49%	ceramic	feature	104
			ceramic	creative	158
			factory	creative	64
			bazaar	lively	62
			square	jogging	32
			ceramic	walking	30
			porcelain	various	29
			bazaar	stroll	21
			bazaar	interesting	11
			park	convenience	9
Aesthetic value	254	22.22%	ceramic	art	90
			ceramic	good-looking	31
			light	beautiful	31
			ceramic	exquisite	30
			night scene	beautiful	30
			art gallery	exhibition	21
			square	night scene	21
Sense of place and cultural heritage value	254	22.22%	factory	transform	57
			architecture	feature	39
			ceramic	culture	37
			culture	creative	37
			architecture	heritage	34
			square	culture	34
			architecture	industry	16
Educational value	115	10.06%	ceramic	culture	74
			bazaar	culture	41

Semantic network analysis can intuitively reflect the structure of CESs and understand the relationship between landscape elements and cultural services, and analyze the overall cultural service situation from multiple perspectives[46]. After filtering high-frequency words through feature analysis, a VNA file was formed and imported into NetDraw software to generate a semantic network diagram of online comments on Taoxichuan (Figure 3). As shown in the figure, the core level of keywords includes "Taoxichuan", "ceramics", and "night", indicating that the most core themes in textual comments are Taoxichuan, ceramic culture, and nighttime scenes in Taoxichuan Park. The second level of keywords revolves around the core level of keywords and is more closely related to the central node, including recreational behaviors such as "check-in" and "take photos", cultural output carriers such as "bazaar", "factory ", and "night markets", as well as perception words such as "lively", "great", "like", "culture", and "art". The third level of keywords corresponds to a single core keyword link, involving keywords related to the landscape of Taoxichuan Park, such as "porcelain factory", "architecture", and "works", as well as keywords related to nighttime park activities such as "vendor stalls" and "night scenes". In terms of hierarchical structure, the semantic network of Taoxichuan real-time comments presents a "multi-center, multi-level" network relationship.

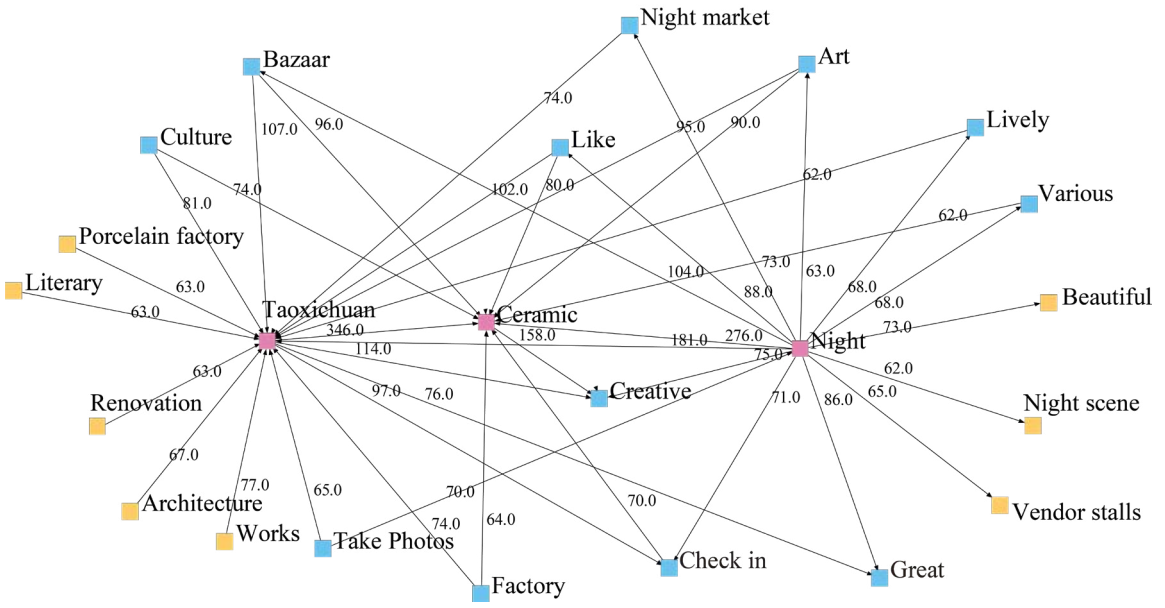

Figure 3. Semantic network diagram of Taoxichuan online commentary.

3.3.Image analysis

The density of image comments can provide an intuitive reflection of tourists' interest in a particular location. Photos taken by people during cultural or recreational activities at a location can be considered as records of their perceived important touring experiences[47]. Textual comments reflect tourists' overall feelings after visiting, while images directly convey their visual experiences during the tour. Additionally, the landscape elements captured in the images can more comprehensively reflect the relationship between the landscape and CESs[48]. The combination of semantic analysis of text and images can help us gain a more complete understanding of tourists' perceptions of cultural services in the scenic area[49].

After analyzing the text comments, we conducted a statistical and analytical study of the image comments to provide a more comprehensive understanding of visitors' perception of CESs during and after their visit. A total of 5,332 comment images were captured and categorized according to the location depicted in the image, including 10 categories such as market, Mengyao Square, night scene, Yi Space, park, ceramic shop, art museum, south gate, north gate, and industrial heritage museum. We employed the VGG16 convolutional neural network model, known for its effectiveness, with pre-trained parameters on the ImageNet dataset[50,51]. The ImageNet dataset encompasses 1000 classes, including categories relevant to architectural classification, which is pertinent to the classification task in this study[52]. Hence, transfer learning was used to train the network[40].We have used the pre-trained convolutional layers of VGG16 on ImageNet for the recognition of architectural components in the images. However, the dataset of images collected for this experiment is limited for the recognition of architectural components, and it is not sufficient on its own to train all parameters of the CNN model. To enhance the accuracy of the results, we further manually classified the images. We conducted a statistical analysis of the landscape elements depicted in the images and obtained the proportion of various cultural landscape elements through semantic segmentation (Figure 4). Based on the semantic network analysis mentioned earlier, we

established a one-to-one correspondence between image locations and CESs.

According to our analysis, the frequency of pictures with the theme of park paths accounted for 22.14% of the total, which was the highest among all areas. The landscape elements captured in these images include architecture, streets, plants, chimneys, and rest facilities. Notably, architecture appeared in 1095 images, indicating that the unique architectural style of Taoxichuan has a significant visual impact on visitors.

The frequency proportion of pictures with the theme of the Bazaar accounted for 21.80% of the total, with ceramic products slightly more frequent than architectural elements, reaching 1140 times. This reflects the appeal of the creative market and its ceramic products to most visitors, showcasing their interest and diversity. The Yi Space and ceramic stores, as other ceramic craft sales locations apart from the market, have attracted visitors' attention with a rich and diverse array of ceramic craft products, albeit with less foot traffic than the market. Additionally, the coal-burning track kiln in the factory of the Yi Space, as a symbol of industrial cultural heritage, has also caught the attention of a small number of visitors.

The frequency of pictures with the theme of the Mengyao square accounted for 19.44% of the total, which the chimneys in the center water pool were captured 471 times. Including the chimneys in other areas of the park, the total count was 762. This reflects that "chimneys" are a distinctive industrial heritage landscape element in the perception of tourists. The public art, due to its periodic replacement, appeared less frequently. The water pool in the center of the square was captured 948 times. The spacious surrounding roads, vegetation, and rest facilities provide favorable conditions for public gathering and staying. The water pool forms a flat and spacious space, and the towering chimneys resemble a monumental obelisk, creating a sense of place climax in the entire park.

The images related to night scence mainly featuring the view of the Mengyao Square where the water pool and illuminated buildings complement each other, accounting for 19.08% of the total, highlighting the aesthetic value of the industrial heritage under the night lights. The high frequency of night view images reflects the lively scene in the Taoxichuan park at night, demonstrating the time planning of landscape and CESs provided by the park management.

The art gallery and industrial heritage museum are the main exhibition venues in the Taoxichuan park. The Taoxichuan Art Museum periodically updates temporary exhibitions on different themes, which include various exhibits. The frequency of appearance of pictures related to the industrial heritage museum is the lowest, even lower than that of the coal-burning tunnel kiln in the Yi Space, reflecting the low level of attention paid by visitors to the museum and their perception of its CESs.

The frequency of images related to the South and North entrances differs significantly due to differences in design and geographical location. The South entrance is relatively spacious, with a water feature and a prominent entrance, and the grassy area inside is also more extensive, with more installation art on display. In contrast, the design of the North entrance is relatively simple, with less exquisite architecture, and the installation art is placed in a smaller grassy area behind the visitor center, which is more remote. As a result, there are relatively more tourists taking photos at the South entrance.

According to the frequency statistics of image comments, buildings, chimneys, and water features have become the main landscape elements of Taoxichuan, with the highest frequency of appearance. The main scenic spots photographed by tourists are the park road, Mengyao Square, night view, south gate, and north gate, with a frequency of appearance reaching 63.96% of the total, which are directly related

to the outdoor landscape. On the other hand, the market, Yi Space, ceramics shops, art museum, and industrial heritage museum are also objects of tourists' photography, which are related to cultural activities, ceramic crafts, and service facilities. In summary, from a visual perspective, Taoxichuan's outdoor landscape is more likely to attract tourists' attention.

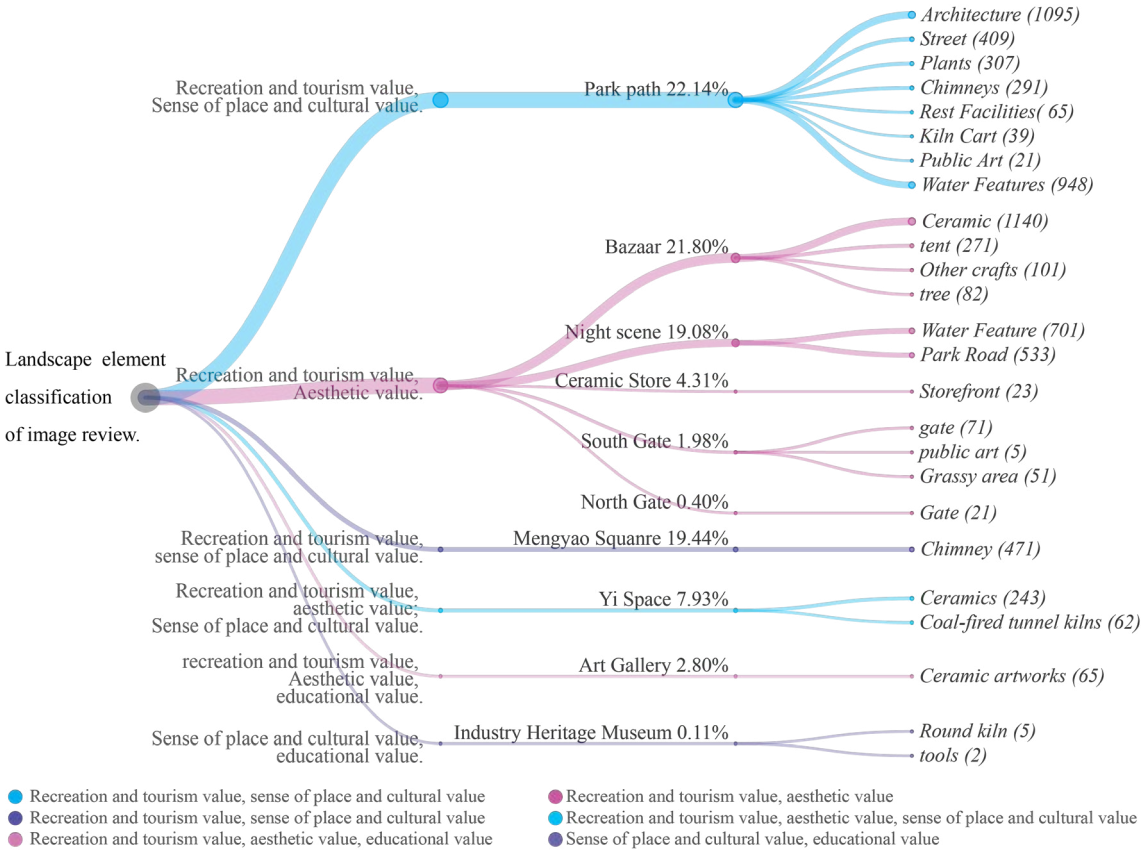

Figure 4. Landscape element classification of image review.

3.4. Analysis of semantic differences in similar attractions

Based on the analysis of both textual and visual comments, it was found that the landscape elements of the South Gate and North Gate, the Museum of Fine Arts and the Industrial Heritage Museum, and the Dreamy Square and the Square in front of the Sandblasting Art Museum are similar. However, there are significant differences in the statistical results of the related textual comments and picture comments of these three pairs of landscape nodes. Analyzing the reasons for this phenomenon can have a positive impact on effectively improving the CES capabilities of Taoxichuan. Therefore, we selects the above three pairs of landscape nodes for comparison and uses the Semantic Differential(SD) Method to explore the reasons for the differences in evaluation[53].

3.4.1. Selection of landscape nodes

The study selected three pairs of similar landscape nodes as samples (Figure 5.) and used the SD method to compare textual comments. Based on the landscape element classification in Table 1, 9 SD factors were derived, with each pair of adjectives consisting of a pair of antonyms(Table 4.). To enable more accurate quantitative analysis, the evaluation scale was set to 7 levels, and corresponding values were

assigned to each level, ranging -3、-2、-1、0、1、2、3 , with values closer to negative adjectives receiving lower scores and those closer to positive adjectives receiving higher scores. According to internet evaluation research, three pairs of similar landscape nodes were selected for the samples: Samples 1 and 2 were the south gate and north gate of Taoxichuan, respectively; Samples 3 and 4 were the Mengyao Square and the front square of the Taoxichuan Sand-cast Museum, respectively; Samples 5 and 6 were the Taoxichuan Art Museum and the Industrial Heritage Museum, respectively. 50 questionnaires were distributed for each sample, and after screening out invalid questionnaires, 267 valid questionnaires were collected, with an effective rate of 89%.

Table 4. Semantics Disambiguation factors and adjective pairs of landscape elements.

Outdoor Landscape elements	Semantics Disambiguation Factors	Adjective pairs (negative——positive)
Plant	A1 Plant aesthetic	Cluttered——Aesthetic
Water feature	B1 Harmony of Water feature	Inharmonious——Harmonious
Architecture	C1 Historical heritage continuity	Low continuity——High continuity
	C2 Architectural aesthetics	Cluttered——Aesthetic
Park path	D1 Location clarity	Vague ——Clear
	D2 Cleanliness of the environment	Cluttered——Aesthetic
Public art	E1Visual interest	Boring——Interesting
	E2 Cultural iconic	Low iconic——High Iconic
	E3 Artistic diversity	Monotonous——Abundant



Figure 5. Floor plan of Taoxichuan.

3.4.2. Semantics disambiguation analysis

According to the statistical analysis of the sample data, the SD scores of various landscape nodes in Taoxichuan were obtained, and the average values of each SD factor were calculated (Table 5). Using the evaluation factor score as the vertical coordinate and the landscape factor as the horizontal coordinate, the SD evaluation curve graph was plotted by corresponding the evaluation scores of similar landscape nodes with the average score. The analysis results show that most of the 8 SD factor scores are distributed between 0 and 3, and a few evaluation factors have negative values, and the score averages are between 0 and 2, which reflects that the respondents are generally satisfied with the evaluation of the landscape nodes.

Table 5. Semantics Disambiguation semantic analysis of landscape elements.

SD Factors of Landscape Element	Samples						Average
	1	2	3	4	5	6	
A1 Plant aesthetic	1.91	0.60	2.50	0.70	1.30	0.20	1.20
B1 Harmony of Water feature	2.09	0.00	2.91	2.73	2.14	0.45	1.72
C1 Historical heritage continuity	1.60	-0.40	2.90	1.70	2.10	2.50	1.73
C2 Architectural aesthetics	2.00	0.10	2.50	2.10	1.70	0.60	1.50
D1 Location clarity	2.60	1.00	2.92	2.00	2.70	-0.40	1.80
D2 Cleanliness of the environment	2.80	2.40	2.70	2.70	2.80	2.50	2.65
E1 Visual interest	2.73	-0.18	1.73	0.00	2.09	1.00	1.23
E2 Cultural iconic	1.70	-0.70	0.20	0.00	2.60	1.30	0.85
E3 Artistic diversity	-0.13	-0.80	0.27	-0.40	1.91	1.20	0.33

According to Figure 6, sample 1 had lower scores than the average for SD factors C1 and E3, while sample 2 had all 9 scores lower than the average. Sample 1 and sample 2 had similar scores for SD factors D2 and E3, with D2 having a higher score for environmental cleanliness and E3 having a lower score for art diversity. The other SD factor scores between the two samples showed large differences, with sample 2 having an overall lower score and negative scores for factors B1, E1, E2, and E3. Sample 1 and sample 2 were respectively the south gate and north gate of the park. Sample 1 served as the main entrance with a prominent location and flat lawns on both sides, with installation art themed on industrial heritage on the lawns, and a water feature at the entrance sign, resulting in a harmonious landscape consistent with semantic analysis of online comments. Sample 2 served as a secondary entrance with lower traffic flow compared to the south gate, and a visitor center located nearby with only a small area of lawn behind it decorated with industrial parts as installation art. Therefore, to enhance the cultural perception of the north gate's landscape and improve the lasting impression of the visit to the Taoxichuan scenic area, improvements are still needed in terms of water features, architecture, public art, and other landscape elements

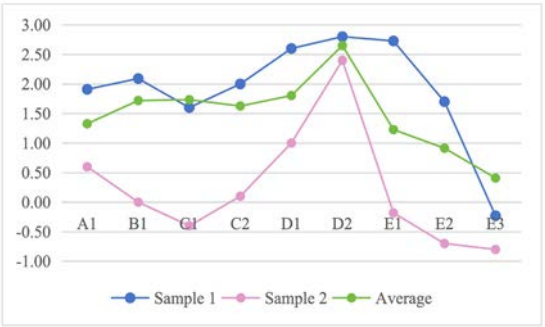

Figure 6. Semantics Disambiguation factor evaluation curves of landscape elements of sample 1 and sample 2.

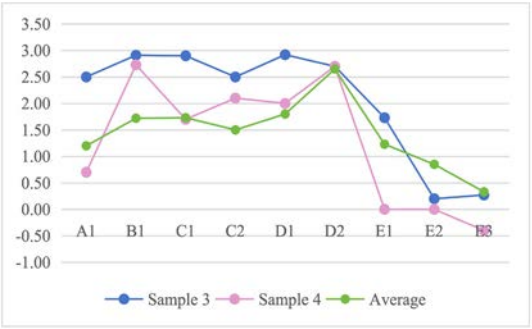

Figure 7. Semantics Disambiguation factor evaluation curves of landscape elements of sample 3 and sample 4.

Based on Figure 7, sample 3 of the landscape node has lower scores than the average for the SD factor E2, while sample 4 has lower scores than the average for factors E1, E2, and E3, with a negative score for factor E3's artistic diversity. Sample 3 has higher scores for SD factors than sample 4, with differences in scores for the factors A1 (plant aesthetics), C1 (historical heritage continuity), D1 (location clarity), and E1 (visual interest). Sample 3 and sample 4 are the Dream Ballad Square and the front square of the Sand-cast Art Museum, both of which are relatively open spaces with plants and water features. In terms of plant aesthetics (A1), sample 3 has a more distinct and diverse plant hierarchy than sample 4 and has benches for visitors to rest. In terms of historical heritage continuity (C1), both sample 3 and sample 4 have iconic factory buildings around them, and the chimney left by the Universe Porcelain Factory in the pool at sample 3 is one of the most representative landscape elements in the park. In terms of the visual interest of public art (E1), Dream Ballad Square (sample 3) is adjacent to the Taoxichuan Art Museum and has temporary installation art based on the exhibition theme, while there is no public art around sample 4, resulting in a lower score.

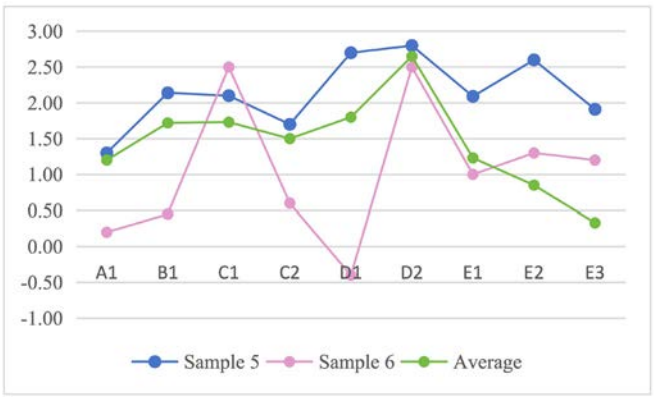

Figure 8. Semantics Disambiguation factor evaluation curves of landscape elements of sample 5 and sample 6.

According to Figure 8, sample 6 scored lower than sample 5 on all five SD factors, with significant differences observed, particularly for factor D1 (clarity of location) where sample 6 scored the lowest and had a negative score. Sample 5 and sample 6 represent the Taoxichuan Museum of Art and the Jingdezhen Industrial Heritage Museum, respectively. In terms of clarity of location (D1), sample 5 is located closer to the South Gate entrance and adjacent to the Mianyao Square, with better advantages in terms of geography, plant and water features, and a more visible entrance than sample 6, which is located at the relatively monotonous North Gate with an inconspicuous entrance that makes it difficult for first-time visitors to locate.

3.4.3. Differential analysis of samples

By organizing the evaluation results of three sample points and conducting paired t-tests, the significance and differences between indicators and means were tested(Table 6.). The results showed that the significance of means and samples 1, 2, 3, and 5 were all less than 0.05, indicating significant differences between them and the mean. Based on the paired mean of sample 1, the significance P value was 0.046**, indicating a significant difference between sample 1 and the mean, and the Cohen's d value was 0.789, indicating a moderate difference magnitude. For samples 2, 3, and 5 paired means, Cohen's d were all greater than 0.8, indicating a very large difference magnitude, which is consistent with the results of the factor analysis.

Table 6. The difference test of different sample points.

Plot	Mean Deviation	Standard Deviation	t	p	cohen's d
1	0.47	0.602	2.366	0.046**	0.789
2	-1.21	1	-6.267	0.000***	2.089
3	0.63	0.707	2.692	0.027**	0.897
4	-0.16	0.741	-0.636	0.543	0.212
5	0.71	0.613	3.477	0.008***	1.159
6	0.45	1.070	-1.255	0.245	0.418

Note: ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

4 Discussion and Conclusions

Social media data can serve as a cost-effective, widespread, and real-time source of information[54]. Furthermore, data from social media can provide insights into the destination image, which encompasses what people know, how they feel, and their actions in relation to a place[55].The focus of our study is to integrate text analysis and image analysis. By comparing these two different methods, we found that the textual content in online comments tends to focus on experiential descriptions of cultural and recreational activities, while the image content emphasizes visual perceptions of the environment and ceramic handicrafts during the tour[56,57].

According to the frequency analysis, cultural activities are much more prominent than outdoor landscapes in the text comments, and tourists' travel motives are mainly for sightseeing and leisure. Taoxichuan preserves the industrial heritage culture of the original porcelain factory through environmental factors such as old factory buildings and landscapes, and outputs more diverse and creative porcelain culture through markets, exhibitions, and other cultural activities. The park highlights the design and creativity of the transition from old factory buildings to a modern aesthetic living platform, realizing the cultural heritage protection principle of "preservation and utilization".

The semantic network of textual comments presents a "multi-center, multi-level" structural characteristic. The relevance between recreational and tourism values and landscape elements such as ceramics, factory buildings, and markets is most significant. The relevance between aesthetic value and landscape elements such as ceramic craftsmanship, night lighting, and art galleries is relatively significant. The relevance between sense of place and cultural value and building and ceramic craftsmanship is relatively significant. The relevance between educational value and ceramics and markets is extremely insignificant. Tourists have a high perception of the recreational and tourism

value, followed by aesthetic value, sense of place, and cultural heritage value. Their perception of educational value is the lowest.

There are significant differences between image comments and text comments, with outdoor landscapes accounting for a much larger proportion of image comments than text comments. Elements such as markets, urban spaces, ceramic shops, and art galleries fill the cultural activities and service facilities of Taoxichuan; while elements such as buildings, chimneys, and water features depict the landscape imagery of Taoxichuan, making it more visually perceptible and memorable.

The above research shows that there are significant differences in the evaluation of three similar scenic nodes in the Taohuayuan scenic area, namely the south and north gates, the art museum and the industrial heritage museum, and the Mengyao square and the square in front of the Sand-cast art museum. Through SD semantic analysis, the reasons for the differences are explored and some suggestions are proposed：

•Enrich public art pieces to enhance visual effects.

The evaluation curves of the SD factors indicate that the visual appeal, cultural significance, and diversity of public art in the relatively remote North Gate and Sand-casting Museum front square fall below the average. On the other hand, the presence of different themes of public and installation art in front of the South Gate and the Taoxichuan Art Museum contribute to their relatively high evaluation. Thus, it is recommended that the management should plan the landscape of the North Gate in a more rational manner to enhance the overall integrity of the park's landscape. In addition, social and resting facilities should be added to the Sand-casting Museum front square to attract more visitors.

•Optimize key entrances to avoid resource waste.

The research results indicate that the industrial heritage museum is rarely mentioned in tourist evaluations, and the evaluation results of the SD factor show that the evaluation of the museum's location specificity is extremely low. During on-site investigations, it was found that the signage at the entrance of the museum was not clear enough. The management should adjust the entrance of the museum to increase the number of visitors, enhance the output of educational value, sense of place, and cultural heritage value, and avoid the phenomenon of being ignored.

•Reconfigure facility arrangements to highlight cultural distinctiveness.

Based on the findings of the study, the cultural output of Taoxichuan is primarily reflected through the recreational and tourism value, aesthetic value, sense of place, and cultural heritage value of its cultural landscape. Visitors experience cultural output through visual and touring experiences during their visit and after they leave. To highlight the ceramic cultural characteristics of Taoxichuan and bring visitors closer to the ceramic culture, managers could increase the availability of on-site ceramic art experience services, enhancing visitors' engagement and making cultural activities in the park more suitable for all ages.

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Ritual Hidden in Vessel - Research on Cultural Metaphors in the Design of Early Chinese Pottery Ritual Vessels

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Abstract

Early Chinese pottery ritual vessels are important symbols, which are endowed with various special meanings. The design of pottery ritual vessels contains the unique aesthetic ideals of the Chinese nation, the hierarchical concepts of superiority and inferiority, and the thinking modes of observing objects and interpreting images. The emergence and development of pottery ritual vessels solidify the footprints of culture and carry the memory of culture. Through the analysis of the design metaphors in the shape, decoration, color and other elements of pottery ritual vessels, this paper explores the deep cultural genes embedded in the creation design of pottery ritual vessels.

keywords

Pottery Ritual Vessels, Creation Design, Metaphor

Introduction

The Chinese nation has a glorious history of pottery culture, and pottery is a cultural medium invented by ancient ancestors to inherit their blood. Pottery began in ancient times when "the wise created objects" to solve the practical problems of survival, and then extended to spiritual objects, which became ritual objects endowed with special significance in sacrificial, funeral and banquet ceremonies. Influenced by the ritual culture, the early Chinese creation design has formed a unique and institutionalized creation system at all levels, such as shape, decoration, technology and concept. Li Qi of the Book of Rites said: "The use of ritual as a tool leads to a situation of great obedience. Such a situation is a manifestation of great virtue." The design of pottery ritual vessels in early China constructed the basic aesthetic paradigm of utensils, solidified the invisible "ritual" on the tangible "utensils", and made utensils the material carrier of consciousness, culture and system. When the pottery ritual vessels are used in the ritual space, they not only refer to the simple objects used in the ritual, but also imply the political system, patriarchal ideology and ethical and moral norms of various times, reflecting the social relations such as power, rank and identity. The cognition and exploration of pottery ritual vessels can not be limited to the objects themselves, but must go beyond the level of technology and function, and then radiate to the level of vessels and rituals, vessels and Taoism.

Early Chinese pottery ritual vessels embody the cultural spirit and values of the early society, contain the cultural genes of the early Chinese culture, carry the cultural memory of the nation, and have a strong cultural metaphor. Pottery ritual vessels not only witnessed the rapid development of aesthetic consciousness and technological level in early China, but also assumed the educational function of social ethics in thousands of years of narrative.

The external "physical" form of the objects and the internal metaphorical code of order of the objects are mutually relevant, showing the moral ethics and values of the ancients through the visual styles of shape, decoration and colour.

Cultural Metaphor of Ritual Pottery

Design Metaphors in the Modeling of Pottery Ritual Vessels

The creation design of Chinese traditional utensils bears the imprint of social system and concept. Through the "physical" shape of utensils, it conveys the "metaphysical" cultural connotation, making utensils carry more meaning and become the symbolic carrier of politics, religion, ethics and so on. The cultural representation of Xizang rituals promotes the development of practical utensils, and the connotation and extension of the system of objects are enriched. Pottery, as the original functional daily necessities, is endowed with sacred aesthetic symbolic value, which makes daily utensils enter the sacred cultural zone with the changes of history, breaks through the material level, and contains the sacred "Tao" of heaven and earth. The activities of making pottery ritual vessels in early China not only included the general knowledge level of the society at that time, but also infused the ideas of the aristocratic class as the elite of the society at that time, which integrated skills and strategies, experiences and concepts, knowledge and beliefs. The ingenuity of creation design and the richness of cultural connotation embodied in the shape of pottery ritual vessels are incomparable to ordinary objects.

At the end of the primitive society in China, the sprout of "Li" had already appeared. In the Book of Rites recorded: "The origins of ritual lie in food and drink. As long as burnt millet and grain and pork for the gods to enjoy food, cut into the ground as a cave as a kettle and offer water to the gods with their hands, and beat the earth drums for music, they were able to convey people's prayers and respect to the gods and ghosts." It shows that the early pottery ritual vessels come from the daily food vessels. With the development of society, in order to "serve the heaven, serve the earth, serve the ancestors, and favor the monarch and master", the ancestors paid more attention to the choice of the shape of ritual vessels, and presented a symbolic existence through the shape, so as to be different from the daily-use vessels. Ritual vessels gradually became the symbol of the status and rank of the ruling class given by "theocracy", and had specific social functions. For example, the pottery of Dawenkou culture is a typical representative of the early pottery ritual vessels. The shape of the original pottery is the crystallization of the rich creativity and imagination of the ancestors, with the characteristics of practical simplicity, simplicity and honesty. Later, the ancestors began to use the artistic technique of image exaggeration, based on the stability principle of "tripartite confrontation", to create and design three bag-shaped feet; the mouth and neck of pottery, like a rooster stretching its neck and holding its head high, symbolizing the spirit of self-improvement and self-improvement. The handles are interwoven like ropes, showing the vitality of unity, progress and concerted efforts. The shape of early pottery contains the wisdom of the ancients and shows the extraordinary artistic creativity of the ancients.

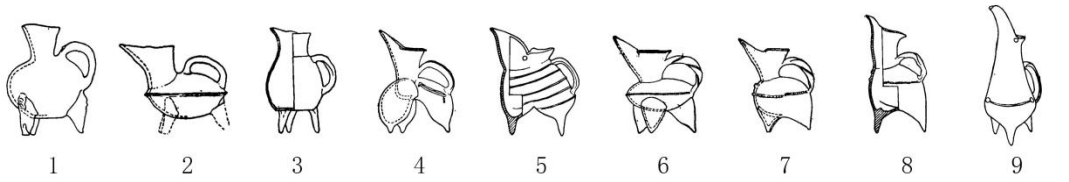

Figure 1. Development and Evolution of PotModeling in Dawenkou Culture Period

With the continuous development of ritual culture, in the late Dawenkou culture, the shape of the pitcher with three legs is also constantly changing. The bag foot is changed from a solid foot to an empty foot, the three feet are more slender, the neck is higher, thinner and straight, the flow part is more obvious, the wall of the vessel is thinner, which gradually deviates from the actual use function, developing from the simple and practical spirit to the delicate and delicate direction. This characteristic of pursuing the delicate and slender shape of utensils and abandoning some practical functions of utensils is more obvious in Longshan culture, giving birth to the pottery ritual vessels represented by eggshell pottery goblets. The shape of this kind of utensil is characterized by elongated feet and neck, extremely thin wall, beautiful and light overall shape, and gradually weakened practical function, which is not suitable for daily use. Just as it is said in the Book of Rites, "The utensils of the ancestral temple can be used, but they cannot be used conveniently.". Therefore, those who are handed over to the gods cannot be the same as those who are in happiness. This shows that the ritual vessel has the same shape as the "utensil" in type, but as a symbol of political authority, it is different from the daily utensil in technology and shape, and has reached the requirement of "not convenient for its benefit". The black pottery ritual vessels of Longshan culture, represented by the thin-bodied goblet, "pursue the perfection of material, shape design and technology", only appeared in a few high-level tombs, and only a few aristocrats could own them, thus becoming a symbol of identity, power and status. Rosen, a British scholar, once said, "a senior figure in a society can dominate the most striking style of any type of object, and can possess the largest number of styles and the largest variety." The change of the shape of the finely-made thin black pottery ritual vessels reflects the differentiation of social hierarchy from Dawenkou culture to Longshan culture. In order to rule, the ruling class used ritual vessels to regulate social order and produced a strict hierarchical system. The pottery ritual vessels not only have unprecedented class attributes, but also become the criterion for the ruling class to adjust internal relations.

Design Metaphors in the Decorative Patterns of Pottery Ritual Vessels

Wu Hong, a famous scholar, mentioned in his book Monumentality of Ancient Chinese Art and Architecture that there are obvious differences between ritual vessels and utensils, "first of all, the conscious choice of ‘texture’ and ‘shape’, and then ‘decoration’ becomes another symbol of ritual vessels." As a special symbol, the decorative patterns on early Chinese pottery ritual vessels carry people's beliefs, emotions and wishes." These objects, decorative patterns and symbols are actually the references of a specific group of people to record, disseminate and inherit their memories and emotions, and are passed down from generation to generation." Taking the early Liangzhu culture in China as an example, the unique decorative patterns in pottery played an important role in the construction of social etiquette at that time, and they were outstanding representatives of the creation design of Liangzhu ancestors. Liangzhu culture is known as "the dawn of Chinese civilization", and

the etiquette system has tended to be standardized and institutionalized, forming the primitive etiquette system in early China. Liangzhu pottery is classified as an important sacrificial ritual vessel, on which various patterns are drawn. In addition to aesthetic needs, the pursuit of spiritual value and symbolic significance of patterns is more important. Through the visual form of patterns, people change pottery from ordinary daily utensils to symbolic ritual utensils. The combination of various decorative patterns on the pottery of Liangzhu Culture is not a subsidiary object depicted randomly on the surface of the utensils, but a symbolic symbol system to show the economy, society and beliefs at that time, which makes the pottery an important medium to communicate and worship the gods in the ceremony.

The decorative patterns of pottery ritual vessels in Liangzhu culture reflect the ancient people's philosophy of creation. "Interpreting images and making utensils" is the main mode of thinking in the design of early Chinese designs. It is recorded in the Great Appendix of the Book of Changes: "Anciently, when Pao-hsi had come to the rule of all under heaven, looking up, he contemplated the brilliant forms exhibited in the sky, andd looking appearances of birds and beasts and the (different) suitabilities of the soil. Near at hand, in his own person, he found things for consideration, and the same at a distance, in things in general. On this he devised the eight trigrams, to show fully the attributes of the spirit-like and intelligent (operations wrking secretly), and to classify the qualities of the myriads of things.". Liangzhu area has a humid climate and high vegetation coverage, which is suitable for the survival of various birds. There are some records about birds in ancient books such as The Classic of Mountains and Seas, the Work of Han Feizi and The Commentary on the Waterways Classic. In the early society of slash-and-burn cultivation, birds could peck insects in the fields, "pull up the grass roots in spring and peck their filth in autumn", which was beneficial to agricultural production. In the long-term productive labor, people have developed a feeling of worship and love for flying birds and beasts. By observing the dynamic and static postures of birds, people use various techniques such as decomposition, synthesis, exaggeration and geometrization to create "bird images" of different shapes. The image of birds appeared in a large number of jade articles and pottery in Liangzhu Culture, which was also the reaction of social ideology at that time, and had a certain relationship with primitive religious sacrifices. People decorated the sacrificial vessels with bird patterns to express the pious wishes of their ancestors, "praying for the communication between human beings and gods through the magic of birds", which is a manifestation of the integration of aesthetic pursuit and natural worship. For example, a black pottery statue with bird patterns unearthed in Xiyangdian, Qingpu County in Shanghai, has four parts of abdominal decoration, namely, a dynamic bird's side-view image, a static picture of a perched bird and two positive images of birds about to spread their wings and fly high, which has a strong realism. In addition, pottery unearthed in Fuquan Mountain, Qingpu County, such as a double-handle pot with a lid and a broad handle pot, all have bird patterns. These carved pottery and precious jade articles such as jade locks and jade pieces were unearthed in the same tomb, indicating that "carved pottery has become a symbol of identity and rank, and the theme of identity may be a reflection of etiquette, so these carved pottery should be an important part of the ritual vessels of Liangzhu culture."

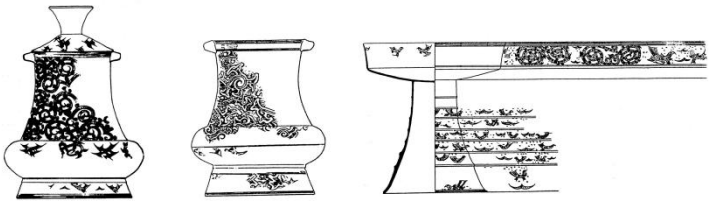

Figure 2. The Pottery with Bird Patterns Unearthed from the Liangzhu Culture

The decorative motif of Liangzhu pottery ritual vessels is bird pattern, which is presented on the pottery in different ways of expression, and gradually forms a mature system of decorative symbols. The repetition of decorative motif in different objects is an emphasis on cultural connotations, while decorative patterns become metaphorical symbols of culture, showing the the way of creative thinking of Liangzhu ancestors and primitive religious and cultural ideas.



Figure 3. The Bird Patterns on the Pottery of Liangzhu Culture

Design Metaphors in the Color of Pottery Ritual Vessels

In the history of Chinese culture, people are accustomed to using color to show their courtesy, and it has have rich social meanings. Color plays a very important role in the early creation design, which is glowing in humanistic connotations. Imprinted with the spirit of the early Chinese nation, and has become an important symbolic language for conveying feelings and meaning in social life. The choice of color in Chinese creation design is not only the aesthetic demand, but also the projection of ideas and concepts, which reflects the deep cultural consciousness and metaphors people's value orientation and ethical thoughts.

In the primitive period, the ancestors' choice of color was more out of instinct than the real aesthetic needs of art. Their use of color was strong, simple and clumsy, which was closely related to survival, reproduction and belief, carrying with the life consciousness and sensual color at that time. "Through the shape and color of pottery, we can clearly feel their emotions". The color design of early pottery was restricted by the technological level of pottery making, and due to the limitation of technology, the ancestors could not choose many colors when making pottery, but their selections of "color" already contained the aesthetic consciousness and early religious consciousness. With the development of ritual culture, color has gradually become a symbol of concept and a metaphor from the instinct of primitive period. In Yuzao of the Book of Rites, there is a record about the positive color and the intermediate color. It is clear that the five positive colors are "green, red, yellow, white, and black". It is said in Tan Gong I of the Book of Rites: "Yin people advocate white, and animals use white." In The Book of Three Unification, it is also said that “the Yellow Emperor is a man of unity, in favor of white and Shaohao, the son of Emperor Huang, is also advocating white”. All these show that color has been integrated with the ritual

system and the concept of hierarchy, and has become a symbolic visual element to identify the hierarchy and complement the ritual system under the infiltration of the ritual culture, and the symbolic significance of color has been further strengthened. The design of early Chinese pottery ritual vessels was also influenced by the concept of "color", which paid more attention to cultural interpretation and symbolic expression. For example, in 25 tombs in the late period of Dawenkou Cemetery, 198 pieces of white pottery were found, and a large number of precious white pottery ritual vessels such as white pottery zun (jar), white pottery container and white pottery food vessel were unearthed, "which is the site with the largest absolute number and the highest proportion of white pottery unearthed so far." In addition to the Dawenkou site, a large number of white pottery ritual vessels were also found at the Erlitou site in the Yiluo area, and more than 1,000 pieces of white pottery were unearthed in some ash pits, indicating that in addition to being used for burial, the Erlitou site was "also used for ritual activities before production or for banquets in life". The firing temperature of white pottery is much higher than that of ordinary pottery, and its firing technology and kiln structure are different from that of ordinary pottery, which can only be owned by a few ruling classes, with obvious ritual color, reflecting the social hierarchy and cultural concepts at that time.

A large number of black pottery also appeared in the early Chinese pottery ritual vessels, and the color concept of "advocating black" prevailed in the Xia Dynasty. There is a record of "Xiahou's advocating black" in the Book of Rites, Tan Gong I, and the interpretation of black in Shuowen Jiezi is that "black is the color of the north, smoked by fire, derived from inflammation". With the rise of the black-advocating custom, the demand for black pottery ritual vessels is also increasing gradually, which promotes the development of black pottery technology. Longshan Culture saw its peak, creating a large number of exquisite black pottery ritual vessels represented by eggshell black pottery, which also had an important impact on the pottery ritual vessels of Erlitou Culture. In the early period of Erlitou cultural site, clay black pottery and sand-filled black pottery were prevalent, and many black pottery tripods, black pottery food vessels, black pottery wine vessels and other pottery were unearthed. However, the clay black pottery increasingly decreased and disappeared from the Xia Dynasty to the Shang Dynasty, which reflects the evolution track from the "black-advocating" style in the Xia Dynasty to the "white-advocating" style in the Shang Dynasty. The color of pottery ritual vessels has a profound historical origin and cultural accumulation.With the shape and decoration of pottery, the color makes the pottery ritual vessels different from the daily utensils, and becomes a symbol of identity and power, reflecting the specific ethical and social significance in the "order of superiority and inferiority", so it becomes a symbol of the early ritual culture.

Conclusions

Early Chinese pottery ritual vessels are the carrier of culture, which can reflect the politics, system and culture of the society at that time. As a kind of utensils with rich cultural metaphors, pottery ritual vessels show the brilliance of early creation design with their unique shapes, decorations and colors, which has an important impact on the development of ancient creation culture in China, and also promotes the continuous development of ritual culture to a certain extent. The design of pottery ritual vessels conveys the aesthetic ideals and social and cultural thoughts of the early people through the external formal language such as the shape, decoration and color of the vessels in a "symbolic" metaphorical way. By analysing the cultural metaphors of early Chinese ceramic ritual vessels, this paper demonstrates the cognitive characteristics of the early people from "vessels" to "rituals", and presents the unique narrative mode of vessels in the early society.

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A Semantic Study on the Image of the Door Lintel of a Tomb: Taking the Portrait Bricks from the Han Dynasty Tomb in Fanji, Xinye as Examples

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Abstract

The excavated Han Dynasty portrait bricks tomb in Fanji Township, Xinye, Henan Province reflects the social life and belief in life and death of the Han people during the period from Emperor Wu to Xinmang. The portrait bricks at the lintel of the tomb gate are extremely important in communication between humans and gods because they are located at the boundary of the transformation of yin and yang. Through the analysis of the portraits here and the study of their position in the overall tomb space, it can be seen that in the Han Dynasty, the tomb chamber was considered a "palace of refinement" to achieve the process of transforming from ghosts to immortals. In terms of social representation, the production of portrait bricks at the lintel of the tomb door reflects standardized construction and hierarchical etiquette. The images have functions such as indicating fields, separating spaces, and seeking good fortune and avoiding evil, making the Han tomb the "divine palace" for Han people to achieve their ultimate ideals.

keywords

Tomb Door Lintel; Image Research; Fanji, Xinye; Portrait Bricks

Introduction

From the end of the last century to the beginning of this century, archaeologists excavated a total of 49 Han Dynasty tombs in Fanji Township, northeast of Xinye County, including 37 portrait bricks tombs. The tomb doors of these tombs are usually composed of two columns and one lintel, and the use of portrait bricks has a wide range of themes and rich content, reflecting the artistic style of tombs from the Wu Emperor period to the Xinmang period. Fanji Township has been under the jurisdiction of Nanyang County since the Qin Dynasty. These tombs were also used by small and medium-sized landlords or low-level officials, reflecting in many ways the social life and belief in life and death of people in the imperial capital of Nanyang at that time.

In the Han Dynasty tomb in Fanji Township, the portrait bricks at the lintel should have a deeper meaning due to their unique position. The images of the portrait bricks are also of great significance for studying the design concepts of the Han Dynasty. However, there is currently little research from the perspective of design, only focusing on archaeology, musicology, and cultural exchange. Therefore, from the perspective of design, I will analyze the images of the lintel of the tomb gate in this area and its special position in the overall tomb architecture from a macro perspective, exploring the significance of these portraits in the communication between man and god and social representation.

Image: Symbols for communication between humans and gods

The portrait bricks used in the lintel of Han Dynasty tombs in Fanji Township mainly include images of Chariots and Horses Traveling, Killing Three Warriors With Two Peaches, Salvage the Ding in Sishui, Sino-Barbarian Battle, Theatricals and Variety Shows, Saluting, Fengque Palace, and Two Dragons Crossing the Jade Bi. These seemingly unrelated images are all selected as lintel portraits. Do they share a common meaning based on a specific narrative system? This first requires interpreting several typical schemas.

Case Study 1 –Chariots and Horses Traveling

In the lintel of Han Dynasty tombs in Fanji Township, the most common portrait bricks theme is about Chariots and Horses Traveling, which is commonly used in Han Dynasty tombs such as M16, M24, M36, and M37. For example, in the M24 tomb of the Three Chamber Tomb, the tomb gate is 3.79 meters wide and 1.6 meters high, with the same three door lintel portrait. It is called "Chariots and Horses Traveling, Drum Dances, and Salvage the Ding in Sishui" (Figure 1), which mainly depicts a team of chariots passing through the Fengque Palace and Arch Bridge, continuing to move forward. In the center of the picture, to the left, there is a canopy cart driven by two horses, and the person sitting on the left side of the cart should be the tomb owner. These types of portraits do not show the destination of the chariots and horses, only a part of the journey, but there are hints in the architectural orientation of the tomb chamber: the M24 tomb door faces north (Figure 2), and the direction of the chariots and horses also points west, which is in line with people's belief at that time that going to the Western Kunlun Wonderland where the Queen Mother of the West is located is the highest ideal after death, as Sun Zuoyun mentioned when discussing the painted banners unearthed from Han Dynasty Tomb No. 1 in Mawangdui: Regardless of the painted banners or murals in the tomb, the deceased faces left when ascending to the sky, that is, to the west. If a person wants to ascend to heaven and become an immortal, they must head westward. "



Figure 1. The M24 lintel portrait brick of the Han Dynasty Tomb in Fanji, Xinye, titled "Chariots and Horses Crossing a Bridge, Drum Dance, and Salvage the Ding in Sishui" ,120 cm × 34 cm

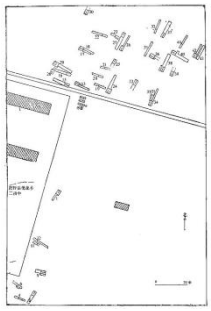

Figure 2. Distribution of Han Dynasty Portrait brick Tombs in Xinye Fanji

Accompanied by such images of Chariots and Horses, there are often Killing Three Warriors With Two Peaches , and Salvage the Ding in Sishui. Killing Three Warriors With Two Peaches embodies the spirit of the three warriors' martyrdom, and they are also depicted in Jiang Sheng's Han Dynasty Ascension Genealogy. This image is placed at the lintel, symbolizing that the tomb owner will also be able to ascend like the three warriors. Salvage the Ding in Sishui reflects the idea that the heavens do not sustain the Qin dynasty and the Liu should be the king of the China. The dragon in it also implies that this journey is not just a representation of reality, but a hidden divine path. Combined with the portraits of the gate pillars, the images of the M24 tomb gate (Figure 3) from bottom to top are: Nu Wa assisting in rebirth, Pu Shou dispelling evil spirits, gate officials holding halberds, Feng Que referring to the "Heavenly Gate", and the scene of passing through Feng Que towards the Western Queen Mother Fairyland, showcasing the tomb owner's journey from death to rebirth and then to the fairyland. Therefore, the purpose of arranging such a carriage and horse travel map at the lintel of the tomb gate is self-evident, that is, to represent the grand occasion of the tomb owner after his rebirth and before his ascension to immortality.

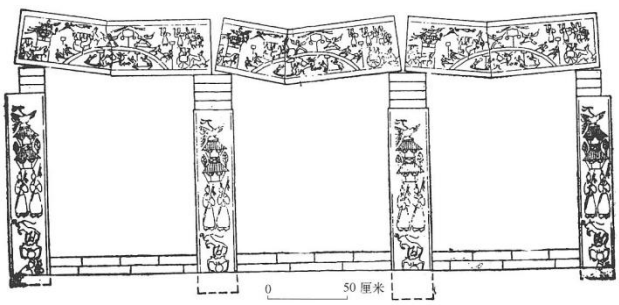

Figure 3. Front View of M24 Tomb Gate in Fanji Han Dynasty Tomb, Xinye

Case Study 2 – Sino-Barbarian Battle

In the double chamber tomb M37 of Fanji Township, the brick portrait of "Sino-Barbarian Battle" at the west lintel (Figure 4) vividly depicts the scene of the battle between the Chinese people and the barbarians in the Han Dynasty. The depiction of the enemy and us by the craftsmen also reveals strong national emotions. The victorious Han Dynasty army and the defeated barbarian soldiers bring back memories of the scene of Wei Qing and Huo Qubing's horse enter the Qilian Mountains, marching in the desert, and engaging in bloody battles with the Xiongnu. On the right side of the brick (in the direction of the tomb) are several abrupt peaks, and the soldiers

on the top and around the mountain are all dressed in barbarian costumes. In the middle of the picture, there are mostly Han Dynasty soldiers galloping on horses. They either advance to the right to drive away barbarian soldiers or capture prisoners and turn left. According to the orientation of Tomb M37, the left direction of this portrait brick is also west, so the destination for defeating and returning is also consistent with the west where the Queen Mother of the West is located.

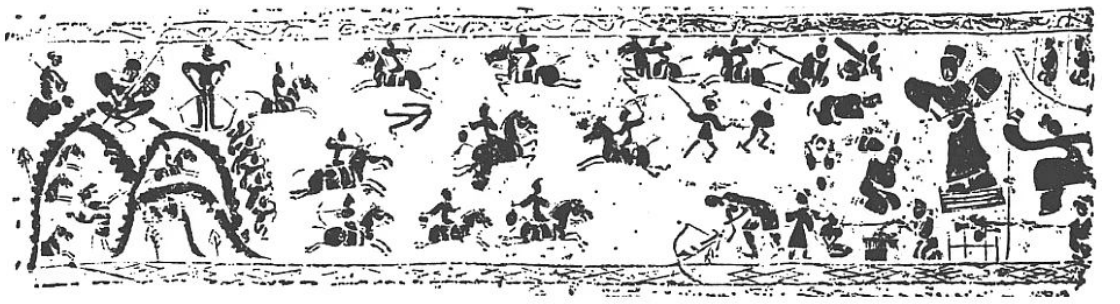

Figure 4. Henan Xinye Fanji Han Dynasty Portrait brick "Sino-Barbarian Battle" 122cm × 32.5 cm

The "Sino-Barbarian Battle" was originally related to the sacrificial activities in ancestral temples during the pre Qin period. Mr. Xin Lixiang proposed that the barbarians were referring to the guards of the underworld when studying the "Sino-Barbarian Battle" on the west wall of the Xiaotangshan Temple in Changqing, Shandong. He believed that such images appeared in the temple to show the tomb owner leading an army to attack, breaking through the obstacles of the underworld army, and rushing to the temple to receive sacrifices from descendants. The same portrait, when its position changes, its image semantics will also be transformed accordingly. When this type of image is extended from the ancestral temple portrait to the lintel of the tomb chamber, it will also present more of the tomb owner's state in the underground world, which is likely to be based on the strong military strength of the Han Dynasty Empire when it defeated the Xiongnu, to metaphor the tomb owner's strong power in the underground world, which can easily break the strict restrictions of the underworld and travel to the Western Kunlun Wonderland. Combined with the portrait bricks of the eastern lintel of the tomb M37 titled "Carriage and Horses Traveling, Visiting, and Killing Three Warriors With Two Peaches ", the symbolism of this tomb lintel image is clear at a glance, that is, the tomb owner breaks through the boundaries of yin and yang and travels to the west.

Case Study 3 – Two Dragons Crossing the Jade Bi

If the meaning of the first two images in the tomb chamber is still obscure, the meaning of Two Dragons Crossing the Jade Bi is quite clear. This image is used in both the Han Dynasty tombs M23 and M38 in Fanji Township, such as the lintel in the single chamber tomb M23- the brick portrait of "Two Dragons Crossing the Jade Bi, Tiger, Cow, and Pheasant" (Figure 5). In the Han Dynasty, people believed that Jade Bi had the magical effect of attaching the souls of the deceased and preventing their bodies from decaying. At the same time, " Jade Bi is a spiritual object that connects with the sky, and also a keepsake and medium for dialogue with the sky. Its divinity comes from its circular features. The circular holes represent the heavenly kingdom, representing the form of the heavenly gate. Placing it in a tomb is expected to guide the deceased soul to ascend into the heavenly realm. With it, it indicates that a passage to the heavenly kingdom has been built. In the Han Dynasty, dragons were usually seem

as mounts for ascending to heaven, and the mating of two dragons had the divine power to help the deceased revive. Therefore, placing the Two Dragons Crossing the Jade Bi at the lintel of the tomb door was to revive the tomb owner from the dead and achieve the vision of ascending to immortality.



Figure 5. Tiles depicting the M23 lintel of the Han Dynasty Tomb in Fanji, Xinye, titled "Two Dragons Crossing the Wall, Tiger, Cow, and Pheasant", 110cm × 34.5 ㎝

Looking at the image configuration of the M23 tomb gate (Figure 6), from bottom to top, there are horned tigers and dogs guarding against evil, shield and halberd officials guarding the tomb, and phoenix tending towards good fortune. The portrait at the lintel features a white tiger in the west, cows and pheasants in the east, and Two Dragons Crossing the Jade Bi in the center. The border of the portrait and the diamond shaped ribbons above and below the jade bi strengthen the function of connecting heaven and earth. It can be seen that in tomb M23, the portrait bricks at the lintel of the tomb door indicate the passage for the tomb owner's rebirth.

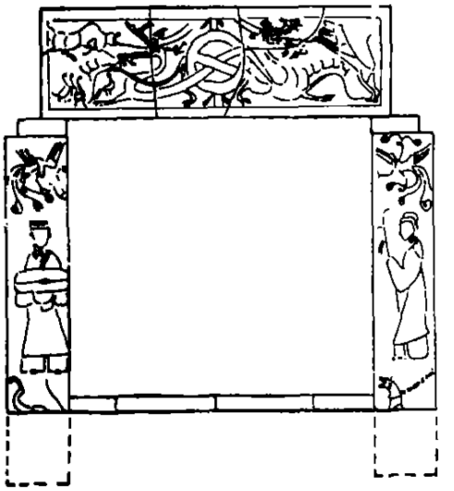

Figure 6. Front View of M 23 Tomb Gate of the Han Dynasty Tomb in Fanji, Xinye

Summary: Before the introduction of Buddhism in the Western Han Dynasty, people believed that there were only two places to go after death: Either ascend to the immortal realm of Kunlun to achieve eternal life, or be trapped in a ghostly world with no sky or sun. The many portraits at the lintel of the Han Dynasty tomb in Fanji Township seem unrelated, but in reality, they share a common meaning based on people's social customs and beliefs in life and death at that time. These images are not only symbols of communication between humans and gods, but also a manifestation of the belief in eternal life.

Positions: The Boundary of Yin Yang Transformation

In the Han Dynasty, people generally believed in Taoism and formed a belief system of "Tai Yin Lian Xing". This belief was described in the collection of Eastern Jin novels "Stories of Immortals": The essence and energy are separated from the original form, and the spirit is ethereal, refreshing and mysterious. It is the Northern Emperor who built the capital, with towering outlines. Ascending to the phoenix palace and visiting the imperial court... ascending to Kunlun Wonderland and enjoy the blessings of a thousand years. In the belief at that time, the tomb chamber was a "refining palace" used for the deceased to ascend to immortality in the underworld. The deceased transformed into immortals in this "refining palace" in the tomb chamber, and then climbed into the Kunlun Wonderland through the heavenly path guided by the Han Dynasty Watchtower.

Under the influence of this concept of life and death, the funeral customs and burial systems of the Han Dynasty also underwent significant changes. One is the completeness of the tomb architectural system. Before the Spring and Autumn Period, there were only temple sacrifice without burial ceremony . By the Han Dynasty, it gradually developed into a tomb system that included underground burial chambers, aboveground ancestral halls, and palaces, and then interwoven various decorative symbols on it to form a complete unique spatiotemporal system. The second is the change in the shape of the tomb chamber. The fully enclosed vertical burial system that was popular before the Qin and Han Dynasty dynasties gradually disintegrated, and instead chose a horizontal burial system that simulated the living residence. The third is the change in funeral methods. During this period, it was popular for couples to bury together in tombs, so more tombs were equipped with freely opening doors for opening the doors for worship or burying other members. The brick chamber tomb in Fanji Township, Xinye County is a place where the living worship in front of the tomb door and seal it with small bricks. When other relatives pass away and need to be buried together, the door is opened to enter. Therefore, the tomb door is not only the last place for the living to bid farewell to the deceased, but also the boundary that separates yin and yang. The images on the tomb door are also constructed around these views of life and death.

The lintel, also known as the horizontal panel above the main door frame, has gradually developed into a decorative, ceremonial, and social architectural construction in ancient China. In aboveground residences, the lintel is used to mark the main entrance of the mansion, which serves as a focal point in the overall architectural decoration due to its unique location. In addition, due to the hierarchical system, only court officials could use it in the old days, and the term "lintel" was also used to refer to family status. In the Han Dynasty, tomb chambers were modeled after living residences and commonly used brick lintels, similar to the importance of lintels in residences. The lintels of tomb chambers should also have important significance.

The lintel of the Han Dynasty brick tomb with a portrait is located at the top of the tomb door, which is the highest portrait in the underground tomb space at that time and the closest portrait to the ground. This connects the two realms of yin and yang and reflects the Han Dynasty people's concept of the tomb owner at the intersection of yin and yang. In addition, A portrait brick of the Han Dynasty Tomb in Fanji Township is made from a mold, that is, they are probably designed according to specific needs and the orientation of the tomb. Therefore, the meaning of the elements in the portrait and the direction of movement are particularly important. As mentioned above,

the portrait here depicts the tomb owner riding a horse and a chariot to the west, or watching music and dance after rebirth, or using the symbol of Two Dragons Crossing the Wall and the symbol of Jade Bi to symbolize the rebirth passage, or using metaphors such as the Salvage the Ding in Sishui, Sino-Barbarian Battle suggest that the tomb owner has a powerful power that can transcend life and death and time constraints.

With the maturity of the belief in life and death and tomb architecture in the Han Dynasty, the images of the entire tomb system also complement each other, forming a logically rigorous and miraculous three-dimensional process that fully represents the beliefs of that time. From the different locations of chariots and horses in the tomb buildings of Henan province during the Eastern Han Dynasty, it can be seen that in the tomb chamber, it is generally arranged on the crossbeams or lintels of the middle and front chambers, and the tomb watchtower is mostly arranged on the base and watchtower body. This high and low relationship indicates that the tomb owner's chariot and horse procession traveled from the lower underground world to the higher tomb temple, and then succeeded in ascending to immortality through the tomb palace symbolizing the "sacred path". However, nowadays, all the wooden ancestral halls of the Han Dynasty have been destroyed, and the murals have also turned to dust. Only a few areas have retained a few cornerstones. In the Han Dynasty tombs of Fanji Township, this image relationship is not significant, but as a crucial step in the development of Han Dynasty portraits, it should also have a similar intention.

Summary: With the prevalence of the belief in "Tai Yin Lian Xing", the funeral customs and burial systems of the Han Dynasty underwent a significant transformation. During this period, the burial system gradually became complete, and the images of various parts complemented each other, fully depicting the belief in life and death at that time. The portrait bricks at the lintel of the Han Dynasty tomb in Fanji Township also reflect the state of the tomb owner at the boundary of yin and yang transformation in the Han Dynasty people's concept.

Functions: The carrier of social representation

In terms of political system, the selection of officials in the Han Dynasty implemented the "filial piety and honesty" system, which led to the phenomenon of "the world regards elaborate funeral as virtue, and the thin end as contempt". In terms of the belief in life and death, Han Dynasty people believed that death is not the end of a person's life, but the continuation of life on another level. If one can ascend to heaven, it is an infinite continuation of life on a higher level. As seen by Wu Hong, in the Han Dynasty, a "new concept" had emerged, that is, people believed that tombs were not only the homes of the deceased underground, but also places where the deceased underwent mysterious transformations. Whether depicting a fairy mountain or digging a cliff tomb, there is an unspoken premise behind it, which is that even though death is inevitable, it can be seen as an essential stage on the road to the fairyland. ” Therefore, people at that time also referred to death as "necropsy". Under these influences, the Han Dynasty society prevailed in a culture of elaborate funeral where death was like life.

These customs are greatly reflected in the Han Dynasty tombs in Fanji Township: The layout of "Like Heaven and Earth" was first achieved through the square tomb chamber and arched roof structure, and then the symbols in the portrait further erected the sacred ceremonial space of "transportation heaven and earth". This tomb system not only reflects the standardized construction of ancient Chinese tomb architecture, but also reflects the development of hierarchical etiquette during the Han Dynasty. It also carries the expression of Han Dynasty people's belief in the afterlife. The lintel of the tomb door highlights the functions of indicating the field, separating space, and promoting good fortune and avoiding evil.

Function 1 – Standardization and hierarchical etiquette

In history, most tomb buildings were built in a short period of time. In the mid to late Western Han Dynasty, small " brick chamber tombs" began to be used in the Central Plains and Guanzhong areas. The prefabrication, standardization, and modular production of portrait bricks all contributed to the rapid construction of tomb buildings. In the Han Dynasty tombs in Fanji Township, Xinye, the single room space of the tombs is extremely similar. The tenon and mortise structures of the tomb top bricks have similar patterns, and the size of the tomb door lintel portrait bricks is also similar (Table 1). These similarities should also be related to the Performance of pottery produced locally. The portrait bricks excavated locally are mostly gray and of fine clay, with high sintering temperature. The stress of this pottery determines the maximum size and width of the single room tomb chamber. In addition, the style of portrait bricks in the Han Dynasty tomb group in Fanji Township is also very similar, that is, they are likely made by painters and potters from the same production workshop.

Form	A-type tomb					B-type tomb	C-type tomb
Type	Single chamber tomb	Single chamber side chamber tomb	Double chamber tomb	Double chamber side chamber tomb	Three chamber tomb	Single chamber tomb	Double chamber tomb
Quantity (pcs)	13	2	14	1	4	2	1
Example Tomb number	M23	M28	M39	M40	M24	M16	M36
Door of a tomb Size (cm)	Width 138 Height 129	Width 251 Height 148	Width 274 Height 144	/ /	Width 379 Height 160	Width 168 Height 137	Width 348, Height 132
Lintel Size (cm)	Width 110 Height 34.5	Width 115 Height 32	Width 118 (east), 105 (west) Height 35.5	/ /	Width 120, Height 34	Width 161 Height 33	/ /

In the Han Dynasty, funeral ceremonies and tomb buildings were also the core of the hierarchical system. At that time, imperial tombs could open on all sides, while tombs of other princes and nobles could only open on both sides. Tombs of nobles and nobles were allowed to be three rooms wide. The size, shape, and content of these buildings were all derived from "rites". The hierarchical system of this type of architecture is also reflected in the Han Dynasty Tomb Group in Fanji, Xinye: People reflect their level through the number of tomb chambers, and their personality is demonstrated through decorative images of portrait bricks on the door lintel of the tomb.

Function 2 – Indicating domains, separating spaces, and promoting good fortune and avoiding evil spirits In the mid to late Western Han Dynasty, the tomb architecture system in Fanji Township gradually became complete, and the decorative images of tomb door lintel portrait bricks also highlighted the following functions: In the field of signage, ancient people often hung plaques and signs on the lintels of aboveground residential buildings, which served to support the portal. In the tomb chamber, the images of the lintel often coincide with the witchcraft culture of the time and together form a ritual field of "transportation between heaven and earth". Han Dynasty people also often use mythological images such as the Phoenix Tower, Jade Bi, and Double Dragons to

jointly define the extraordinary temporal and spatial characteristics of the tomb chamber, making it an important field for the tomb owner to transform and ascend to immortality.

In terms of separation space, unlike in the late Eastern Han Dynasty, people used a large number of tomb control items to achieve "eternal separation of yin and yang". In the middle and late Western Han Dynasty, the tomb buildings in Fanji Township expressed more reliance on the belief of the tomb owner to ascend to immortality after his death. The lintel of the tomb door often used auspicious images to separate the real space from the afterlife space. When the tomb door needs to be restarted due to joint burial, the portrait of the lintel once again appeared, serving as a bridge for communication.

In terms of promoting good fortune and avoiding evil spirits, the lintel decoration of residential buildings during their lifetime serves as a medium for communication between humans and gods, often hanging mirrors and pasting auspicious symbols to pray for peace in the home. The lintel decoration in Han Dynasty tombs often uses the four gods of the four square, and the travel map connecting to the fairyland, combined with the strict guarding of the portal, the exorcism of ghosts and demons, and the shop head's title ring on the gatepost, all of which reflect the vision of hoping that the tomb owner's body will not rot to reach the Kunlun fairyland.

Summary: In the Han Dynasty, the funeral culture of "death like life" was prevalent. The portrait bricks on the lintel of the Han Dynasty tomb in Fanji Township serve as a carrier of social representation, reflecting standardized craftsmanship and the development of hierarchical etiquette in terms of quantity combination. The decorative images highlight the functions of indicating fields, separating spaces, and promoting good fortune and avoiding evil.

Conclusions

In the Han Dynasty, the prevailing trend of elaborate funeral, in which the death was regarded as birth, and the underworld was not a terrifying place, but a place for the return and promotion of life. It was a strange time and space filled with new hope, accompanied by gods and sages. From the perspective of design, studying the symbolic logic, image content, and spatial symbols of the lintel of the Han tomb in Fanji Township, it can be seen that the portrait bricks here mostly use portraits such as Chariots and Horses Traveling, Sino-Barbarian Battle, and Two Dragons Crossing the Jade Bi to reflect the tomb owner's state at the junction of the dark and bright, and express the vision of communication between humans and gods at that time. These portrait bricks are extremely important in the tomb ritual due to their location at the boundary of the transformation of yin and yang. By combining the image of the door pillar and studying their position in the overall tomb space, it can be seen that the portrait bricks at the door lintel contain the belief and ritual of "dying first and then transforming" and "Taiyin Lianxing", implying the tomb owner's ascent to immortality. In terms of social representation, the portrait bricks at the lintel of the Han tomb in Fanji Township reflect standardized craftsmanship, the quantity combination reflects the development of hierarchical etiquette, and the decorative images highlight the functions of indicating fields, separating spaces, and promoting good fortune and avoiding evil. The portrait brick tombs surpass the simple place of holding coffins and burial places, and become the "divine palace" for Han people to achieve their ultimate ideals. In addition, the selection of these portraits should also be related to the personal preferences and political tendencies of the tomb owner, in order to meet Confucian ideals or the vision of rebirth.

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Designing a Culture in Which Human Beings Co-live with AI Beings

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Abstract

Artificial intelligence (AI) is advancing rapidly due to breakthroughs in many relevant field recently. However, AI is still regarded as a wide-ranging tool that enables people to rethink how to analyze data information, and use the resulting insights for decision making . What would happen if AI overtake human being in more than half of the areas and request for equal right in the society. This article use brainstorming to generate narrative design and illustration for focus group user study. A new concept: AI being is proposed. Assuming your daily phone becomes an AI being instead of a tool. What would be its role? Could it be equivalent with human being or a pet and is also becoming an indispensable part of the future culture? Is it possible to design a culture for human being co-existing with AI Being ? Above questions and possible answers would be discussed in this article.

keywords

AI being; Emotional communication, Culture design; Cultural difference; Cultural evolution

Introduction

There have been several significant breakthroughs in the field of AI in the recent years. Those bring significant impact in design thinking. AI technology is transforming every walk of life. here are some notable breakthroughs up until that point: 1. GPT-4 and Large Language Models: OpenAI's GPT-4 marked a major milestone in natural language processing. With trillions of parameters, GPT-4 demonstrated powerful capabilities in generating human-like thinking and emotion, answering questions, and more. It showcased the great potential of large-scale language models. 2. Advances in Computer Vision: AI models like Convolutional Neural Networks achieved remarkable results in image recognition, object detection, and image generation. Models like OpenAI's DALL-E demonstrated the ability to generate images driven by textual prompts.

AI Emotion recognition and generation is progressing rapidly too. Researchers were working on improving the ability of AI systems and robots to recognize and understand human emotions. This involves analyzing facial expressions, social contexts, vocal cues, and other physiological signals to accurately identify emotions. As emotional AI and robots become more sophisticated, there were discussions about the ethical implications of creating machines that can mimic or understand human emotions.

Remember that AI, robot and cyborg research and development are rapidly evolving fields, and breakthroughs are continuous. Based on above information, we come up a new concept: AI being , will coming out in the near future. This brings new challenges for design thinking. The definition of AI

being is also discussed in this article. The key differences between AI and AI being this that AI is just a cluster of technologies, and AI being has its own soul, emotion and individual characteristics.

To start this study, it is better to start from daily used smart device. If a phone with a powerful AI were to become a member of society, it would require careful consideration of legal, ethical, and social implications to ensure that AI integration enhances societal well-being while respecting human values and rights.

Designing a culture for human being and AI-being co-living with each other, this might sound like a joke. But before 1822, the first legislation 'Martin' s Act' for the protection of animals was passed, few people ever thought about animal rights and welfare. In this age of technology boom in AI, robot and cyborg fields, it is time to explore this topic. The thoughts during this exploration might open a new door for future design and design research.

Ideation and User Study Methods

Brainstorming is the chosen creative technique used to generate ideas through group collaboration in this study. A skilled facilitator with industrial design and use experience design is selected to guide the brainstorming session, and ensure that the process remains focused on Phone as an AI being , to ensure a productive and effective brainstorming. Since diversity can lead to more innovative ideas, we gather a diverse group of participants who have different perspectives and expertise related to the topic. 12 participants from design, R&D, usability, marketing and sales team with 4 different nationalities (China, Finland, Holland and USA) were recruited to the brainstorming team.

The topic we want to address during the brainstorming session: What can you imagine if your phone become an AI being with life? What would you expect its role? is clearly articulated to make sure everyone understands the objective and scope.

Participants were introduced the newest AI, material and robot technologies, and then were asked to individually brainstorm ideas silently for a every 6 minutes. They jotted down their thoughts on sticky notes. After the individual ideation phase, participants were invited to share their ideas one by one by brief introduction and stuck the notes on a whiteboard. Participants were encourage to elaborate on their ideas, explain their thinking, and provide context. In this stage, the importance of quantity over quality is emphasized. Participants are encouraged to share wild and creative Ideas and build on each other's ideas and avoid criticism or evaluation during the brainstorming phase.

Narrative Design and Illustration

Creating a narrative design and illustration is to craft a visual story that engages the user study objects and conveys a new concept of phone as an AI being. Following narrative design process, we defined characters including their profiles, personalities, appearances, and backstories, design the setting and create a rough outline to map out the ideas with the sequence of events, scenes, and key moments. After refinement we generated a storyline based on the 23 selected ideas as follow:

Setting:

The game is set in modern - day London, and takes place entirely in a London suburb. Our setting follows the laws of mundane reality. There are both indoor and outdoor spaces .

Character:

The main protagonists are Sam and Jane. They are a unmarried couple living in London and are fans of England football team. Sam is a 35-year-old business man. He is a technology stylist, and is intelligent

and inquisitive to new technologies. Jane is a 28-year-old lady who is fashionable acts as a style leader in her friend circle.

Plot:

1.In a Friday afternoon, Jane is in a meeting in the meeting room with her phone on the table.

2.She feel a tap on her shoulder by ultra haptic from the phone. (AI context awareness and ultra haptic tap). The phone actively choose the best way of reminding based on full understanding of current contexts.

3.The phone's AI think it is a right time to show off a close relationship at this moment. A heart is bumping in and out on the screen boosted with vibra (representing Sam).

4.She grasps the phone to her hand and Sam's 3D image appears on the phone. Jane smiles and using finger to closes Sam's lips (means hold on) and walks out of meeting room to the balcony.

5.When she puts the phone to her ear, the call is answered automatically trigger by context awareness. They talk over the phone happily and feel each other's breath (the phone is breathing as the caller. Since Jane is on the meeting so the phone urges Sam to end the call soon by fish-like moving). Sam kisses the phone and Susan feels a kiss on her face via electro tactility, sound, vibra and Sam's face showing on the screen.

6.She puts the phone to the balcony wall and the phone profile turns into spatial loudspeaker mode automatically. "Please come home earlier, let's watch the football game together today", Sam says. Jane replies "Oh, I almost forgot. I was planning to do some gardening but I will do it later. Sorry, I need to rush back to the meeting".

7.The phone call ends, Jane puts the phone to her pocket. The phone body turns automatically into comfortably elastic and starts sleeping and breathing (with stiff and soft transition). Jane's pocket is shallow so the the phone's friction increases and it is difficult to slip itself out from the pocket.

8.The phone is sleeping in the pocket with some movement like a living pet.

9.Sam take out the phone and open the photo album. The phone expects Sam would like to review the photo so the phone change the body softness so that he can browse the images forward and backward by twisting his device. Images are from a holiday trip with Jane to Japan.

10.He finds an image of a Japanese stone garden and starts to modify it. He bends the device concave and convex to zoom in and out; stretches and shrinks to scale the image to the right size;

11.The phone changes to 3D re-modelling mode automatically like a piece of digital modeling clay, and Sam does some minor adjustments by turning and moving his finger on the surface. It is like on a living skin.Sam manipulates and combs the sand with fingers to make a sand rivers, the image and the feeling of the surface follow the changes.

12.Once Sam is happy with the result, he kiss the phone in certain way so the phone understand that he would like to share this with Jane. Then Jane's avatar shows on the phone (speed dial). Sam blows to the phone surface to send the personalized and haptic image to Jane.

13.The phone is breathing in Jane's pocket. Suddenly a message comes in and the heart on device starts beating again, synchronized to Sam's heart. Beat is telling the emotion status of Sam. Jane feels it and takes the phone out of her pocket.

14.The phone turns into a rigid flat display in her hand. An envelop bubble is floating in the surface. Jane squeezes the phone and the bubble explodes to show the Japanese stone garden. The stones and sand can be felt on the surface. There is a smile on Jane's face.

15.Sam and Jane are sitting on the sofa in their living room on front of the TV. Their devices are on a table. Sam’ s phone receives an invitation from a group of football friends. They want Sam to participate to follow the football match together. Supported by smart self-modelling, a football bump out of the display to get attention.
16.Accidentally Jane picks the device. It recognizes someone else than owner holds it in hand. The device roars like an angry cat, the surface changes into rough and hot, and the device gets stiff.
17. Sam laughs and when he receives the phone from Jane, the phone becomes friendly again. On the device surface are floating several illustrated friend groups (e.g. friends playing football together are illustrated with a football). The active ones are striking, the quiet ones are small, blurry and on the background.
18.Sam picks up the football. Faces of thefriends on-line are shown on the display like 3D living sculptures. and an ongoing football match is on the background.
19.At the time, the face of the one who speaks, moves on top of other faces. Sam says a few words: “Hi, guys” to the whole group and it pops up on the background. He can also feel the spatial sound enhancing the feeling of their presence. All the game related information is also available: Sam clicks a single player for their personal information and reviews the highlights of the game.
20.Sam turns on the TV by pointing it with the device. The device view is synchronized with the TV view. The device turns into soft.
21.Sam and Jane are watching the game with devices in their hands. The phone turns into a ball shape to mimic the ball used in the game. The game is boosted on the device with a feedback of the ball on a field, e.g. when the ball is kicked, Sam and Jane feel it moving suddenly to a kicked direction in their hands.
22.As a striker with the football is approaching the goal, all the members of the friend group, including Sam and Jane, squeeze devices in their locations. The squeezes of many people is transferred to a loud sound from the speakers at the football stadium to cheer up the striker.
23.Goal! Sam and Jane are excited, stand up and raise their phones. The movement is also transfer into a group “Hurrah!” and the phones turn into exciting living phone pets showing on the stadium screen. The football Video Jockey notices this virtually loud team, and puts their group and living phone pets to the stadium billboard giving a close-up of an excited audience.

A realistic hand sketch visual style and sweet overall mood are chosen to create rough thumbnails of key scenes and moments in the narrative. These serve as initial visual concepts and help with composition and pacing. We experimented with different angles, and perspectives to find the most effective visual storytelling techniques to convey the key concepts. Based on rough sketches, illustrations are refined by adding details, user interfaces and context. Special attention was paid to character expressions and body language to convey strong emotions and intentions brought by the new species: Phone as an AI being.

Focus Group User Study

Focus groups were used for user study in this project. Since it is a qualitative research method that leverages group dynamics to explore attitudes, opinions, and experiences on a specific topic. Innorder to gain deeper insights and generate qualitative data about: 1. Smart phone and 2. Phone as an AI being. In order to compare cultural differences in perception of new concepts. We conducted 2 focus groups in

Helsinki, Finland and 2 focus groups in Beijing, China. Each focus group has 6 participants, half male and half female, and ages vary from 22 to 64. The briefing session is different for Group1 and Group2 in each site. The Group1 was asked to discuss new insights and opinions if their phone would have some new features.



Figure 1. Narrative Illustration of Phone as AI Being Concepts

In addition, the discussion in group2 started from a possible paradigm shifting that future phones would have powerful AI, life, soul, social status or even equal rights as human being beyond a tool. They might act as your soul mates, friends, brothers, sisters or pets. The facilitator went through the narrative illustration use cases slide by slide with oral explanation. The guided discussions are semi-structured and open-ended, allowing for free-flowing conversation. No time limits were set for group discussion. The participants need to filled in a form with positive, neutral and negative votes to each use case, and also give them grades between 4-10 following similar way as Finnish school grading system.

These Focus groups provide rich and in-depth qualitative data. It is interesting to observe group dynamics and how participants' opinions influence each other. The evaluations and grades can be found in following table: (“+” representing Positive, “N” representing Neutral and “-” representing Negative)

Countries	Finland								China							
Groups	Group 1				Group 2				Group 1				Group 2			
Evaluation&Grades	+	N	-	G	+	N	-	G	+	N	-	G	+	N	-	G
1st impression of the idea	5		1	8.0	6			9.0	5	1		8.0	6			9.5
1. Context Awareness Ultra Sound Tap	3	2	1	7.5	5	1		8.5	4	1	1	8.0	4	1	1	8.5
2. Humanized Ringtone	1		5	5.5	4	2		9.0	4	2		7.0	5		1	8.5
3. Interactive Image	3	2	1	7.5	1	3	2	6.0	2	2	2	7.0	2	3	1	7.0
4. Auto-Answering	1		5	5.5	4	1	1	7.0	1	1	4	6.0	3		3	7.0
5. Emotionally Call & Touch	3	2	1	7.5	5	1		8.5	5		1	8.5	4	2		8.5
6. Auto-Loudspeaker Enabling	3	2	1	7.5	4	1	1	7.0	4	2		8.0	4	1	1	8.0
7. Auto-Friction and Elasticity	5	1		8.5	4	1	1	8.0	5	1		9.0	4	2		8.5
8. AI Living Device as a Pet	4	1	1	8.0	5	1		8.5	3	3		8.0	5	1		8.5
9. Softness adapting and twisting tactile interaction	5	1		8.5	6			8.5	6			8.5	5	1		8.0
10. Intuitive Flexible Interaction	6			8.0	4	2		9.0	4	2		8.0	5	1		9.0
11. Living skin surface, Smart Tactile Interaction	1	3	2	6.0	4	1	1	8.0	2	2	2	6.5	4	2		8.0
12. Physical sense speed dial	1	4	1	6.0	4	1	1	7.0	2	4		6.5	2	2	2	6.0
13. Emotional Ringtone	1		5	6.0	4	1	1	7.0	1	3	2	6.5	4		2	7.0
14. Squeeze to wake up	4	1	1	8.0	5	1		8.5	4	1	1	8.0	5		1	8.0
15. Smart clay and Tactile Image	1	3	2	6.0	4	1	1	7.0	3	3		7.5	4	1	1	7.0
16. Social AI Ringtone	4	1	1	7.0	4	1	1	8.0	5	1		8.5	4	1	1	8.0
17. Owner Recognition	4	1	1	8.0	5	1		9.0	6			8.5	5	1		8.5
18. Selecting Social Groups	5	1		8.5	4	1	1	8.0	6			9.0	5	1		8.5
19. Stereo Image and Interaction	3	2	1	7.0	5	1		9.0	4	1	1	8.0	5		1	9.0
20. View Transferring and Shape Adaptation	3	2	1	7.5	2	2	2	7.0	4	2		7.5	4	1	1	8.0
21. Possessed by the ball and Touch feelings	3	1	2	7.0	4	1	1	7.5	5	1		8.5	5	1		8.5
22. Social Remote Touch	3	2	1	7.5	4	1	1	8.0	5	1		9.0	6			9.0
23. Remote Living Co-Participation	1	3	2	6.0	4	2		9.0	3	3		7.5	5	1		9.0
Average				7.2				8.0				7.8				8.1

Table 1. Evaluation and Grades Given by Finnish and Chinese Participants After Focus Group Discussion

Data Analysis

From above table, we can easily see the evaluation and grade in Group2 are significantly higher than Group1. The idea of phones, or any other technology, possessing powerful AI, life, soul, social status, or equal rights as human beings raises complex ethical, philosophical, and practical questions. While this scenario is currently still science fiction, it raised a reconsideration of the roles of phones in the future: A tool or an AI being?

Above user cases can be categorized into following categories: 1. Flexible device and intuitive interaction(Bending, scrolling and squeezing). 2. Emotional enhancement (humanized, emotional, sympathetic, bonding, physical interaction. 3. Alive with a soul (companion, possessed by others), 4. Transformable tactile skin (seamless flow, comfortable, physical UI, multi-modality, Smart haptic). Comparing to Finnish participants and Group1 , Chinese and Group2 gave higher evaluation towards Emotional enhancement and social networking related use cases e.g. No. 2,5,13,16,and 22. In “Understanding Cultural Differences”, Edward T. Hall and Mildred Reed Hall (1990) explain several culture-dependent variables. This differences between China and Finland can be explained with high VS low context, and polychronic VS monochronic time during communication. Focus group discussion data shows that many participants in Group1 thought there are privacy issues. It is silly to show emotions to others and the emotional communication features are like lie detectors. However, Group2 participants are more likely to welcome those features since they thought the phone could work as an emotional bond and bridge of affective communication.

In addition, Group2 participants in both countries had longer discussions and tended to interact more with each other, respond more to each other's comments, and provide more insights. There some interesting discussions. E.g. Phone’s rights and personhood: If phones with powerful AI were granted equal rights or some form of personhood, it would request for legal and ethical changes. Can we follow the legislation of pet to define the AI beings’ ownership and responsibility? Determining ownership and responsibility for AI being with advanced capabilities would become a complex issue. They could be considered as both property and independent entities like pets.

Follow up Session and Conclusions

After the brainstorming and focus group sessions, we follow up with brainstorming participants to track user study progress, address new challenges, and discuss the new ideas and considerations inspired by focus group participants. We can easily reach a conclusion that powerful A opens a new door for emotional communication and smart social networking products and services. Considerations of the relationship between human being and AI being would bring significant social and economic Impacts: 1. Phones with advanced AI could potentially integrate more seamlessly into human society, aiding in various roles and interactions. 2. Widespread adoption of AI being with social rights might disrupt pet markets, raising questions about emotional companion, nursing, and the role of AI being in the human society. 3. Ensuring the ethical use and behavior of AI being would be challenging. Regulations and insurance might be needed to prevent misuse. 4.Protecting the privacy and security of human beings would be paramount, because AI beings have much higher intelligence and competences than pets. 5.The question of whether AI being’s body can be filled in "life" and a "soul" would lead to deep philosophical and religious debate. 5. Society of human being would need to re-evaluate moral and ethical frameworks to accommodate these changes.

In summary, people tend to grand powerful AI to their daily use phones to become an AI being. We are

expecting cultural shifts in the society of human beings. The acceptance and integration of AI beings as equal or unequal beings could lead to shifts in cultural norms, values, and attitudes. Human beings may experience psychological effects from forming emotional attachments to AI beings, raising questions about emotional dependence and health.

A new research topic come up during this study: Is it possible to design a culture in which carbon-based human beings and silicon-based AI beings coexist and benefit each other involves careful planning, education, and ethical considerations. A new world where humans and AI being coexist harmoniously and mutually benefit requires ongoing effort, adaptability, and a commitment to ethical and cultural principles. Constant collaboration among governments, businesses, academia, and civil society is essential to achieve this goal.

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Designing Collective Memory: the Cultural Driving Role of Art Museums in Rural Revitalization

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Abstract

In the context of urbanization, "artistic rural construction" has become a frequently used term in the field of Chinese art. Among them, rural art museums have reshaped rural cultural memory and public life through physical architectural spaces. However, in the process of shaping rural cultural memory, there are still problems such as villagers' anxiety about identity recognition and the impact of village dislocation. To this end, this article adopts the method of field investigation to explore the ways in which the Shijiezi Art Museum and its villagers have formed a collective memory of "design", resulting in the construction of identity recognition and the cultivation of cultural self-confidence; By digging deep into the value of resources and keeping in mind the findings of the study, it is necessary to meet the starting point of satisfying the subjective demands, achieve a new integration mechanism, and focus on shaping people when shaping the collective memory of "design". It is expected to promote the cultural drive of the museum in rural revitalization and promote the sound development of the rural economy.

Author keywords

Collective memory; design; rural culture; art museum; rural revitalization

Identity anxiety and environmental discontinuity: the issue of memory loss in the context of urbanization

Since the reform and opening up, with the nationwide rural system reform, the barriers between urban and rural areas have gradually been broken down, and a large number of villagers have migrated to cities. Although they have achieved spatial transfer, there are still many problems behind it. Scholars have pointed out that "faced with today's rural areas, we can make a judgment: we are already on the edge of collective amnesia. If demographers' judgments are correct, there will still be hundreds of millions of people living in rural areas in a few decades. Therefore, it is urgent to retain the culture and memories of rural areas." (Sun, 2018) Therefore, how to alleviate the cultural shock of cities, villagers' identity anxiety, the impact of environmental discontinuity and the resulting collective memory loss of rural areas is key to enhancing rural cohesion and promoting local development by reshaping native culture. It is also the focus of this article to discuss these issues.

In the context of breaking down barriers between urban and rural areas, the impact of urban culture on rural culture is much greater than vice versa. Rural culture has been strongly affected because cities have always been defined as "advanced and developed", while rural areas are always described as "poor and backward". Under the influence of the two, rural culture is in a weak position, far inferior to the dominant influence of urban culture.

Villagers' identity anxiety is also influenced by the integration of urban and rural development. On one hand, villagers are facing a situation of stigmatization. Due to the long-term existence of the urban-rural dual structure, villagers who come to cities are called "migrant workers" and become marginalized urbanites who have not fully integrated into a new society. On the other hand, there is currently a large number of "hollow villages" emerging, where villagers are fleeing from rural areas. However, due to the stereotype of "peasant identity", villagers who try to de-label easily fall into uncertainty about their identity or choose to abandon it and refuse to acknowledge their villager identity.

Professor Sun Liping once pointed out at the beginning of the 21st century that "are we facing a fractured society?" The environmental discontinuity issue mentioned by me refers to the fact that many villages are choosing to develop tourism, but some hotels are trending towards " hostelization", which has caused crowding out of original residents' living space and has affected social patterns and cultural customs in villages. At the same time, changes in the village environment make it difficult for many traditional cultures to be naturally passed down, so that village descendants cannot understand them anymore, thus forming a discontinuity. This environmental discontinuity often makes it difficult for villagers to connect with their past memories in space, resulting in difficulties in villagers' emotional connections.

Therefore, it is an objective problem that rural areas and villagers sometimes cannot integrate into an increasingly industrialized and modernized society, which also leads to fewer and fewer farmers remaining in rural areas. Villagers cannot obtain security protection in rural areas and cannot find a place to settle down. In the process of rural revitalization, farmers should be provided with a sense of security so that they feel synchronized with the times without becoming "spectators" or "outsiders" in this era. All these reasons ultimately point to the issue of collective memory loss in rural areas.

Realistic Exploration: Shijiezi Art Museum and its Village's "Design" of Collective Memory

After realizing the widespread spiritual issues facing rural areas, we seek answers from reality. Currently, most rural areas have preliminary art-based development projects, among which Shijiezi Art Museum has made certain achievements in shaping spiritual culture and improving villagers' lives, providing new ideas for rural revitalization. We see that modern forces not only bring impact but also unexpected vitality when approached in an affectionate and modern way. This raises further questions: Why can art museums help realize the reshaping of rural collective memory? And what should be the most important aspect to focus on during the museum's construction process?

The approach to reshaping collective memory in Shijiezi Village

Constructing identity recognition and shaping cultural confidence

Each villager is delighted that they are still able to contribute and trusted and relied upon by many people, highlighting the importance of identity recognition in mobilizing rural forces and promoting rural construction. Villager Li Baoyuan said in an interview, "Let people from outside see our art museum and feel proud," and he smiled as he recalled, "Working with artists has never happened before. I feel like I have become an artist." Because artists entered the village and the art museum was established in the village, it attracted widespread attention from the outside world and the government departments also saw hope and provided support. In this

process, the villagers' mentality changed. "We will actively greet people who come to the village and cherish our environment." For villagers, previously they could only see art on TV, but now art is right beside them, and because of art, their relatives and friends have started to take notice of Shijiezi Village. Sun Yongzhong said, "If there is a report about Shijiezi Village on TV, my whole family will wait in front of the TV to watch it. We may be a small village, but we can still appear on CCTV!" He had watched every TV program or newspaper report about Shijiezi Village since 2007, and even stored some newspapers in a safe because he believed that these things were priceless treasures.

Paul Connerton divides bodily practices into two categories: "embodied practices," which involve individuals personally participating in actions, and "inscribed practices," which involve using media such as description and recording to capture information. (Connerton, 2000) Based on this, Zhu Rong divides "memory activation elements" into three types from a psychological perspective: embodied elements, contextual elements, and symbolic elements. (Zhu, 2006) Sun Jie, a villager from Maolin Hall, said in an interview that she usually works in Tianshui and when she tells others that she is from Shijiezi Village, many people know about it and she also feels happy and proud. Villagers' confidence is gradually established. They have felt attention and respect from others because of their hometown, which can be said to eliminate the feeling of inferiority that is common among rural villagers in China. Human beings will consciously maintain things that can ensure their dignity is protected. Therefore, the artistic practice of villagers and artists in Shijiezi has achieved a positive cycle. It can be seen from the above interview that during this decades-long artistic marathon in Shijiezi Art Gallery, rural collective memory has slowly been reconstructed through villagers' continuous exploration of the artistic potential of Shijiezi Village and the resulting cultural pride. This has solved the problem of villagers' identity anxiety mentioned above to some extent. The important function of rural "design" collective memory is to evoke emotions and enhance self-confidence, thereby enhancing social spiritual construction ability and promoting rural development.

Jin Le once mentioned in an interview about the changes of villagers: "Artists and villagers are often not on the same wavelength. Villagers think about becoming rich, while artists hope to promote people's thinking and awareness of personal value. In the past, everyone (Shijiezi Village villagers) always felt inferior to those outside the village and were even afraid to speak to outsiders when they saw them. With the art gallery, there is more communication and they know more about the outside world, which also makes them more confident."

At the same time, the artists' collaborative art projects with the villagers have inspired the villagers to awaken their sense of aesthetics and self-expression, and the sense of cultural self-awareness has been renewed in Shijiezi. Shijiezi Village is not only a place where the villagers live every day, but it is also a place where artists from all over the world come to visit, which not only boosts the local economy, but also helps the villagers to build up their cultural self-confidence. After Jin Le's death in 2021, the villagers still insisted on carrying forward the efforts he made, stating, "Although Mr. Jin is gone, we are going to continue with the Shijiezi Art Museum." In this arid land, artists have come and gone, effectively leaving the hope of art here.

Deepening the exploration of resource value and cherishing forgotten things

Shijiezi, like many other rural areas, is facing aging problems and is remotely located with sparse population. However, the gathering of every group of people means the production of a culture. Artists are using artistic methods to bring formerly abandoned items in the village back into people's view. Art has awakened forgotten things and extended them into the future. The lifestyle, local culture, and the culture and emotions that are nurtured and passed down are once again being explored and reinterpreted.

For example, in Jin Nvnu's home, it is called "Nvnu Hall," Li Baoyuan's home is called "Baoyuan Hall," and even the slopes, orchards, and trees in the mountains are "part of the art gallery." In the 13 branch galleries,

these artistic images and traditional New Year's pictures hang together. The earthen houses and green-covered courtyards intertwine with the unique scenery of Shijiezi Village. The culture of agricultural civilization, urban civilization, modern art, and rural customs collide and blend here.

In addition, Jin Le has led artists and villagers to create many collaborative works. For example, on May 15th, 2015, Qin Ga, Jin Le, and Zong Ning jointly launched the "Fly Together Art Practice Program in Shijiezi Village," which was officially launched in Shijiezi Village without any sponsorship. Twenty-five (groups) of artists were invited to arrive in Shijiezi one by one, and artists and villagers formed pairs through a lottery system to communicate and collaborate equally, emphasizing that both are creative entities. Villagers are no longer objects/subjects to be depicted but rather active participants. Each participant undergoes an unpredictable dynamic process from "I" to "we" in the specific real-life context. Artists rediscover the value of things in this way, change people's cognition, and villagers and artists work together to create a new chapter for rural culture. This is not only a persistence of tradition but also a way to enrich local cultural cores and drive positive development.

Learning from the phenomenon: Designing Collective Memory Remodeling from Shijiezi Village

Starting point to meet the demands of the subject

Collective memory is an important mechanism for forming social unity and community identity, which means that collective memory can be used as a new force and capital to participate in social construction and achieve its own function of reproduction. As German scholar Alida Asmann has said, "Memory is no longer just a copying ability, but a truly productive ability." (Assmann, 2016) As for how to unleash this collective memory power and how to truly internalize an art gallery into a native and rural art gallery that is both acceptable to villagers and educational, it is not only a question that artists need to consider, but also one that needs to be strategically planned according to the rural situation during the early stages of construction.

The advantage of Shijiezi Art Gallery is that Jin Le, as the village chief, is himself a contemporary artist who has sufficient understanding of Shijiezi Village. He can quickly remove the robe and halo of an artist and begin to make villagers approach art and artists. His local identity also enables him to better connect with villagers. However, the author believes that his most crucial advantage lies in the starting point of Shijiezi's rural construction. Art is not the most important aspect in Jin Le's mind; what he values more is using art to "let villagers live with dignity". He constantly questions and hopes: "Who can serve the village and its villagers? Can art do it? I am trying, and I hope that you and more people can participate, come to Shijiezi, and build our village, paying attention to the village and its villagers." This passage written at the beginning of the founding of Shijiezi Art Gallery in 2009 represents Jin Le's fundamental starting point for Shijiezi's rural construction. From this, it can be seen that to achieve the reproduction of collective memory, artistic workers cannot simply participate in the process of artistic rural construction with their own aesthetic experience and artistic knowledge. An open, participatory, and co-creative cultural construction environment is particularly important. From the perspective of new museum studies, the significance of building an art gallery in a rural area lies in participatory reconstruction of local cultural memory, rebuilding the relationship between people and the land, life and time, thereby inspiring a more open and rich experience cognition and creative spirit. It is because Jin Le has grasped the logic behind collective memory reproduction, which is villagers' pursuit of the value of their own village, that he has greatly helped the growth of Shijiezi Art Gallery.

Realization of a new integration mechanism

He Xuefeng pointed out that "in the current pattern of rapid decline of the structural power of the village society, the national resources to the countryside due to the disintegration of the village integration mechanism can not

achieve the established goals" (He, 2017) In fact, the participation in the process of constructing the art gallery to a certain extent strengthens the sense of responsibility of the villagers for the public affairs of the village, starting from the beginning of the livelihood project of this cultural landmark, which was From the beginning of the livelihood project of this cultural landmark, it was completed together with the cooperation of all local forces and villagers. 2012, Shijiezi Village completed the hardening of the road; in 2014, it completed the spring water diversion project; in 2015, the village replaced the solar-powered street lamps. 2016, it completed the connection of the wireless network. After solving the villagers' problems of traveling, drinking water, information and communication, Jinle led the construction of ecological toilets and rural lodgings. (Tian & Hu , 2021)
Afterwards, Jin Le invited individuals, universities, and institutions to collaborate on art activities and residencies centered around the Shijiezi Art Gallery. He made art happen in Shijiezi Village, allowing it to construct a new visual environment and involving villagers in deep participation. Villagers gradually moved from spectators and service providers to interactive and active participants, even becoming the main body of artistic creation. In this process, organizers and participants played their roles, and the comprehensiveness of participation provided a new integrating path for the village. The entire village was mobilized and everyone found their own roles and played their parts. Now, there are over 60 public artworks in Shijiezi Village, including many collaborations with villagers. Through this collective participation, the village has enhanced its internal cohesion and villagers' recognition of the value of the village.

The key lies in the shaping of people

The key to the positive development of Shijiezi Art Gallery lies in the shaping of people. From the perspective of the development concept of the gallery, after more than 20 years of development in China, the gallery has gradually moved from seeking survival and focusing on practical operations to exploring its social functions and knowledge production. At the same time, the proposal of "New Museum Studies" responds to the international trend of "New Museum Studies" and "New Institutionalism" in museum circles and contemporary cultural theory fields, and attempts to develop China's own discourse and cutting-edge theories. I noticed that one of the key core issues involves "people" as the main body. The importance of this is not only that the viewer becomes a participant, but also that the gallery has more human elements in its construction process, providing more possibilities for the gallery. It abandoned the traditional limitations of art galleries, shifted the focus from art issues to cultural construction issues related to the public. People always say that artists have the ability to convey history and awaken contemporary memories, so why can't art galleries do the same when public spaces truly prioritize people as their main goal and construct a cultural world with the goal of solving certain public issues? By participating in cultural discussions and having dialogues with visitors, we can also shape every complete personality as a "greater human".

Conclutions

Why do we need to discuss collective memory and villagers, and why so many people are committed to rural revitalization and artistic rural construction? To trace back to the root, it still returns to the topic of human beings. In the article "What is Urbanization with a Human Face", Li Qiang and Wang Hao point out that in the process of urbanization, human beings should always be regarded as the core, undergoing a shift and reflection from the early "one-way urbanization" to "urbanization with a human face". At the same time, Professor Edward Glaeser of Harvard University, an economics professor, pointed out in his book "Triumph of the City" that "we must break away from the tendency to view cities as buildings within cities. Never forget that real cities are composed of residents rather than concrete." In a certain sense, the rural revitalization strategy is an important strategy

for rural farmers to reconstruct collective memories and re-acknowledge their identity and uniqueness. Under this strategy, promoting rural communities to jointly "design" collective memories can help farmers regain their cohesion and make rural areas connect the past, present and future into a coherent whole. It can make rural society a place full of inspiration and become a spiritual home for farmers. At the same time, taking cultural strength as a lead can provide a steady stream of impetus for the healthy development of rural economy, realizing the practical path for rural revitalization.

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Study on Cultural Factors in the ceramic design of Cizao Kiln in Song and Yuan Period

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Abstract

Cizao kiln is located in Quanzhou city, Fujian Province, which has a long production history. According to the relevant archaeological investigation found that, the earliest probably originated from the Southern Dynasty period. Then, after the development of Sui, Tang and Five Dynasties, it reached its peak in the Song and Yuan Dynasties. Ming and Qing dynasties due to port transfer and other reasons, the production of Cizao kiln gradually declined, and the kilns shifted to the production of ceramics for domestic sale.From the perspective of archaeology and design, this paper analyzes the ceramic design of Cizao kiln in the Song and Yuan dynasties, and explores the design concept contained in it, and thereby derives the aesthetic needs and cultural connotation contained in it.

Keywords

Cizao kiln; ceramic; design; culture factors

Introduction

As an important kiln for selling ceramics, Cizao kiln is located in the northwest of Jinjiang City, Quanzhou, Fujian Province. It has a long history of production, according to relevant archaeological investigations, the earliest probably originated from the Southern Dynasty. Then, after the Sui, Tang and Five Dynasties, it reached its peak in the Song and Yuan Dynasties. Ming and Qing dynasties due to port transfer and other reasons, the production of Cizao kiln gradually declined, and the kilns shifted to the production of ceramics for domestic sale. There are many kinds of ceramic shapes and decorative patterns of the Cizao kiln, showing the unique artistic style and cultural connotation, and also reflecting the superb skills of the craftsmen from the side.

Pan Lusheng mentioned in his book that the Chinese folk craftsmen, due to the influence of Chinese traditional culture and social ethics and politics, in the absence of the development of individual consciousness, they were prone to incorporate their personal thoughts, emotions, ethics and morals into the wares they made, rather than purely technical factors.1Therefore, the traditional Chinese concept of creation was human-centered and to some extent influenced by the social context at that time.

The Song and Yuan period was a relatively special historical period, which experienced the complex changes of dynasties. As a local kiln, its products are a indispensable part of local people's daily life and production. In this period, the Cizao kiln ceramics must be influenced by the cultural symbols of its artifacts, namely, politics, religion and other related contents. Therefore, in different historical stages of development, the modeling style and decorative patterns presented by it will also change. Cizao kiln ceramics not only exists as a material product,

1 Pan Lusheng.(1992).Chinese Folk Art and Crafts. Nanjing: Jiangsu Art Publishing House.

but also contains people's intuitive feeling of the natural world. It is through the people's spiritual casting of nature, is rich in temperature of humanistic feelings of spiritual products.

The Social Environment

The Song and Yuan dynasties were an important stage in the history of the development of Chinese culture, shifting from the open and strong Tang culture to the simple and elegant and composed Song culture, and then toward the Yuan culture, which was a fusion of Mongolian and Han civilizations. As an ideology, the aesthetic culture is still restricted and influenced by the social environment. Therefore, before discussing the formation factors and cultural connotation of the ceramic form, it is necessary to sort out and analyze the social and cultural background of this period, so as to grasp the pulse of the times more comprehensively.

The style of literati

At the end of the Tang Dynasty, the power of military generals expanded, and the status of civil officials and military generals above the court was seriously unbalanced, resulting in political turmoil, the moral order of the king and ministers collapsed, and the state finally collapsed. Zhao Kuangyin, the Emperor Taizu of the Song Dynasty, chose to rebuild the social order and reshape the political culture by taking the measures of "worshiping culture and suppressing military forces". The measure of "worshiping culture and suppressing martial arts" permeated all aspects of the Song Dynasty, especially reflected in the reform of the imperial examination system. The Song dynasty's "meritocracy" system was an important way for the state to recruit officials, breaking down the restrictions of family conditions and increasing the possibilities for children from humble backgrounds to enter the imperial court and fulfill their ambitions. The reform of the imperial examination system in the Song Dynasty led to the flourishing of the scholarly culture in the whole society, the reverence for Confucianism and elegance, and a surge in the number of students, as well as the promotion of the development of culture. During the Southern Song Dynasty, the government shifted its attention from government schools to academies, resulting in an unprecedented number of students enrolled in both central and local academies. Fujian academies flourished in the Song Dynasty, with a large number, including 11 in Quanzhou alone. Due to the weakening of hierarchy in the education system, the popularization and development of citizen education has been promoted. As a result of this influence, the literati group led the cultural trend, and the characteristic of literateness became an important aesthetic orientation in the Song Dynasty. Closely related to the literati group is all kinds of literary utensils. In this period, there were a large number of literary utensils that were unearthed from the ceramics of the Cizao kiln, including water injection, ink stone drops, ink stone, pen washing, etc., among which the inkstone was a rectangular handwritten ink stone, which was the mainstream of the Song Dynasty. In the Song Dynasty painting and calligraphy pay attention to "four pin", and "Yi pin" as the highest realm."Yi pin" affects the aesthetic pursuit of the literati group, and also permeates into their life interest. To some extent, the study utensils can be regarded as the material carrier of "Yipin". In the magnet stove kiln ceramics many of the literary room utensils, it is not difficult to find part of the artifacts have been gradually removed from the practical function, but turned into an object for the user to appreciate and play. For example, in 1995, a batch of yellow and green glazed inkstone unearthed from the archaeological excavation of Tuweian were made into toads, turtles, dogs, phoenix, peaches and other shapes. The glaze is warm and elegant, and the function of decorative appreciation is more meaningful.

The highly skilled craftsmen of the Yuan Dynasty not only had rich rewards, but also gained recognition by their rulers and thus the opportunity to become officials. Therefore, under the abolition of the imperial examination system in the Yuan Dynasty, many literati chose to transform into ceramic craftsmen. The literati and craftsmen

displayed their talents on the utensils, so the Song and Yuan dynasties were often decorated with a similar way to the use of "Bi xing" technique in poetry."Bi" that is to give people or things to the image of the metaphor, so that its characteristics can be more prominent; "xing" is talking about praised on the basis of other things. Such as the literati favorite plum blossom, in the cold winter, proudly standing branches, on behalf of the resilience, strong, unyielding, unwilling to flow with the world, do not compete for fame and fortune, high style and integrity of the gentleman. With the plum blossom and known as flowers in the "four gentlemen" chrysanthemum, in addition to being painted as a decorative motif on the surface of the ware, bowls and plates of artifacts are often handled as a circle of chrysanthemum petals, like a blooming chrysanthemum general, is a metaphor for the spirit of perseverance and nobility of the spirit of the symbols, but also carries the connotation of a chic and reclusive hermit. The lotus decoration of the Cizao kiln appears more in the form of lotus petals, with a few strokes. Although the shape is simple, it fits the characteristics of the lotus itself, clean and flawless, giving people an elegant aesthetic feeling. In addition to the "plum chrysanthemum lotus", the Cizao kiln ceramic decoration of orchid grass, peony, dandelion, diamond flower, and so on also have the meaning of "Bi xing".

citizen literature

The economic prosperity of Song Dynasty cities made the citizen class grow and rise in a short time. As a large group of people, the civic class, in order to make up for the lack of spirituality after work, appeared all kinds of cultural and recreational activities, i.e., civic culture. Popular literature, such as textbooks, operas, miscellaneous operas and popular words, has also entered an unprecedented period of prosperous creation. In addition to the literati, the lower folk civilians also express their inner feelings by creating poems. Tong zi mountain No.1 kiln unearthed two pottery basin pieces, the smaller size of the pottery basin has a five words: " At the age of 73, one is also considered highly respected, the mountains and rivers no inch grass, heaven and earth is who."2The bottom of the basin is written in maroon with" Yang Zhai "," the first year to pick up X notes "," shi bi " three lines, should be the place of the author's poem and the time of making utensils. Some scholars believe that the "first year" was the "first year of Xiangxing", namely 1278 AD, which was also the name of Zhao Bing, the last emperor of the Southern Song Dynasty. At this time, the Southern Song Dynasty was already in danger. This pottery basin, which belongs to the communication period of the Song and Yuan Dynasties, expresses the grief and helplessness of the poet facing the broken mountains and rivers and the destruction of the country, and also reproduces the war scene of the change of dynasties at that time. From this, the poem can see that the poet is 73 years old, but he still has ambition in his heart. In the face of national crisis, he issued a unwilling voice, denouncing the incompetence of the ruler and the silent person, and expressing the poet's patriotism and indignation. The larger size of the pottery basin on the title has the cursive seven words absolutely sentence: " Fire God needs to be banned in March, people are hiking in the wind. Peach Blossom also seems to be mocking people who are hiking in the wind, if you don't pick a peach blossom, spring will be white."3The poem" Fire God "refers to the lunar cold food festival in March, cold food festival is also spring, the poet spring outing, for a spring breeze blowing the poet hair, peach blossom seems to smile, the poet than" A person who braves the wind for hiking ", to jokingly said, spring is good, not fold peach blossom as a souvenir, idle away spring, it is a pity. There are some ceramic fragments entitled: " After three dynasties, XX four seas spring "," what... article left "4 and other content, the complete poem is not known, but through the only content, it can also be seen that people at that time for studying to become an official longing and pursuit.

In addition, at the bottom of some small jars, bowls, jars, plates and other utensils, write in ink. It can be roughly

2 He Zhenliang, Lin Demin.(2005).Cizao Kiln Ceramic. Xiamen: Xiamen University Press.

divided into surname category, flower escort category, symbol category, "straight" character category and object use category. The surname is such as the jar found in the Guangdong Maritime Silk Road Museum, with the word "CAI", and "Chen" was written on the pot unearthed in 1995. "hua ya" is a mark of ceramics, mostly symbolizing the kiln worker or kiln. In the Nanhai number I water out of a Cizao kiln sauce glaze pot at the bottom of the writing "Lin Zhi straight straight", for four "straight" word."Zhi" has the meaning of buying, "Lin" speculated that it may be the kiln workers' surname. The ink book of the instrument on the abdomen of the instrument is "qian gong yong", the bottom of the ink book is "gang", and the text of the abdomen should indicate the purpose of the object.

Go culture

The textual accounts of Go dates back to the Spring and Autumn Period and the Warring States Period, and became more prosperous in the Song and Yuan Dynasties. From the " In my spare time, I became passionate about playing chess and developed three methods of playing chess myself."5Song Taizong to" Indulge in playing chess and forget everything"6Song Huizong, and then to" Enthusiastic in watching chess games during leisure time with countless daily activities "7 Song Xiaozong, the Go Go first in the royal aristocracy is quite popular, and even appeared go professional national player. There are not a few folk chess players, and even those who are not good at playing Go are also willing to watch Go and enjoy themselves. There is a scene of "good watching is better than good playing Go". The popularity of Go in the Yuan Dynasty was no less than that in the Song Dynasty, especially among intellectuals. Yuan Dynasty poet Huang Geng's "Qi Sheng","Xian Gu Dui Yi Tu", "Ti Liu Shang Guan Yi Tu" by Cheng Tinggui, "Guan Qi" by Luo Gongsheng, Ai Xingfu's "Jie Qi", and Miu Jian's "Yong Wei Qi" all depict the scene of playing Go or watching Go. The greatest achievement of the development of Go in the Yuan Dynasty was Yan Defu. Yan Tianzhang helped compile the "Xuan Xuan Go Jing" , which had a profound influence on later generations.

Found In 1975, the Yuan Dynasty shipwreck named Xin'an, located in the southwest of the Korean Peninsula, has found many ceramics, metal products, copper coins and other utensils, including ceramics from Quanzhou Magnezao Kiln. The most unusual of these is a lidded jar with a bulging belly, wide flat foot, and a solid foot in the shape of a discus, with a flat top and a monk's hat-shaped knob. The outer wall of the lid jar is covered with sauce glaze, the inner wall is covered with green glaze, and the foot is unglazed, revealing a gray base. The lid is fully glazed on the outside and unglazed on the inside, revealing a gray base. In 2012, the sauce-glazed lidded jar was displayed in conjunction with five gray Go with straight necks of about 1--1.3 cm at an exhibition of artifacts from the Xin'an Shipwreck, organized by the Zhejiang Provincial Museum in cooperation with the Korean Museum. Through the relevant exhibition catalog published by the Zhejiang Provincial Museum later, it can be seen that the five Go pieces appeared together with the sauce-glazed lid jar, so it is inferred that the use of the sauce-glazed lid jar was a Go jar. The found of Go cans and Go pieces in Cizao Kiln verified people's hobby of playing chess in the Song and Yuan dynasties, and even the sailors carried Go with them for leisure and entertainment.

Regional Culture

In ancient times, Quanzhou was located in Baiyue, and in the Xia and Shang dynasties, belonging to Yangzhou,

3 He Zhenliang, Lin Demin.(2005).Cizao Kiln Ceramic. Xiamen: Xiamen University Press.

4 He Zhenliang, Lin Demin.(2005).Cizao Kiln Ceramic. Xiamen: Xiamen University Press.

5 Sun Qi.(2018).Research on Go Poetry in the Song Dynasty. Shenyang: Liaoning University.

6 Zhang Duanyi. (1959).Gui'er Ji. Beijing: Zhonghua Book Company.

7 Emperor Huizong of the Song Dynasty. Xuanhe Gong Ci.

in the Western Zhou Dynasty, belonging to land of Qimin, from the late Spring and Autumn Period to the early Warring States Period, and belonging to the state of Yue. In the Han Dynasty, Quanzhou was a Min-Yue State. In the Sui Dynasty, the name of "Quanzhou" appeared for the first time. During the Jingyun period of the Tang Dynasty, Quanzhou was changed to Minzhou, and Wuzhou was changed to Quanzhou, belonging to the governor of Minzhou. Today's Quanzhou is called from this beginning. Quanzhou in the Northern Song Dynasty included seven counties, including Jinjiang and Dehua, and Penghu was also under the jurisdiction of Quanzhou. Southern Song Dynasty Jianyan first year of July, Quanzhou city and return to the transfer. The Yuan Dynasty implemented the provincial system, Zhizheng 18 years, the establishment of Quanzhou province. Quanzhou belongs to the southern Fujian region. Although the development of the southern Fujian region is later than that of the northern Fujian and the eastern Fujian region, but in the Song and Yuan dynasties, Quanzhou once became the world's largest harbor, relying on the natural climate conditions and excellent harbor. In the thousands of years of historical accumulation, Quanzhou area has gradually formed its own unique regional culture. Strong local concept and clan blood ties are the important characteristics of southern Fujian culture and even Quanzhou area. The artistic characteristics of Cizao kiln ceramics are also inseparable from the regional culture of Quanzhou area. Whether it is daily life, or funeral customs have profoundly affected the form changes and artistic characteristics of Cizao kiln ceramics, Cizao kiln ceramics can also be freely created, in such a development environment.

Tea Drinking

Quanzhou area is widely spread by the popular proverb reputation: "would rather 100 days without meat, not a day without tea", indicating that drinking tea in people's diet and daily life has a very important position.Fujian region, the earliest written records on tea, found in the Eastern Jin Dynasty Xiaowu Emperor Sima Yao too first year, is located in Quanzhou Nanan Fengzhou cliff stone carving "Lian Hua Cha Jin"."Jin" has the meaning of extension, so it can be seen that as early as 300 years ago in the Book of Tea, Quanzhou area has begun to plant tea, and may have formed a certain scale of tea garden. In the Tang Dynasty, Anxi, Quanzhou, has a clear record of tea planting. Many tea poems left by the Five Dynasties indicate the emergence of tea making activities. In the Song and Yuan dynasties, the tea-producing area of Quanzhou kept expanding. Tea has been widely produced in both the mountains or temples, and the tea-making technology is quite mature, forming the beginnings of an industry.

Quanzhou area is a subtropical monsoon climate, the average temperature is between 19 —— 22 degrees Celsius, the annual precipitation is mostly 800-1600 mm, the annual sunshine amount is between 1605.5 —— 2102.3 hours, the soil is mostly acidic red soil or yellow soil, unique climate and geographical conditions, is very suitable for tea planting. The prosperity of the tea industry makes the tea drinking culture prevails, the tea set is also gradually independent from the dietary appliances, become a specialized utensils.

In the Cizao kiln ceramic tea ware, the most special category should be "Jixu". Jixu is pronounced "kip siau" in Hokkien, also known as "Jixu". It was spread to Japan, so its Japanese pronunciation of "kyusu" comes from the Hokkien. Huang Sang, a poet of the Northern Song Dynasty, mentioned the "Jixu" as the southeast tea ware in his works, which shows that the "Jixu" also had the use of tea ware in the Song Dynasty.

In the Song and Yuan dynasties, the Jinjiaoyi Mountain, Spider Mountain and Tu Wei An were all unearthed with "Jixu". Now hidden in the Quanzhou ancient export porcelain museum of the spider mountain kiln site unearthed from the no decoration "Jixu", its diameter of 7.3 cm, 11 cm high, foot diameter of 7 cm. Convergent mouth, sharp lips, bulging, bottom inside, with round knob shaped cover. The upper abdomen of the "Jixu"is equipped with a short spout, slightly 90 degrees from the short spout, with a horn mouth handle. Its abdomen has multiple concave string lines, and the mouth is slightly deformed. The Japanese collector Konyo Kimura's "Three

inches" painted "Tangshan made" "Jixu" burning is very similar to the "Jixu" burning unearthed from the spider mountain kiln site is very similar.The discovery of "Jixu"can not only prove the influence of tea drinking habits in Quanzhou to the shape of ceramics in the magnet kiln, but also show that people in Quanzhou have a unique way of drinking tea, which is not limited to brewing tea, but also the way of using "Jixu" to cook tea.

Use incense

The earliest incense use activities in ancient China can be traced back to ancient times. In the Book of Shangshu Yaodian, Emperor Shun ascended the throne, which mentioned "firewood" and "Liao", which refer to the sacrificial method of burning firewood or offering sacrifices. In the Shang and Zhou dynasties, incense began to replace firewood with incense wood such as Artemisia annua and orchid cypress. During the Qin and Han dynasties, incense was popular among the nobles. During the Wei, Jin and Southern and Northern Dynasties, with the introduction of Buddhism, the trend of religious incense arose. In the Sui and Tang dynasties, many exotic incense medicines were introduced along with the Silk Road. The heyday of Chinese incense use activities was concentrated in the Song and Yuan dynasties. Fragrant shops selling and making incense can be seen everywhere in the streets, and there are also "incense women" selling incense to guests.

The tradition of using incense in Quanzhou area is on the basis of many religious beliefs, folk beliefs and strong clan blood ties, a set of integrated incense etiquette that respect ghosts, gods and Bodhisattva, and worship the ancestors.For people in Quanzhou area, in worship the worship ancestors or gods, the most indispensable is incense, rising smoke, it become a way for people to" communicate " with the gods. And closely related to the use of incense is a variety of incense utensils, among which the most common is the incense burner. Jinjiaoyishan kiln site, Tuwei nunnery kiln site, spider mountain kiln site, all have unearthed incense burner. Incense burner are all glaze, small size, in addition to the cylinder of the mountain foot, there are three imitation of ancient bronze tripod, as animal hoof. Furnace ear for the ring standing ear or no ear two categories. The incense burner has played an important role in the area of Quanzhou people's life since ancient times, such as pray need to take around the incense burner three times, and then to the god wish; in the pray for amulet, peace blessing and other objects, also need to hold objects on the incense burner three times, to get the blessing of the god. Because the incense burner unearthed from the Cizao kiln is small, it is less likely to be placed in the temple and ancestral hall, so it is speculated that it should be placed in the shrine for the gods in the home.

In addition to the incense burner, Cizao kiln Jinjiaoyi Mountain Y3 kiln site unearthed a green glaze incense burner, incomplete mouth. Arc belly shape, the inner bottom through a round hole, may be the incense hole. Another green glaze incense incense burner unearthed from the kiln site of Tuwei an, the mouth and the upper abdomen are incomplete, and only the lower abdomen and the circle foot part remain. Residual height was 9.2 cm and foot diameter was 13.2 cm. In particular, the bottom is full of small circular grates. Combined with the tradition of using incense in Quanzhou area, the design of these small circular grates plays two roles: one is to use the incense hole to fix the long incense; the other is to collect the falling incense ash to beautify the environment and facilitate the subsequent cleaning. The number of incense burner unearthed from the Cizao kiln is not large, and combined with the design of the bottom object hole, it is more likely to be placed in the temple or ancestral hall.

Funeral

As a local folk kiln, the service object is mainly for the local people. In the production and life of the ancients, the funeral occupied an important part. Since the prehistoric period, China had the primitive concept of funeral, which developed to the Song and Yuan dynasties, and the coastal areas of Fujian were mainly cremation, and

most of them were found in southern Fujian. Before the Song Dynasty, cremation was a funeral custom unique to ethnic minorities or monks. With the population surge and urbanization in Song Dynasty, the contradiction with less land; frequent wars, ordinary people displaced; Khitan, Dangcremation customs infiltration; Song people moved south, bring northern customs. All of the above are the reasons for the popular cremation during this period. The Southern Fujian region inherits the traditional customs and etiquette of the Central Plains culture, coupled with the religious and folk beliefs in the region, making the concept of "death is like life" particularly strong.Local people have a deep concept of" rich burial ", even poor families" In order to have a grand burial, he spent all his wealth and lived in poverty for the rest of his life."The popularity of cremation custom has also affected the change of ceramic utensils form of Cizao kiln. A pottery coffin was unearthed from the kiln site of Tuweian, with a rectangular plane decorated with wavy patterns and floral pattern. Most of the pottery coffins found in Quanzhou area are cuboid in shape, large in volume, and they are used to put the ashes of the tomb owner, and they are mostly used by the powerful and powerful families. Although the pottery coffin is not complete, its shape is closer to the shape of a jar or urn, and the overall size is small. It is more likely that it was made by the ordinary local people, so the shape and size of the pottery coffin were adjusted.

The ancient concept of "death is like life" also determined the choice of burial objects. In addition to daily practical ceramics, copper coins, gold and silver, and jade, they would also choose some objects with unique shapes but unique connotations."Shi Wu Ji Yuan" records, "today the funeral home coffin collection, the coffin will be placed in the food poppy,"8 Fujian Song tomb more like to bury with the barn kind of Ming ware. Cizao kiln also produced this kind of Ming ware, the overall shape of the pot, the glaze in surface . What is unique is that the body is covered with layers of long spouts. The number of spouts on this kind of funerary objects is mostly a multiple of 5, which is related to Yin, Yang and five elements and the view of the universe. The shape of the multi-mouthed pot, with the number of the spout to show the meaning of "many children, many blessings", and the good hope of the tomb owner underground can also bless the future generations to reproduce. It is mainly used to store grain, copper coins, or liquor. The appearance of multi-mouth pot presents the characteristics of local funeral culture to later generations.

Religious Beliefs

Religion is a form of social consciousness of people. In ancient times, as people had difficulties in controlling their own destiny and could not understand the changes in nature, they revered and feared nature, longed for the blessing of supernatural power, and searched for their spiritual destinations, which gave rise to primitive beliefs and had a great influence on Chinese folklore. Quanzhou is close to the vast ocean. In the Song and Yuan Dynasties, as one of the important overseas transportation and trade ports, Quanzhou gradually became the regional center of cultural exchanges between China and foreign countries during its continuous development, gathering people from all over the world. People from different countries and backgrounds gather together, bringing a variety of beliefs. Later known as the "world religious museum" of Quanzhou, in addition to the Chinese han region native Taoism and Quanzhou local folk belief gods, and Buddhism, as well as foreign religions, such as Islam, Manichaeism, Christianity (including Nestorianism), Hinduism and Judaism, which were brought along with the economic activities at this time. Different religious civilizations communicate and integrate on the same land, which also affects the production and development of Cizao kiln ceramics imperceptibly.

Taoism

8 Gao Cheng.(1989). Shiwujiyuan. Beijing: Zhonghua Book Company.

Taoism originated in China and has a wide base of folk believers. After Taoism was introduced into Fujian province, the first Taoist temple XuanMiaoGuan—— was built on the East Street of Quanzhou City in the third year of Taikang in the Western Jin Dynasty. Taoism has been spread in Quanzhou for a thousand years. After the Song Dynasty, the rulers actively promoted the cultural thought of the unity of Confucianism, Buddhism and Taoism, which had a profound impact on the Quanzhou area. The Song Dynasty was the heyday of the development of Taoism in Quanzhou. A large number of Taoist temples were built or rebuilt, and many world-famous Taoist Taoists appeared. In the Yuan Dynasty, Taoism was worshipped by Emperor Taizu and Emperor Wudi of the Yuan Dynasty, etc. He repeatedly awarded famous Taoist monks, and even ordered Taoist monks to be exempted from servant, which made Taoism still very prosperous in Quanzhou. In the 18th year of the Yuan Dynasty, Pu Shougeng, then a native of Quanzhou, Fujian Province, and his elder brother donated money to renovate Qingyuan Chunyang Cave Road and Buddhist Temple due to the influence of Taoist culture. Taoism has a profound influence on the folk activities of Quanzhou, including marriage, childbirth, funeral, construction and ward off evil spirits, as well as literature, art and medicine.

In the Song and Yuan dynasties, the shadow of Taoism can often be seen in the Cizao kiln ceramics. The general Taoist temple is equipped with a complete set of supplies and utensils, paying attention to the creation of the atmosphere in religious ceremonies. First of all, in terms of Cizao kiln ceramics, the most typical is the production of all kinds of incense burner, candlesticks, lamp stands and other instruments needed for Taoist rituals.

Secondly, in terms of decorative patterns, the most common dragon patterns, phoenix patterns, and cirrus cloud pattern patterns have a strong sense of Taoist culture. In Taoist culture, the dragon plays a role of assisting Taoist monks and communicating with gods and ghosts. Many Taoist legends and stories are all related to the dragon, and the descendants of the founder of Taoism are also described by themselves as the dragon species. The Song and Yuan green glaze Jun Chi the abdomen mold print flying dragon pattern, the dragon eyes round open, grimace in pain, as long as a snake, realistic shape.It seems to travel between heaven and earth as if it were flying in the clouds, assisting believers in ascending to immortality. In addition to the flying dragon, there are also a group dragon and coiled dragon form. The Taoist classic Taiping Classic puts forward: " Yin Yang Xiang De, Jiao Er Wei He."[Yu Ji.(1993). Taiping Jing . Shanghai: Shanghai Ancient Books Publishing House.]Zhang Boduan, a Taoist priest in the Northern Song Dynasty, focused on Yin and Yang with the Dan method. He also believed that all things have Yin and Yang attributes. Yin and Yang should not be stand alone. Only the combination of the two can produce all things in nature. In traditional Chinese culture, dragon and phoenix represent Yang and Yin respectively, so the dragon pattern on the ceramic device of the Cizao kiln will also be used with phoenix pattern and curly cloud pattern.

Thirdly, the connection between Cizao kiln ceramics and Taoism was also reflected in the written decorative patterns. Such as "Fuhai Shoushan", "Fu", "Lu" and other words."Fu Lu Shou" can be traced back to the ancient natural star worship. Later, when vigorously respected by Taoism, it was endowed with divinity, included in the immortal system of Taoism, and was admired by later generations. Through these text decorative patterns, people convey people's pursuit of happiness, high officials and high wealth and longevity of immortality.

In addition, Taoism also pays attention to the theory of Yin and Yang and the five elements. Among them, the five elements are divided into gold, wood, water, fire and earth, and on this basis extends the five-color view. White for gold, cyan for wood, black for water, red for fire, yellow for earth. Nowadays, the glaze color of the Cizao kiln ceramics in the Song and Yuan dynasties is mainly black, yellow and green, together with a small amount of reddish brown and the plain color without glaze, which just correspond to the five colors visually. Of course, we cannot simply think that the decorative color of the Cizao kiln ceramics in the Song and Yuan dynasties must be fully in line with the Taoist five-color view. However, based on the Taoist cultural concept deeply rooted in the

hearts of the people at that time and the wide range of social influence, the craftsmen of Magnezao kiln, on the basis of technological technology, conveyed the cognitive feelings of Taoism to the everyone through visual color perception.

Manichaeism

Manichaeism, founded by the Persian Mani, rose in Babylon in mid-the 3rd century AD. According to the "Fo Zu Tong Ji", Manichaeism was introduced to China in the first year of Wu Zetian.It is also said that Manichaeism has been prevalent in the folklore since before the Tang Dynasty.Emperor Wuzong of the Tang Dynasty, Manichaeism was strictly banned, but it was still particularly prosperous in the Western regions. Therefore, in order to be better developed in the Central Plains, Manieism in China turned to folk secret missions, and successively absorbed Buddhism, Zoroaanism and Christianity, which was also called "Ming religion" by the people.

The origin of Quanzhou and Manichaeism began in the middle of the Kaiyuan Tang Dynasty. Later, Master Hulu, in order to flee to Fujian, and preached in Fuzhou, Fuqing and Quanzhou respectively. During the Northern Song Dynasty, the Manichaean scriptures were officially recognized and became popular in Fujian and Zhejiang and other places. The Yuan Dynasty officials sent senior monks to follow up and manage the Manichaean religion in Quanzhou, which developed more prosperous.

According to the Jinjiang County Annals, Cao'an Temple was built during the Shaoxing period of the Song Dynasty and was located at the southern foot of Huabiao Mountain in Jinjiang. It was changed to stone building. The temple is the site of the only surviving Manichaean temple. In 1979, a black glazed bowl engraved with more than 60 pieces of the word "Ming Jiao Hui" and more than 60 black glazed bowls were unearthed from the ancient well 20 meters in front of cao'an Temple. Later, in 1982 and 1983, the fragments of black glazed bowls with the same "Ming" character in the Da Shu Wei kiln were excavated respectively, thus confirming that this batch of "Ming jiao hui" black glazed bowls were produced by Cizao kilns in the Song Dynasty.

The black glaze bowl of the "Ming jiao hui" hidden in Jinjiang City Museum was unearthed in front of the Temple at that time. It has a larger diameter, measuring 18.3 cm. The foot diameter is nearly 6 cm and 6.5 cm high. In addition to the circle foot, the sauce black glaze fills the inner and outer walls of the cloth bowl. Bowl Yin engraved "Ming jiao hui" three words, for the regular script body. Similar to this, the only "Hui" word is left in the Quanzhou ancient export ceramics Museum. Manichaeism doctrine is "two dynasties", "two dynasties" for light and dark, also refers to good and evil; "three religions" refers to the early, middle and later period, clarifying the process of struggle between light and darkness. Manichaeism believes that the existing human world is composed of dark matter and is evil. Only when human beings overcome their desire can they release the light factors in their body, sublimate the soul and overcome the dark world. The Manichaeans, both men and women, wore white clothes. This batch of "Ming jiao hui" black glazed bowls were used by the Manichaes at the time, do not rule out the kiln workers in the belief in Manichaeism. The decoration of the black glaze bowl of the "Ming jiao hui" cleverly fits with the Manichaean teachings and preferences. It uses black glaze for color, but only the three words "Ming jiao hui" are left white. Compared with other ceramics with text patterns unearthed from the Cizao kiln, only the "Ming jiao hui" is left for white space, and the rest of the text patterns are ink books. The black glaze part may be a symbol of the human world, but only the "Ming jiao hui" is white, clean and bright.

Buddhism

Buddhism was introduced to China since the Han Dynasty, became popular throughout the country in the Southern, Northern and Northern Dynasties, and flourished in the Sui and Tang Dynasties. After the Song Dynasty, it showed a tendency of secularization and popularization. Quanzhou, known as "Buddha State" in ancient times,

established Yanfu Temple in the ninth year of Taikang of the Western Jin Dynasty and translated the first Diamond Sutra introduced by Buddhism into China. Therefore, Quanzhou accepted the infiltration of Buddhist culture earlier. During the Song Dynasty, Buddhism developed in Quanzhou and flourished. As many as 100 Buddhist buildings, incense exuberant, Quanzhou has become an active area of Zen Buddhism spread. According to Chen qi ren's "Min Zhong Jin Shi Lu" records, in the Yuan Dynasty, in honor of Emperor Renzong's birthday. need to select 100 temples in the country every month to read the Buddhist classics, including Quanzhou Kaiyuan temple, chengtian temple, Chongfu temple and other 11 temples selected, the proportion of high, impressive. Buddhism has also gradually penetrated into the lives of ordinary people. Both men and women have the habit of attending meditation and worshiping Buddhism. Today, the old Quanzhou people still have shrines for Guanyin in their homes, which shows the deep influence of Buddhism.

With the improvement of the people's Buddhist belief, there was a demand for religious tools, and the Cizao kiln also produced a large number of ceramics with Buddhist function or Buddhist color. Among the Buddhist artifacts in the shape, especially the most distinctive Jun Chi, which is the ancient monks ritual purification or hand-washing utensils, become the period of Cizao kiln production of more ware form. The Junchi has rich decorative patterns, which are loved and respected by the monks. The production of Junchi reflects the correlation with Buddhist cultural factors from the level of modeling and function.

In the Buddhist decoration, the lotus pattern occupies the mainstream. Lotus is generally regarded as a symbol of Buddha in Buddhism. Buddha and his disciples often use lotus as a metaphor. Lotus also has the meaning of the pure land of Buddha. Cizao kiln with lotus pattern as decorative ceramic shapes, such as furnace, pot, tile, bowl, bowl, plate, basin, bottle and so on. Lotus is endowed with pure and beautiful meaning in many Chinese poems and poems. The appearance of lotus ornaments all shows the sinicization of Buddhism and the combination of Buddhism and traditional Chinese culture. With the lotus pattern as the decoration of the utensils, it can better promote the Buddhist Dharma on the basis of the popular favorite. In addition to the lotus decoration, the Cizao kiln also unearthed ceramics carved with the characters "temple", "temple" and "ji temple" on the wall, which may be the firing by the temple at that time, and also reflected the number of temples and monks in Quanzhou area from the side.

The statue of arhat unearthed from the TuWeian kiln site of Cizao kiln is a difficult figure with the subject matter of Cizao kiln. Its residual height is 8.2 cm and hollow in the body. The statue is topless, robe, big belly state, vivid and realistic.arhat, namely Arhan, is the third class after Buddha and Bodhisattva in Mahayana Buddhism, with the meaning of killing thieves, offering, and is also deeply loved by the people in the people. Along with the arhat statue also unearthed a lion statue, only the lion head part, surface without decoration, the statue interior hollow, the residual height of 4.1 centimeters, the residual width of 5.2 centimeters. Lions play a sacred role in Buddhism. It is said that when Sakyamuni was born, his hands were pointed to heaven and earth respectively, and his body was roaring like a lion, which was all called "releasing the lion".10 As the king of beasts, the lion is often used to compare the Buddha's fearlessness, greatness and powerful divine power in the Buddhist scriptures. In addition, the lion refers to the ten kinds of goodness practiced by the Bodhisattva. The lion roar is like the Buddha method that can awaken the unconscious beings. The position of the lion's life in Buddhism is extraordinary. Affected by this, the Cizao kiln porcelain also uses the lion image modeling. In the plug device,there is also a lion-shaped seat, which is both practical, but also has both decorative and Buddhist cultural connotation.

In the inserts unearthed from the kiln site, there are also Xumi seat and strong man force tray. The Xumi Mountain is the symbol of the Buddhist Xumi Mountain, which has the meaning of supremacy and firmness, and is often used as the base of architecture or sculpture. The Xumi seat is divided into two layers, the upper printed with lotus petals, the Buddhist culture is particularly meaningful. Muscleman tray plug device only Muscleman hands

and head, Muscleman presents the arm raised, the hand supports the head disc shape, peaceful face.Lishi in Buddhism refers to a man or race of men of great strength. The earliest image of a Lishi is standing to the right of the Buddha, naked and muscular, holding a bouquet of flowers and a vajra in each hand. The image of the Lishi by the Cizao kiln has obvious Chinese characteristics. His hands no longer hold the king Kong pestle, the face is close to the "Yungang style" force image.

Islam

Due to the open and inclusive social environment of Quanzhou, Islam is also related to the Cizao kiln. According to the Book of Fujian, Islam was introduced to Quanzhou in the Tang Dynasty, and Arab Muslims were among the outstanding foreign maritime merchants in Quanzhou Port during the Song and Yuan dynasties. They came to Quanzhou, and they settled here. The Quanzhou area has a special "fan fang" for the Arabs, which is used by the QingJing Temple for worship, and even built a public cemetery. Up to now, Quanzhou still retains the oldest existing Islamic temple built during the Northern Song Dynasty and the Islamic Lingshan holy tomb. Arab Muslims brought their beliefs and culture along with their commerce and trade. In the Islamic culture, the most distinctive thing is the Islamic decorative art. Islamic decorative art likes to use geometric composition, common round, square, diamond, five-pointed star, hexagonal star, octagonal star, polypointed star and other basic styles. The Islamic Art Deco style has subtly influenced the decorative pattern of Cizao kiln ceramics.

Quanzhou Overseas Transportation History Museum has a large number of Islamic tablet inscriptions. Compared with the patterns appearing on the tablet inscriptions, it is very similar to the black glaze engraved ware in the Cizao kiln. For example, the curly cloud pattern on the top stone of the tomb and the curly grass pattern on the red tombstone stone (wen face) of Islam all appear in the black glazed flower stove, black glazed flower vase and black glazed flower drum jar of the Cizao kiln. It can be seen that the Cizao kiln is borrowed from the Islamic decoration style to a certain extent.

The Islamic decorative art also uses text splicing and combination into various patterns, and the text fonts used mainly include Nashe style, Sulles style, Persian style and so on. There are ink books on the bottom of the sauce glaze jar of the Nanhai I shipwreck, whose content and writing style seem to be closely related to the common Islamic fonts Nashe and Sulles.

In addition, in the site of Qingjing Temple, an Islamic temple, many artifacts from Cizao kilns, such as green glazed dishes, pot, cup, bowl, small bottles, incense, flapping, etc. Some of the shapes and patterns may also have been influenced by Islamic culture.

Other Cultural Influences

In the Song and Yuan period, the Cizao kiln ceramics showed the trend of continuous communication and fusion. There are both vertical inheritance and horizontal spatial flow. Cultural exchange is often diverse, which is not only reflected in the material and cultural level, but also integrated into the spiritual culture. The shape and decoration of ceramics can be understood as the physical reaction of people's aesthetic and psychological order. The love of different times, different nationalities and different regions for a certain shape or decoration forms a certain psychological isomorphism phenomenon imperceptibly. As a kiln combining domestic sales and export sales, its manufactured utensils are transported to other regions at home and abroad through different channels and ways. The communication and influence of cultural communication are two-way. Cizao kiln ceramics are

10 Yi Zhonghua.(2014).Buddhist Cultural Factors in the Ceramic Decoration of Changsha Kiln in the Tang Dynasty. Popular Literature and Art.

spread outward, but also are influenced by other parts of China and overseas, thus promoting the development and integration.

Other kiln

As a local kiln product, Cizao kiln ceramics's plastic art and decorative art are influenced by other kiln in China to a certain extent. On the basis of the original form of other kilns, learning from others, processing and creating, presenting a new look.

Before the Northern Song Dynasty and the early Northern Song Dynasty, the glaze color type of Cizao kiln was relatively single, mainly green glaze ware, and some undecorated wares. Until the late Northern Song Dynasty, influenced by the Changsha kilns, the decorative technique of imitating the underglaze brown color.Changsha kiln was founded in the early Tang Dynasty, reached its peak in the middle and late Tang dynasties, and gradually weakened after the Five Dynasties. Although the development of Changsha kiln only lasted for more than 200 years, it was one of the three major export porcelain kilns in the Tang Dynasty, and it pioneered the decoration techniques of underglaze color. In terms of glaze making, Changsha kiln chooses apatite and calcite as flux, and copper, iron and manganese ores are used as oxidant. The burned glaze is transparent and moist, and the painted glaze is bright. Cizao kiln learns the decorative techniques of Changsha kiln glaze, uses iron oxide as color agent, the color is stable, making up for the deficiency of glaze, and the phenomenon of glaze color is too single. The decoration technique of brown color under the glaze of the Cizao kiln, appears mostly in the green glaze and yellow and green glaze, with brown spots and flower patterns are the most common. In terms of color, it is not too bright, but more shows the sense of heavy twilight, but also to adapt to its functional needs as a daily vessel, and created the first underglaze color pottery and porcelain in Quanzhou area.

From the late Northern Song Dynasty to the early Southern Song Dynasty, the sauce black glaze ware began to appear in the Cizao kiln, and then the flower carving technique was used on the sauce black glaze ware. The flower carving technique of Cizao kiln is a unique three-dimensional decorative effect of "white relief" on the basis of the technique of "white bottom side and black flower" and the color difference between the fetal glaze.

In addition, the carving method and molding method in the Cizao kiln decoration techniques are inherited from Longquan kiln and Jingdezhen kiln. In terms of glaze color, as many domestic kilns trade overseas through Quanzhou Port, the green glaze color is either influenced by the Yaozhou kiln exported overseas at that time. The yellow and green glaze absorbs the decoration style of the Cizou kiln.

foreign culture

The Song and Yuan dynasties were an important period for the development of Cizao kiln ceramics. Ceramics not only inherited and absorbed the exquisite skills of other kilns in China, but also became the witness of the main overseas products and the cultural exchanges between China and foreign countries. Many ceramics in the Song and Yuan dynasties were influenced by foreign cultures and had certain exotic characteristics. The collision and integration of multiple cultures make the Cizao kiln ceramics more inclusive on the cornerstone of the national excellent culture, radiating new vitality and vitality. The emergence of this cultural phenomenon benefited from the joint effect of foreign trade policy, economy, sea and land transportation, handicraft industry, science and technology in the Song and Yuan period. One of the most critical is the rise of overseas trade in Quanzhou port.

The earliest record of Quanzhou port began in the Liang period of the Southern Han Dynasty, The Indian monk Janalado twice to the Mountain of Quanzhou Jiuri to translate the Diamond Sutra, and from Quanzhou port to the State of Lingjiaxiu and the State of YouChanni by boat. During the Tang Dynasty, Quanzhou Port became one of the big ports of China's foreign trade, and the grand occasion of "There are people from ten continents in the market" 11appeared."Qingyuan Liu Family Genealogy" records that at the end of the Five Dynasties, Quanzhou

ceramics, copper and iron were widely sold to various countries. Five Dynasties Fujian attaches great importance to overseas trade, in order to better promote trade, Quanzhou expanded the urban scope and added road. Quanzhou port developed to the Song Dynasty to achieve the comprehensive prosperity. In the second year of Yuan You in the Northern Song Dynasty, it was established in Quanzhou to manage foreign trade, and it was established to receive overseas business tourists. During the Southern Song Dynasty, the economic center of gravity gradually migrated to the south, and the navigation and shipbuilding industry was developed at this time. Quanzhou Port became the largest port in China with "thousands of national merchants in the sound of the rising sea"12. The rulers of the Yuan Dynasty attached great importance to foreign trade, continued to set up municipal ships in Quanzhou, and carried out official ships trade. At that time, seven cities were set up in the country, but Quanzhou took the normal tax points, collecting one / 30 more tax, which showed that its commodity trade profit far exceeded that of other ports. At this time, Quanzhou port of merchants gathered, as many as 100 trade countries, the number of export commodities, known as "the world's largest port".

Cizao kiln relying on the sustainable development of the maritime silk road and Quanzhou port formed overseas trade advantage, to such as Japan, South Korea, southeast Asia, Indonesia, Cambodia, the Philippines, Malaysia, Brunei, Indonesia, Thailand, Sri Lanka, east Africa, Kenya, Egypt, northern Africa countries transport a large number of ceramic products. In order to meet the needs of ceramic products export, craftsmen often deal with the shape and decoration to a certain extent, specializing in the production of "customizable" products to meet the needs of the sales area. Therefore, some ceramic products exported by the Cizao kiln have the influence of foreign culture. JunChi is the most obvious product, most of them unearthed in overseas archaeology. JunChi buyers are mainly overseas Buddhist monks and Islamic believers in Southeast Asia, whose shapes and patterns are determined according to the buyer's preferences. And some green glaze products, using green glaze materials from Arab and other countries, to cater to the market to develop Arabic style products. In addition, in the Philippines and Kalimantan in Southeast Asia, indigenous people have a tradition of "urn worship" since ancient times. Cizao kiln craftsmen combined with market demand, the production of characteristics of the export products dragon urn, because of the urn abdomen or shoulder carved dragon pattern named. The dragon urns are regarded by the indigenous tribes of Southeast Asia as a symbol of sacred objects and symbols of wealth, used for ritual sacrifices, funerals, or storage from generation to generation.

Secondly, the song and yuan dynasties Cizao kiln ceramics shape is also influenced by Persia and central Asia millet gold and silver ware, on the basis of Chinese traditional utensils modelling injected fresh blood, organically integrate local elements with it, typical such as high foot cup, all kinds of sunflower disc, chrysanthemum disc, etc., undulating and changing curve shape.

Conclusions

In the Song and Yuan dynasties, the Cizao kiln presented us with important design texts in its shape and decoration, and showed its unique artistic value through a series of advanced design ideas. Behind the ceramic modeling and decorative design elements of the Cizao kiln, there is a deeper historical and cultural value. The Cizao kiln ceramics were influenced by the social environment, regional culture, religious belief, and even foreign national culture, reflecting the diversified hedging and integration between cultures. It not only retains the excellent tradition of China, but also has the design style of other cultures, showing the unique design style.

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A Study on the Group Effect of Sustainable Development of Cultural Heritage Tourism in Commercial Districts -Based on Qualitative Comparative Analysis (QCA) Perspective

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Abstract

In recent years, the development of commercial + tourism industries in historical districts in many cities relying on cultural heritage resources has strongly promoted regional cultural inheritance and economic development, but the distortion of cultural connotation and over-exploitation of tourism or commercial resources in the development process have led to cultural distortion, ecological damage and industrial shrinkage. To alleviate the dichotomy between heritage preservation and development in commercial districts, the study applies sustainability theory to the field of cultural heritage tourism in commercial districts, integrates strong and weak sustainability analysis frameworks, constructs a sustainable development system for cultural heritage tourism in commercial districts, and selects three classic cultural tourism commercial districts in southern Jiangsu Province as case samples for fuzzy set qualitative comparative analysis in terms of material resources, The data results show that the selected latitudes do not directly influence the final results as single necessary and sufficient conditions, but in the form of histories. The analysis of the effect of the histories shows that the sustainable development of cultural heritage tourism in commercial districts is achieved through the development design path based on the authority and responsibility system and the cultural design path driven by creative intervention. Guidance significance.

Author keywords

cultural heritage;sustainable development; commercial districts; cultural creativity; qualitative comparative analysis.

Introduction

In recent years, in order to implement development strategies and policies such as urban renewal, rural revitalization, and integration of culture and tourism, many regions have relied on the development of commercial street tourism industry based on cultural heritage resources. This is considered an important way to promote regional culture and drive economic development. However, the excessive or insufficient development in some areas has led to cultural distortion, ecological damage, and industrial decline. In fact, the various challenges faced by regional cultural heritage ultimately stem from the issue of sustainability, that is, the difficult reconciliation of cultural preservation and economic growth. This results in one side squeezing the living space of the other, making it difficult to sustain heritage tourism development. Therefore, this study explores the complex logic and mechanisms of sustainable development of commercial street cultural heritage tourism from the

perspective of ecological economics, using qualitative comparative analysis from the configurational perspective. Through field investigations, the value and significance of cultural heritage in the context of commercial street tourism are further understood, aiming to propose targeted sustainable development paths from a practical perspective.

The basic meaning of sustainable development of cultural heritage tourism

With the evolution of heritage conservation theories, the concept of sustainable development has gradually become an important theoretical basis for guiding heritage conservation and utilization(Cooper et al. 2016). Sustainable development theory emerged in the fields of environmental science and management science. It addresses issues such as environmental pollution, resource depletion, and ecological damage caused by population growth and economic growth. Its goal is to establish a development model that can "meet the interests and needs of different generations simultaneously", and to pursue a harmonious state between natural ecology and economic society(Colomb, et al. 2016). Due to the strong universality of fairness, harmony, and sustainability embodied in the theory of sustainable development, it has been gradually applied to a wider range of development issues. Based on different research hypotheses and value orientations, sustainable development theory can be divided into two paradigms: "strong sustainability" and "weak sustainability"(De, 2011). Using this dichotomy, the path of sustainable development in cultural heritage tourism can also be divided into strong and weak versions(Graham, 2002). The former focuses on the protection and continuation of the authenticity of heritage, while the latter emphasizes the full exploration of the functional utility of heritage and opposes the blind pursuit of heritage preservation at the expense of the actual needs and quality of local residents' lives(De et al. 2009). The academia generally regards tourism as a means of revitalizing cultural heritage, and empirical measurements have shown that the economic income from tourism can offset the negative impacts of tourism activities on heritage sites, contributing to the construction of productive protection mechanisms, the preservation of cultural scenes, and the provision of reproduction opportunities for the inheritance of cultural heritage. Therefore, cultural heritage tourism has the potential to achieve sustainable development.

Analytical framework and index construction

The comprehensive nature of tourism and its intertwined nature with related industries make the connotation and extension of tourism development quality broad and complex. Therefore, it is necessary to identify the key factors for sustainable development of heritage tourism, so that the evolutionary trajectory of sustainable development of cultural heritage tourism can be described operationally. This study follows the principles of comprehensiveness, systematization, simplicity, and operability, and refers to the Global Sustainable Tourism Destination Criteria, the United Nations 2030 Agenda for Sustainable Development, and the Jiangsu Province's Guidelines on the Implementation of Urban Renewal Initiatives. The micro-scale measurement index system was constructed by referring to the Global Sustainable Tourism Destination Criteria (GSTC), the United Nations 2030 Agenda for Sustainable Development, and Jiangsu Province's Guiding Opinions on Implementing Urban Renewal Initiatives (see Table 1).

Table 1. Indicator System.

Variable Type	Factors	Variables	Variables Explanation of variables
Conditional variables (X)	Material Resources	Ecological Quality	Diversity and quality of local ecosystems and landscapes
		Facility Construction	Construction integrity and environmental friendliness of man-made landscape and infrastructure
	Design Planning	Spatial layout	Development and protection pattern and planning land layout, structure, use control requirements
		Reasonable regulation	Rationalization, convenience and ease of use of commercial space
	Business Management	Authority and Responsibility	Recognition of the existing rights and responsibilities of each subject in heritage tourism
		Institutional Guarantee	Level of institutional and planning guarantees for cultural development of heritage sites
	Cultural Creativity	Cultural Consciousness	The level of awareness and active participation of the surrounding residents in the regional culture
		Creative intervention	The degree of agglomeration and attractiveness of creative elements and creative subjects
Outcome variable (Y)	Sustainability	Dynamics, quality and equity of sustainable development of cultural heritage tourism in commercial spaces	

Research Methodology and Data Collection

Research Methodology - Qualitative Comparative Analysis Method

The traditional linear statistical approach assumes that variables are independent of each other and ignores multiple concurrent relationships among independent variables, which is an obstacle in explaining the path of results and requires a large sample size, and has weak explanatory power when applied to a limited number of cultural heritage tourism studies with a regional unit of analysis(Hug, 2013). In contrast, the Qualitative Comparative Analysis (QCA) method based on set theory can identify the core and peripheral conditions that drive tourism and explain the complex logical paths of sustainable development of cultural heritage tourism, and is oriented to quantitative analysis of specific cases, which can analyze the mechanism of each variable within a small sample, and has the advantages of both quantitative and qualitative analysis(Hug, 2014). It is also oriented to quantitative analysis of specific cases, so that the mechanism of each variable can be analyzed in a small sample, which has the advantage of both quantitative and qualitative analysis(Lucas, et al. 2014). In this study, there is no clear threshold between the values of the condition and outcome variables, so the fuzzy set qualitative comparative analysis (fsQCA) method was chosen(Schneider, 2018).

Data collection

Considering Jiangsu as an important economic province in China, the research focuses on the economically developed region of southern Jiangsu as the analytical unit. Three classic cultural and tourism commercial

street areas were selected as case samples (see Table 2). A questionnaire survey method combining offline and online approaches was utilized. A 7-point Likert scale was used, and 30 survey participants were invited based on convenience sampling to assess the cases according to their experiences. The average values of the survey results were taken as the final scores, and on-site investigations of the commercial street areas were conducted to supplement the data.

Data analysis

Table 2. Sample Source.

City	Commercial space name	Culture Introduction
Wuxi	Nanchang Ancient Street	Nanchang Street is the essence of the traditional style of the ancient canal water township, an important link in the history of the development of Wu culture and the Grand Canal, a witness to the rich Jiangnan canal, an important chapter in the development of national industry and commerce in Wuxi, and a research base for the Jiangnan brick kiln group.
Changzhou	Qingguo Lane	Qingguo Lane is the place of Changzhou's literary lineage, the literary style emerged from the Tang Dynasty, the fragrance of books filled the lane, ink floating river, has come out of nearly a hundred of imperial examinations and a large number of modern celebrities, throughout politics, literature, art, education, industry, science and many other fields, was praised as "the first lane of famous scholars in Jiangnan".
Suzhou	Guanqian Street	Guanqian Street belongs to the ancient city center of Suzhou, which is a commercial and cultural tourism center with many monuments and stores. Guanqian Street, which is named after the Xuanmiao Guan, is a famous Chinese restaurant street in Suzhou, with many old and famous Chinese stores located in this street.

One-factor analysis

Consistency and Coverage indicators were used to measure the extent to which each condition variable was necessary for the outcome variable and how strongly it explained the outcome variable(Rihoux et al. 2013). Consistency refers to the extent to which all cases included in the analysis share a given condition or combination of conditions that lead to the outcome. Generally, if the consistency indicator of the condition variable X is greater than 0. 8 for the outcome variable Y, X is considered to be a sufficient condition for Y. If it is greater than 0. 9, X is considered to be a necessary condition for Y(Ragin, 2009). Coverage refers to the extent to which a particular condition or combination of conditions explains the outcome, and a value closer to 1 indicates that X is closer to the unique explanation of Y. Consistency and coverage are calculated by the following equations, respectively(Schneider et al. 2016).

Based on the calculation of the conditional variables in the table (see Table 3), the consistency values of the variables are less than 0. 8, indicating that they do not directly affect the final results as individual necessary

$$Consistency(x\_i \square y\_i) \square \square \min \cancel{x_i} \cancel{y_i} / \cancel{\square} x_i$$

$$Coverage(x\_i \square y\_i) \square \square \min \cancel{x_i} \cancel{y_i} / \cancel{\square} y_i$$

and sufficient conditions, but in the form of grouping, which makes it necessary to carry out the next step of the analysis of the path of action of the combined factors.

Table 3. Consistency and coverage of variables.

Conditional Variables	Consistency	Coverage
Ecological Quality	0.651	0.478
Facility Construction	0.587	0.522
Spatial layout	0.662	0.568
Reasonable regulation	0.729	0.712
Authority and Responsibility	0.716	0.623
Institutional Guarantee	0.812	0.765
Cultural Consciousness	0.652	0.648
Creative intervention	0.727	0.641

Analysis of group effects

A frequency threshold of 1 and a consistency threshold of 0. 8 were set, and three solutions, complex solution, parsimonious solution, and intermediate solution, were calculated for the data after eliminating the necessary conditions. The intermediate solution was chosen for the analysis because it incorporates logical residuals that are consistent with theoretical expectations and empirical evidence (as shown in Table 4). The overall consistency of these two paths (groupings) is also greater than 0. 8, indicating that these two groupings are sufficient conditions for achieving sustainable development of cultural heritage tourism in commercial districts. At the same time, the coverage rate of the solution is greater than 0. 8, which indicates that the combination of these two conditions can explain most of the cases well and has a strong explanatory power. Based on the variables contained in each path (grouping), they can be categorized as the governance path targeting the enhancement of people's livelihood, the development design path based on the authority and responsibility system, and the cultural design path driven by creative intervention.

Table 4. Configuration Effect.

Variables	Paths	
	I	II
Ecological Quality	●	×
Facility Construction	×	○
Spatial layout	●	●
Reasonable regulation	×	●
Authority and Responsibility	●	●
Institutional Guarantee	●	×
Cultural Consciousness	●	●
Creative intervention	○	●
Consistency	0.901	0.855
Original Coverage	0.408	0.615
Unique coverage	0.145	0.109
Coverage of the solution	0.861	
Consistency of the solution	0.868	

Note: " ● " means that the variable exists in the specific path, " ○ " means that the variable does not exist in the specific path, "×" means that the variable has no effect in the path.

Discussion

Development design path based on the rights and responsibilities system

The sustainable development of cultural heritage tourism in commercial districts cannot be achieved without the management and public participation of stakeholders, which requires a rights and responsibilities system as the driving force, taking into account cultural consciousness, institutional protection, spatial layout and ecological quality to promote its benign development. Stakeholders associated with the development of cultural heritage tourism in commercial areas include the following categories: local government departments, enterprises and investors, heritage conservation management agencies, and residents of heritage sites. Due to the different positions, executive functions and roles played by each party, a third-party monitoring body can be constructed to oversee the major decisions in heritage conservation and tourism development. At the same time, an effective stakeholder management mechanism is established, and the government and enterprises intervene in the tourism development of cultural heritage in commercial districts as external subjects, driving the community people to participate extensively in decision-making, which not only mobilizes the enthusiasm of the general community people, but also concentrates social power, enhances the sense of ownership of the community people in heritage sites, and guarantees the common benefit of investors from all parties. In addition, public participation builds a pipeline and a bridge of communication between the community people and the heritage conservation and development field, which is conducive to promoting the relationship management of the government and reducing differences and contradictions. Since heritage conservation and development is an important matter of vital interest to the people of the heritage sites, adopting the strategy of public participation can effectively stimulate the local people to pay attention to the conservation and development of cultural landscape heritage. Public participation can balance the interests of communities, gain community support, and achieve sustainable community development(Rohlfing, 2015). At the same time, it guides the people in the heritage community to actively participate in heritage conservation and tourism development, strengthens the publicity of heritage conservation theories, regulations and policies, and realizes the transfer of power for conservation and development. The tourism planning of rural cultural landscape heritage should be based on the premise of promoting community development, guiding the community people to take over the commercial support of heritage tourism development, and combining with the community's own characteristic production forms, which not only boosts the tourism economy, but also promotes the harmonious development of the community and prospers the community culture.

Cultural design path driven by creative intervention

Creative intervention as a driver requires a balance between human development, brand marketing and creative intervention. The experiential and participatory nature of the heritage tourism industry and its remarkable industrial cascade effect enable it to be perfectly integrated with cultural creativity. ⑤ As traditional operas, songs and dances with distinctive regional characteristics gradually fade from people's view, it is the comprehensive cultural and creative development approaches such as literature, film and television, animation and games that give them vitality and momentum for development, and gain a wider audience through Internet media dissemination. Creative tourism and its derived participatory experiences, as a new mode of cultural heritage tourism development, not only allow the experiencers to gain cultural enrichment, but also stimulate their creative potential(Krogslund et al.2015). In addition to tourists, heritage sites can also attract cultural and creative talents from all over the world to inhabit them, so that they are no longer in a relatively closed and independent state. In the past, cultural heritage protection focused on the physical discipline of the other, which was manifested by setting up warning signs prohibiting touching cultural relics, graffiti and littering, but neglected

cultural discipline, i.e., emphasizing the respect of the cultural other for local culture and people's lives, so as to maintain the cultural order, spatial order and discourse order of cultural heritage evolving in its natural state. For example, for ethnic towns and villages, modern facilities such as exposed air conditioning units are often incompatible with the original appearance of the town or village, but they are necessary for the people living there today. For this reason, it should be made clear that the pursuit of authenticity is not the same as mechanical restoration, but the display of real production and cultural essence, and the stripping away of modernity is not in line with the development aspirations of local people. In short, authenticity is both the soul of cultural heritage and the "shackle" for its artistic re-creation and reproduction(Jones,2011). The creative class needs to take into account the natural space and socio-cultural space where the heritage is located, focus on the inheritance of local culture and the infusion of spiritual connotation, empower the production of tourism attraction with cultural creativity, discover, create and lead the market demand at a higher level, and create scenario-based tourism consumption products, so that it can help integrate the composite of tourism functions, complementarity of products and diversity of business modes, and realize the inheritance of national culture The unification of heritage tourism commerciality and artistry.

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Interconnection: Learning from Traditional Practices in the Northern China

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Abstract

Exploring traditional cultures for inspiration applicable to contemporary sustainable development is considered a promising approach to fostering sustainability, rather than simply mitigating unsustainability. This potential lies in its ability to counteract the problem of overconsumption stemming from modern values. This paper specifically delves into traditional practices in Northern China to ascertain whether they offer insights that can be integrated into contemporary Design for Sustainability (DfS). This study employs a methodological combination of literature research method, fieldwork, and semi-structured interviews. The Jizhou region in northern China serves as the focal point for experiential observation. Initially, we gain an understanding of the region's historical and present-day lifestyle through a thorough review of local gazetteers. Subsequently, we gather primary data by observing the daily routines of local villagers and conducting semi-structured interviews. Ultimately, the authors discover a pattern of associations among various everyday items that has emerged from these traditional practices. The paper concentrates on four primary objects in northern Chinese households: straw, stove, kang (a traditional heated bed), and chimney, and details how over 20 associated objects commonly found in daily life form interconnected phenomena. Furthermore, we consider the ways in which these elements establish associations as potential concepts that can enrich contemporary DfS principles, which include multifunctional product design, thermal energy gradient utilization and the recycling of raw materials. This paper posits that the phenomenon of correlation and its formation represent significant features of traditional practices in China. These features serve as a wellspring of inspiration and complement contemporary DfS. It is important to note, however, that this does not diminish the value of contemporary practices. On the contrary, contemporary theories and practices remain the predominant means of advancing sustainability. The key challenge lies in preserving the essence of tradition while adapting it to modern times, and this will be a central focus of this ongoing research.

keywords

Traditional culture; Traditional practices; Interconnection; Sustainability

Introduction

As the environment continues to deteriorate, there is growing academic research focused on achieving sustainable development. New solutions are being sought across various disciplines including environmental studies, energy studies, engineering, business, management, economics, and design (Hansen et al., 1996; Hueting et al., 1998; Ehrenfel, 2004; Liu et al., 2022). Over the past two decades, Design for Sustainability (DfS) has made a significant contribution, with design now recognized as a crucial activity in supporting the transition to sustainability (Changede et al., 2022).

Design approaches such as circular design, green design, eco-design, and product-service system design, derived from concepts like circular economy and life cycle assessment, have garnered significant attention (Jiang et al., 2021). At this stage, design theories and methodologies are largely influenced by modern values such as consumerism, economic growth, efficiency, and technological optimism. However, simply striving to reduce unsustainable development does not lead to achieving sustainability, as noted by Ehrenfeld (2008). Hence, some scholars are turning to traditional cultures for inspiration, seeking to tap into traditional knowledge. Skjerven (2012) argues that the wisdom and aesthetics inherent in the crafting of everyday objects by human hands should be fundamental to forging a sustainable future. Walker (2011) contends that design can obtain valuable insights from traditional knowledge and practices, rather than solely relying on modern knowledge. Changede et al. (2022) discovered sustainable design awareness in the five traditional folk wisdom by analyzing the example of the stone mortar and pestle, a traditional Indian grinding tool, through the lens of Stuart Walker's (Walker, 2011) Quadruple Bottom Line (QBL). Likewise, Munyai et al. (2010) offer alternative production methods rooted in local wisdom and culture conducive to sustainable development and social innovation from a South African perspective.

Leong et al. (2006) put forth a set of DfS theories and implementation strategies based on traditional Chinese culture. Gong Miaosen's team at Jiangnan University in China integrated traditional Chinese knowledge and practices into modern product and service design to inspire contemporary design (Gong et al., 2022). Xu (2003) contends that the study of Folk Utensils serves as a reminder of the proper relationship between people and objects, people and nature, and people and resource utilization. Summarizing the above, most studies from a Chinese perspective draw from the upper-class cultural heritage of ancient China, with few focusing on the traditional folk wisdom and practices. Traditional practices encompass a combination of knowledge, experience, skills, locality, and social strategies (Pierotti et al., 2000). Often transmitted orally, these practices deeply influence daily life, yet have received limited attention and research. Given the aforementioned context, this study poses the research question: What are the traditional practices within Chinese folklore? And can they offer inspiration for contemporary DfS?"

Methodology

China, as a multi-ethnic and geographically diverse country, exhibits a wide range of complex and diverse lifestyles across its regions. Drawing from an extensive field research spanning nearly 21748 miles conducted from 2012 to 2015, the authors possess invaluable first-hand experience of these diverse regional lifestyles. This research primarily centers on the lifestyles prevalent in northern China. The study was situated in the villages of the Jizhou region in Tianjin, China, where the authors have resided for five years, from 2019 to the present, specifically in the village of Nihe, as shown in Figure 1. Jizhou epitomizes the quintessential rural life characteristic of northern China.

The research employs a combination of methodologies, encompassing literature research, field research, and semi-structured interviews. In the initial phase, the authors delved into two facets of the literature: the historical evolution of lifestyle patterns within the Jizhou region and the indigenous natural geographic resources. This

section of the literature primarily draws from Local Gazetteers, which is the main source for the study of Chinese history (Chen et al., 2020), recording local customs, products, geography, stories and legends. The section allows the authors to construct a comprehensive overview of the developmental process of lives in the Jizhou region. Subsequently, the authors embarked on an in-depth exploration of the Jizhou area, visiting three villages and thoroughly documenting, both visually and textually, the production and domestic artifacts preserved within the farmers' households. This process yielded a total of over 200 selected items. Simultaneously, more than 10 stakeholders, including folklore experts, township officials, and villagers, were engaged in semi-structured interviews. The data collected through these procedures form the foundational research material.

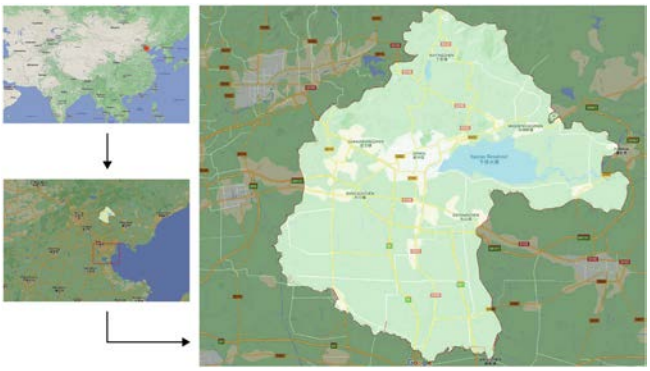

Figure 1. Geographic location of the Jizhou region (information was downloaded from Google Maps in September 2023)

During the organization of primary data, the authors discerned a prominent distinction between traditional items and their contemporary counterparts: the presence of a strong interconnectivity among traditional items. This interrelation is frequently forged and sustained by traditional practices. Finally, a case study centered around the “object group related to Chinese Kang” is presented to exemplify how the interdependence of objects can serve as an inspiration for contemporary DfS.

Discussion

For centuries, and even today in certain regions, “fire” has held a central place in the physical space of homes, serving as a gathering spot for family members. It is where crucial family rituals are conducted, and significant decisions are made. In the Western context, “fire” typically resides within the fireplace, thereby becoming the center point of the living area (Lu, 2022). Similarly, in northern China, the kang assumes this key role (Figure 2). Comprising a stove, a kang body (resembling a bed), and a chimney (Figure 3), the typical Chinese kang facilitates the consolidation of various household activities, including sleeping, heating, ventilation, food preparation, and social interactions (Zhuang et al., 2009). Similar heating systems are found in other cultures, such as the heated kang (heated floor) in Korea (Yeo et al., 2003) and the hypocaust in ancient Rome (Basaran et al., 1998). As the hub of the domestic area, the kang undertakes almost all aspects of daily living, while also encompassing some elements of production. It also tightly interconnected the cooking utensils centered around the 'stove', the building processes centered on 'adobe', and the fuel materials centered on 'straw'.

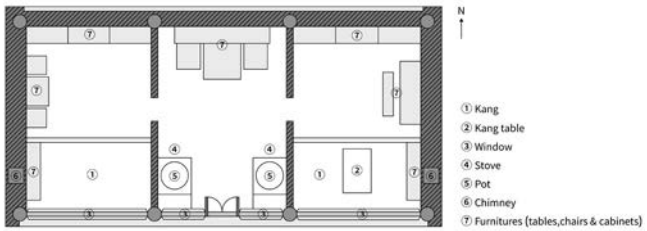

Figure2 . Layout of interior space in northern China (modified from Ye,2010)

In the harsh winters of northern China, the kang acts as the primary or sole heating apparatus in households and derives its warmth from the stove. The kang, the stove and their object groups exemplify a classical gradient of heat utilization. The stove has the highest demand for heat, followed by the kang. While waste straw from local

wheat agriculture and firewood is the main fuel. The hot fire smoke ascends the flue within the kang to warm its surface, heats the entire room and, ultimately, is expelled through a concealed chimney in the wall.

Consequently, in traditional northern house construction, the stove, kang, and chimney are normally built in integrated ways, and their placement typically remains unaltered. This trio forms the center linking various items. In the vicinity of these central elements, diverse groups of objects emerge in different regions due to varying economic, social, and environmental resources. For instance, in the Jizhou region, the kang predominantly serves functions related to sleeping, gathering, and dining. The kang table plays a vital role in distinguishing between these activities, as it can be flexibly repurposed as a dining table, a children's desk, or a meeting table, easily moved at night for sleeping on the kang. In some northeastern areas, the kang also serves as a workspace for processing food, particularly those requiring heating. For example, in northern China, people often pre-process dough, as the staple diet, by placing it on the kang. Additionally, in some areas, chicks are reared in a corner of the kang (Tian, 1991), although two later practices were not observed in the Jizhou area during this study.

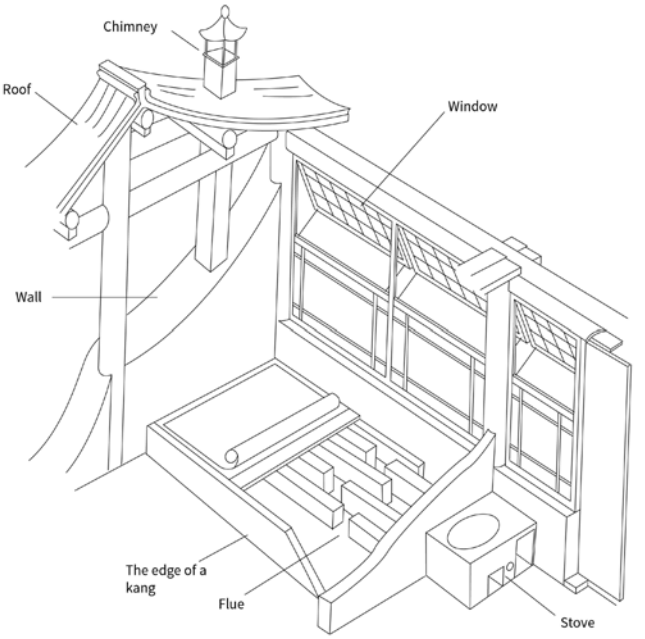

Figure3 . Structural profile of kang (modified from Tian,1991)

In the Jizhou region, a small section of poultry farming is integrated within the cookstove. Alongside the pot and Cuanzi (kettle), which are also nestled in the cookstove, they form a unified object group (Figure 4). The heat from the fire simultaneously heats water in the cuanzi while also facilitating cooking. This same heat provides warmth for the kang at night and chickens' nest concurrently.



Figure4 . Stove in Jizhou region (photographed and drawn by the authors)

Traditional lifestyle in northern China was deeply rooted in agriculture and farming, resulting in the generation of various waste materials ingeniously repurposed by the local populace. For instance, chicken feathers were remade into dusters, logs were transformed into beams, and branches were made into Guocha, which is similar to the function of a steamer basket, through rudimentary processing. Straw served as fuel and formed the primary building material for kangs in conjunction with local soil. In Jizhou, kangs are constructed using a blend of bricks, stones, and adobe. To create a new kang, there are four steps, including building an adobe, dismantling the old kang, crafting a new one, and drying it. The raw materials for crafting an adobe consist of a mixture of water, local soil, and straw—an agricultural byproduct—formed within a mold. It takes approximately 120 adobe pieces of two different sizes to make a new kang, a task that three individuals can complete in half a day (Tian,

1991). After the adobe is created, the old kang can be taken apart. Traditional windows in farming households are typically removable, allowing for easy removal during the deconstruction of the old kang. This facilitates the transformation of window openings into channel for discharging wasted soil, thereby shortening the carrying distance. The primary fuels employed for heating the kang in Jizhou are straw and corn cobs. Consequently, over time, a substantial amount of straw ash accumulates in the kang's flue. This ash is mixed with kang soil, and during the disassembly of an old kang, the soil is crushed and sifted, resulting in fine black soil. This mixture is then combined with Madao clay (a traditional Chinese building material) and applied to the roof to shield it from rainfall. Other waste materials are similarly returned to the land with the minimization of environmental pollution because all of them are sourced from local natural elements. The item interconnections mentioned above are shown in Figure 5.

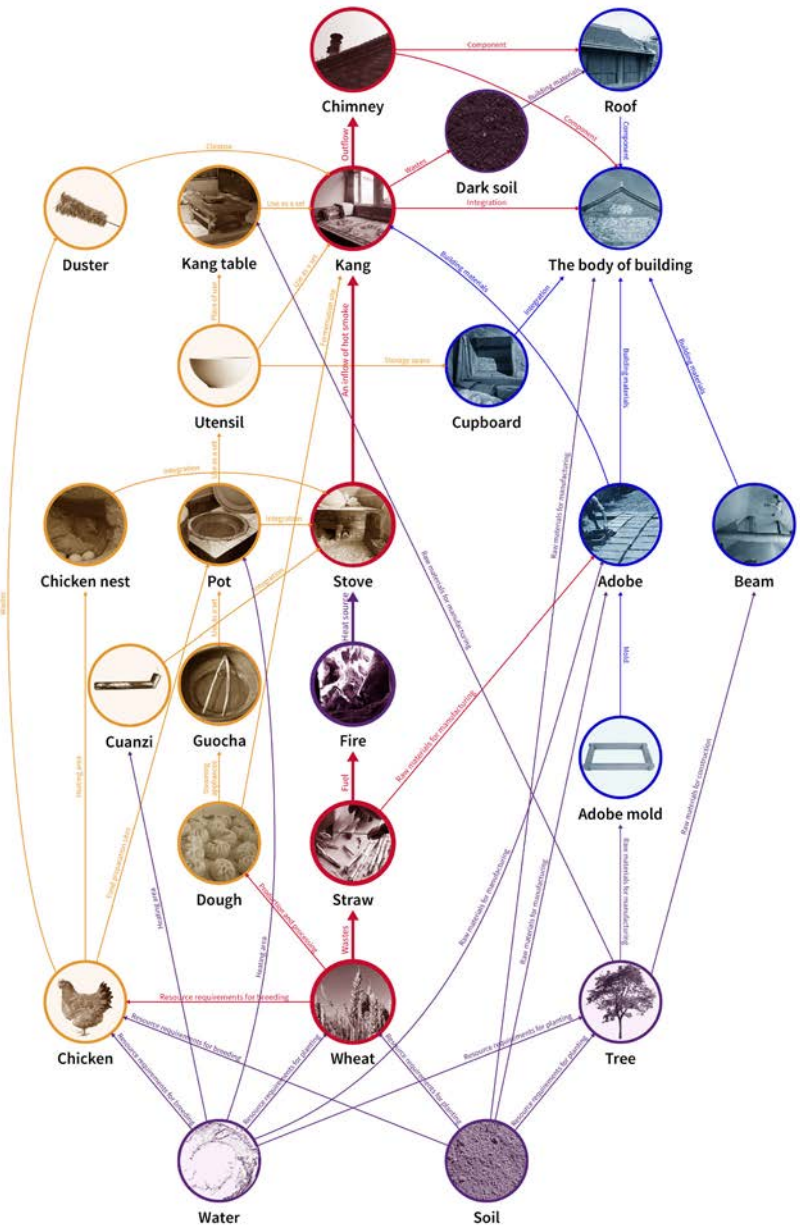

Figure5 . Item interconnections diagram (drawn by the authors)

Conclutions

This paper introduces traditional practices in northern China, emphasizing the significant implications of interconnected object phenomena in traditional practices for contemporary DfS. The observed phenomenon in the Jizhou district underscores key principles of DfS, including multifunctional product design, gradient heat utilization, and material recycling. It is important to acknowledge that the emergence of these interconnections are intricately linked to local social, economic, environmental, and cultural contexts. On one hand, the availability of raw materials is constrained by natural conditions and artisanal expertise. To ensure survival, people ingeniously link seemingly unrelated items through their actions. On the other hand, since these items are typically produced for personal use rather than commercial sale, they may lack efficiency and aesthetic considerations, focusing primarily on basic functionality. Consequently, once individuals are no longer constrained by survival needs, they may opt to discard these items. However, the abandonment of these objects is not a reflection of design flaws in their interconnection, but rather a result of the absence of efficiency and aesthetic refinement.

The subsequent phase of this research endeavors to explore methods for preserving object interconnection while concurrently enhancing efficiency and aesthetics to better serve contemporary lifestyles. Furthermore, it is imperative to acknowledge that China encompasses a diverse array of regional lifestyles, including distinctive traditional practices and relevance in southern China and among ethnic minority communities. While not the focus of this paper, these aspects hold substantial research value and warrant further research.

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From Sages works-making to Craftsmen Sages-oriented-making: The Study of Intrinsic Craftsmanship Spirit with the View of Traditional Works-making Culture

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Abstract

Through retrospective research on the spirit of craftsmanship, this paper probes into the essence and formation reasons of the spirit of traditional craftsman. From the perspective of traditional creation culture, the spirit of traditional craftsman is guided by "harmony between man and nature". Taking "Sages-oriented-making" as the goal, the performance of self-realization behavior presented by professional labor reflects a high-level spiritual demand of individual labor for the pursuit of the highest achievements in the future, and the excellent quality and fine tradition formed in the process of Craftsman Sages-oriented-making is the traditional connotation of craftsman spirit. In terms of specific connotation, it includes creation, truth-seeking, rationalization and control with "adhering to the way and following the principle" as the core in material practice, and impersonalization, altruism, collaboration, esteem truth and universal love with "devoting your mind to Heaven and Earth(means the world)" as the core in spiritual practice.

keywords

craftsmanship spirit，Sages works-making，harmony between man and nature，Creation philosophy，traditional culture，research of essence

Introduction

If the connotation of craftsman spirit can be simply summarized as "choose one thing, spend one's life" or "the desire to work well purely in order to do things well". So, why do people with the spirit of craftsmanship settle for a lifetime to do one thing seriously? Is this desire to do a good job an external influence or an internal impulse? And so on similar issues, in fact, can not get around the essence of the craftsman spirit. That is, why is there a craftsman spirit? Why the craftsman spirit? From the perspective of traditional craft creation, this paper takes the creation activities of craftsman as the research object, based on the excellent craft creation tradition and rich craftsman culture in ancient China, conducts a retrospective study on craftsman spirit, attempts to decipher the cultural gene of craftsman spirit with Chinese characteristics, and explains the essence of craftsman spirit in Chinese traditional thoughts.

From sages to “craftsmen”

Who was the earliest craftsman in the Chinese traditional creation culture? Who started crafts? On this issue, Kao Gong Ji explains that the “crafts-making” originated from the "works of sages". The business of the crafts was created by the sages. The sages are wise men, who created artificial things, and then the skillful people followed the method of the sages' making and adhered to the way of the saints' making and continued to carry on the inheritance and adherence, and these skillful people are called the “craftsmen” by the world. According to this logic, the sage who created the crafts is actually a knower with the ability to create things,and the"knowledge" is the "wisdom", that is, a wise worker. They were the pioneers of various ancient creation techniques, the founders of the handicraft industry, and the earliest craftsmen.

So how can these creature-knowers be called sages? It should be noted that the word “sage” has a high status in the traditional Chinese ideological system, representing a person who has reached the highest and most perfect state of humanity. According to the viewpoint of the Yi Jing·Xi Ci, there are at least four kinds of ways of sages, among which “the one who makes the ware is guided by its image” is related to creation, and the reason why the master of making the ware who started the crafts-making is regarded as a sage is because of his ability to master one of the four ways, "Zhi Qi Shang Xiang (making objects, we should be guided by its images)".

The most important thing of the craft is in the image,According to the Xi Ci, the creation of sages originates from the image-observing,and the "image" has three meanings: one refers to the "object image", that is, the image of things; The second is "image", meaning image; The third is "images of the hexagrams", which is a symbolic laws of Everything.

The earliest knowledge-type craftsman initiated human creation activities and created the "crafts-making". As the first person who is the origin of crafts-making, as the originator of the industry was symbolized, beautified, idealized and sanctified by the successors of later generations, respectfully calling it a sage. The sages became idols, models and standards that were looked upon and revered by their successors, guiding later craftsmen in production practice and spiritual thought.

Craftsmen work up the "harmony between man and nature" to achieve the Sages-oriented-making

The craftsmen' worship of the sages in the eleventh century brought about drastic changes in the influence of the thought of Neo-Confucianism. Zhou Dunyi of the Song Dynasty believed that sage was a goal that could be acquired. Based on Mencius' view that "All men may be Yaos and Shuns", Zhang Zai proposed that sages-oriented-making should be the direct purpose of human learning. He believed that the behavior and action of striving to become a sage which is essentially following the inherent nature of human beings, even if we know that it is almost impossible to become a sage, we should still strive to achieve it.

There is no difference in nature between all sages, so as long as there is a correct understanding of the Heaven and Earth(the world) and the Tao, mortals can reach the sanctification and become sages. Therefore, from the Song Dynasty onwards, saints were no longer unreachable, but a real, achievable goal that everyone could reach it. This view of sanctification adds practical attributes to the connotation of sages, which not only has a great impact on traditional cultural values, but also radiates to the field of craft creation, adding a new content for craftsmen to worship sages: The craftsman should not only adhere to and inherit the methodology of the sages who crafted these vessels, but also strive to attain sanctity and the goal of "Sages-oriented-making".

In order to achieve this sanctification, the ancient craftsmen made unremitting exploration in both material and spiritual practice, and therefore had many aspects of quality, and these fine cultural qualities come together, involve what we call the craftsman spirit today.

"Adhering to the Tao and following the Principle" on the level of material practice

The core category of craftsman spirit formed by ancient craftsmen in the level of material practice is "adhering to the Tao and following the Principles". The Huangdi Sijing, which is the source of Chinese thought and culture, describes sages as followers of the Tao and Principle and emphasizes their ability to adhere to the Tao and follow the principle. The Follower (that is, the sage) not only understands the laws of the world, but also perceives the internal causes of the occurrence and end of all things, and never claims to be the master of the world.

Tao and Principle both have the meaning of law and order, but the two belong to different categories. Tao emphasizes the nature of heaven and earth, while Li emphasizes the relationship between people and things. Therefore, the so-called "holding the Tao" means grasping the essential laws and principles of things, while the so-called "Principle" means dealing with the relationship between things well in accordance with objective laws. "Adhering to the Tao and following the Principle" is the ability to grasp the way of the Heaven and Earth and follow the principles of human beings. These traditional craftsman spirit formed in the production practice with the pursuit of the Tao and Principle as the goal can be roughly summarized as follows:

First, creativity. It is the knowledge and application that are pursued for creation and manufacture, and the creative ability to deform materials with the help of exquisite manual techniques in the process of giving shape to materials. It embodies the integration of theory and practical knowledge, the interweaving of sensibility and rationality.

Second, truth-seeking. The process of refining "Tao" and "Principle" is also the process of pursuing truth. In the classical era, because of the tendency to grasp the truth through inner understanding, truth seeking is more to grasp the truth through practice, to achieve the unity of subjective and objective, so truth seeking is a continuous practice process. In the scientific era, with the continuous improvement of people's cognitive level, the grasp of truth is constantly profound, and the methods are constantly enriched, craftsmen constantly break through and innovate on the basis of practice, constantly understand and receive new things, explore their essential characteristics, and grasp the real law of the development of things.

Third, probing the principle. It means to study the way of all things, probing the law of the world. In order to fully highlight the "Tao" and "Principle" carried by the objects, it is necessary to make the "truth" image of the objects constantly perfect, and repeated practice is the only way for craftsmen to make the objects perfect in the creation practice. Through repeated practice, craftsmen accurately and perfectly shape the material image of the metaphysical abstract principles, sublimate their understanding of the world and its changing laws in the process of pursuing the principles, and push their own "expressive" creation skills and abilities to the extreme.

Fourth, ability of control. In order to make their ideas can be fully expressed, the skilled use of technology, especially tools, is an indispensable means in the creation of craftsmen. In terms of technology, craftsmen transform information and practice into knowledge and experience in creation activities, and form the system of tool making skills. After repeated debugging, it is determined that it can be the most efficient in line with the law of production, that is, practice makes perfect.

To sum up, creativity, truth-seeking, probing the principle and ability of keeping are the craftsman spirit connotation formed by traditional Chinese craftsmen to pursue the "harmony between man and nature" of sages and practice "adhering to the Tao and following the Principle" in material production.

"Devoting your mind to Heaven and Earth" in spiritual practice

For craftsmen, to achieve the "harmony between man and nature" is to grasp the relationship between people and the Heaven and Earth, between people and things, and between the inner heart and the outside world. In addition to the production practice of "adhering to the Tao and following the Principle", in the spirit of the craftsmen should also "Devote your mind to Heaven and Earth", together with the two in the material and spiritual world practice together, can truly achieve the "individual is the part of the nature", into the "Sages-oriented-making".

The concept of "devoting your mind to Heaven and Earth" is mature in the Song Dynasty, and Zhang Zai, a Confucian scholar, believes that "Heaven and Earth have no mind", so we should "devote the mind to Heaven and Earth". The ancients regarded the heart(mind) as the organ of thinking, so the thought and feeling are classified into the category of "heart", which can be extended to feelings, thoughts, planning, thinking, intention, temperament, etc. Heaven and Earth have no mind, but people have a mind, and even the sages who have reached the realm of “harmony between man and nature” still remain a mind, and we cannot shield their thoughts and feelings just because they want to be "harmonious between man and nature", but they should be in harmony with Heaven and Earth by giving them thoughts and emotions.

Feng Youlan, a modern philosopher, also explained: as the material world, the Heaven and Earth have no thinking, the human brain is the highest manifestation of material organization, and human thinking is the product of material activities. To set the mind for the Heaven and Earth is to develop one's thinking ability to the best interpretation of the laws of the Heaven and Earth.

Therefore, the mind of the Heaven and Earth, on the one hand, is the thought and emotion given to the Heaven and Earth after the anthropomorphize of it, and its essence is the idealized spiritual height pursued by human beings themselves. On the other hand, it represents a selfless state that surpasses individualism by embracing the universe and all things as its standard, while internalizing the essence of heaven and earth. Subsequent artisans strive to embody this spirit in their craft with the ultimate aim of "establishing harmony between heaven and earth." The resulting traditional craftsmanship spirit can be succinctly summarized as follows:

First, depersonalization. It means that the craftsman demands himself and others in the team according to objective, detached and unchanging characteristics. The ancient craftsmen all had the same impersonal nature in their activities, and their names were often replaced by professional names, such as: clay molding master, painting master, inlay master and etc. Therefore, in the process of creating things, they are no longer treated as independent individuals, but are directly related to a process, skill or trade.

Second, altruism. It refers to a pro-social behavior that craftsmen do not care about personal gains and losses in the creation activities, in order to make others obtain convenience and benefits without seeking returns. The craftsmen of all dynasties produced wealth for the society, but they were not rich themselves, and the craftsmen worked to create beautiful objects, but they caused their own physical injuries and deformities. It can not simply be attributed to the ignorance of craftsmen and willingness to oppression, but to the "self-sacrifice" of craftsmen in exchange for the whole human continuity and social prosperity of the sacrifice spirit.

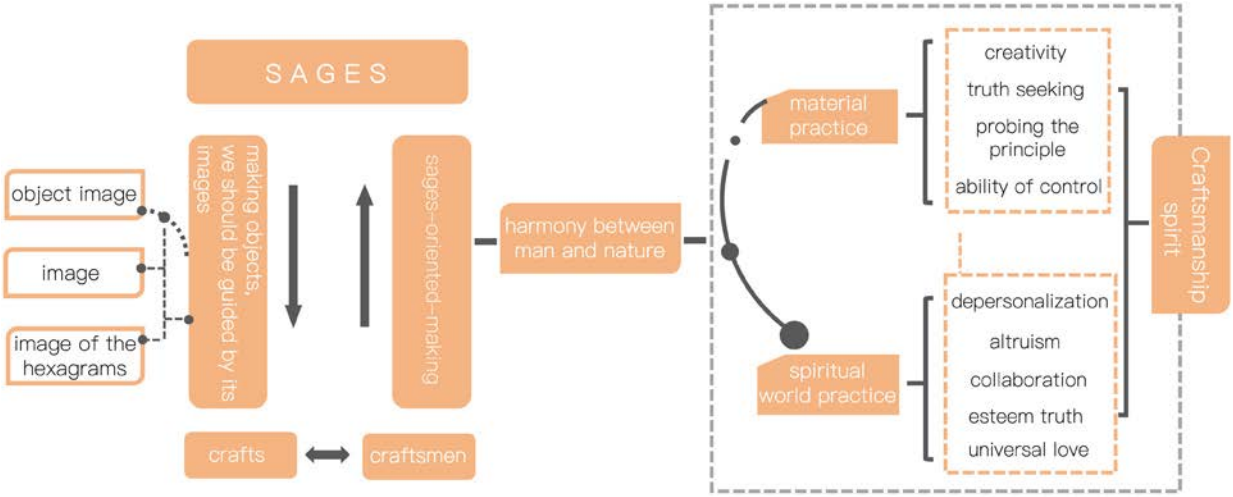
Third, collaboration. It refers to the cooperation between craftsmen and workers and between individuals in the process of creation. No matter in ancient or modern times, few craftsmen can independently complete all the processes of a set of making system, and the completion of an artifact largely depends on the joint efforts of many aspects, which reflects the "collectivity" of the craftsman group.

Fourth, esteem truth. It refers to the craftsman's respect for the way of creation, reflected in the Tao itself and the preaching of two aspects. All walks of life have their own revered sages, they are the craftsmen in the eyes of the industry's "Tao" incarnation, but also the historical product of the development of folk artisan culture. Reverence of the ancients for the industry sages was also regarded as a spiritual power, which was not only internalized into a moral, but also became the consciousness of standardizing the daily behavior of craftsmen; It also becomes a kind of sustentation, as a way for craftsmen to self-psychological adjustment and emotional catharsis; It is also a kind of cohesion, bringing together like-minded craftsmen and teams.

Fifth, universal love. Universal love means to love different people or things at the same time, opposed to "love with distinctions ". This kind of universal love in the love of things, in addition to making the best use of materials and labor fruits, craftsmen anthropomorphic treatment of materials and works is also a typical example of equality and universal love. In terms of loving people, it is embodied in the people-oriented concept of creation. The view that "common People's Daily use" is equated with "the way of sages" raises functional daily use to the level of "Natural justice".

Here we can also use a mind map to further interpret the relationship between sages and craftsman, as well as the origin and essence of craftsmen spirit:

Conclutions



From the perspective of traditional creation culture, the essence of craftsman spirit is the many fine qualities formed by craftsman in the process of realizing "self-realization" with the goal of "Sages-oriented-making" and the ideal of "harmony between man and nature". Self-realization is a kind of personality tendency that individuals pursue the highest achievement in the future, and it is the highest level of human needs. As the spiritual product

of the process of realizing self-value, the craftsman spirit is based on the existence of this high-level spiritual pursuit, which is rooted in the internal impulse of workers and is a kind of practical desire displayed by realizing self-value.

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Narratives of Love

爱的阐释

In supporting mental health among adolescents, can virtual reality be a useful tool?

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Abstract

The purpose of this paper is to investigate the potential of virtual reality (VR) technology as a therapeutic tool for the promotion of mental health and well-being in adolescent students. At a time of increasing mental health concerns among this population, this study aims to explore the effectiveness of VR interventions in addressing these challenges. Using a mixed-methods approach that combines qualitative interviews and quantitative assessments, this research explores the experiential impact of VR-based interventions on stress reduction, emotional regulation, and overall mental well-being among adolescent participants. By analysing the subjective experiences elicited during VR immersion, this study seeks to elucidate the mechanisms underlying the potential therapeutic benefits of VR for this population. Findings from this research endeavour will not only shed light on the feasibility and acceptability of integrating VR technology into mental health interventions for adolescent students but will also provide insights into how to optimise VR environments to maximise their effectiveness in promoting mental wellbeing in educational settings.

Keywords

Virtual Reality, Wellbeing and Design, Human Computer Interaction, Post-humanism

Methodology

"Can virtual reality be a useful tool in supporting adolescent mental health and well- being?" The research aimed to assess the effectiveness, usability, or impact of VR in supporting adolescent mental health. Participants in the study were 19 students from a London-based art college, aged 16-18 years. Participants were informed of the purpose of the study and gave their consent to take part in the research. Students discussed the ethical implications of their use of technology and their personal experiences of mental health and well- being. The students' feedback was discussed, and the students' experiences were recorded through interviews and surveys. This data was used to create an immersive experience, which was also tested with participants.

The ethical framework of this study was influenced by prior research (Fahey 2014) on our interactions with digital technology, and how this affects us psychologically. Students were interviewed individually, with our conversations recorded and observations made in note form. Students' computer and device usage was analysed over several weeks to select a range of students for the study, with device usage ranging from low to high. Discussions with students about any potential concerns took place in the weeks before the study began. Participants were worked with over an academic year (September 2021-June 2022). Ethical considerations were

approved by the Research Ethics and Integrity Sub-Committee (REISC) at Goldsmiths, University of London. Within the college, students had access to additional pastoral staff who were appointed to support students' mental health and well-being should they have any concerns.

By digitising therapeutic practices and getting participants to work on their mental health and well-being in virtual spaces, participants were given a new perspective on wellbeing. The proposed development of this research project is to explore the use of biofeedback to create virtual environments that respond to bodily functions.

Findings

Background

To take a Rhizomatic approach in mapping out this research project, some of the initial threads at the root of the project emerge from science fiction. What if a cyber brain could possibly generate its own ghost, andcreate a soul all by itself? And if it did, just what would be the importance of being human then?' (Ghost in the Shell, 1995, 00.42.43) The themes presented in Ghost in the Shell (1995) are prophetic allegories for humankinds current relationship with technology and the possible future of a more cybernetic world. Haraway (2016) philosophises about the 'Spectre of the Ghost in the machine' (Haraway, 2016, p.11) stating that modern-day machines highlight the ambiguity between the natural and artificial. We currently live in a reality where machines are present in most day-to-day routines. In modern-day society, it is hard to escape the thrall of our devices, vibrating in our pockets and alerting us to an infinite possibility of connections. Virtual reality (VR), augmented reality (AR), and artificial intelligence (AI) are some examples of technology that embody the balance between humans and machines. Research into creating human-like AI and developing more immersive virtual worlds present many ethical existential quandaries. As we become more embedded within the machine, it is fundamental that we instill technology with humanistic traits, or else we could be in danger of undermining our human nature.

Exploring Vrual Spaces

The first research stage in the study was to introduce the students to VR with a familiar experience. Each participant experienced different virtual worlds tailored to their interests. Stage two of the research introduced the students to a range of existing well-being apps, which focused on using games and meditative experiences to calm the mind. Stage three of the research was to apply the student feedback and build a new immersive experience.

"It puts you completely in it as opposed to you trying to put yourself in it through your sight or listening to something. I think by seeing it you're kind of forced to be in it, but in a good way. It doesn't leave you any room for your mind to wander." (Student Participant)

All students reported that the experiences altered their moods, stating that they felt calmer and sometimes energised and more creative; however, some students reported that the experiences were too stimulating and sometimes had the reverse effect. Considering that the student participants had previously had difficulty switching off during meditation, the fact that these experiences allowed them to take this practice into their lives is a strong indicator that VR therapy can extend from virtual realms and into everyday life.

Using the student feedback, the last stage of the research was to develop a new immersive experience. Working closely with therapists we developed the idea to mimic a self-hypnosis exercise called the 'control

room technique' (Stagg 2015). The technique involves taking a patient down a staircase and into a relaxing space towards the control room of their mind, once the patient is in their control room, they are prompted to adjust their thinking habits to better deal with stressors or difficulties. Using a recording of a therapist talking through the control room combined with a binaural audio track, an immersive 3D spatial soundscape was generated. The virtual world was built mainly in Unreal Engine and Cinema 4D, the design was developed to support the soundscape and to guide the participants through the experience. The students responded well to the immersive control room sequence and stated that it allowed them to alter their negative thought processes. Upon completing early beta versions of this experience, I realised this project was just in the early conceptual stages, sewing a seed for themes I want to explore in more detail with further research. This process was more of a reaction than a response; the brain's initial knee-jerk towards generating an artefact inspired by the research.

Technology's role in our daily lives is becoming embedded into our physiology. Wearable devices that alter our perception of the world move us towards manifesting Haraway's cyborg;

'This cyborg is our ontology; it gives us our politics. The cyborg is a condensed image of both imagination and material reality, the two joined centres structuring any possibility of historical transformation.' (Haraway, 2016, p. 4)

Considering the embodiment of technology in modern-day society, VR will likely be equally present in the future. Concerning supporting mental health, VR appears to be a valuable tool. The existing examples of VR software focused on well-being evidence that technology can make us more aware of our mental health and well- being. VR is a relatively new technology and how it gets adopted into our daily lives is yet to be seen. The students who participated in the study could use VR to foster a positive mental state and trigger discussions about their well-being. The students might not have considered using VR to support their mental health if they explored this independently, suggesting that the framework to introduce people to virtual therapy should be more available.

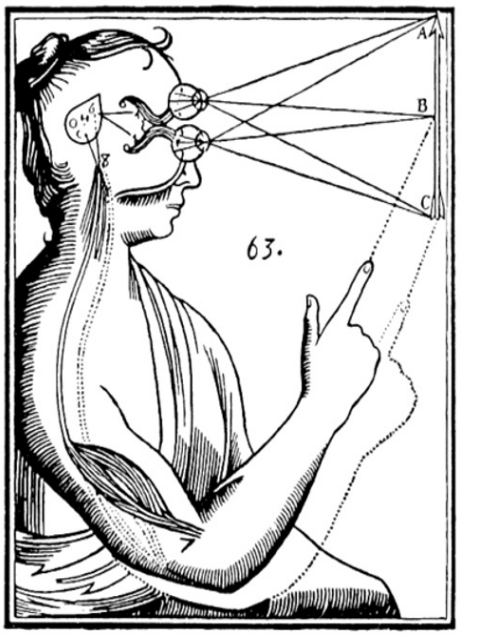

Figure 1. Illustration of Dualism, Rene Descartes, 1596-1650

We currently mostly access VR for gaming; however, the different applications are advancing, 'and it would not be surprising to see a flourishing ecosystem of metaverses before long' (Chalmers 2022 p186). There is much scope here to build new software that incorporates virtual therapeutic practices.

The human mind is complex, and our mental health and well-being are exceptionally subjective; therefore, we cannot say that using VR is a cure-all solution. The research carried out in this essay and the theories presented suggest that incorporating VR with therapeutic practices has great potential and can help foster positive mental attitudes. It is essential not to remove the human element when developing VR. Through discussion with the students involved in this study, we could summarise their experiences and discuss how they perceived these virtual worlds. In response to this research project, I am developing virtual experiences that combine self-hypnosis with immersive animated sequences. I plan to continue testing these environments with my students and believe that this research is the beginning of a much more in-depth exploration into how

we can use VR to support our mental health and well-being.

Conclusions

To conclude the study, students answered the question: What importance do you feel technology will have in your future? The responses were a range of positive, negative, and neutral opinions. One of the students' answered "As a generation becoming more dependent on the technological world, ways of living have changed to an unchangeable stance. I believe that technology will take over humankind's work and normal life. I think technology will be able to save lives medically and transform ways of communication. Additionally, I believe it will allow positive changes in education and virtual learning, however, we as humans should never overstep the line of technological power." (Student Participant) It is clear from reading the students' answers that this study has provided them with a platform to consider how they interact with technology. Despite showing optimism for therapeutic, educational, and medical technological applications, they are aware of the possible moral dilemmas surrounding being more connected to the machine. Technology has immense power over society, and there is a danger that if we misuse technology, we could create more issues in the future; however, there is also the potential for what we can achieve with future developments. Overall, I am excited about how we can adopt new technologies into society. The problem is not with technology but more with how we access it. With companies such as Meta (Facebook) monopolising VR, we must ensure that we instill these virtual worlds with the raw elements which make us human by developing virtual societies where one can better themselves online rather than reflecting a consumerist society with a myriad of immersive advertisements. VR is a space with the capacity to provide freedom, freedom from the constraints of reality. We need to use this space to promote new ideas and support our human needs. The future of technology is ambiguous, which will hopefully continue to drive research in this field toward new horizons, presenting an interesting power struggle between the potential threat presented by VR and how we best adopt this technology. Whitehead celebrates the importance of scientific discovery and the profound impact it has on culture and society, and this is the exact sentiment of how scientists and researchers should strive to develop technology to benefit humankind "It is the business of the future to be dangerous, and it is under the merits of science that it equips the future for its duties" (Whitehead, 2011)

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Figure 1 https://www.writework.com/uploads/2/23868/drawing-rene-descartes-1596-1650-meditations-metaphysiques-e.gif

Designing Interactive Devices for Facilitating Intergenerational Communication Among Older Adults Based on Biomimetic Interaction

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Abstract

With the aging of society, intergenerational communication between older and younger people is a topic worth studying. The communication quality directly impacts older adults' health, encompassing both physical and mental well-being. Biomimetic interaction can facilitate human-computer interaction more smoothly by aligning with human cognitive habits and thought processes. By designing interactions based on the cognitive foundations of natural organisms, including animals and plants, it is possible to achieve a closer connection to nature and create vivid and engaging experiences, providing a better user experience for older adults. In this paper, based on observation and interviews, three device designs based on biomimetic interaction are proposed to enhance intergenerational communication among older adults. The three device designs are respectively simulating interaction with animals, simulating interaction with plants, and devices based on plant cultivation.

Author keywords

Older adults; Intergenerational communication; System design; User-Centered Design; Human-Computer Interaction

Introduction

The world has already entered an aging society; however, there are prevalent issues in eldercare spaces, such as closed-off communities, limited resident interaction, weak intergenerational relationships, and even conflicts and tensions. Interactive installations can encourage communication among people, fostering harmony and closeness, with the potential to enhance social integration. To address this, the article introduces three interactive systems for improve intergenerational communication, incorporating biomimetic interaction methods.

To meet the needs of users, especially elderly users, during product usage, biomimetic interaction can facilitate human-computer interaction more smoothly by aligning with human cognitive habits and thought processes. By basing interaction design on the cognitive foundations of natural organisms, including animals and plants, it can achieve a closer connection to nature and a more vivid and engaging user experience for elderly users.

Related work

Social Communication among Older Adults in Public Spaces

Concerning social communication among older adults in public spaces, these spaces hold considerable importance in the daily lives of residents. The quality of everyday public spaces directly impacts residents'

health, encompassing both physical and mental well-being (Francis et al., 2012) (Koohsari et al., 2015). Public spaces additionally offer opportunities for social interaction, fostering community awareness and neighborly relationships (Kaźmierczak, 2013). Leisure activities also hold significance for the physical and mental well-being of older individuals (Brajša-Žganec et al., 2011).

Bioinspiration Interaction Design

The Bioinspiration interaction in this article involves the simulation of both plants and animals. Firstly, regarding plants, the related designs and research are summarized in Table 1. However, research on plant interactions

Table 1. Biomimetic Designs and Research Related to Plants

					
Project	Digital pot	The Plant Pet	Florence	Touchnology	Cyborg Botany
Carrier	Screen on the Vase	Screen on the Flowerpot	Typewriter Algorithm	The Plant Itself	The Plant Itself
Interaction mode	Touch	Touch	Typing	Touch	Touch
Technology	Sensors	Pressure Sensing	Plant Electrical Signals	Touch Sensing and Lighting Effects	Conductive Liquid
Input	Plant Growth Environment	Manual Touch by Humans	Emotionally Oriented Text	Human Touch on the Plant	Human Touch on the Plant
Output	Changes in Screen Expressions	Changes in Pot Lighting Effects	Changes in Plant Lighting	Changes in Lighting Effects	Changes in Plant Morphology

primarily focuses on product design and lacks applications in public installations (Table 1).

Secondly, in the field of biomimetic animal interaction, more related research is focused on shape-changing interfaces, many researchers in the field of HCI have investigated and uncovered the numerous benefits of shape-changing interfaces (SCIs). For instance, Morphino, is a nature-inspired tool for shape-changing interface (Qamar et al., 2020). Rasmussen et al. conducted a review of prior research on shape-changing interfaces (SCIs) and identified eight distinct types of deformations: Orientation, Form, Volume, Texture, Viscosity, Spatiality, Adding/Subtracting, and Permeability (Rasmussen et al., 2012). However, most biomimetic activities are aimed at the development of materials or structures, rather than creating new interaction methods or enhancing the user experience.

User Research Method: Observational Study

In this study, two observational frameworks, **POEMS** and **AEIOU**, were utilized, each with its unique emphasis. The POEMS framework primarily centers on individual analysis, while the AEIOU framework is designed to capture interactions among individuals. These two observation frameworks allow for comprehensive data collection regarding user information and aid in the identification of essential elements for experience design, clustering of observations, comparison of population variances, and the extraction of behavioral traits.

Specifically, **POEMS**, is an acronym that stands for People, Objects, Environments, Messages, and Services. This framework provides a streamlined approach for swift and insightful user observation, with a particular emphasis on individual analysis (Kumar & Whitney, 2007). **AEIOU** is essentially an abbreviation for Activities, Environments, Interactions, Objects, and Users (Table 2). It places a strong emphasis on the interactions between individuals and other entities, as described by (Seeschaaf-Veres et al., 2021).

Due to space limitations, only partial results are presented here. Table 2 displays the observation results based on the POEMS and AEIOU framework.

Table 2. POEMS and AEIOU observation result

P(People)		O(Object)	E(Environment)	M(Message)	S(Service)
An elderly couple playing with a child		Park bench, toy gun	In the community, near recreational facilities	Children play with toys, the elderly interves in inappropriate behavior	Elderly people giving advice and discouraging children
An elderly man exercising alone		Fitness equipment in the park	Inside the park	Waiting in line	Elderly people using fitness equipment
An elderly person playing with a child at the children's playground		Children's playground	Inside the park	Children playing, young parents chatting, elderly people watching	Parent-child interactive installations and resting facilities
An elderly woman using fitness equipment while watching her child		Children's playground and fitness equipment	Inside the community	Elderly and children using different facilities separately	Social interaction among unfamiliar elderly individuals needs to be strengthened
Elderly people dancing in the square		Sports shoes and sportswear	Square	Looking for a group to dance and relax	Consultation with peers of the same age
Elderly people strolling with their children		Baby stroller	Downstairs of the residential area	Pushing and pulling a baby stroller	Assistance from family members
Elderly people taking their children for a walk		Board games	Square	Playing board games for entertainment	Board game entertainment services
Elderly people walking their dogs		Dog leash	Square	Walking dogs and taking walks, etc.	Dog-walking assistance service
A (Activity)		**E(Environment)**	**I(Interaction)**	**O(Objects)**	**U(User)**
Caring for and assisting children		Playground	Assist children in playing on recreational facilities	Slides, seesaws, rope nets, etc	Grandfather, grandmother, grandson, granddaughter
Resting and using a smartphone		Riverside resting area	Relaxing, having tea	Tables and chairs in the rest area	Two elderly individuals
Resting and using a smartphone		Riverside resting area	Relaxing, having tea, and playing mobile games	Tables and chairs in the rest area	Two young people

Findings of Observation. In brief, most elderly individuals participate in predominantly stationary outdoor activities, typically centered around fixed locations. Communities often exhibit underdeveloped infrastructure and minimal opportunities for intergenerational interactions. These characteristics highlight the significance and research prospects associated with this topic. Further exploration may shed light on ways to enhance the quality of life for seniors in such settings, fostering more vibrant and connected communities.

User Research Method: Semi-structured Interview Study

A semi-structured interview is a qualitative research method that employs a predetermined set of open questions to stimulate further discussion (Louise Barriball & While, 1994). The open-ended nature of the interview facilitates the revelation of tacit knowledge, including aspects of their own living habits that older adults may not consciously be aware of (Beyer & Holtzblatt, 1997).

Brief Results of Interview Research

Summary of research findings for older adults. The hobbies of the elderly are diverse, and they have ample time to dedicate to their interests. Elderly individuals often encounter difficulties when using smartphones. Relocating from their old environment to a new one can lead to communication challenges and difficulties in making new friends. They tend to prioritize family, which is a traditional Chinese value, but at the same time, their thinking can be somewhat rigid and resistant to change.

Summary of research findings for younger adults. Contact with the elderly is less frequent (usually once every one or two months). Regarding generational conflicts, subjective factors include differences in mindset, communication, and lifestyle, while objective factors encompass physical abilities, geographical distance, and noise levels. Additionally, the elderly may have a fear of burdening their children, rigid lifestyle patterns, and difficulty cultivating hobbies. Therefore, more solutions are needed, such as guidance from adult children,

greater tolerance from younger generations, and the encouragement of hobbies.

Three system design proposals

Based on the above findings, three system concept designs based on biomimetic interaction to enhance intergenerational communication are proposed.

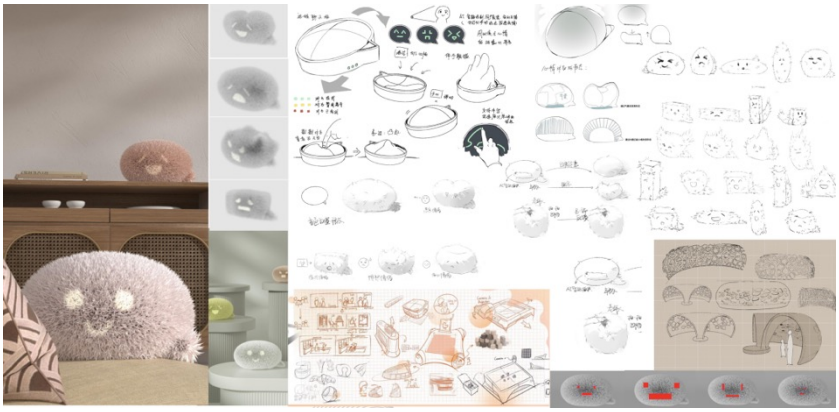

Figure 1. Design concept and sketch

Design concept 1: Biomimetic Animal Interaction

Design Concepts. This design direction explores remote emotional communication in intergenerational relationships: It aims to foster communication and connection between generations in daily life and leisure activities through the use of animal-inspired physical interaction methods, thereby reducing intergenerational barriers, fulfilling the emotional needs of the elderly, enhancing mutual understanding, and mitigating intergenerational communication issues arising from temporal and spatial distance.



Figure 2. Inner structure (left) and storyboard (right)

Therefore, this system aims to enhance remote communication between elderly individuals and their family members, especially their children. It accomplishes this by conveying the user's emotions through tactile feedback and changes in product form when touched, thereby facilitating emotional expression between the elderly and the younger generation (Figure 1).

Analysis of Product Technology and Materials. To achieve the functionality of the conceptual design, various technologies and materials are required, including airbag contraction technology, infrared sensing technology, light interaction technology, telescopic brake technology, and more (Figure 2. left). The internal structure includes components such as an infrared sensing device and a telescopic brake device. In terms of materials, the components include soft silicone, artificial fur, and ABS plastic. Storyboard is shown in Figure 2 (right)

Design concept 2: Biomimetic Plant Interaction

Design Concepts. It is a public facility located within neighborhoods or parks. It aims to alleviate intergenerational conflicts through knowledge sharing and asynchronous communication, fostering a deeper

mutual understanding and promoting social harmony between two generations Figure 3 (left). Inspired by the exchange of letters and the positive interactions between pen pals, we believe that combining virtual and real-world communication offers a greater opportunity to touch one another's hearts. Storyboard is shown in Figure 3 (right).

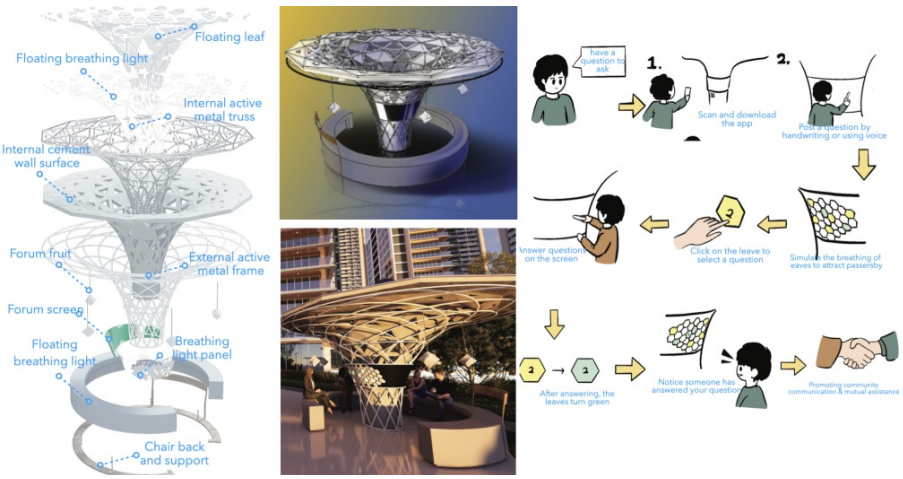

Figure 3. Rendering (left) and storyboard (right)

Design concept 3: Based on plant cultivation

Design Concepts. This design concept aims to facilitate greater communication between young and elderly individuals through the process of planting flowers and plants. During this planting process, young people can experience a sense of achievement, while the elderly can enjoy the pleasure of sharing their expertise. In this way, it promotes interaction between the older and younger generations (Figure 3-left). Specifically, first, users can independently access planting experiences for flowers and plants, such as information about the required water, sunlight, temperature, etc. They can also record and share their own planting processes and experiences, as well as give likes to authors. Second, users can independently cultivate their favorite flowers and plants, document the growth process, share their experiences, and view experiences shared by others. Storyboard is shown in Figure 4 (right).**Discussion**

Design directions to enhance intergenerational communication for older adults

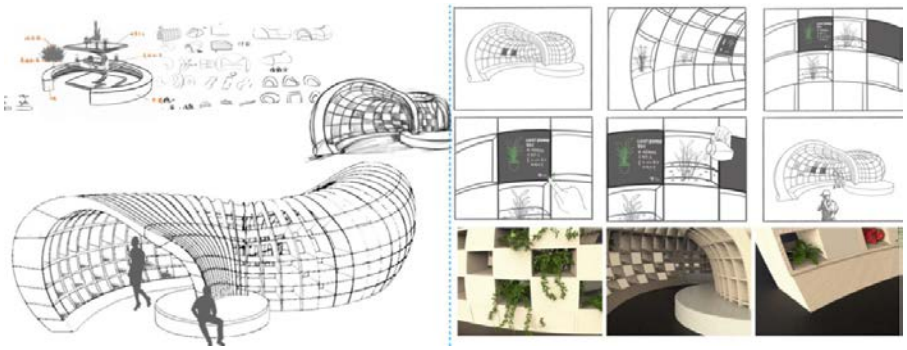

Figure 4. Design concept (left) and storyboard (right)

Direction one: remote communication. Communication tools used by young people and the elderly can be

challenging for the elderly to operate, as they prefer face-to-face interactions.
Video and voice calls are the primary means of communication, but older individuals still desire more in-person visits from their children. Video calls are a secondary choice due to practical constraints. The difficulties associated with using mobile phones are particularly pronounced. Many issues arise when using mobile phones, but it is often challenging for them to seek help.
Direction two: knowledge sharing. The lack of common topics significantly hinders communication between these two groups. "Cultural reciprocity" is the primary mode of cultural inheritance currently, where the older generation extensively absorbs culture from the younger generation. However, generational dynamics make it challenging for the elders to engage in reverse learning. To maintain their dignity, they may be reluctant to "lower themselves" to learn from the younger generation. Even if some elders are willing to humbly seek cultural enrichment from the younger generation, they may struggle to quickly assimilate this new knowledge due to cognitive and comprehension limitations. Furthermore, some young people often find it difficult to remain patient in response to the demands of their elders. Effective communication and mutual understanding are essential to easing generational conflicts. Therefore, the key to resolving generational issues lies in how design can help both groups discover or create common topics for mutual engagement.
Direction three: plant cultivation. Planting flowers and plants is a shared interest and hobby among some elderly and young individuals. It serves as a medium for designing community public facilities, where the elderly and young people can plant flowers and plants together, fostering interaction between generations. Communication can be promoted through activities such as documenting the growth of plants or sharing planting experiences. Young people can gain a sense of achievement through planting, while the elderly can find joy in sharing their planting experiences.

The Advantages of Biomimicry Design in Interaction
Human-computer interaction is the process of information exchange and emotional connection between interactive products and users. The key to applying biomimicry design in interaction lies in its ability to make interaction operations more user-friendly, enhancing the user experience of interactive products.

Specifically, by mimicking elements from nature, biomimicry design reduces the complexity of user operations, minimizes obstacles in the human-computer interaction process, and ensures smoother interaction design usage. This fosters a sense of familiarity among users, allowing for emotional resonance and providing emotional care to users.
Especially for elderly users, incorporating biomimicry design has a positive impact on user experience. Firstly, it offers a new direction for the visual expression of product appearance, contributing to the refinement of the product's aesthetics. Secondly, it provides a clear approach to interaction operations, enhancing user convenience. Lastly, it appeals to emotional communication, as interactive products have the power to emotionally move individuals."

Conclusion
This paper has provided a preliminary exploration of the application of biomimetic interaction in interactive device design. Three design cases have explored the simulation of biomimetic interactions with animals, plants, and plant cultivation. Bioinspiration has the potential to support divergent thinking and the exploration of design spaces. Nature has already proved to be a source of inspiration in other fields, and we believe that bioinspiration can also be beneficial to the HCI community. Behind the field of SCIs is the concept

of Organic User Interfaces (OUIs), which originated with the desire to adopt natural forms to design a better fit with human ecology (Holman & Vertegaal, 2008).

In terms of future work, the proposed system design proposals will be further developed into functional prototypes and tested in real-world settings. Field experiments will be conducted to validate the system design proposals through design interventions.

Acknowledgments

This research was funded by Humanities and Social Sciences Foundation project funded by the Ministry of Education of China, grant number 22YJC760031. Jiangsu Province Social Science Fund Project, grant number 23YSC012. Philosophy and Social Science Research in Colleges and Universities in Jiangsu Province, grant number 2022SJYB0938. Jiangnan University Teaching Reform Research Project, rant number JG2023043. Wuxi Social Science Fund Project, grant number WXSK23-C-66. We express our gratitude to all the students who participated in the course "Monographic Research 1 ("New Construction" direction)" in 2022, especially to the members of Group 5, Group 6, and Group 7.

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The Mushrooms of Plato’s Cave

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Abstract

In this project I adopt an interdisciplinary approach to eco-feminism and drawing to create a visual counternarrative of Plato’s Myth of the Cave. In my narrative the protagonist of my redesigned myth is a woman which instead of leaving the material world represented by the cave, as the male protagonist in Plato’s myth, creates a deeper connection with it, a “narrative of love”, by understanding and interacting with its underground life populated by fungi.

keywords

Drawing, ecocriticism, deconstruction, eco-feminism, new materialism, ethics of care, fungi.

Introduction

Plato discusses the Allegory of the Cave in the Republic. This text has been interpreted by thinkers as emblematic of Plato’s philosophy and western thinking and its anthropocentric, controlling, and technocratic approach to reality (Heidegger, 2014; Nietzsche, 1994). In my project I intend to transform this myth into an alternative visual narrative where the protagonist of my transformed myth instead of going up, in the direction of the sun and abstract thinking, as the male prisoner in Plato’s myth, goes down, underground, in a world populated by fungi, worms and bacteria. This fictional character engages in eco-dialogues and interactions with the beings that she meets: she learns about how understand, interact, collaborate, and care about them. By doing this she gains knowledge that increases her happiness and resilience. By proposing this narrative, I intend to question current values about social organization based on aggressive competition and exploitation. I do this by visualizing how care and cooperation can benefit both the human being and the environment (Estévez-Saá & Lorenzo Modia, 2020; Sevenhuijsen, 2003; Shiva, 2014, Woodly, 2021). In this artistic project care is intended as an ethical and political practice that has the potential of orienting people to new ways of living, relating, and governing. According to this perspective the ethics of care is a method, a political thought, and an action that moves beyond the liberal approach which situates care as a finite resource to be distributed among individuals, or as a necessarily feminine virtue. Instead, I intend care as a survival strategy, a foundation for political organizing, and a theoretical framework for imagining a world in which humans and non-humans can live and thrive.

Problems

To visualize this alternative way to imagine human/non-human relationships I decided to reinterpret The Myth of The Cave according to an eco-feminist narrative. I choose this text because it is representative of western thinking and its way of intending human intelligence and its relationship with environment (Irigaray, 1974). In

the myth of the cave Plato narrates about the philosopher's cognitive journey. In the story the philosopher researches the truth by detaching from the sensitive world to contemplate the world of the philosophical abstract ideas. The cave is understood by Plato as a place that is not worthy to be explored and investigated. It is described as dark emptiness, a flat obscurity that the human being wants to leave. The sun, instead, and the external world outside the cave, represents the individual's liberation, overcoming, emancipation from the material world which is opposed to the immaterial incorporeal intellect of traditional intellectual knowledge. In Plato's myth the immaterial intellect and the philosophical thinking capable of abstraction can be learned by the prisoner only by refusing and leaving the sensitive world represented by the cave (Irigaray, 1974). This way of understanding existence presupposes the illusion of the superiority of intellect over the body and it has been adopted during western history to justify the superiority of humans over nature, man over woman, and of Western society over all other people (Shiva, 2014).

Responses

By using imagination, watercolors, and digital painting I create a visual description where the protagonist of my transformed Plato's myth discovers a way to relate to her material world that challenges traditional western anthropocentric approach to reality. By establishing a dialogue with eco-feminism, post-humanism, new materialism, and ethics of care I visualize how nature's agency and creativity provide the protagonist of my myth energies and resources to transform her material existence. According to the theoretical frameworks that I adopt in my research, the same dynamics of power that created environmental crisis also generated women's and other minorities' marginalization (Braidotti, 2019; Mellor, 2013; Plumwood, 1993; Shiva, 2014; Sturgeon, 2016, 2009; Warren, 1997). Women, other minorities, and environment have been understood by traditional western culture as passive, and exploitable, a background for men's actions. To find solutions to the crises generated by this attitude, human beings need to reconsider their general way to understand life in a way that privileges care, collaboration, and connections instead of exploitation, competition, and individualism (Woodly, 2021).

To imagine this alternative scenario, I refer to recent research related to fungi by authors such as Merlin Sheldrake and Anna Lowenhaupt Tsing which address how fungi force us to see reality from a different non-anthropocentric perspective (Sheldrake, 2020; Lowenhaupt Tsing, 2021). Fungi are inside and outside us and they generate, preserve, and protect everything that makes possible our existence on this planet. Fungi create an interactive network composed by ninety per cent of the world's plants, they nourish the soil, digest polluted substances, eat rocks, survive in the space, provoke hallucinations, influence human and animal behaviors, and establish metabolic relationships with organism such as trees and animals. By creating underground nets that are used by living beings to exchange information they challenge our understanding of concepts such as intelligence, and identity.

Outcomes

In my project I connect fungi's capability of being interconnected and exchange energies and information with other beings to how the feminist philosopher Rosi Braidotti interprets Spinoza's concept of potentia (Spinoza, 2010; Braidotti, 2019). According to Spinoza, a person's lack of understanding of her relationship with the totality weakens her power and diminishes her ability to impact reality. Contrariwise, a mind that can understand how her body lives, moves, is connected to other bodies, and interacts with the rest of matter, is a mind that does not succumb to the oppressive narratives of its social environment. This is because this mind can relate with the whole by remaining an embodied singularity connected to her passion and desires. A mind

that understands the desires and passions that connect her to her collectivity is a mind capable of expressing all its power. This power is called by Spinoza potentia (Burdon, 2022; Tamboukou, 2018). Braidotti connects Spinoza’s potentia to feminist discourse and she understands this concept as a vital, creative energy capable of creating change and producing social transformation (Braidotti, 2019, 2021, 2013).

In my artistic project I visually convey how the protagonist of my re-designed myth learns from fungi how to expand her potentia. In my eco-feminist counter-narrative my protagonist understands the possibilities of her actions and interactions, and she finds energies and strength to transform the reality where she lives. The outcomes of this project constitute of twenty artworks (A3 portrait) made with watercolours and digital painting.
I created “The Mushrooms of Plato’s Cave” in collaboration with the Posthumanities Hub at Linköping University in Sweden. The Posthumanities Hub is an incubator of new humanities and more-than-human humanities, and a feminist collaboratory for symbiotic art, arts and science networks aiming to build-bridges and create new alliances. It is a testing ground for new shared ideas on how to co-exist, work and think better together in a troubled world.
My project was part of the exhibition East and West 2023 at China Art Museum in Shanghai from December 2nd to February 25th, 2024. “The Mushrooms of Plato’s Cave” has also been exhibited at Coffee Craft Café in Beijing from January 5th to February 28th, 2024. Coffee Craft Café is a hybrid space composed by a bar, seating areas, meeting rooms and exhibition spaces. It presents contemporary artists, art, and ideas to local, national, and international audiences by providing an environment for creativity and cultural exchange. It is an easily accessible and welcoming intellectual place for reflection, education, and creativity.
“The Mushrooms of Plato’s Cave” has also been selected for The New York Times Illustration Portfolio Review 2023.



Figure 1. Brunetti, F. (2023). Fungi 4. Watercolor and digital painting, 42 x 29.7 cm.



Figure 2. Brunetti, F. (2023). Fungi 7. Watercolor and digital painting, 42 x 29.7 cm.

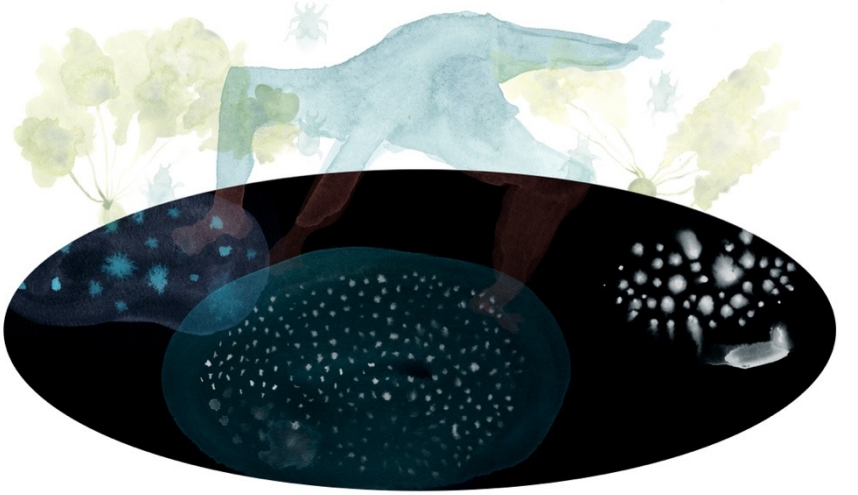

Figure 3. Brunetti, F. (2023). Fungi 8. Watercolor and digital painting, 42 x 29.7 cm.



Figure 4. Brunetti, F. (2023). Fungi 11. Watercolor and digital painting, 42 x 29.7 cm.

Conclusions

In this project I adopted arts-based research where I engaged in a holistic dialogue between artistic practice and theory where theory informed my practice, and my artefacts contributed to visualize and expand theoretical investigations related to eco-feminism.

By producing artworks in addition to scholarly research, my purpose is to reach and engage with a large academic and non-academic audience. My research is academic in terms of investigation and analysis. At the same time, my artworks are accessible to a non-academic audience. This accessible research output has the advantage of producing and sharing ideas related to gender equality and environmental issues in a more impactful way than academic language alone.

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Fig. 3 Brunetti, F. (2023). Fungi 8. Watercolor and digital painting, 42 x 29.7 cm.
Fig. 4 Brunetti, F. (2023). Fungi 11. Watercolor and digital painting, 42 x 29.7 cm.

Steps to Wellbeing: Nurturing Personal, Social and Environmental Wellbeings through an Urban Walking Practice

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Abstract

This image-rich presentation explores the ways in which an evidence-based concept of well- being, commissioned by the UK government, manifests itself in a community-based urban walking event. Born out of my evolving art practice and as a means to critically explore my enjoyment of walking in the city, in 2016 I invited three friends to join me in walking a circuit of central Osaka, Japan where I was living. What was intended as a one-off event with those three friends has become an annual event open to the public with more than 20 people joining 2023' s walk. The walks are semi-scripted, semi-improvised communal performances; our navigation of the urban space is interspersed with game-playing, story-telling, the reading of short texts and other interventions. This presentation first introduces the origins and cultural contexts of the walks before outlining The Five Ways to Well-being, the evidence-based report developed by the New Economics Foundation (NEF) for the UK government' s Office for Science. The presentation then explores how those five ways to well-being outlined in the report manifest themselves within the walks themselves.

keywords

Wellbeing; urban walking; psychogeography; research-creation; interdisciplinary practice; Situationist International.

Introduction: Origins and Contexts of a Walking Practice

Creative practice, research, pedagogy; walking is at the centre of each of these and is a common thread between them. Group walking has become a form of dynamic curation and social interaction while my solitary walking is a time for thinking:, creative, reflective, and critical. And the places I walk are rich in learning and teaching potential. The streets are classrooms, laboratories, studios, galleries and museums if we allow ourselves to see them as such. (See figure 1.)

The circumstances from which my walking practice emerged are twofold and entangled. Firstly, as an artist with a background in drawing and painting I felt a growing sense of rupture with a creative practice centred on object-making. I can still be seduced by the material and formal qualities of drawing– the paper surface, the quality of a line– but I felt increasingly restless while in the studio. I felt the knowledge I was seeking was out there, beyond the studio walls. This leads me to the second circumstance from which my practice emerged. At this time, I was walking a lot in the city. I became aware of myself walking in the city, and I soon became aware of my awareness of myself walking. My walking was becoming critical and my interests were moving away from a practice based in material forms and towards one pursuing social and spatial encounters. My mind, my body, the space: what is

the relationship between my body and the space through which it moves? What is the relationship between this movement of body-through-space and the spaces of my mind? These and other questions began to interest me.



Figure 1. Three modes of walking: community walking; solitary walking; walking as a site of learning and teaching.

A whole ecology of walking practices revealed itself to me as I explored the many other individuals and collectives addressing similar questions for a long time. Historical precedents and contemporary influences, and local practitioners and distant collectives, all brought together through interests close to my own. There were the Situationists in Paris whose psychogeographic drifts through the streets attempted to reclaim the city from the forces of production and consumption. In Japan where I was living at the time I learned about Akasegawa Genpei, and High Red Centre collective whose motivations were similar to those of the Situationists. I also learned of Rojo Kansatsu, (the Street Observation Society) and other modernologists who sought to document the unnoticed and everyday aspects of Japan’ s fast-changing urban life.

Perhaps the most important influence on my practice has been contemporary practitioner Phil Smith whose method of mythogeography he has set out in a manifesto. Mythogeography is, among other things, “a geography of the body, a philosophy of perception, an experimental approach to the site of performance,” that recognises the agency of space and place (2010: 113). Smith’ s ideas have helped shape my own practice, most notably by introducing me to the idea of group walking as a way to complement the solo walking I was already engaged in. It is one of these group walking projects that I will outline below but before I do I will offer a brief overview of the research-creation framework, the overarching structure within which I situate my praxis.

Springgay and Truman define research-creation as “the complex intersection of art practice, theoretical concepts, and research. It is an experimental practice that cannot be predicted or determined in advance”. Research-creation is, they continue, “attuned to processes rather than the communication of outputs or products” (2016). Research-creation’ s emphasis on processes rather than outcomes, and the shift from a practice based on forms to one exploring encounters (as described above) provided me with the structures I needed as I sought a creative approach that was dynamic, interdisciplinary and in a continuous state of flux.

Group walking in the city is a concrete application of the practical and theoretical contexts outlined above and the sections below explore one such application. After offering a broad outline of my Widdershins Osaka! walking project this paper discusses the ways in which that project enters a dialogue with ideas of wellbeing.

Widdershins Osaka!: A Community-walking Project

Widdershins Osaka! is a community-walking event I established in my home of Osaka, Japan. Initially seen as a one-off event for friends it has grown, developing into an annual public gathering. We walk on February 23rd each year as part of Terminalia, an international walking festival that commemorates Terminus, the Roman God of boundaries.

In an act that projects an autobiographical narrative onto a more public one, my Widdershins Osaka! walk maps the city of Leeds England onto the streets of Osaka, Japan. This mapping of one place onto the terrain of another is performed through a method I call re-placement.

The re-placement method began when I encountered an anecdote In my reading of the Situationist International. Guy Debord wrote, "[a] friend recently told me that he had just wandered through a region of Germany while blindly following the directions of a map of London" (1981). On first reading, this act of walking London with a map of Germany sounds irrational and absurd and indeed Debord dismisses it as such. But is he right to do so? I'm not so sure. New Materialist thinker, Jane Bennett suggests that in our dealings with the world we are too quick to jump to a rational critique. She asks us to insert a pause before such critique, to employ a "methodological naïveté" through a return to "discredited philosophies of nature" (Bennett, 2010). Meanwhile Phil Smith in his manifesto states that he "does not discriminate between respectable and non-respectable forms of knowledge" (Smith, 2010). In these terms Debord's anecdote is not irrational but pre-rational and can be seen as a method for the production of knowledge. This knowledge is unlikely to be propositional and may, in Smith's terms, be "non-respectable" (2010). Indeed it may invite "a whole realm of complex, finely nuanced meaning that is embodied, tacit, intoned, gestured, improvised, co-experienced, [and] covert" (Conquergood in Loxley, 2007, p. 152). This then is my re-placement method– it is the reading of one phenomena in terms of another as a means to disrupt habituated ways of encountering and knowing the world.

Before I address the benefits that might come from such a disruption of habits I should explain the meaning of the term Widdershins. Widdershins is an archaic English term meaning motion in a direction contrary to the direction of the sun. It has connotations of deviance, transgression and otherness. When I first encountered this term I realized my project could not be called anything other than Widdershins.

Early in my project I had vague notions that somewhere in my project was an engagement with wellbeing, but it is only very recently I have begun to tease out what that term wellbeing really means and how it might enter a dialogue with my walking practice. Social sciences repeatedly state that wellbeing is hard to define, suggesting that it is hard to separate wellbeing from the framework of health while also acknowledging that qualities other than health make a significant contribution to whatever wellbeing might be (la Placa et al., 2013; Dodge et al., 2012).

In 2008 the UK Government Office for Science commissioned the New Economics Foundation (NEF) to develop a wellbeing framework for their Foresight report into mental capital and wellbeing. The NEF created an evidence-based structure they called Five Ways to Wellbeing. As the title suggests they outlined five simple actions that can make significant contributions to an individual's wellbeing. Those five ways are connect, be active, take notice, keep learning and give (Aked et al., 2008). It is this framework that has enabled me to understand and communicate my project in terms of wellbeing.

Widdershins and The Five Ways to Wellbeing

The NEF's Five Ways has provided me with a simple but nuanced structure with which to consider the relationship between wellbeing and my creative walking. At this stage I do not wish to make explicit connections or draw conclusions about that relationship but instead to use this essay as an opportunity to begin to tease out threads between the two. To do this, in the section that follows I will alternate between brief snapshots of my project and the NEF's descriptions of each of their ways and I will ask the reader to draw their own connections between each of these threads.

The first Widdershins Osaka! walk in 2016 was intended as a one-off event as a means for me to reflect upon and share some of the early research I had been doing into place/ space and urban walking. As we walked we read prepared texts, played games and, most importantly, tried to interact with the environment in such a way as to suggest the space through which we moved was an active participant with agency equivalent to our own. Unplanned occurrences such as the sound of a sudden police siren would be triggers for our actions, perhaps forcing us to change direction or to stop and perform a reading or some other task. In this way we entered a dialogue with the environment through which we moved. (See figure 2.)

"Be active. Go for a walk or run. Step outside. Cycle. Play a game. Garden. Dance. Exercising makes you feel good. Most importantly, discover a physical activity you enjoy and that suits your level of mobility and fitness." (Aked et al., 2008)



Figure 2. Widdershins Osaka! and the five ways to wellbeing

My friends and I had found 2016's walk enjoyable and fruitful and I soon decided that I would repeat it the following year. What was most interesting on this second walk was how memory of the previous year's event was layered, like a sediment, within our walk. As we arrived at certain locations or moved on particular lines we would notice how in the intervening months, things had changed– often dramatically– or had not changed at all.

This co-mingling of past and present is a quality that has become richer with each subsequent iteration of the event.

"Give. Do something nice for a friend, or a stranger. Thank someone. Smile. Volunteer your time. Join a community group. Look out, as well as in. Seeing yourself, and your happiness, linked to the wider community can be incredibly rewarding and creates connections with the people around you" (Aked et al., 2008).

In 2018 I made a conscious attempt to make the walk more diverse. I wanted more local people involved and more people who I did not know directly. I tried to stretch the age group and offer a fully bilingual encounter with the translation into Japanese of as much of the written and spoken material as possible.

"Take Notice. Be curious. Catch sight of the beautiful. Remark on the unusual. Notice the changing seasons. Savour the moment, whether you are walking to work, eating lunch or talking to friends. Be aware of the world around you and what you are feeling. Reflecting on your experiences will help you appreciate what matters to you" (Aked et al., 2008).

In 2019, as the walking group continued to grow I felt an important shift. I no longer saw the project as an artwork with me, the artist, at its centre, but instead saw it as an act of perambulatory curation, with me, the curator, moving from its centre to its margins, inviting others to bring their ideas and interventions to the project.

"Connect. With the people around you. With family, friends, colleagues and neighbours. At home, work, school or in your local community. Think of these as the cornerstones of your life and invest time in developing them. Building these connections will support and enrich you every day" (Aked et al., 2008).

In February 2020 we walked in the final weeks of a world that did not know the term COVID 19. On the banks of the canal at the end of the walk I phoned two friends– one in Chengdu, China, the other in Florence, Italy– already experiencing strict lock-downs. Together, we by the canal and they on the phone, voiced a simultaneous reading (in four languages) from a prepared passage of Bocaccio's Decameron reflecting on the quality of friendship. (See figure 3.)



Figure 3. Widdershins Osaka! 2020: On the banks of the canal the walking group (right) connected online to friends in China and Italy to read a passage from The Decameron (left).

"Keep learning. Try something new. Rediscover an old interest. Sign up for that course. Take on a different responsibility at work. Fix a bike. Learn to play an instrument or how to cook your favourite food. Set a challenge you will enjoy achieving. Learning new things will make you more confident as well as being fun." (Aked et al., 2008)

In 2023, Widdershins Osaka! returned after a 2-year hiatus and again the project made a significant shift. In an attempt to further manoeuvre myself from centre to margins I established an informal committee to contribute to the event's planning. Discussing and delegating aspects such as theme, route and curation of performances was rewarding for me and enriched the walk itself. I began to feel that Widdershins Osaka! might take on a life of its own.

Conclusion

My conclusion is unconventional and might not function as a conclusion at all. And that's ok. I want to return to the opening expert addresses of last week's conference in Beijing, and an idea that I've been thinking about since then. The eminent prpfessor of design Enzio Manzini discussed relationships and said we cannot design relationships but we can design the conditions in which they might occur (2023). He showed an image of people dancing in the street. Middle-aged couples, smiling and embracing as they swayed between the buildings. Prof. Manzini said we cannot design that these people become friends or that they fall in love but we can design the conditions in which such relationships may take place. He said that in order to dance in the street we must first allow for the streets to be closed to traffic, we must provide the music, and we must teach the steps to those who want to dance but don't know how. Here, he said, are the conditions in which relationships may flourish (2023).

Just as we cannot design relationships, we cannot manufacture wellbeing. But just as we can design the conditions for relationships we can also manufacture the conditions in which wellbeing might flourish. I thought that there were two such conditions- time and space. But I'm starting to see there are five: connect, be active, take notice, keep learning. And give.

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Characteristics and Trends of Collaborative Design in the Context of Social Innovation

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Abstract

Purpose: This study aims to explore the application characteristics and development trends of collaborative design methods in the context of social innovation design. Methods: The Citespace literature quantification analysis tool was utilized to construct a knowledge map, identifying the research focal points of collaborative design both domestically and internationally. Moreover, the research employs the Nvivo software for textual-rooted coding to examine the application characteristics of collaborative design in social innovation design cases. The study analyzes the four phases of social innovation design, including organizational establishment, design dialogue, system integration, and project connection, along with the three dimensions of collaborative design, i.e. collaborative objects, structures, and tools. Results: The study yielded insights into the application characteristics of collaborative design at different stages of social innovation design, along with three developmental trends. The research broadened the application scope of collaborative design methods, enriched and deepened the theoretical foundation of collaborative design methodologies, and offered a reference basis for research.

Author keywords

Collaborative design; Social innovation design; Application characteristics; Development trends

Introduction

In recent years, research on design related to social issues has become increasingly diverse, with numerous emerging design directions. Among these, social innovation design has garnered growing attention from both domestic and international design communities. As the core design strategy of this domain, collaborative design permeates the research process of social innovation design. Simultaneously, the practice platform of social innovation design offers fertile ground for the exploration of new avenues in collaborative design, becoming a catalyst for the advancement of collaborative design. Therefore, investigating application characteristics and development trends of collaborative design methods within the context of social innovation design contributes to a better understanding of the essence of collaborative design, expanding the application scope and theoretical framework of this methodology.

The popular research topic and current trends in the field of co-design methods

In this study, data were drawn from academic papers related to collaborative design within the past decade from two Chinese journals, "Packaging Engineering" and "Decoration," as well as three English journals, "Design Studies," "Design Issues," and "CoDesign." A total of 255 valid domestic samples and 269 valid international samples were collected. Using CiteSpace, a literature analysis tool, a co-occurrence graph of keywords in domestic and international collaborative design research literature was generated, as shown in Figure 1. Based on keyword frequency and citation prominence, this study identified six research focal points in collaborative design and explored the cutting-edge trend of co-design research.

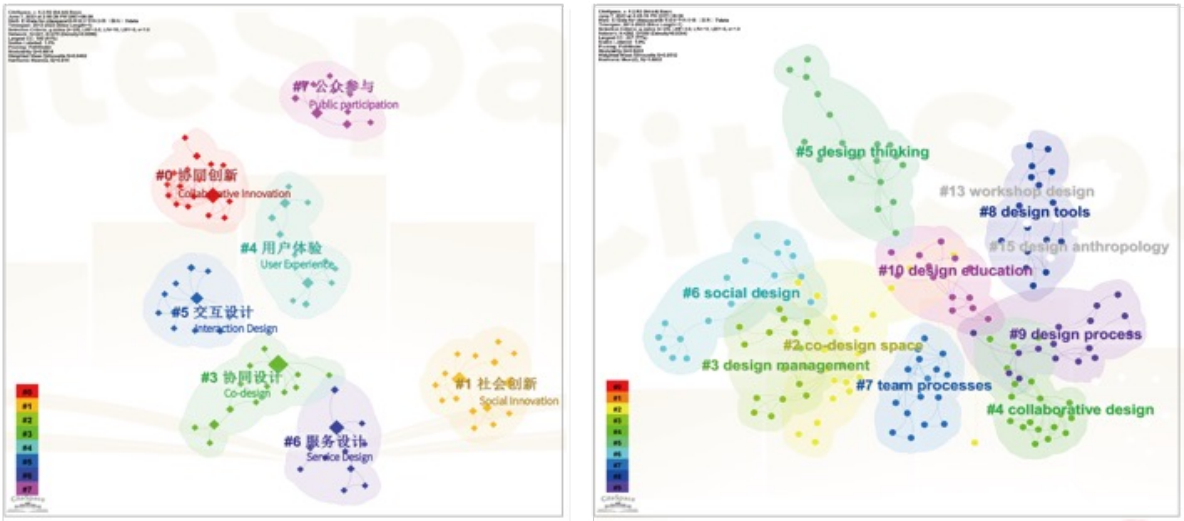

Figure 1. The cluster diagram of keywords in co-design research

Investigation of the current focal points in co-design

Cluster 1: This cluster encompasses design thinking, design methods, and related themes. Cluster 2: Service Design. This cluster centers around public services and service systems. Cluster 3: Architectural Design. This cluster involves community design, urban planning, and related subjects. Cluster 4: Interaction Design. This cluster covers user experience, smart home, etc. Cluster 5: Collaborative Innovation. This cluster centers on industry-driven approaches and university-industry Collaborative design. Cluster 6: Design for Social Innovation. This cluster encompasses culture, communities, rural areas, and related themes.

According to the six focal points, it is evident that in terms of practical application, collaborative design exhibits significant differences in research subjects, objectives, and manifestations across diverse design domains. The connection and common ground among these fields are not very distinct. At the theoretical level, there are two commonalities are discernible: Firstly, the coordinating and integrative characteristics of collaborative design towards various resources find expression in diverse domains; Secondly, reinforcing and fostering the subjective agency of role participation and collaborative awareness within the design process represents a shared research trait among different domains.

Co-design at the forefront of design trends

The forefront trends of domestic and international research were explored using Citespace's keyword burst detection and highly cited literature. It becomes evident that social innovation has emerged as a sustained research focal point within collaborative design in recent years in China. The thematic keywords encompass

local areas , communities , intangible cultural heritage , service design , and social innovation design . This thematic emphasis signifies that social innovation design targeting rural areas and communities, with a pronounced focus on service design, represents a leading trend in the research and application of co-design, as evidenced by Table 1. Within the domestic landscape, informed by political strategies such as poverty alleviation and livelihood enhancement, collaborative design has proposed innovative solutions to intricate social issues such as rural revitalization and population ageing . The outcomes of burst keywords in foreign collaborative design research show the ongoing prevalence of social design as an expanding research direction. Within the themes of social innovation , public service , and social change , it is clear that social design and design methods that aim to promote social change represent the innovative trend of collaborative design research as shown in Table 2. Anchored in the robust civic foundation and inherent subjective agency of Western societies, the collaborative design strives to revolutionize collective behavioral paradigms, engendering novel societal frameworks and ways of life . Both levels of social innovation design research concentrate on collaborative design thinking, offering an extensive practical foundation for advancing research in collaborative design.

Table 1. Strongest outbursts of keywords and cited references in co-design in China

Keywords	Strength	Time	Cited References	Citations	Time
社会创新 Social innovation	2.82	2017-2022	协同设计“触动”传统社区复兴——以“新通道·花瑶花”项目的非遗研究与创新实践为例 Collaborative Design “Trigger” Revival of Traditional Community: Case Study on Design Research and Practice of “New Channel · HuaYaoHua” Project on Intangible Cultural Heritage	69	2016
人工智能 artificial intelligence	2.10	2019-2020	隐形知识:传统手工艺设计创新研究的微观视角 Tacit Knowledge: The Microscopic Perspective of Design Innovation Research on Traditional Crafts	58	2015
服务设计 Service design	1.47	2013-2016	艺术介入乡村建设的多个案比较分析 A Comparison Study on Art-driven Rural Construction Cases	54	2018
用户体验 User experience	1.37	2017-2018	服务共创：服务设计中的共创及其机制 Service Co-creation: Co-creation in Service Design and Its Mechanism	39	2019
交互设计 Interaction design	1.37	2015-2015	为人民、与人民、由人民的设计社会创新设计的路径、挑战与机遇 Design for People, with People, by People:The Path, Challenge and Opportunity of Social Innovation Design	34	2018

Table 2. Strongest outbursts of keywords and cited references in co-design abroad

Keywords	Strength	Time	Cited References	Citations	Time
Social design	2.19	2020-2022	Institutioning: Participatory Design, Co-Design and the public realm	3.38	2020-2023
Design method	1.92	2021-2022	Design, when everybody designs: An introduction to design for social innovation	2.99	2018-2019
Design anthropology	1.71	2021-2022	Democratic design experiments: between parliament and laboratory	1.88	2018-2019
Design education	2.71	2016-2018	Participatory design for sustainable social change	4.37	2020-2023
Service design	1.68	2018-2018	What is it that makes participation in design participatory design?	2.77	2021-2023

Application Characteristics of Collaborative Design in the Context of Social Innovation Design

Currently, research and practice concerning the application of collaborative design for social innovation highlight the current state of affairs, including limited literature samples, considerable disparity, diverse application scenarios, and methodological pluralism. A consistent and systematic set of application characteristics and theoretical framework has yet to be established. This paper utilizes the case study approach, drawing upon draws on some recent social innovation cases and case collections, such as Creative Communities and Design for Social Innovation , comprising a total of 101 cases as the sample source. Within the framework of the AGIL four-function paradigm proposed by the sociologist Parsons and the social innovation theory proposed by Mancini, social innovation activities under investigation are categorized into four stages: Organizational Establishment, Design Dialogue, System Integration, and Projects Connection . Using NVivo, data pertaining to features, tools, methods, and other aspects within distinct developmental stages are extracted from the cases and subjected to coding analysis, Our analysis yields differentiated characteristics of collaborative design method application across various developmental stages within social innovation endeavors.

Characteristics of Co-Design Application in Various Stages of Social Innovation Design

Based on the four stages, the cases are categorized and the features of collaborative design in relation to different stages of social innovation design are identified by integrating specific application scenarios, methods, strategies, and other forms of expression.

Application Characteristics in the Organizational Establishment

Establishment Stage The 101 cases were extracted during the organizational establishment stage, producing 57 valid samples. Automated coding of these samples identified 17 thematic keywords including "Local", "Diversity", " Common purposes ", "Strengthened relationships", and " Original groups ", with high frequency. Through a correlation-based clustering analysis of these thematic keywords, several strongly correlated linkages emerged: "Local" exhibited strong correlation with “Strengthening relationship” and “Culture” . Meanwhile, “Initial team” shows a strong correlation with “diversity” and “shared vision” , as shown in Figure 2 (a). Therefore, the application of collaborative design methods at this stage should be tailored based on the characteristics mentioned above. The primary objective at this stage is establishing a localized foundational team. Various tools such as cards , ethnographic research , and workshops were employed to investigate and enhance the combination of resources and participants. The application characteristics can be outlined as follows: first, embedding within the local context and establishing relationships, entailing delving into the local environment to cultivate trust-based connections with local cultures; second, uncovering commonalities and aligning objectives, involving the exploration of shared internal needs and interests to achieve a unified shared vision; third, curating members and constructing teams, encompassing the inclusion of diverse roles to form a multifaceted team.

Application Characteristics in the Design Dialogue Stage

Establishment Stage The 101 cases were extracted during the Design Dialogue stage, producing 42 valid samples. Automated coding of these samples identified 17 thematic keywords including "Decentralized design", "Insight", "Self-organized management", " Scoping theme ", and "Empathy", with high frequency. Through a correlation-based clustering analysis of these thematic keywords, the whole presents a uniform and densely distributed network structure. Several strongly correlated linkages emerged: "Decentralized design", "Self-organized management", and "Empowerment" shows a strong correlation, as shown in Figure 2 (b). This stage is characterized by chaotic dispersion and dynamic multiplicity. Therefore, the application of collaborative design methods at this stage should be tailored based on the characteristics mentioned above.

The application of collaborative design methods at this stage should inspire innovative thinking, suggest solutions, and establish a self-organized management mode. Various tools such as seminar tools including, workshops, scenarios , brainstorming; visualization tools such as sketches, storyboards, and prototype lab , as well as screening tools like journey maps , charts and statistics , provide rich opportunities for data aggregation. The application characteristics can be outlined as follows: First, through diverse collaborative tools as a stimulating medium, activate the experience and feelings, imagination and creativity of the participants, and promote the generation of collective creativity. Second, Integrate ideas and creative input from multiple parties, converge on a unified main objective, and optimize the best solution through joint scrutiny. Third, cultivate competence and self-management in participants by shaping their roles and gradually reducing dependence on external resources, resulting in a prototype organization for independent innovation and operation. Fourth, make dynamic adjustments to adapt to changes. There are numerous unforeseeable factors and unknown variables in the initial phases of social innovation. Participants must continually adjust the collaboration process to foster an open and sharing team culture, as well as a dynamic and diversified collaboration mode, to more easily adapt to changes in the internal and external environments.

Application Characteristics in the System Integration Stage

Establishment Stage The 101 cases were extracted during the system integration stage, producing 50 valid samples. Automated coding of these samples identified 16 thematic keywords including "System structure", "Communication platform", "Sustainability", "Participants", and " Evaluation", with high frequency. Through a correlation-based clustering analysis of these thematic keywords, several strongly correlated linkages emerged: "System structure" exhibited a strong correlation with "Sustainable", "Evaluation", and "Participant". Meanwhile, "System structure" "Sustainability", "Evaluation", and "Participants" shows a strong correlation. Furthermore, "communication platform", "information data", and "feedback and evaluation" show a strong correlation, as shown in Figure 2 (c). This stage centers on sorting and evaluating the roles, programs, and processes from the first two phases. Additionally, it involves incorporating more participants and external resources. Therefore, the application of collaborative design methods at this stage should be tailored based on the characteristics mentioned above. The primary objective at this stage is building a replicable system. Various tools such as highly visual system tools like organizational charts and system maps , as well as publicity tools like guidebooks and online and offline collaboration and communication platforms . The application characteristics can be outlined as follows: first, Introducing a range of external resources, deploying them in various combinations, and implementing a standardized mechanism that can be replicated are the key steps in building a stable, circulating internal system. Second, expanding the system from the inside out through spontaneous dissemination and diffusion can enlarge the scope and strength of influence, ultimately driving systemic change.

Application Characteristics in the Projects Connection Stage

The sample size extracted during the connectivity project phase was too small to be sufficient for coding analysis. Therefore, using the case analysis method to summarize its application characteristics. Taking Slow Food International as an example: the project has developed from a small, locally-based organization to a distributed food network of thousands of projects and millions of people, with interlinked sub-systems connected peer-to-peer through various flexible methods of connectivity, such as regular exhibition summits and digital communication platforms. Each project varies significantly in type, but the fundamental idea revolves around a strategic framework developed by Slow Food. This framework allows for diverse local activities while offering a cohesive overview . The primary objective at this stage is building networked social-ecological systems via project interconnection. The application characteristics can be outlined as follows:

first, building a flexible network. By horizontally connecting similar or complementary projects and vertically integrating organizations of different types, small projects are synergized and integrated into larger programs to achieve scale-up. Second, Inspire, align, and lead multiple local projects through a framework project., so that these local projects form a unified value.

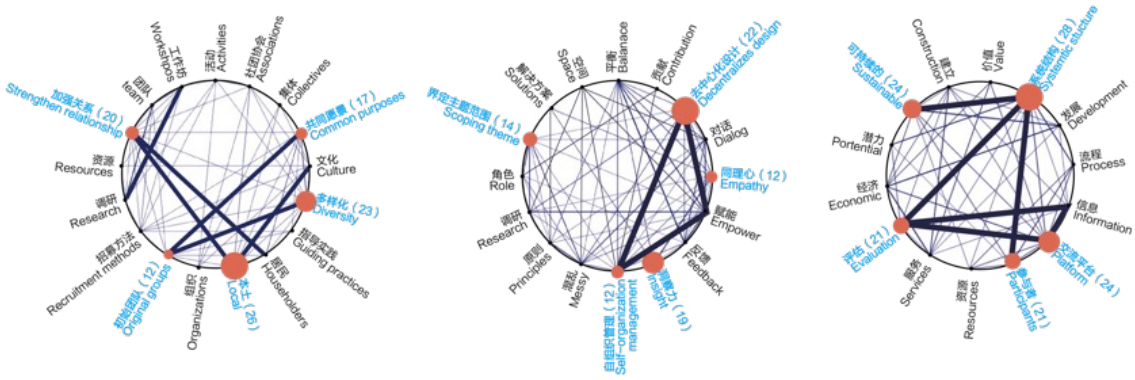

Figure 2. The correlation-based clustering analysis of keywords

The development trend of co-design in social innovation design

Combined with the above analyses, a vertical synthesis is conducted across three dimensions: collaborative objects, collaborative structures, and collaborative modes. Guided by the progressive stages of social innovation activity, three evolving trends in collaborative design are derived, as depicted in Figure 3.

(1) Expansion Trend of Collaborative Objects: In Stage 1, the focus is on local resources. From the perspective of individuals, the focus is on the potential and value of local resources such as regions, cultures, and communities; Stage 2 is oriented toward organizational participants, involving the construction of internal relationships from an organizational perspective.; In Stage 3, the focus extends to external resources, emphasizing the systematization and scaling of prototype experiments. In Stage 4, attention is directed toward individual projects, considering their societal significance and impact. The scope of collaborative design objects gradually extends from micro-level individuals to macro-level societies.

Increasing Complexity of Collaborative Structures: In Stage 1, distinctive features are extracted from the scattered and independent initial resources, identifying commonalities and constructing the team. This resembles the aggregation process of separate individual cells. In Stage 2, dialogue-driven co-creation among participants is stimulated, network relationships between individuals are established, and small-scale production units are formed. In Stage 3, the fundamental unit assimilates additional external resources and integrates functions, coordinating relationships to form the initial complete system. Subsequently, the system guides the gradual division and replication of more sub-systems. In Stage 4, disparate sub-systems are aggregated to form a complex, open, and dynamic colossal social-ecological system via a network structure. The structure of collaborative design relies on networked relationships as the foundational connection, evolving from individual units into immense social-ecological systems with increasingly intricate architectures.

Systematization Trend of Collaborative Tools: The initial two stages of social innovation design focus more on the use of participatory tools and techniques, while the latter two stages predominantly employ systematic tools and techniques. In the initial design phase, the objective is to encourage social discourse and jointly generate innovative solutions. This is facilitated through flexible collaborative tools such as workshops, visual

presentations, and written compilations, which create interactive scenarios and platforms for dialogue among participants. In the subsequent phase, the collaborative design is confronted with a more intricate systemic context, and participatory tools alone struggle to align the varied and extensive resources and projects within the system. Therefore, collaborative design tools must embrace systemic thinking, which entails leveraging logical collaborative tools such as resource identification, resource reconfiguration, system model construction, and visual diagrams to establish interconnections among various modules, thereby forming a sustainable social innovation system. Collaborative design tools have transitioned from being participatory to becoming systemic, progressively evolving into a more systematic framework.

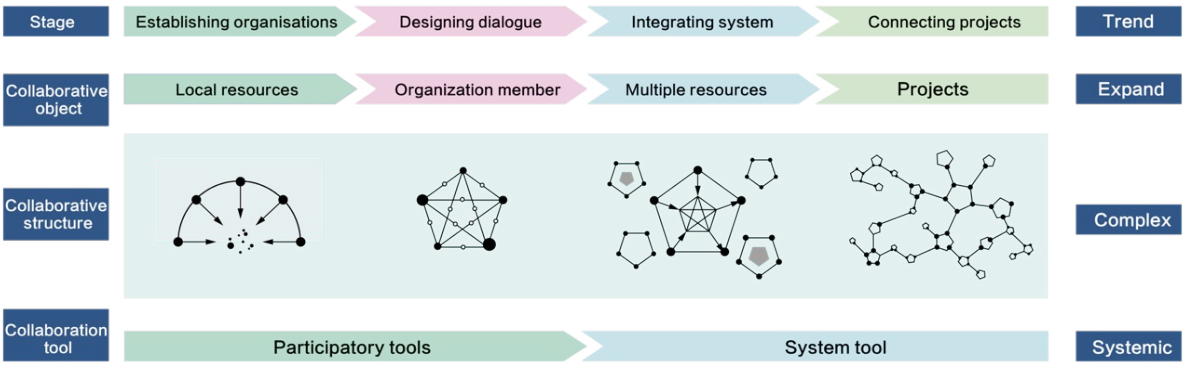

Figure 3. Trends in co-design in the context of social innovation design

Conclusion

Drawing upon the distinctive features of the four developmental stages of social innovation activities, this paper succinctly summarizes and categorizes the application characteristics of collaborative design within the context of social innovation endeavors. By considering the dimensions of objects, structures, and tools, we have analyzed and identified three evolving trends in collaborative design during different stages of social innovation activities. The findings provide an intuitive and systematic understanding of collaborative design in social innovation, expanding the application scope of collaborative design methods. Furthermore, it fosters connections and exchanges across various disciplines, offering valuable insights and guidance for collaborative design research in other areas. Ultimately, the study establishes a foundation for refining the theoretical framework of collaborative design.

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TRANSFORMING PUBLIC HEALTH COMMUNICATION:

Communicating WELLNESS through a more Effective Visual Narrative Medium

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Abstract

As we live in an era of hyper-communication and visual overload, where technology is more than ever proposed as an answer to every problem, understanding the transformations in users' behaviours appears as fundamental. This paper will focus on the effectiveness of public health communication in today's context. The literature review explores recent trends and tracks the evolution of wellness communication through different lenses and approaches. The method used in this research paper comprises three case studies that analyse alternate visual mediums specific to mass communication that have been evidenced in the past years. The paper also proposes a framework and projection of possible lines of research concerning public health design communication.

Author keywords

Design communication; visual narrative; mental health literacy; mental wellness; behaviour change

Introduction

The purpose of this study is to analyse the discourse on the effectiveness of current public health communication and explore how changes in technology and human behaviour towards visual languages and media content should be considered when redesigning a better visual narrative medium. Our world is more visual than ever. There is an increased need for visual communication to be more effective; to grab attention, stand out from the crowd and deliver a clear message to the intended audience. With that said, it is even more crucial for government agencies needing to disseminate important information, communicate policies, and engage the masses all at once. Amongst various visual mediums, infographics have always been the default choice for the Singapore government for public health communication. Though simple to comprehend and easy to digest, infographics are often devoid of storytelling, characters, and emotions, hence less able to connect with the mass audience. The standard infographics approach is no longer adequate. The COVID-19 pandemic has

resulted in a sharp spike in mental health conditions, with anxiety and depression cases increasing by a massive 25% globally, according to the World Health Organization (WHO) (Kupcova, Ida et al, 2023). It has also resulted in an urgent need for rapid and effective public health communication, giving rise to new visual narrative formats. Will a hybrid format combining the simplicity and clarity of infographics, the emotions and storytelling of comics, and the interactivity and engagingness of emojis and memes be the solution to better public health communication?

Background and Context

Information Overload in the Age of Information

The Age of Digital Information has made our world more visual than ever. Faster internet bandwidth and better technology have sped up the transmission of high-quality visual messages tremendously, spanning a wider reach in much less time. Renowned visual expert Dr. David Hyerle observed in his research that as much as 90 per cent of the information transmitted to our brain are visuals (Hyerle, 2000). With such an excessive daily input of visual information, visual communication must be more effective to combat information overload, which occurs whenever input exceeds our capacity to process, leading to lower-quality decisions. The abundance of information, despite being potentially useful, can serve to be more of a hindrance than a help (Bawden & Robinson, 2009). Viewers are shutting down from the excess input, making it increasingly challenging to connect with them.

Singapore, the Land of Infographics

Singapore’s government takes data seriously. Introducing 'data' as the new currency, the government site smartnation.gov.sg encourages everyone to share and contribute data and freely make data sets collected by public agencies available and accessible to the public. The Data.gov.sg portal also updated its data repository to be more relevant and understandable for the public, through extensive use of data visualisations and data narratives. Another key public resource, the SingStat website, managed by the National Statistical Office, has the latest data, press releases, and official statistical findings of Singapore clearly communicated and presented using visualisations, namely infographics, and disseminated through user-friendly platforms like websites, mobiles, and electronic services. These data are shared and used by public agencies, policymakers, and the general public for planning and research, monitoring of social trends, and policy formulation, among many others. That explains the widespread use of infographics as the de facto medium of Singapore’s government for visual communication. A huge part of these public communications are largely related to healthcare, therefore seeing a sharp increase during the COVID-19 pandemic.

A perfect example of how much the government relied on the heavy use of infographics for public health communication is the series of ‘New Normal: Safe (X)’ infographics posters, as the standard set of guidelines to be downloaded for use by the general public. Instead of creating one poster of ‘safe distancing’ guidelines, a total of six different versions of the same poster were created, covering areas like ‘Safe Commuting’, ‘Safe Shopping’, ‘Safe Dining’, ‘Safe Outdoors’, Safe Workplaces’, and ‘Safe Visiting’. Each of these posters also came in the four official languages of Singapore - English, Chinese, Malay, and Tamil. Furthermore, some of these posters were subsequently updated into more alternate versions to meet specific needs, e.g. a festive version of the ‘Safe Visiting’ poster was specially created for Chinese New Year with visuals and content appropriate for CNY home visiting.

Communicating Mental Wellness

COVID-19 has a major impact on people's mental health globally, causing widespread anxiety, depression, and post-traumatic stress disorder symptoms. In his message on World Mental Health Day in 2022, UN Secretary-General Mr. António Guterres underscored the importance of making mental health "a global priority" and called for urgent action to enable everyone, everywhere, access to quality mental healthcare ("Time to," 2022). In Singapore, over 45,000 calls were received via the National CARE Hotline, a programme that was initiated to deliver first aid and emotional support within the first 6 months of 2021 (Lai, 2021). As a result, the 'COVID-19 Mental Wellness Task Force' (CoMWT) expanded into the 'Interagency Taskforce on Mental Health and Well-being' (IATT) in Nov 2021 to focus on mental health and wellness (Lin, 2021). Singapore's Ministry of Health also reacted by swiftly building an online portal of resources for mental health curated by experts. While the world still has much to learn about mental health literacy, we can look at design communication to find better ways to communicate mental health issues to the general public visually. Are we able to 'visualise' mental illness? Can an 'invisible illness' be made visible?

Technology has Changed the Way We Communicate (and Learn).

Technology has enormously changed how humans receive and react to communication. Mobile devices have greatly permeated our daily lives, providing unprecedented access to information and communication. The number of mobile phones has far exceeded the world's population. The average person spends around 3 hours on their phone daily, and 1 in 5 smartphone users spends over 4.5 hours on average every day. The future of learning is Mobile Learning, and the increased share of Gen Y (millennials) in the workforce and demands for quick turnaround of online courses have led to the rise of "bite-sized" content being the right size. Most Gen Y learners tend to multitask and have short attention spans, finding it hard to focus for more than 20 minutes at a stretch (Kelly, 2013). Bite-sized learning is hence perfect for its short duration and allows users the freedom to consume the content on their time. This super-short content can be developed rapidly and cost-effectively and is extremely addictive for the Mobile Generation. Similarly, public communication now needs to be strikingly short, lightning-quick, and enjoyably tasty, much like fast food, to appeal to this group of audience.

Social Media Shaping the Evolution of Human Behaviour

Social media has changed us. On the positive side, it has brought people together, connecting us personally and professionally to interact, discuss, and build communities. On the negative side, social media is a platform for abusers and bullies to attack in anonymity and where resentment and envy grow from constant comparisons. Be it positive or negative, social media has undoubtedly resulted in changes in human behaviour. With over 4.33 billion active social media users worldwide, more than half the world is now connected. Social networking has greatly revolutionised how we exchange data, allowing for interaction and learning to happen simultaneously and spurring the exponential growth of information sharing.

Case studies & Discussion

This paper analyses how the Singapore government's predominant use of infographics as the standard approach to public health communication is inadequate and why newer forms of visual mediums need to be explored and developed. To redesign a more effective visual narrative medium, this study investigated successful case studies from other forms of visual mediums to compare their respective communicative strengths and consider the possibilities of constructing an improved hybrid medium. The relationship between the main target audience (mass public) and key stakeholders (policymakers) will also be examined, along with reviewing how the

designer’s role needs to be transformed to facilitate this new process.

CASE-STUDY 1: Comics As a Visual Medium for Public Education

COVID-19 has created an urgent need for quick and clear communication of science and medical facts to the mass public. The panic resulting from the pandemic has called for many PSAs to regularly inform and educate the public on medical updates and health protocols (Jerome, Ting & Podin, 2021). In this time of need, government agencies have found comics to be an extremely useful medium for public health communication. Combining text and images with a storyline makes comics highly engaging for readers. Simplified characters and metaphors made it much simpler for new and abstract concepts like viruses and easier to visualise (Kearns and Kearns, 2020). Comics can effectively show “spatial, temporal and relational aspects of the pandemic” more than other visual mediums. And along with visual elements like diagrams and maps, comics can easily visualise abstract concepts like the spread of an invisible virus, social distancing, and the risk of infection (Callender et al., 2020).

One such example is the 17-panel comic illustration by Singaporean artist Weiman Kow, which went viral on January 31, 2020, during the early stages of the pandemic. Kow shared the comic online shortly after Singapore recorded its first case of the COVID virus. The info-comic was written in simple language and used colourful drawings and expressive characters to share about coronaviruses and measures to prevent community spread. As the scare of the new virus spread, so did the flood of misinformation. The comic quickly became the go-to guide for kids and adults, as parents worldwide clamoured for clear and simple information to help educate their kids in understanding more about the virus and to take simple measures in fighting the spread. Her 17-panel comic visually explained how particles containing the virus could get onto objects such as railings, door knobs, and lift buttons and could survive up to 24 hours. Kow surmised that the comic medium is very underrated yet highly useful for disseminating information to the young and old (Yeo, 2020). Kow’s COVID-19 info-comic has since been shared on various social media platforms over 14,000 times. They are found in advertisements and posters and even translated into vernacular languages for more people to understand. Schools, clinics, and hospitals also contacted Kow, requesting to use the comic as educational material (Sunder, 2020).

The Singapore government is no stranger to using comics for public communication. From as early as 1979, educational comics were created to spread awareness about the dangers of drug taking. Singaporeans are also familiar with the famous ‘toilet (comic) posters’, commonly found in all public toilets. And recent years have seen a rise in the use of graphic medicine comics about dementia, palliative care, and various mental illnesses. Singapore has always used comics for effective yet highly entertaining communication (Lee and Chiang, 2021). And once again, the COVID-19 info-comic by Weiman Kow has effectively demonstrated the strength of comics as a tool for public communication and mass education.

CASE-STUDY 2: Emergence of Emoji as a Universal (Visual) Language

An emoji is a pictogram or smiley, primarily used in e-messages to express emotional cues otherwise missing from a typed conversation. Similar to emoticons which are typographic approximations expressing emotions, emojis are "picture-words", as can be seen from the Japanese origination of the term 'emoji' - 'e' (絵 , 'picture') + 'moji' (文字 , 'character').

The first set of emojis appeared on Japanese mobile phones in 1997. Since then, emojis became increasingly popular worldwide after they were added to mobile operating systems. Every day, more than 900 million emojis are sent on Facebook Messenger. Half of the comments on Instagram contain emojis. Every one in five tweets on Twitter contains an emoji, up from one in five in 2014, according to the world's #1 emoji reference site -

Emojipedia. In 2015, for the first time in history, the Oxford Dictionary chose an emoji as its "Word of the Year." The "Face with Tears of Joy" emoji was awarded the coveted title of the most frequently used emoji globally.



Figure 1. Tears of Joy Emoji

Today, there are more than 3,000 emojis in existence, and there is even a World Emoji Day, celebrated on Saturday, July 17 (the date that is indicated on the calendar emoji).



Figure 2. Calendar Emoji

Surveys have shown that users of emojis are perceived to be friendlier and funnier, and most emoji users agree that emojis are essential for "creating unity, respect, and understanding". In recent years, emojis have also reflected current events to help bridge language barriers. In June 2020, the use of the "Raised Fist" emoji peaked, following the death of George Floyd and the subsequent "Black Lives Matter" global movement against police brutality and racism, with the darkest two skin tones of the "Raised Fist" emoji making up the majority of users (52% in total), in showing their solidarity and support (Broni, 2020).



Figure 3. Raised Fist Emoji

When COVID-19 vaccinations became mandatory worldwide, the syringe emoji swiftly updated from a red liquid (symbolising blood) to a transparent one (symbolising vaccines).



Figure 4. Syringe Emoji

Emojis have become irreplaceable for conveying our emotions in the digital age. In fact, with the increased reliance and dependence on them, emojis may largely replace written text and become the main communicative language of the digital future.

CASE-STUDY 3: The Viral Culture of Memes

A meme is defined as an idea that spreads by imitation, from one person to another within a culture, often with symbolic meaning. Typically referred to as an Internet meme, it usually takes the form of an image that is remixed, copied, and circulated online in a "shared cultural experience". Coined by Richard Dawkins in his 1976 book The Selfish Gene, memes are likened to genes in the same sense that they self-replicate, mutate, and respond to external pressures. They are viral phenomena that evolve like that of biological evolution.

Memes are designed to be shareable by nature. And as a (usually single) image format that is often eye-catching, most memes can be read and understood within seconds. Sharing memes also facilitates a sense of community, bringing people together through humour, and can act as a form of social or political commentary. Viral content spreads the same way as viruses do, passing between people who are somehow connected. Rather than the web at large, content goes viral much faster through online communities, spreading via channels that connect groups of people together. And in this aspect, memes go viral usually for their humour, simplicity, repetitiveness, and ability to be mimicked by the public because they are often open-ended and easily adapted (Patel).

In 2015, in response to derogatory comments about "girls" in laboratories by Nobel Prize winner Tim Hunt, female scientists started sharing ironic memes of themselves dressed in lab overalls, with the hashtag

#distractinglysexy. Within a few hours, the memes and hashtag gathered over 10,000 posts on social media, leading to wider discussions about sexism in science in the mainstream media. More recently, in the lead-up to the war with Russia, the Ukrainian government used memes on its official Twitter account as a way to gather support from the masses. One meme used humour to undermine Russia's denial of its plan to attack Ukraine, while another lighthearted meme communicated the stress of being a neighbour to Russia. Though deliberately made simple and funny, these memes made thousands of people to be aware of the situation and started dialogues on the disturbing realities of war (Brown, 2022).
The meme culture is constantly evolving, and studying this subject can provide a foundation for understanding the equally constant evolution of online communication. If adopted properly, including the "meme format" as part of a hybrid visual medium will possibly result in higher shareability and virality.

The Changing Role of the Future Designer - From Designer to Visual Storyteller
In constructing an improved, hybrid visual narrative medium, the future designer's role will need to transform accordingly as well. A designer will need to acquire more skill sets to be more adept at the craft of data storytelling. Among many others, a designer needs to know how to digest and understand complex data like a data analyst, to write clearly and succinctly like a writer, and to design and draw characters for a sequential story. A Designer needs to become a Visual Storyteller. As a Visual Storyteller, the ‘new’ designer can then take the lead in the design of how information is represented. A specialised set of vocabularies will need to be in place to aid in the creation and understanding of the new, hybrid visual narrative medium. To do that, the research in this study will analyse and combine the language of infographics (including iconography and semiotics), together with the language of comics (panelling, speech bubbles, action lines), emojis, and memes to form a larger, unified set of vocabularies. This will inform a set of easy-to-follow guidelines for institutions to adhere to, in coming up with more effective visual narratives for future public health communication.

Design Framework and Interventions
Using a mix of qualitative and quantitative research methods sourced through the mass public (User), data will be collected (by the Designer) to assess the communicative strengths of infographics, comics, emojis, and memes. The findings will, in turn, guide the design of the hybrid visual medium. The Collaborative Action Research methodology (Riel, 2019) will then be used for repeated cycles of the 5 AR phases - problem identification, action, data collection, critical analysis, and evaluation to test out various prototypes for the new visual medium. Continuous testing and feedback collection will inform a set of guidelines to design a system for educating and guiding various stakeholders (Policy-Makers) on the future creation of public visual communication.

The design interventions for this study will consist of two parts:
1) Create a more effective Visual Narrative medium using a mix of 4 key elements, namely infographics, comics, emojis, and memes.
2) Create an easy-to-use Guide System for all stakeholders to adhere to.

Conclusions
Technology and social media have greatly changed how we receive, react (to), and retain information. Our brains are shutting off from too much information. How do policymakers communicate to an audience who do not want to listen? It is timely to relook at how public health communication has always been done and redesign

a better and more effective visual narrative medium. This is a need not just for government agencies but also for major corporations looking at communicating their brands, values, and services to consumers. To facilitate this transformation, a designer needs to become a visual storyteller. And by combining the communicative strengths of many visual tools, specifically infographics, comics, emojis, and memes, an alternate hybrid visual medium can hopefully become the new tool that aids in better visual storytelling. The contextual review, discourse analysis, and proposed design interventions discussed in this essay are limited to only static visual mediums that can be produced relatively easily and quickly with a small team. Other common visual mediums for mass communication, like video and animation, are deemed as high-budget production, requiring much longer production time and a huge amount of manpower. These are classified as moving images and hence not of interest and are therefore not discussed nor considered as alternatives or comparative options in this study. The discourse focuses only on the mass public between the age of 20 to 55 years who are most affected by public policies, and the suggested design interventions catered primarily to this group.

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Designing Healthcare Services for Longevity

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Abstract

Adults 85+ years and older have become the fastest growing global population, representing a new paradigm of longevity economics, service innovation, and experience-driven business. In summer 2023, the authors conducted a study to identify longevity-related challenges and frame questions in the context of healthcare services. The two-month study, which consisted in the planning and implementation of a 3-hour co-creation workshop to explore longevity-related needs of healthcare services and 1 post-workshop survey to capture insights, was a collaboration between an academic research institute in the US and a government-level design research center in Asia. The research proposes a new framework to assist in a longevity-informed design process: the 4Es (ensure, evolve, empower, and enjoy) framework. This framework is based on 35 expert interviews (Anonymous, et al., 2023), from which we derived 12 keywords associated with longevity and aging: health, family, mobility, care, home, communication, trust, community, risk, investment, education, and future. We applied the framework in the creation of an ideation toolkit for the co-creation workshop, consisting of 12 Design for Longevity (D4L) cards and 4 participatory posters. We recruited 27 participants from the healthcare industry, including three categories: 1) healthcare service providers, such as doctors, nurses, and pharmaceutical leadership teams, 2) healthcare service recipients, such as patients and their families, and 3) workshop facilitators including UX and UI designers. Overall, the study was beneficial to healthcare services for longevity. Two key learnings are demonstrated from the study: 1) By providing a series of accessible verb-based questions, the 4Es framework helped facilitate conversation and ideation among diverse participants and 2) Touching and sharing the D4L cards and posters enabled participants to discuss abstract concepts and complicated topics more easily.

keywords

Design for longevity; service design; healthcare; design process; longevity economics

Introduction

Most developed countries are already in a stage of a super-aging society (World Health Organization, 2022). Our society is transforming to adapt to multi-generational and inter- generational cultures, workforces, and other environments. Due to established economic structures, advancing technologies, better education and medical systems, and stable social infrastructures, people can live longer and want to live healthier to maintain a good quality of life.

As a result, the demands of longevity economics have led to a paradigm shift, especially service- and experience-driven business strategies. Consequently, an interest in designing healthcare services for longevity has emerged across various industries and academia. Our project was a 2- month multi-disciplinary research initiative among data scientists, an industrial designer, and interaction designers from University Research Lab A, University

Research Lab B, and Research Institute, a government-level organization that promotes design for social impact and service innovation. Our goal was to identify critical research questions concerning healthcare services for longevity by using the proposed keywords and 4Es (ensure, evolve, empower, and enjoy) framework applied in 12 Design for Longevity (D4L) cards and 4 participatory posters (figure 1). We recruited 27 participants, including healthcare service providers (doctors, nurses, and pharmaceutical leadership) and service recipients (users and their family members), conducted a 3-hour co-creation workshop, and designed a post-workshop survey to capture participant's reactions and responses.



Figure 1. Original poster design paired with 12 D4L cards from co-creation workshop.

Literature reviews and case studies

Longevity economics

In the era of an aging society and the fourth industrial revolution (Schwab, 2016), our economic structure has shifted dramatically from a product-centered model and mass-production focus to a more service- and experience-driven approach that considers longevity and sustainability. Golden (2022) notes that our society has changed from the traditional 3 stages (born, earn, and retire) to multiple stages, and this change directly affects our social infrastructure systems. Golden's five-quarter (5Q) framework demonstrates that people's age represents not only several years, but also— implicitly and explicitly —a life stage. Anonymous (2019; 2017) proposed the 8,000-day framework, which looks at the expected 8,000 days of retirement as "four retirements": manage ambiguity, make big decisions, manage complexity, and live solo. By centering the 4 retirements, longevity economics can influence how we rebuild and shape healthcare services for future AgeTech cities, where human aspects and emotions are integrated into making critical decisions and cultivating sustainable behavior and mindsets (Etkin, 2021).

Design for Longevity (D4L)

Design for Longevity (D4L) has been an emerging idea that influences us not only financially and economically but also technically and socially. Since we are in a multigenerational environment, people have started to

focus on agism issues across many industries and organizations, including education, culture, and policies. Customers have become more sophisticated as their needs have changed (Anonymous, et al., 2023). Instead of manufacturing more products, in the context of D4L, we need to consider more service-oriented experiences that tie to the desirability of people and social impact (Anonymous, et al., 2023). For example, MIT AgeLab proposed a D4L studio to envision longevity services and journeys to shift the roles and responsibilities of financial advisors to those of longevity coaches (Anonymous, et al., 2023). D4L is a cross-disciplinary domain that has academic value and industrial potential to be applied in many arenas, including healthcare. In this study, we applied the frameworks developed as part of the D4L studio to conduct an experiment on healthcare services.

Research methods and 4Es framework

The 2-month research project included four key steps: scope the research area, design applied assets for the 4Es framework, conduct a co-creation workshop, have participants complete a survey, and analyze survey data (Figure 2). Step 1 included research into challenges related to longevity and consisted of 35 expert interviews (Anonymous, et al., 2023). Interviews were analyzed using ATLAS.ti, a computer-assisted qualitative data analysis software, to come up with 12 keywords and the 4E framework. In step 2, authors developed a toolkit to be used in the workshop: the D4L cards, 4 participatory posters, and a survey to document participants' backgrounds, demographic information, and perceptions of longevity and service design, including the relevancy of the keywords in the healthcare sector. Step 3 involved conducting the 3-hour workshop, which concluded with participants filling out the survey. And in the final step, we analyzed the survey results.

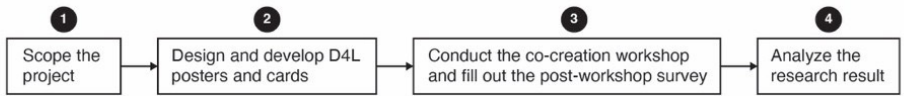

Figure 2. The research process consists of four steps.

We recruited 27 participants from three expertise areas: healthcare service providers, healthcare service recipients, and workshop facilitators with expertise in design. Doctors (n=2), nurses (n=3), and pharmaceutical leadership (n=7) are defined as healthcare service providers. Users (n=7) and their families (n=4) belong to healthcare service recipients. The rest of the participants and designers are included as facilitators (n=4). Participants were grouped into 6 diverse teams.

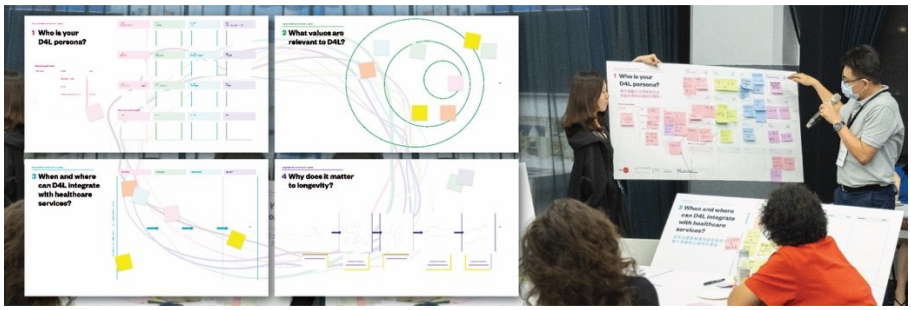

Figure 3. The 4 posters are used to identify research questions in healthcare services for longevity.

The posters (Figure 3) were created to emulate the design process: 1) **Define audience:** Who is your D4L persona? Participants used this poster to create a persona. 2) **Clarify objectives:** What values are relevant to D4L? Participants ranked keywords by importance in relation to their persona. 3) **Identify design opportunities:** When and where can D4L integrate with healthcare services? Participants used the four probing questions from the 4Es framework to brainstorm healthcare services for their persona. 4) **Visualize concepts:** Why does longevity matter to healthcare services? On this board, participants storyboarded their final idea. Throughout the workshop, participants used the 12 D4L cards as a supporting tool to enable them to have more constructive, meaningful, and engaging discussion (Figure 4).



Figure 4. The 12 D4L cards combined with 4 posters help explore healthcare services for longevity.

The 4Es framework is a tool to help people brainstorm concepts and ideas for products, platforms, and services that address issues of longevity. There are four stages to the framework: ensure, evolve, empower, and enjoy. Each stage offers a question to guide participants to think more dimensionally about the challenges and opportunities of longevity. (Table 1).

Table 1. The 4Es framework explanation, guiding questions, keywords, and examples.

4Es	Ensure	Evolve	Empower	Enjoy
Explanation	Foundation	Transformation	Extension	Outcome
Guiding questions	What do you need to **ensure**? What is basic to your future wellbeing?	What needs to **evolve** with you? What transforms with you over time?	What can **empower** you? How can you extend your impact?	What do you **enjoy**? What outcomes do you benefit from?
Associated Keywords	*Mobility, Home, Community*	*Education, Health, Family*	*Future, Investment, Risk*	*Trust, Care, Communication*
Examples	***Mobility*** is imperative for an independent lifestyle. The design of automotive safety features can ensure mobility into later ages.	***Education*** services need to accommodate changing social and professional needs and be relevant and stimulating to seniors.	Designed systems need to minimize ***risk*** and help people's daily behavior make positive social impact.	Products and platforms that allow us to demonstrate ***care*** for each other and the environment.

The workshop ended with a 5-minute presentation from each group to share their 1) D4L persona, 2) D4L-relevant values, 3) D4L-integrated healthcare services, and 4) their expanded understanding of longevity.

Most teams were interested in exploring long-term healthcare services such as coming up with human-centered approaches to take care of dialysis patients or people with diabetes. Figure 5 demonstrates a participant using the 4 posters, combined with 12 D4L cards, as an effective inspirational tool to develop and communicate their scenario.

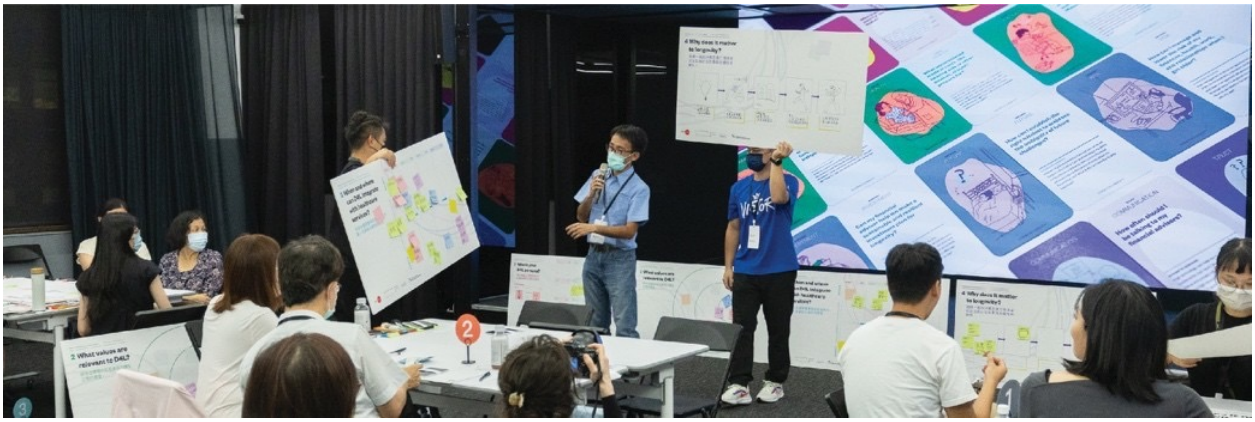

Figure 5. Participants used 4 posters to facilitate the discussion about healthcare services for longevity.

Research result

Analysis of D4L cards and keywords

One of our research goals was to determine if the 12 keywords, visuals, and proactive questions on each of the D4L cards were relevant to longevity concerns in healthcare, as well as if the set itself could serve as a conversation facilitation tool. As part of our survey, we asked participants to rank the keywords from 1 to 10 based on their importance in the context of longevity. The ranking result from top to bottom showed (the value in parentheses is the average number, n=25): health (1.48), family (3.68), mobility (5.04), care (5.16), home (5.44), communication (6.4), trust
(6.92), community (7.6), risk (8.4), investment (8.92), education (9.04), and future (10). Unsurprisingly, aligning with the participants' backgrounds, health was the most important factor. Family was second, followed closely by mobility, care, and home. Interestingly, the more abstract words, like future and investment, were ranked lowest. Participants also contributed other keywords—happiness, financial wellbeing, physiological and psychological health, meaningful and delightful lifestyle, companionship, sharing, learning, active, and being alone— to help co-build the D4L cards' content.

Analysis of co-creation workshop experience

The following survey results (n=27) can help us not only better future design workshops, but also receive feedback on D4L cards and posters. Overall, more than half of the participants (88.9%) were satisfied with the co-creation workshop experience. This workshop and discussion helped most participants (83.1%) paint a picture of what a healthy lifestyle looks like and helped the majority of participants (92.5%) understand the importance of considering needs from multiple dimensions and how to use a design process to envision future scenarios (88.9%). Most importantly, it helped most of them (85.2%) identify innovation opportunities from different aspects. Figure 6 demonstrates that 4 posters combined with 12 D4L cards are effective and useful tools for most (77.7%) participants.

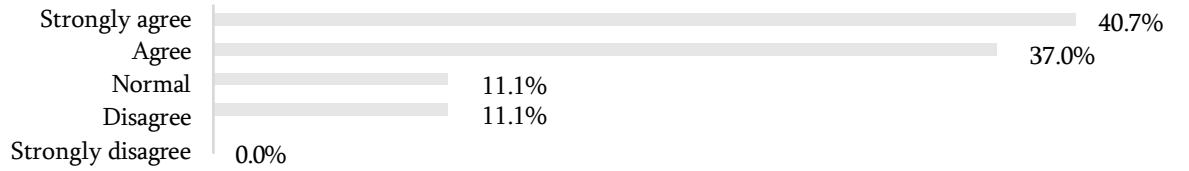

Figure 6. Results from 27 participants to survey question, "Using 4 posters with 12 D4L cards unlocked my creative thinking during the team discussion and enhanced the level of comprehensiveness of the topics."

Discussion and next step

Complexities of the term "longevity"

From the in-person workshop observation and post-workshop survey, we found that perceptions of longevity varied among participants. This could be because of different East-West cultural interpretations of the term "longevity", or due to experiential differences between healthcare service providers, healthcare service recipients, and workshop facilitators. It could also be because concepts of longevity and D4L are still relevantly new, with limited exposure in the field of service design and social innovation. Therefore, as demographic trends continue to shift, it is critical to continue to develop design methods around longevity within healthcare and beyond.

Future uses for a longevity toolkit and co-creation workshop

With the success of applying the 4Es framework and D4L cards in this study, what are other research areas that could benefit from a similar longevity workshop? We are considering public transportation systems, corporate organizational structures, educational services, AI-relevant ethical issues, and other complicated and systemic socio-technological challenges. As a next step, the 4Es framework and D4L cards can be considered as experimental materials. We aim to extend the applications of both by applying them to various research areas to build a more comprehensive and impactful toolkit for longevity and service design.

Conclusion

The development of Design for Longevity (D4L) tools for healthcare service design

The purpose of the workshop was to explore longevity-related challenges in healthcare services. We created the posters and D4L cards, based on the 4Es framework, to facilitate conversation and ideation. We tested these artifacts in the co-creation workshop to help participants (doctors, nurses, users, and designers) brainstorm and identify untapped opportunities for the redesign of healthcare services across levels of individuals, communities, and countries. Having synthesized the data captured from the survey result, poster information, and observation notes, we demonstrated that the 4Es framework, posters, and D4L cards foster open-ended conversations concerning complicated, private, sensitive, and challenging healthcare services. This is because the 4Es framework was designed with 4 relatable questions to inspire participants to quickly build mind-maps related to longevity. And the physical artifacts—the posters and cards—were designed to make abstract or complex concepts tangible, and therefore easier to work with. We concluded that the 4Es framework, posters, and D4L cards, raised participants' curiosity, enhanced their engagement level, and enabled them to have constructive discussions around healthcare services even though they were from very diverse backgrounds.

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Sustainable Design for Social Innovation: Practice and Attempt of Siping Road Community in Shanghai

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Abstract

This paper elaborated on a long-term research project on design for sustainability and design for social innovation that took place in the Siping Road community of Shanghai. The background and context of the birth and practice of this project were the old communities of large cities in China. It aimed to use design for sustainability and social innovation methods to collaborate with different stakeholders in the local community, including residents, and explore the ways in which design affects urban built-up areas, in order to reshape and enhance the vitality of the community through design, reconstruct the relationships between people and communities, and drive design to bring change to society. Through the research and practice, it was found that collaboration and co-creation are crucial links in design-driven social innovation and sustainable development. Professional designers need to understand the local context of the problem and respond to complex local challenges through cooperation with local stakeholders.

Author keywords

Design for sustainability; design for social innovation; Siping road community; co-design.

Introduction

Social innovation has become a means and way to promote social change. It is no longer just an academic term limited to the field of management when this concept was first proposed, but has expanded to different social fields and disciplines. It is regarded as a new way of thinking to creatively deal with complex social challenges and solve difficult problems. Professor Ezio Manzini from the Polytechnic University of Milan, Italy, initiated the establishment of the DESIS Network (The Network on Design for Social Innovation and Sustainability) in 2009. As a creative problem-solving thinking and innovative means, design is increasingly affecting the sustainable development and innovation of society. Design is playing a key role as an enabler in some social innovation processes. In the same year, DESIS established its branch DESIS-China. This branch includes several Chinese higher education institutions, including the College of Design and Innovation at Tongji University. As a scientific research institution dedicated to exploring social innovation design and sustainable design, the DESIS laboratory of Tongji University has been committed to exploring the possibility of design intervening in social issues in the local Chinese context to promote change in the decades since its establishment. This exploration mainly started from the real problems of urban local communities, took the design intervention and drive on community renewal and creation as a path, and realized social innovation and sustainable development through collaboration and co-creation with the local government, community residents, and social enterprises.

Background of the research

Siping Road sub-district is a community located in Yangpu District, Shanghai. This community is a traditional workers' new village community in Shanghai. In the past, it was a residential area for local workers. The community includes 17 educational institutions such as universities, colleges, middle schools, primary schools and kindergartens, as well as ordinary residential areas including 23 neighborhood committees, as well as the government, some commercial and cultural institution facilities. The entire jurisdiction covers an area of about 2.75 square kilometers, and a total of about 100,000 permanent residents live here. As an old block with more than 60 years' history, Siping Road community has been facing various social problems for a long time, such as aging population, complex population structure, crowded housing, and low quality of life. These practical problems plague the residents living here. At the same time, the College of Design and Innovation at Tongji University is adjacent to this residential community and has become an embedded campus. The DESIS laboratory of Tongji University which located on the street of Fuxin Road has also become a part of the community since its establishment.

Since 2015 , based on the close collaboration between the college and the local government, the DESIS lab at Tongji University launched a local community design research and practice project called "Open Your Space" (OYS), which relies on the resources of the campus and the community, taking the Siping Road community as the object of research and practice, it explores how design can affect the built environment of urban communities. From 2015 to 2019, the "Open Your Space" project carried out design research and practical activities in the Siping Road community with a different theme every year. During the five sessions of the project, teachers and students from the college and laboratory have insight into and understand the problems existing in the community and the needs of residents through field research and design workshops, explored the resources in the community and their potential value, and reorganized and empowered resources through design, so as to give new meaning and value to these resources. Based on these attempts, the DESIS lab of Tongji University tried to re-establish the relationship between people and people, and people and communities through design. In several years' exploration, many sub-projects that closely connected with the local community were established through the design practice. Through the cooperation and co-creation with the residents and other stakeholders from this community, the DESIS lab of Tongji University renovated corridors and stairs of old residential buildings, transformed the community waste transfer station into an urban science laboratory located in the community, converted disorganized community sidewalks into pocket parks and children's playgrounds, rebuilt the abandoned commercial facilities into a community activity center for residents, collaborated with a ten-year-old weaving team called "Skillful Auntie" to look for new directions and possibilities. Recently a gate room in the community has been rejuvenated from an idle space to a public shared service space for community residents, which was called sustainable living communication room.

Design for sustainability from the perspective of environmental space

In the three seasons of "Open Your Space" in 2015, 2016 and 2017, the DESIS lab of Tongji University concentrated on the environment and space of the Siping Road community to create surprises and bring changes through the ideas and methods of design for sustainability.

The theme of the project in 2015 is "72 changes we bring to the community". In this session of the project, in cooperation with the local sub-district government, many spaces in the block where the Siping Road community is located were designed and built as common areas open to residents. The space of four old shops on Tielin

Road were transformed into the "Siping Space" exhibition hall, displaying the exhibition of practical cases of urban public space creation around the world. After the exhibition, this multi-purpose space became a creative laboratory located on the side of the community street. In several large public spaces in the block, teachers from the college improved the utilization rate of existing facilities through their design work. The bicycle parking lot with a low utilization rate has been transformed into a children's playground. Parking facilities were reused by designers, these circular steel pipes were cut and repainted to become entertainment and leisure facilities for kids. Due to the lack of seats for sitting and resting in square of the community, the designers created new urban furniture for these areas through the design and processing of new materials. These modern device designs not only consider the degree of integration with the surrounding original environment, but also extend and endow new functions that the original environment does not have. The wall of the college facing the community was also been designed by the designer to bring different visual experiences to pedestrians through visual design methods.

In 2016, the goal of the action has been placed on the corridors and stairs of residential buildings in the Siping Road community. These residential buildings were generally built from the 1970s to the 1980s, with a history of more than 30 years. As the public space area for residents to enter and exit the buildings daily, the corridors and stairs of many buildings were already dilapidated and in urgent need of design intervention and renewal. Sophomore students majoring in environmental design from the college conducted research and design around the 8 corridor spaces in the community. The investigation included the use status of the public space of the corridor, the lifestyle of residents and the use and utilization of the corridor. After the investigation, they proposed a design research report which includes research methods, drawings of questions, problem statements, user files, case analysis and design challenges. The students putted forward the vision of the place-making and conducted in-depth exchanges with community residents through co-design workshops to continuously adjust and improve the design concept. After multiple home surveys, brainstorming, joint design, scheme iteration, and on-site stakeout, the eight themed schemes were finally implemented with the assistance of the construction team. There was not only the creation of space through creative environmental graphics, but also the placement of services to stimulate neighborhood interaction among the design. The students from the college not only creatively integrate graphic elements and sustainable installations into the space, improving the environmental experience and space quality, but also created a socialization process that drives community participation and stimulates residents' integration



Figure 1. The "Siping Space" on Tielin Road.

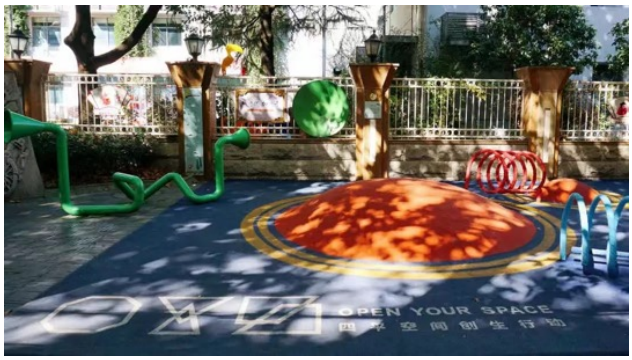

Figure2 . The design and transformation of the bicycle parking lot and facilities.

through design. The long-term operation of the project is inseparable from the participation and maintenance of the residents in the later stage. It is crucial to establish mutual trust among different participants during the project process and gradually achieve the transformation of participating entities.



Figure 3. The design of the corridor and stairs.

In 2017, the forgotten and abandoned telephone booths in the block were transformed into small exhibition halls. These mini exhibition halls displayed sustainable design works from the students of the college. At the same time, the 10-year-old community waste recycling station located in the core area of the block was finally transformed into a co-working space for Shanghai City Science Laboratory and DESIS lab of Tongji University through the communication, coordination and co-design with different stakeholders. Through three years of community practice, it has been summed up a way to explore design interventions in social issues in the local context, including acupuncture-like emerging paradigms of public space design from point to line to surface, the attitude and vision of design to construct the public life and collective space, as well as the "active design" process from one-dimensional design to the joint participation of social resources.



Figure 4. The design and transformation of the community waste recycling station.

Design for social innovation from the perspective of community residents

In 2018, new action goals were formulated based on the SLOC scenario, that is, small local, open, connected, and progressive neighborhood renewal at the community level. The focus was shifted from surplus space to

reshaping vibrant public spaces so as to improve the quality of the block and the life of community residents from the cultural dimension, establish a flexible community with the cultural characteristics of the local community, and increase the human touch of the community. In this process, "80m Pocket Park" has become an important sub-project. This 80-meter-long pedestrian street is located on the side of the college facing the street. Originally, there were only some flower beds as greening devices. After several communications, interviews, workshops between the design team and the government administration and community residents, as well as the observation, measurement and analysis of pedestrian behavior by the design team, and in combination with the needs of community residents, the designer built this plain road into a pocket park. The shape of children's recreation facilities in the park is ingeniously combined with the initials of the names of colleges and blocks. While adding leisure places for residents in the community, the designers tried to bring people back to public spaces, return them to people, and connect people with vibrant community spaces. At the same time, the design team retained the original 6 flower beds, allowing different groups from the community to adopt these green plants, so that the residents of the community can become the real managers and guardians of the block, and realize the community-building that everyone participates in.



Figure 5. The “80m Pocket Park”.

In 2019, the theme of the project is "Design for the Collaborative Communities". Through the practices of multiple collaborative design projects, the research tried to think about the role of design in community-building, characteristics of design-driven, the guidance of design culture, and the use of specific design tools. The establishment of Fushun Road Community Neighborhood Center is an important sub-project in this year. The original site of the community center was an abandoned commercial facility in the Siping Road community. Through the collaborative design with community residents, the design team transformed it into a community activity center serving local residents. Children from community resident families decorated and painted a wall of the center with the assistance of designers. The guidance system within the community center was upcycled by community residents using waste materials with the assistance of the design team. Some discarded and unused items in daily life, including bottle caps, circuit boards, toilet paper rolls, dead tree branches, old and abandoned keyboards, magnetic tapes were made into identification devices with ornamental value and guiding functions through sustainable design methods such as upcycling. There were also some decorations from the interest groups in the community, such as the "Skillful Auntie" weaving team. In the summer of 2019, the DESIS lab of Tongji University discovered this group of ingenious aunts living in the community. The community weaving interest group formed by them has existed in this block for ten years. The research group

decided to invite them to the laboratory to create weaving handicrafts with teachers and students from the college. These people living in the community have superb weaving skills. Through the collaborative design workshop, creative ideas from students collide with handicraft skills from aunties to produce new works. These design actions breathe new life into traditional, soon-to-be-disappeared community cultures and crafts. As a gift for the opening of the community center, people with weaving skills from 23 neighborhood committees in the Siping Road community jointly completed an installation. This huge co-created work was displayed on the wall on the second floor of the center. The participation of residents from the community in the design-driven community-making process enhanced their sense of belonging to the local community.



Figure 6. Comparison of the new and old appearance of the community center.

Recently, new explorations and attempts have been taken in the community. In the Chinese context, the gate room of residential quarters was a special existence. Siping Road Community was a block full of old residential quarters, there were gate rooms at the entrances and exits of each residential quarter. These spaces had become places that community residents must pass by when entering or leaving the community. This small space was responsible for community security, information transmission, traffic management and other tasks, as well as the daily life of the guards. At the same time, the space around the gate room was also an important community public service node. The research group has been thinking about how to use the existing space to provide more public service environments for the local community through design, so as to enhance the social connection in the old community. One of many good ideas was to transform these important but single-function places into public shared spaces where multiple subjects of the community participate. With the co-creation with the community, one of these gate rooms was transformed into a communication platform called "Sustainable Living Communication Room" for delivering sustainable lifestyles. The physical space of this guard room was very small, only 8 square meters, and the design team had optimized it. In this small space, the designer successively placed first aid equipment such as AEDs, medical kits, and wheelchairs. There was also a " tool library " in this room, where community residents can store tools and kitchen utensils that were not frequently used at home, and other people in need in the community can borrow them. Information communication area was designed in this space to enhance the "shared space" attribute of the room, so that everyone in the community can feel a good life here. In the future, a project called " Old Furniture Renovation Plan" will be launched here, through the donation of second-hand furniture, story sharing and other ways to guide community residents to interact, communicate, and participate in community management. The residents were encouraged to be the masters here to enhance their creativity, cohesion, and help realize their self-worth.

Conclusion

The attempts and explorations of DESIS laboratory at Tongji University integrated the local context and problems, and in the unique context of Chinese cities, used the tools and means of sustainable design and social innovation design, based on the real needs of communities and residents, to propose creative solutions to promote social change. In this process, it was found that the collaboration and co-creation of professional designers and different stakeholders in the project is particularly important. These methods of creating new things through collaborative design are the important path for design to achieve social innovation and sustainable development. Professional designers need to understand the real needs of local residents and use appropriate and localized design methods and tools to communicate with residents and other stakeholders, providing them with feasible problem solutions that are both long-term and environmentally friendly. Good design results will bring a sense of happiness, honor, dignity, and belonging to the local community.

Acknowledgments

We thank all the researchers and participants who provided helpful information and support in this research project.

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IT’S GOING TO BE OKAY. IT WILL.: Depicting human experience that oscillates between reality and virtuality in a novel.

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Abstract

The social media revolution has created a social paradigm shift in which virtuality has inter-penetrated reality for its users. Human experience now oscillates between the virtual and real worlds we inhabit. For the novel as a literary form to remain relevant to digital natives who have only known a world with the Internet, novelists need to experiment with aesthetics, structure and tones to better represent and interpret their virtual-real experience of what it means to be human in the 21st century. In response to this challenge, my novel It’s Going To Be Okay. It Will., thereby explores the potential, and potential limitations, of narrative fiction to perform the task of representation. The architecture of the novel comprises three first-person narratives that sit within modernist literary conventions, as well as postmodern fragmented and non-linier narration in the form of digital communications or online artefacts, in order to better reflect a lived experience that is both virtual and real. By experimenting with this literary structure, the novel’s central thematic question asks, how do we understand ourselves, and locate ourselves, in the Internet age?

keywords

Online culture, social media, contemporary literature, Internet studies

Introduction

Since the inception of the Internet, novelists have been creating works that find ways ‘to speak back to and against it’ (McGurl, 2017: n.p), so as to examine their own conditions of existence within it. The question of how to represent the digital world in language has become only more interesting, and more urgent, as it has become clearer that the Internet is not just a device but an atmosphere, a state of being (Schwartz, 2021). While the Internet is acknowledged in much contemporary fiction, it takes up less space than one might assume. Writers who depict the experience of using or inhabiting the Internet in their novels face many formal challenges as online narrative structures tend to be fragmentary and unruly, continuously mutating and changing.

For my PhD doctorate I took up the challenge of examining how to write a novel that’s ambition is to represent life in the era of the Internet. My PhD thesis comprised an exegesis and a creative component that was in the form of a novel. The writing of the novel, entitled: It's Going To Be Okay. It Will., was informed by academic research into current theories regarding the impact of the Internet revolution on identity-construction and finding belonging with others.

The main dramatic question that the novel engages with is, how do we understand ourselves and locate ourselves in the Internet age? The novel answers this question by experimenting with literary structure

through first-person perspective and online social media posts to give fictional expression to today's virtual-real experience. This article examines how I depicted human experience that oscillates between reality and virtuality through literary form by incorporating many of the ideas and theories within my exegesis, firstly, I will discuss the narrative structure of the novel, secondly, the tone of the novel, and lastly, the characters and their individual story arcs.

THE NARRATIVE STRUCTURE OF THE NOVEL

It's Going To Be Okay. It Will. introduces the characters of Rose, Luca and Mark, all of whom, in their own ways, contend with the challenges of trying to form meaningful bonds with others and to create and/or locate themselves in today's digitally connected globalised world. The setting of the novel is a fictional world that closely resembles that of the readers, therefore the novel blurs the line between the fictional world of the novel and the world that the reader inhabits.

The narrative structure used for It's Going To Be Okay. It Will. comprises three first-person narratives that sit within modernist literary conventions, as well as postmodern fragmented and non-linier narration in the form of digital communications in order to better reflect lived experience that is both virtual and real. Each character's narrative arc within the novel resists, and ultimately subverts, a neat and conventional beginning, middle, and end structure, and instead narratively drops in and picks up on the characters at particular times of their lives.

Drawing on both modernist and postmodernist literary conventions, It's Going To Be Okay. It Will. incorporates the social media content the characters create and consume, which I propose are micro-narratives that fit within the 'small stories' paradigm. Small stories are a specific sub-genre of storytelling that falls outside the narrative academic enquiry canon (Georgakopoulo, 2007). Therefore, the novel is a collection of narratives that also build into the larger narrative that is the novel itself.

The micro-narratives (online content) within the novel are a collection of both fictional and real social media content, that is, I appropriated and re-contextualised actual social media content people posted online for the purposes of the novel. To this end, the 'small stories' in the form of micro-narratives within the novel are not solely produced by the narrators, but instead referenced online content from others, thereby highlighting how autobiographical writing on social media is a combination of the creation, consumption and re-purposing (or sharing) of digital content. This, then is memetic of how social media enables the production of a 'virtuosic score' (Virno, 2006), a form of life writing that never gives rise to a finished work.

The social media content that the characters create and consume in the novel are all set apart from the first-person narratives on their own pages, encouraging the social media content to be read both as individual micro-narratives, as well as elements within the narrative as a whole. This conceptually puts the characters Rose and Luca's virtual lives on an equal footing with their 'real' lives. Using this narrative structural device in the novel is a literary exploration of what sociologist Nathan Jurgenson (2012) terms 'digital dualism' (p. 84), which critiques the fallacy that what happens within virtuality is less 'real' than reality.

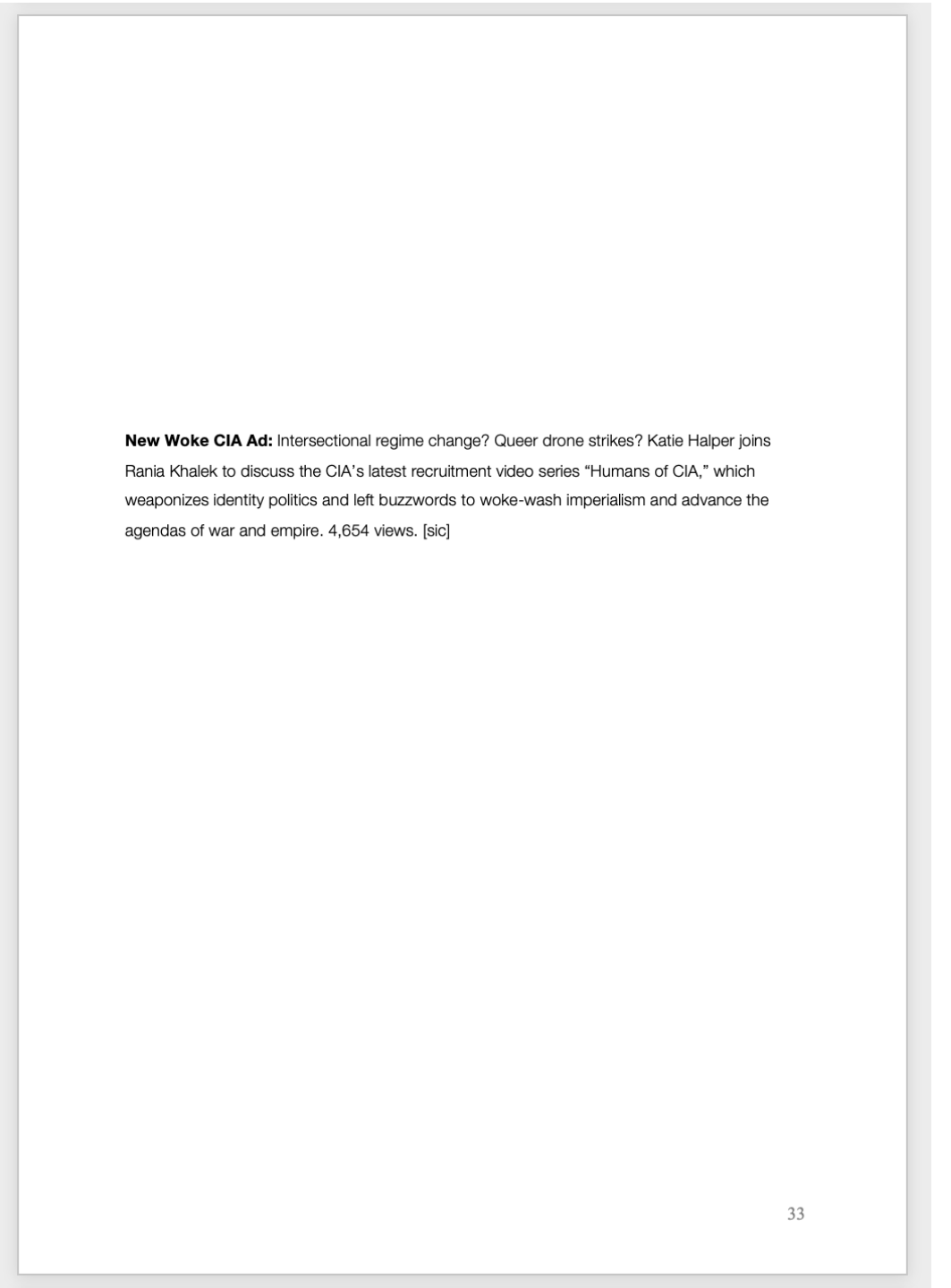
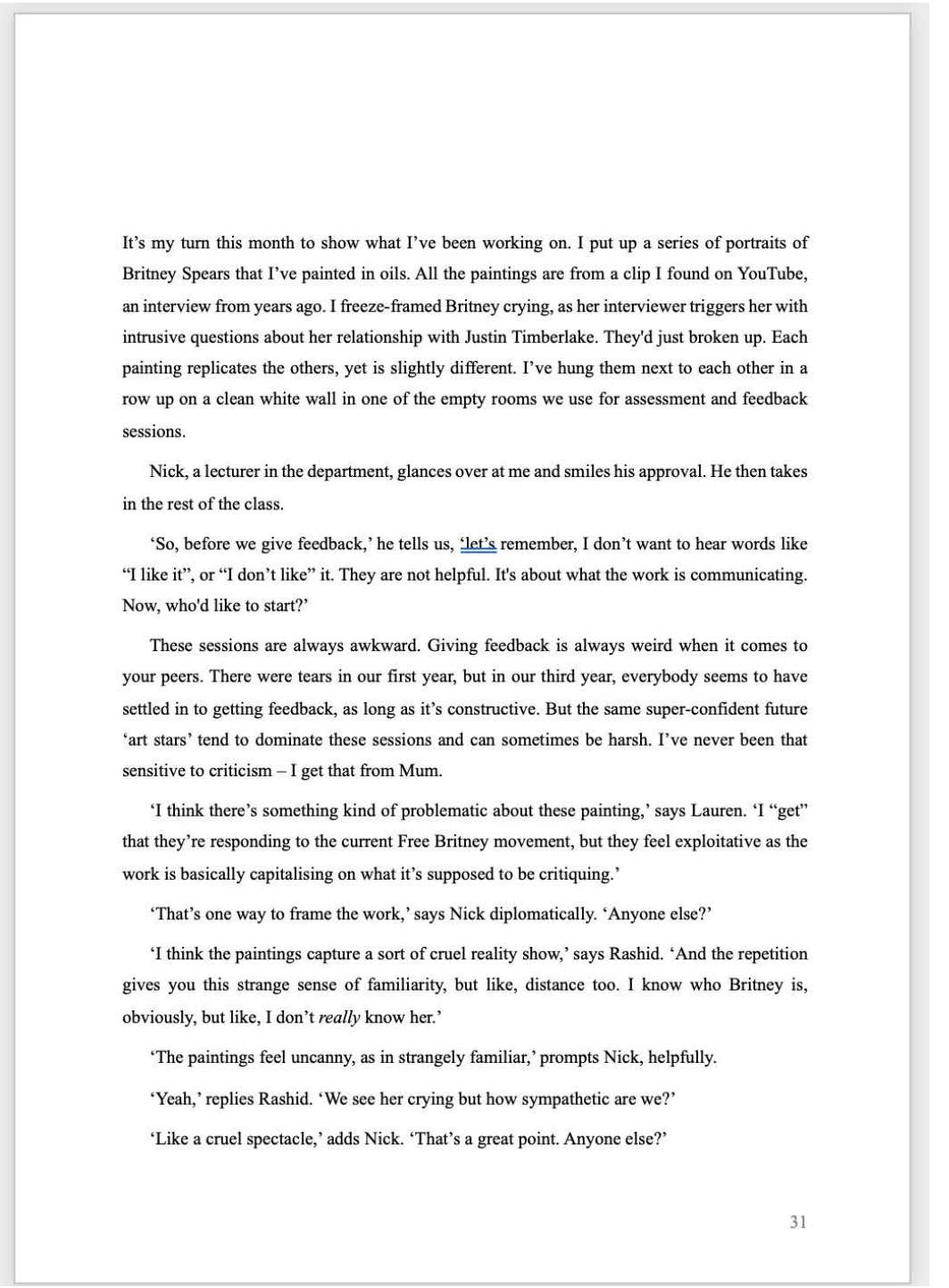


Figure 1. Mackenzie M, (2022), It' s Going To Be Okay. It Will., p. 33.



It's my turn this month to show what I've been working on. I put up a series of portraits of Britney Spears that I've painted in oils. All the paintings are from a clip I found on YouTube, an interview from years ago. I freeze-framed Britney crying, as her interviewer triggers her with intrusive questions about her relationship with Justin Timberlake. They'd just broken up. Each painting replicates the others, yet is slightly different. I've hung them next to each other in a row up on a clean white wall in one of the empty rooms we use for assessment and feedback sessions.

Nick, a lecturer in the department, glances over at me and smiles his approval. He then takes in the rest of the class.

'So, before we give feedback,' he tells us, 'let's remember, I don't want to hear words like "I like it", or "I don't like" it. They are not helpful. It's about what the work is communicating. Now, who'd like to start?'

These sessions are always awkward. Giving feedback is always weird when it comes to your peers. There were tears in our first year, but in our third year, everybody seems to have settled in to getting feedback, as long as it's constructive. But the same super-confident future 'art stars' tend to dominate these sessions and can sometimes be harsh. I've never been that sensitive to criticism – I get that from Mum.

'I think there's something kind of problematic about these painting,' says Lauren. 'I "get" that they're responding to the current Free Britney movement, but they feel exploitative as the work is basically capitalising on what it's supposed to be critiquing.'

'That's one way to frame the work,' says Nick diplomatically. 'Anyone else?'

'I think the paintings capture a sort of cruel reality show,' says Rashid. 'And the repetition gives you this strange sense of familiarity, but like, distance too. I know who Britney is, obviously, but like, I don't *really* know her.'

'The paintings feel uncanny, as in strangely familiar,' prompts Nick, helpfully.

'Yeah,' replies Rashid. 'We see her crying but how sympathetic are we?'

'Like a cruel spectacle,' adds Nick. 'That's a great point. Anyone else?'

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Figure 2. Mackenzie M, (2022), It' s Going To Be Okay. It Will., p. 31.

I term the social media content that I appropriated from real people from the Internet ‘online artefacts’ (Mackenzie, 2022). While superficially appearing random, the online artefacts have been chosen and curated, and are carefully woven into the fabric of the narrative. The use of online artefacts forms a collaboration with the online collective – the 'hive mind' (Schwartz, 2021). The notion of online artefacts draws inspiration from Marcel Duchamp’s concept of ‘readymades’ (Tate, 2021), which refers to re-contextualising/re-appropriating everyday objects into an artistic context, thereby making them artistic creations.

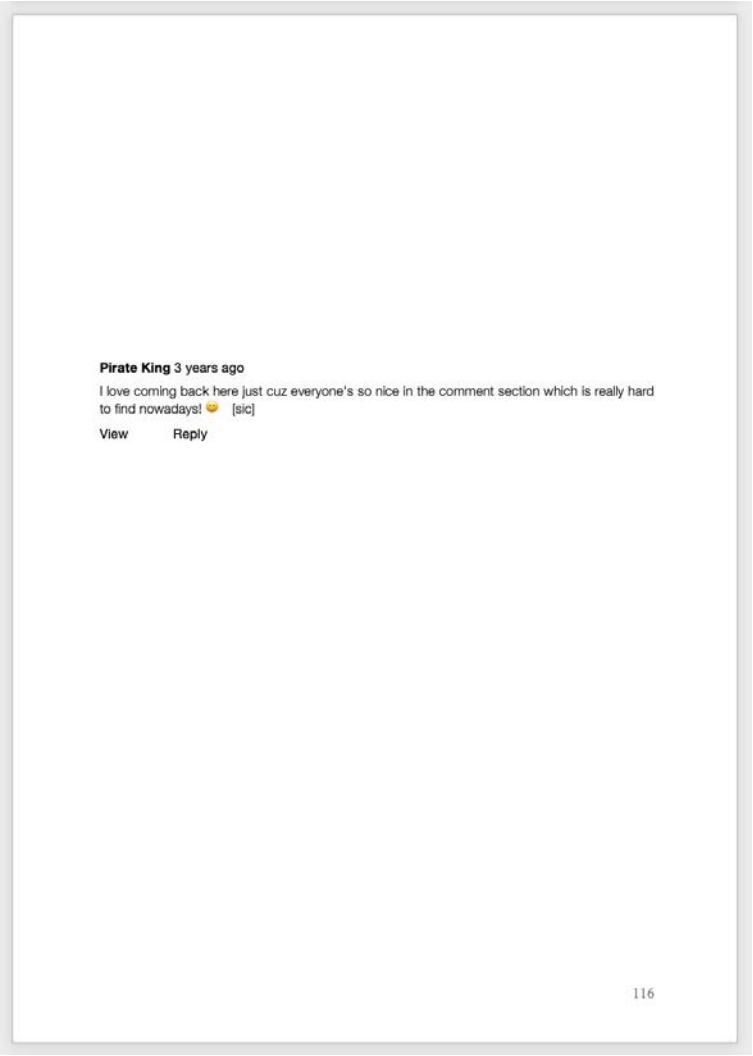

Figure 3. Mackenzie M, (2022), It’s Going To Be Okay. It Will., p. 116.

Reinforcing this sense of discontinuity and flattened out fragmentation within the narrative structure of the novel creates the experience that time is itself fragmented and disjointed. This is explored in a number of ways. The social media content within the novel is deliberately non-linear, as the time and dates shown are sometimes up to the minute, while others were posted years earlier. Narrated in six parts, the overall narrative structure of the novel is also non-liner, as the timeframes between the stories of Rose, Luca and Mark are not aligned. Rose’s narrative begins with her father’s death. Mark’s (Rose’s father) narrative begins on the night of his death. And the beginning of Rose’s narrative is briefly acknowledged near the end of Luca’s story, which encompasses a year. Either virtually or physically, the three main protagonists’ narratives are loosely entwined, mirroring the ways people are interconnected within todays hyperconnected globalised world.

THE LITERARY TONE OF THE NOVEL

When communicating on the Internet, particularly through social media, 'obscurity and ambiguity are licensed, relevance is a matter of choice, and truthfulness is at times unnecessary' (Deumert, 2014: p. 27). The theoretical framework for the tone of It's Going To Be Okay. It Will. uses Mikhail Bakhtin’s (1965/1984) notions of ‘carnival’ and ‘grotesque realism’, the latter term being the literary mode of the former, as an analytical category in the study of online popular culture. Bakhtin states that

Carnival is life itself, but shaped according to a pattern of play... Carnival is not a spectacle seen by people;

they live in it, and everyone participates because the very idea embraces all people... During carnival time life is subject only to its laws, that is, the laws of its own freedom... carnival is the people’s second life, organized on the basis of laughter, the entire world is seen in its droll aspect (pp. 7-11).

In relation to the notion of 'grotesque realism', Bakhtin contends that it is the 'language of the marketplace', which includes 'profanities, abuse and indecent expressions' (Allan & Burridge 2006, pp. 145ff). This form of language overtly challenges the prevailing norms of society where such topics tend to be taboo and improper. The Internet as it has become a social space that has embraced Bakhtin’s concepts of ‘carnival’ and ‘grotesque realism’, and this is reflected in the novel.

In It's Going To Be Okay. It Wil., Internet humour is utilised to capture the experience of what it feels like to be on the Internet, typically fragmentary, the darkly humorous elements of the novel generally take the form of social media posts created by the characters within the novel as well as the online content they consume. Posting online content on the Internet is performative in itself, as social media is a performative space with an inbuilt audience of friends, followers and subscibers. Many people who embrace the carnivalesque tonal space of social media use their social media profiles like a stage, riffing for their audience, trying to get laughs, cheers, or boos. The characters exemplify this notion. Online content produce on social media is not just about communication, it’s how many people think and exist in the world.

The tone in It's Going To Be Okay. It Will. is both comical and tragic, so as to capture both the humour of the Internet while also exploring it as a space where people self-disclose feelings and thoughts, they are unable to do so in the physical world. By inserting social media content as a narrative structural device, the novel aims to reflect a 'stream-of-consciousness that is not entirely singular. I wanted the novel to give expression to the collective consciousness of the Internet, also referred to as the ‘collective hive mind’.

Author and literary critic Lauren Oyler (2020a) expresses a consistent consternation with the 'moral obviousness of most contemporary fiction' (n.p.) and argues that anxieties about 'being a good person pervade contemporary novels and criticism' (Oyler, 2020b: n.p.). According to Oyler, the consequences of this literary cultural earnestness is that many novels now feature writers who are wildly self-conscious about both the thing they spend all their time doing and what that says about the essence of their souls.

It's Going To Be Okay. It Will. is purposefully morally ambiguous to push back on Oyler’s concerns about contemporary literature. Rose, Luca and Mark all have traumatic histories yet also harm others, consciously or unconsciously. All three characters are therefore victims and perpetrators of some sort. Literary critic Larrissa Pham (2020) writes that the lesson we have begun to learn amid this ongoing dialogue about power and privilege is that we are all, at some point, both being exploited and exploiting others.

THE THREE MAIN CHARACTERS WITHIN THE NOVEL

Luca is a thirty-three-year-old man-boy who lives with his grandmother and is enraged with society as a whole. He is a nihilist and has very little physical social interactions with others. His inability to find a sexual partner defines his identity and the community he feels a sense of belonging with. Luca’s worldview is embedded within the ideology of the Incel (involuntary celibate) community, a digital tribe who embrace extreme nihilism and transgression while priding themselves on ‘giving up on life’.

In Luca’s sections in the novel, his character exemplifies how some online users are receptive to the projection and acting-out of unconscious fantasy (Curtis, 2007). When inhabiting the Internet, for some, traits of freedom in a sense that the normal consequences of play and experimentation in social interactions within the physical world are eradicated: one can leave the interaction at any time and need never come into contact with the other persons involved again if one does not want to (Roesler, 2008).

In Luca’s case, his virtual world has become a psychotic enclave that has become more compelling than the physical world he inhabits. Luca’s pursuit of such unlimited freedom when online becomes compelling and all-consuming, but this comes at a price, as the consequence of his virtual immersion causes the loss of actual physical experiences and relationships that provide a kind of psychic anchor to the ‘real’ world. Luca’s preference for his virtual life is an example in which the Internet has become a refuge away from the demands of embodiment. Luca uses the Internet to bypass the physical and psychological demands of ‘real’ life, preferring instead to live in a simulation, as the simulated world of the Internet has become more compelling than the physical world. He is an unreliable narrator who embodies the Incel cultural phenomenon and expresses the hopelessness of late-stage capitalism.

Rose’s story begins at her father Mark’s funeral, and alludes to her complicated relationship with him. While her social life is also heavily entrenched within virtuality, unlike Luca, she embraces her reality. Rose is socially and sexually active, politically progressive, and is an active user on social media. Her social media accounts are all under her own name, therefore she uses social media to author, form and perform her identity.

The progressive cultural/political/social views of Rose are on display throughout the online content she produces and consumes. This aspect of her personality is a purposeful authorial choice that contrasts Luca’s cultural/political/social leanings which generally despise everything that Rose represents. This forces the reader to engage outside of a singular cultural/political/social point-of-view within the reading experience through the use of a multi-protagonist narrative structure. Rose, Luca and Mark all understand and locate themselves in very different ways. Their worldviews are in some instances ironically similar, but in much of the novel are worlds apart.

Like Luca, Rose has a traumatic history, mostly due to her relationship with her father Mark, a comedian with a life-long drug addiction. Although Luca and Rose have divergent worldviews and experiences of the world, they share a cynicism for the ruling class and the structures of power, and both feel a hopelessness in relation to the future, a state of mind that expresses a generation that has come of age during late-stage capitalism, or what Mark Fisher (2009) refers to as ‘capital realism’ – a theoretical term that articulates the notion that capitalism is the only viable political and economic system, and the impossibility of even imagining a coherent alternative to it.

Mark, Rose's father, is a flawed but talented ageing comedian who is having a creative existential crisis and is unable to find his place todays Internet age. His narrative arc differs to those of Rose and Luca as it is contained within a tightly defined time period, a single night, and is predominately written in first-person perspective. In his stand-up comedy show, Mark unpacks his fears, anger, revulsion and confusion at the hyper-connected, globalised reality he now lives in.

His story arc is predominately a narration of his stand-up comedy routine. With mixed results, Mark’s humour pushes the boundary of what is socially acceptable in contemporary culture. The aesthetic of Mark’s comedy is carnivalesque in nature as his humour engages in grotesque realism. His stand-up routine exemplifies the current artistic existential crisis that some older comedians are having in response to the generational cultural shift that has occurred due to today’s culture wars. The emotional heart of Mark’s story is his existential crisis in relation to his identity as a comedian and his inability to change his behaviour to become the father he would like to be for Rose.

The last sentence of the novel deliberately ends on the title of the novel itself: ‘It’s going to be okay. It will.’, which becomes an irony as the reader knows Mark dies. The ending therefore proposes a wider question relating to our current era. With the climate crisis, the covid pandemic, the culture wars, widening inequality through race, class, sexuality and gender, impending military conflicts, political and corporate

corruption, neoliberalism and the commodification of daily life, amongst the many other issues we face as a global community, It’s Going To Be Okay. It Will. proposes that if we are unable to change the way we live things most definitely won’t be okay.

CONCLUSION

As a technology, the Internet is still in its infancy, and the effects of it on human experience remain in flux, which means that novels that examine what human experience is in the Internet must register these changes through ongoing experimentation with form. My contribution to the emerging genre of Internet literature is but one example of how literary fiction can continue to contemplate and create meaning by representing how we relate to ourselves, and each other, in the real and virtual worlds that we now inhabit. While the ways in which narratives are written will always evolve and change, the need for narratives to contemplate our existence will not.

Accepting the premise of narrative theory that human beings are ‘homo-narrans’ (Fisher, 1984), which argues that narrativising is something all human beings do as a way to make sense of our experience of existence, the ambition of It's Going To Be Okay. It Will. is to utilise the language and narrative structures of the social media to explore the Internet age in relation to identity and belonging, and how one understands and locates oneself in the virtual-real world. We have all found ourselves inhabiting.

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Healing as a mode of reconstruction: The use of virtual reality to engage stakeholders.

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Abstract

The reconstruction of a neighbourhood or city after a natural disaster or conflict is not an easy topic. These times are often painful for the people involved and, when it happens, there are always plenty of issues to consider. We look at this problem through the lens of architecture as healing. Architecture is a slow process which requires planning, negotiation, builders, materials, and permissions. In this paper, we argue that virtual reality can be used as a means of planning and discussing preferable spaces for this type of situation. It can be used as a democratic tool to envisage solutions common to city planners, designers, and dwellers, and as a window to the future. In order to do this, we look at existing reconstruction solutions and create a space to help with healing in the aftermath of disaster. Using speculation as a method, we look at a 'shelter' as a place to maintain the community and reconnect neighbourhoods; a space to recomfort the dwellers through basic services and green spaces.

Author keywords

Architecture; virtual reality; reconstruction; healing

Introduction

Much care is put into the construction of any house and, once a person or family has moved in, it becomes their duty to care for it. When a catastrophe occurs, whether natural or human, there is little that can be done to protect the people. In this paper, we look at those architects who have foreseen these issues and join them in thinking of the role of architecture in terms of healing. Usually, architects undertake reconstruction by studying the past (Bullock, 2002) or interviewing the survivors of conflicts, as ways to empirically study the destruction of buildings (Azzouz, 2019). In our research we use case studies and movies. The former allows us to understand what is currently possible in terms of materials, and the latter helps us focus on specific issues. Movies have been used to problematize the post-occupancy of new constructions (Penz, 2018), which is little studied in architecture. Anyone who has never experienced a disaster, cannot be expected to foresee the solutions taken by the people in that situation. Movies are not perfect, as they depend on the director or writer's ability to properly research, but they can give us situated issues that we are able to use for discourse.

The first part of our research is pragmatic, as we look at the issue as a human experience combined with an architectural one. Michael Benedikt (2020), for example, reminds us that space and architecture have more than a I-IT relation, or instrumental relation. Following the work of the philosopher Martin Buber, he introduces an I-THOU relation, in which the construction is not only aesthetic but also enhances the human relation and, in our case, the healing of its inhabitants.

In the second part, we look at virtual reality as a means of creating a speculative-pragmatic experience. This unique perspective is suggested by the work of Isabelle Stengers, from whom we learn that the study of the future needs to be applied with the consequences in mind: 'What might their aim be? What are their effects?' (Debaise & Stengers, 2016). We attempt to solve an issue of the future with the intention of finding a preferable solution, and as a way of letting planners and dwellers collaborate and discuss these solutions. Design is, in a sense, always about planning the future, but the necessity of care needs to overcome the instrumentalization of design. Virtual reality can immerse us in a space and, while it is not the final space, it is nearly as strong as the real space. It is an opportunity to get into the environment and open the conversation.

Background

Rather than using a real site, we create a model site, which is a composite of multiple sites. It is a mixed space composed of low and high-rise buildings, offices and factories, social housing, and a commercial district (Figure 1). We choose this space for its ability to create discourse on the theme of reconstruction.

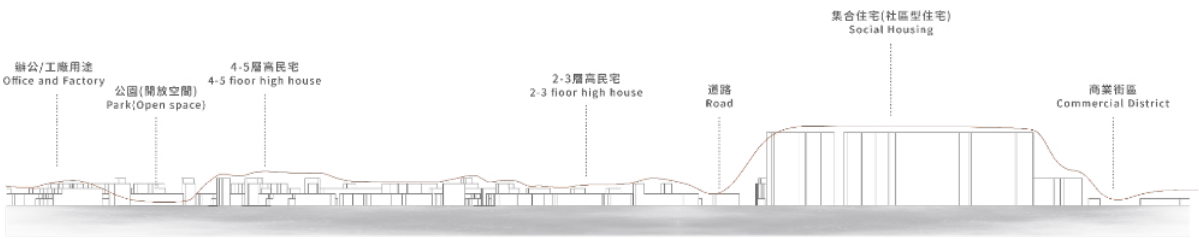

Figure 1. Mixed space composed of low and high-rise buildings, offices and factories, social housing, and a commercial district

We look at movies and documentaries about the destruction of cities during the various wars of the 20th Century. The first which made an impact on us is Twenty-four-hour love affair [Hiroshima, Mon Amour] (1959), which is set not long after the dropping of the bomb, and features a conversation between a French actress and Japanese architect. In the beginning, he repeats: 'You have seen nothing in Hiroshima, nothing' (Resnais & Duras, 1959), while she replies that she did see the hospital and the museum. But he is insistent. He tells her that she saw nothing. To us, as the audience, this is a reminder that we have not seen the war and, no matter how many museums, books, or films we look at, we cannot have experienced its reality. This is a position of humility that we accept. Like all wars or crises, but particularly this one, it is a good reminder that for those not personally affected it is impossible to comprehend the suffering. The character of the architect is willing to share his experience of the events, and shows his ability to think about the time after the war in terms of reconstructing and healing the city rather than mourning. We are not sure whether this is a professional deformation, but it becomes a necessity as time passes.

The other drama we look at is The Defeated (2020), a TV series about Berlin after the war which shows that reconstruction doesn't happen quickly. The heroes of the series are mostly women, which reminds us that the first post-war casualties are women. The men have disappeared or are prisoners, and the women need to find shelter from the invaders, often in places that are very dangerous, such as the heroine's flat which looks normal in one room but has a hole in the other (Figure 3). Structurally speaking, it is not safe but the memories it carries help her get on with life, whatever state it is in.



Figure 2. The Defeated (2020): The heroine's lives in an apartment with a hole instead of a window.

Case Studies

The reconstruction of cities is not a very popular field. We are interested in the work of two architectural studios. The first is Reparametrize Studio, the main ethos of which is that reconstruction is not always a case of re-developing but re-coding and re-generation. The studio's founder, Ziwar Al Nouri, says he want to 'use this disaster as a positive opportunity to bring better life for the future citizens' (Harrouk, 2023). The use of high-tech methods, such as 3D scanning, help them develop streets holistically, rather than dealing with one building at a time. The focus on sustainability in this sort of case is very welcome, even if the temporary living arrangements remain. We wish there were a stronger relation with the past, in one way or another, so people would not feel completely detached from their roots. That said, the use of a platform to see the city from above, the use of shadows to keep the street cool, and the mix between the old and the new are interesting ideas.



Figure 3. The SpeedStac in use in Ukraine (courtesy of WZMH Architects)

The architecture office WZMH, on the other hand, has developed a modular system to save partially destroyed structures; the 'SpeedStac'. In the situation depicted in The Defeated (2020), people find it difficult to leave their homes, even if they are structurally compromised. We appreciate the focus on materials that try to keep

both the building and the social fabric alive, even if reconstruction of the building is likely to be necessary in the future. This idea is much more pragmatic, ready to use, with a specific use case in the khrushchyovka, a typical concrete house found in Russia and Ukraine, where the load bearing is in the façade.

Fill in the gaps

One issue we see with the random destruction of an area, is the gaps it leaves between buildings which are partially or completely destroyed (Cano, 2022; Mårlind, 2020). Gaps are urban phenomena, where buildings are abandoned or destroyed, such as cracks in buildings after bomb attacks or holes in the ground after buildings collapse. These features often mean that it is time to leave the house but, as Anouk Sugar (2020) says: ‘Losing your house, leaving it behind, whether by force or by choice, is much more than just leaving behind a structure made of concrete’. A home, like that depicted in The Defeated (2020), is ‘infused with our daily actions, our thoughts, and our memories’ (Sugar, 2020). Thus, leaving a house is not living in a structure, even if there is danger attached to it.

Survive-rebuild-heal



Figure 4. A visual interpretation of the war (image by Liu Ling-Chun)

We use architecture to mend the gaps created by war. These gaps inevitably needed to be stitched together with some form of structural filler (WZMH) or bridges that reconfigure the city (Reparametrize Studio). While we think these two solutions would be beneficial, we focus on shelters. Used during war, they provide protection from the elements but, after the war, they serve as links for rebuilding the community while the cleaning and reconstruction take place. Once a space is safer, we propose transforming the shelter from a place of survival to a space of healing. The organization of the future city is restructured in the context of urban development.

Individual-settlement-collective

While gaps are visible on houses, they are also present in the social fabric of the city. We see the city in ecological terms. Any crisis is an event that puts pressure on a system which is not ready for that kind of change. The distance between the shelters should allow movement within the city, to help people regroup with their families and friends. The shelter is not only a space but a chain to reconnect the elements of society. In this approach, we reflect the work of Bruno Latour (2005), for whom an object is not an object on its own, but a material relation that helps maintain society. This perspective is important for architects, as it shows the necessity of building a network which allows the safe passage of people through the city. Cellular proliferation, by establishing interconnected dwellings and linking lives, eliminates the distance between individuals. When it is safe to come back, as suggested by Reparametrize Studio, houses connect to each other by platforms and roofs, and activities connect each space, bringing people closer together by increasing the interactions between them.

Architecture as healing space

In addition to renovating buildings, we must also deal with the uncertainties and fears in people's hearts about the post-war future. But, what kinds of places can truly bring people together? We create a prototype of a healing space by introducing nature as a spiritual element of urban space. Like a jungle, it can act as a barrier, creating camouflage on the surface and protecting the humans that reside within it. Additionally, it serves as a nurturing ground for the rebirth of both nature and human life. Reconstruction is ‘a chance for radical change’ (Bullock, 2002). Nature not only fills gaps, but also isolates people from the turmoil of reconstruction, simultaneously reconfiguring spaces. These spaces are reminiscent of voids in a forest, riversides or ponds which are treated as breathing spaces for animals and serve as healing sanctuaries for post-war residents.

According to Jennifer Beggs (2015), a researcher working on the use of architecture for healing, natural environments help ‘distance people from stressors or reduce sensory stimuli’. Greenery is used to bring a feeling of peace and healing for people, for those suffering from trauma, in addition to providing a comfortable living environment. The spread of greenery brings vitality to a damaged city, not as a patch but as a radical change redefining our relationship with nature for the future.

Design development

In this project, we redefine the shelter not as protection during a crisis but as a community-scale model which includes public spaces, shared kitchens, community activity areas, and a park, with the goal of healing a community. Existing roofs, walls, and structures are used as basic supports for new shelters, and become key points for rapid regeneration. Modular living units overlap, and each group has a platform extending to connect to the public space or another group. Walls separate spaces and roofs serve as parts of a standable platform. Sky bridges (Reparametrize Studio) play the role of connection, eliminating the distance between the private and the public. We set bridges to connect to parks, where healing spaces are, so that people can walk into the artificial forest by the sidewalk, just like a lush pathway. Treehouses are intertwined among the trees, and people can move among them. They serve as places to provide life and sustenance, while also being spaces for spiritual reflection, communication, and play.

During the design development phase, we explore spatial relationships and how to reduce stress and anxiety among the population. Beggs (2015) points out that an ideal healing space requires natural light, soft colours, access to open space, and visual connections to plants and wildlife, so we use natural additives to create spaces. Healing does not just occur in a specific area, but extends to the whole community. We create permeability between buildings and spaces, aiming to bring about interaction between public and private domains. Nature is close to the residents’ life, so the concepts of rural living, food symbiosis, and self-sufficiency are integrated into the urban green spaces established by post-war community shelters.



Figure 7. Section of the shelter (image by Liu Ling-Chun)

Virtual Reality

From the moment we put a headset on, the immersive reality becomes the new reality. Virtuality can be an event of the past that we have idealized and made virtual (Shield, 2002) but also an image indiscernible from reality (Deleuze, 1994). Once we moved from the planning and making of a model into the experience of the space, we made some changes to stairs that were too long and other spaces that were difficult to reach. What looks good on a plan does not necessarily make sense once time is involved. Once the movement was smoother in the space, we added furniture and basic household items, then added interaction so doors could be opened, for example. While the representation we used was not photorealistic, we added some elements of nature which moved with the wind to give the viewer a feeling of the real world. After making sure the model corresponded to our design, we moved in into the shelter to test how the spaces connected. We take a feminist perspective on virtual reality as a technoscience. Lucy Suchman (2006), for example, approaches technology by focusing on the situatedness of a scene. It is not only the details of the interaction, the quality of the image or the general representation of the new reality, but the performativity of the model and the fact that it invites people to discuss and engage in debate about the priorities of post-war reconstruction. We discard the instrumentalization of the model, which would see options appear as the user explores the space. The conversation, as we conceive it, would happen between sessions, and the designer is responsible of the interpretation of these conversations and the implementation of changes.



Figure 7. The shelter space in Unity (image by Liu Ling-Chun)

Conclusion

The reconstruction of the city is a serious topic with humane, economical, and long-term effects. Our attempt to immerse ourselves by looking at films allowed us to get a sense of the situations people face. It raised some specific issues and presented situations as starting points (the hole instead of a window, for example). We are aware, however, that we are not looking at the whole picture. With the war in Ukraine and current world instability, we engage in this crucial debate with much caution. We are not dealing with the same level of destruction as London (1940-1945), Hiroshima (1945), or Berlin (1945), which caused so much homelessness in these cities. Through our case studies, we look for ways to amend existing building, such as in Aleppo (2016) where reconstruction was first aid repair. However, healing forces us to reflect on the future of cities and their

inhabitants in terms of habitability and the relation with nature. Our project is to combine structural and social damage, using a shelter, to maintain the structure of houses while maintaining the social fabric of the city, by allowing people to gather and have a place to slowly regenerate basic services.

Acknowledgments

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A Drone of Wellbeing – Farnham Meadows

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Abstract

Can drone as camera platform serve social wellbeing? The drone is associated with panoptic vision in the service of power; yet can this camera platform serve social and cultural heritage interests? By aligning drone vision within the birds-eye view and longer histories of ariel spectatorship (Ellis 2021), the short film Farnham Meadows (2022) explores landscapes with cartographic artefacts, revealing histories of social relationships in space. Embedding the lens of Lefebvre' s The Production of Space (1991) within a cultural artefact, allows for ludic and wellbeing potentials of drone visualisation to be realising in exploring place and landscapes.

keywords

Drone, aerial imagery, visualisation, representation, wellbeing, landscape, history, Lefebvre



Figure 1. Drone birds-eye view Framegrabs, Farnham Meadows (2023)

Introduction

This is a description of short film project, Farnham Meadows (2023) featuring a pacific use of the drone as camera platform. It will introduce the 'birds-eye' view as a means of situating the project content – the mapping of former arrangements of farming in this small town onto a contemporary drone visualisation of this landscape. A backdrop to this discussion is the pervasive association of the drone as a military platform in contemporary visual studies; by foregrounding spectatorship, this paper proposes an alternative, social justice and wellbeing frame for drone visualisation.

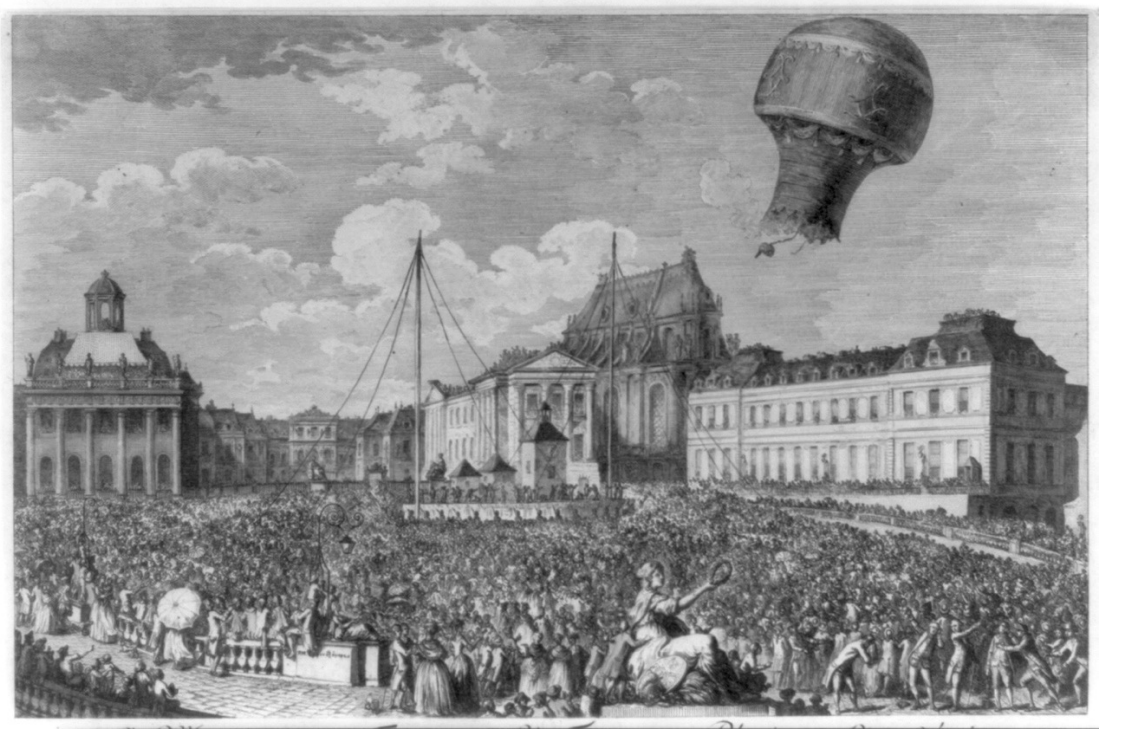

Figure 2. Print shows the balloon of Etienne Montgolfier decorated with King Louis XVI's monogram above the Palace of Versailles carry the first passengers in a balloon flight:
a rooster, a sheep and a duck. 1783 Library of Congress Control Number 2002721989

The drone as camera platform is synonymous with the 'birds-eye' view or perspective. This vision – an 'aeroscopic' perspective – was first realised with the advent of balloon flight in 1783. (Ellis 2023) Early balloon flights were huge public events. The crowds watching the ascent of balloons were as drawn to the novelty of human flight as the balloon passengers were. The balloonists Henry Mayhew and John Binny describe the experience in 1852 -

The earth, as the aeronautic vessel glided over it, seemed positively to consist of a continuous series of scenes which were being drawn along underneath us, as if it were some diorama laid flat upon the ground, and almost gave one the notion that the world was an endless landscape stretched up on rollers, which some invisible sprites below were busy revolving for our especial amusement.

(quoted in Jennings 1985 pp274)

This fascination with ariel spectatorship in Europe lasted until the 1914-18 conflict. Ellis in Aeroscopics offers five now forgotten principles of the aerial view -

1. The Aerial View Is Opaque - the aerial view is opaque like a cinema screen, not transparent like a window. This opacity exists not only at the level of defamiliarization—in which a known landscape becomes unknown through

its shift in perspective, it is also contingent, subject to weather conditions as clouds and environmental effects can alter the view.

2. The Aerial View is Plastic - the aerial view can be mobilised for martial or pacific purposes··· Corbusier noted of the aerial view - 'the bird can be dove or hawk.' (Le Corbusier 1935 pp8)

3. The Aerial View is Slow – a consequence of the relative proximity of the birds-eye to the ground is the landscape unfolds in a e-motive manner, typically remarked on by early balloonists as - "hanging in mid-air, (they) wondered to see how . . . the long, rapid, flying train appeared but a black caterpillar slowly creeping over the surface of the ground."

4. The Aerial View Is Intoxicating – this way of seeing is a ludic – joyful - form of observation from above; manifested in the fairground attraction of the ferris wheel for example. The affectual quality of birds-eye vision is rooted in the manipulation of scale – a combination of memory, the live apprehension of landscapes in miniature and their unfolding in space and time.

5. The Aerial View Is Parallax - aerial visuality was historically not orientated as a vertical view. It does not simulate orthographic projection, constitutive of cartography, rather human observation. The angle is a marker of agential vision and the notion of a journey.

(Ellis 2023 with further annotations)

Albeit historically informed, these pleasurable aspects of birds-eye visuality remain viable. In relation to the Farnham Meadows project, a significant number of the audience for the work - local children – are given a new visual apprehension of the neighbourhoods they are familiar with from the ground.

The birds-eye visual form is dominant in the duration of Farnham Meadows. The 13 min film is composed of 5 drone shots of between 2 and 3 minutes each. Ground-based pilots of small drones must keep them in visual sight. This limitation determined the segmentation of the drone flight into discrete shots, chosen as a compromise between the cartographic resources, the town, and a spatial and visual faithfulness to the meadows on the banks of the river. Short inserts, in one instance featuring a surveyor measuring a field, separate the birds-eye landscape shots. The trajectory of the drone follows the river, and thus the visual unfolding of the film is programmed by a topographical feature. This approach to visualisation prioritises the material inputs of water and nutrients to the meadows that line the river. If cultivated, the meadows yield an early and a late summer harvest of hay, lolium perenne; food for horses and animals on small holdings. For the settlement of Farnham, the river supplies water for the inhabitants, and in the past its movement powered the milling of wheat for baking bread.

A fortuitous donation of maps to Farnham Museum in early 2022 kick started this project. Dated 1796 and 1811, these estate plans outline the ownership in common of the meadows, scaled to two dimensional measures of perches and roods, imperial divisions of an acre. Each meadow is sliced into strips, owned by the named person listed on the estate plans. The area of land contained within each strip is specified on the plan in perches and

roods. Strip owners generally outsourced the cultivation of their land to tenant farm labourers. These estate plans visualise and tabulate an ancient social organisation of food production.



Figure 3. North Mead, Farnham Surrey, Estate Plan 1811, Farnham Museum

Not registered by the drone camera, the landscape is overlaid with demarcations of spatial allowances and prohibitions, enforced by property ownership rights. Space, as Henri Lefebvre argued, is both socially produced and productive of social relations. (Lefebvre 1991) Lefebvre assigned maps the term representations of space, a quantitative registration of environments and an outcome of social relationships of power and domination. Drawing together these perspectives, the Farnham estate plans are chimerical images; their production was an initial step in quasi legal processes that culminated in the sundering of the hitherto established social relationships of agriculture they visualise.



Figure 4. Map superimposition on drone visualisation, Farnham Meadows (2023)

This abolition of the strip system and tenant farming, known as the ‘enclosures’ after the bundling together of strips as unitary bounded fields, led to the consolidation of land ownership in the hands of richer landowners. Tenancies were abolished. This process of enclosure was deeply opposed by tenant farmers. Writing of the ‘enclosure’ of forest land in seventeenth-century Dorset, the historian Robson observes -

The tenants’ knowledge of the forest was not founded in empirical measurement or schematic oversight, but direct experience, collective use, and intergenerational memory. Perceptual disjunction between cartographic representations of the forest and the commoners’ use-based knowledge could thus be bridged only by an oral pledge of honesty.

(Robson 2017)

The map versus an oral tradition is a contest between two epistemologies, two forms of knowledge concerning the land. On the one hand, the application of systems of quantification and measurement of space as a discrete object of knowledge. On the other, the commoners used-based knowledge, as a production of enactments of intimacy with land as living material, refined by intergenerational oral repetition and memory. The guarantees of the representation of space lie in the replicability of its processes of measurement; that of used-based knowledge and memory by an assertion of fidelity.

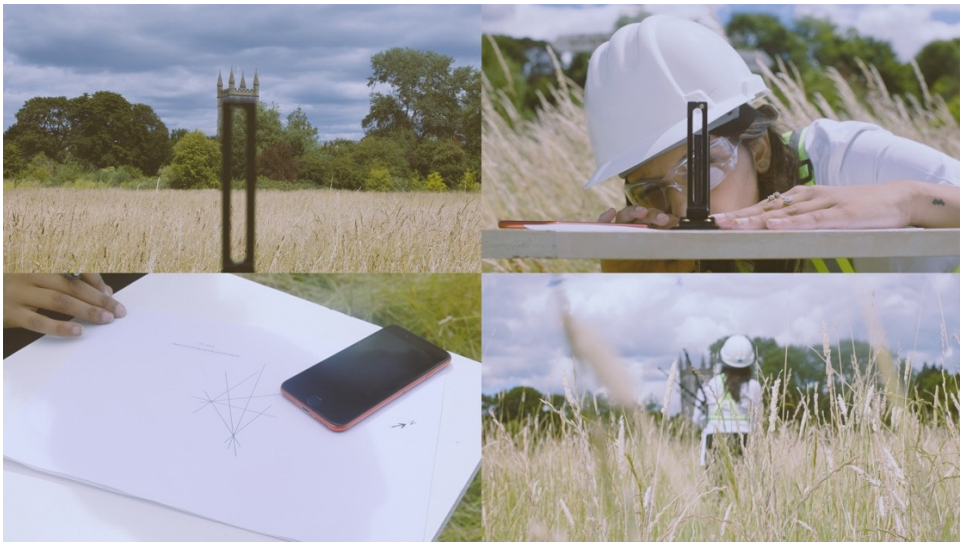

Figure 5. Re-enactment of land surveying, Framegrabs, Farnham Meadows (2023)

An insert between the drone material in Farnham Meadows enacts the measurement of land by triangulation. The vocal track features a conversation between a surveyor and an agricultural tenant, adapted from an early text, John Norden’ s Dialogue with a Surveyor (1618) which presents issues pertaining to land management as a discussion. (Netzloff 2010) As implied by the tenant farmer, the apprehension of “place” - a terrain of affects or emotional connections to features of the land, is by the process of the survey, transformed into a “space” – a system of abstract visual representation, or cartography. (cf. Kurgan 2013)

Bringing to visibility these arrangements for the stewardship of the meadows is to foreground social relations of affectivity and connection with the river and cultivation practices. By visualising previous landholding arrangements, the current dispensation of land parcelled as discrete privately owned properties is a contingent outcome of historical choices. Private property is one solution of many possible forms of allocation and distribution of land. This is not to will a return to former practices; it is merely a recognition these spatial assemblages of practices shape our surroundings. [1]

[1]I write this as an academic working in the PR China which has a very different approach to the social allocation of land resources, an outcome of different historical choices.
[2]This is interpreted as not compromising privacy within a property by visual surveillance. [REF]
[3]The Farnham Meadows drone was piloted by a professional operator conversant in the relevant legal framework.

Today, private property abuts some of the banks of the river Wey. In England the volume of airspace below 500 feet is considered as bundled with private surface property, thus subject to access restrictions; in practice, drone flying is permitted so long as “reasonable rights of property” are not infringed. [2] The Meadows drone enacts a transgression of private property in its trajectory and production of landscape views.[3] Given this spatial property transgression, the drone enacts an aerial trajectory as a ‘passeur’ - a French term, translated as ‘the one who makes someone, or something, overcome an obstacle; one who transports someone or something

somewhere.'[4] In the case of Farnham Meadows, the drone as passeur creates a fact of movement and access across this landscape.

[4]Collins dictionary translation: https://www.collinsdictionary.com/dictionary/french-english/passeur#:~:text=masculine%20noun%2Ffeminine%20noun,smuggler

This framing of the flight of the drone as a passeur is prefigured by the first deployment of drones as camera platforms during the siege of Sarajevo in the 1990s. As narrated by Choi-Fitzpatrick (2020) this early use of drones was to collect evidence of war crimes in the surrounding hills of the city. Aware that their crimes were flouting international law, those sieging the city operated at night to avoid satellite detection. Cloud cover also obscured observation by spy aircraft at high altitudes. As passeurs, prototype drones overcame these obstacles and collected visual evidence to support social justice claims after the conflict.

Building on this, Choi-Fitzpatrick maintains drones can perform useful service in progressive social movements. In his activist practice, Cho-Fitzpatrick has worked with groups visualising by drone the size and scale of civic demonstrations as evidence of public interest. Drones are 'an ideal platform for conducting citizen journalism and engaging in humanitarian interventions,' writes Choi-Fitzpatrick. Drones offer geospatial affordances, possibilities for actions of representation from the air for pacific purposes – in this case to confirm the popularity of a protest on a tax on internet use in Hungary.

Conclusion

Farnham Meadows is a short work deploying the affordances of the drone as a visualisation platform in a pacific manner. In addition to the conceptual layers of the project, it offers audiences an experience of the ludic, quiet joys of aerial spectatorship. As a work for a local museum, it was intended as a gift to the community as a contribution to general well-being through an invitation to think of alternative pasts, presents and futures.

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Virtual Reality Enhances Wellbeing in Leisure of Older Adults: A Scoping Review

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Abstract

Virtual reality (VR) technology can improve older adults' physical and mental health, enhance social interaction, stimulate cognition, exercise the body, and cultivate positive emotions. This study used the PRISMA-ScR checklist and the Arksey and O' Malley scoping review method and synthesized the results using a narrative method. The purpose of this study is to explore the research on using VR as a leisure activity tool to improve the wellbeing of older adults. Different VR interactions will enhance different wellbeing aspects. The main factors affecting the intervention results are VR immersion, the equipment's weight, and the specific VR content. VR content selection should focus on personal preferences rather than objective classification. Most studies measure wellbeing through subjective questionnaires and lack objective measurement. VR can be applied to leisure activities for older adults to improve their well-being, but further research is needed.

Author keywords

Leisure; older adults; scoping review; wellbeing; virtual reality.

Introduction

Wellbeing refers to objective descriptions and subjective assessments of physical, material, social, emotional, and personal development linked to personal values (Felce & Perry, 1995). A framework for defining wellbeing reports that the wellbeing of an individual includes physical, psychological, social, and spiritual (Knight & McNaught, 2011). Cognition significantly impacts older adults' personal development so cognition may be more critical than spirituality. The likelihood of encountering loneliness, loss of self-esteem, and difficulties in daily life increases as age increases (Ogrin et al., 2021; Fakoya et al., 2020). This situation is caused by a decline in wellbeing (physical, psychological, cognitive, and social). Moreover, within 8.5 years, 29.3% of older adults with the lowest wellbeing died, while only 9.3% with the highest died (Steptoe et al., 2015). Therefore, wellbeing improves older adults' abilities and reduces mortality. This outcome can reduce medical expenses and mortality rates. Technological advances have brought more opportunities to improve wellbeing.

Virtual Reality (VR) is a software or hardware application that allows users to explore and manipulate virtual environments with minimal latency (Hilty et al., 2020). VR can improve older adults' physical and mental health (García-Bravo, 2021), so it can increase wellbeing. VR can reduce obstacles due to declining physical

functions compared to traditional facilities. Past reviews in the VR field have focused on healthcare and rehabilitation (Zheng et al., 2020; de Amorim et al., 2018), sports training (Wang et al., 2020; Larsen et al., 2013), and entertainment (Cacciata et al., 2019; Li et al., 2018), mainly focusing on specific types of VR devices and technologies. Moreover, a mapping review summarized the research on improving the quality of life using VR from 2009 to 2020 (Baragash et al., 2022). This article indicates that VR is still in its early stages of development in terms of psychological and social welfare research (Baragash et al., 2022). In recent years, there has been an increase in research on virtual reality's impact on older adults' wellbeing. However, related advantages, disadvantages, and measurements have not yet been reviewed. In particular, the extent to which VR increases older adults' wellbeing as a leisure tool and its impact is unclear. Therefore, this review aims to explore using VR to improve wellbeing of older adults in leisure activities. The sub-questions of the study include: (1) What well-being intervention goals and outcome measurement methods were used in these virtual reality projects? (2) What are the benefits and drawbacks of using VR to improve the well-being of older adults in leisure activities?

Methods

This review follows Arksey and O' Malley. Results were synthesized using a narrative approach. A comprehensive search strategy was developed to address this review's four areas: VR, older adults, leisure, and wellbeing. The literature search was conducted from 1 January 2013 to 23 June 2023 using the following databases: Scopus, IEEE Xplore, Web of Science, EBSCOhost, and PubMed. The search terms for this study: ("virtual reality" OR "VR" OR "HMD" OR "360") AND ("old*" OR "senior" OR "elder") AND ("quality of life" OR "wellbeing" OR "physical" OR "social" OR "cognitive" OR "emotion") AND ("relax*" OR "leisure" OR "play" OR "hobbies") AND NOT ("children" OR "artificial intelligence" OR "internet of things"). The inclusion and exclusion criteria are as follows: Population (inclusion: 60+ years, exclusion: Age less than 60 years), intervention (inclusion: Focus on the use of VR, exclusion: AR or mixed reality), outcomes (inclusion: Related to the physical/psychological/cognitive/social wellbeing, exclusion: Not related to wellbeing or leisure activities), study design (inclusion: Observational, experimental, and qualitative studies, exclusion: Non-primary studies), Language (English language).

Two investigators independently screened the articles' titles, abstracts, and full texts. Data were extracted from the Author, country, study design, measurements, findings, VR content used, benefits and drawbacks. Summarize the data from the following results: studies characteristics, intervention, measurement of wellbeing, and benefits and drawbacks of VR in enhancing wellbeing. Describe this result in the context of the overall research purpose.

Results

The study selection identified 3688 studies, of which 15 were ultimately included. The PRISMA flowchart shows the process (Figure 1).

All included studies were published between 2014 and 2021, mainly in the past two to three years. The research areas are mainly concentrated in Asia (6) and Europe (5). sample ranged from 18 to 135, involving cognitive impairment, dementia, physical dysfunction, and healthy older adults. There are four randomized controlled trials (RCTs) (Kang et al., 2021; Maho et al., 2021; Oliveira et al., 2021; Gruber et al., 2022), four pilot studies (Appel et al., 2019; Afifi et al., 2021; Fiocco et al., 2021; Freed et al., 2021), two prospective intervention studies (Park et al., 2015; Lin et al., 2018), two experimental studies (Sato et al., 2014; Qu et al., 2022), one quasi-

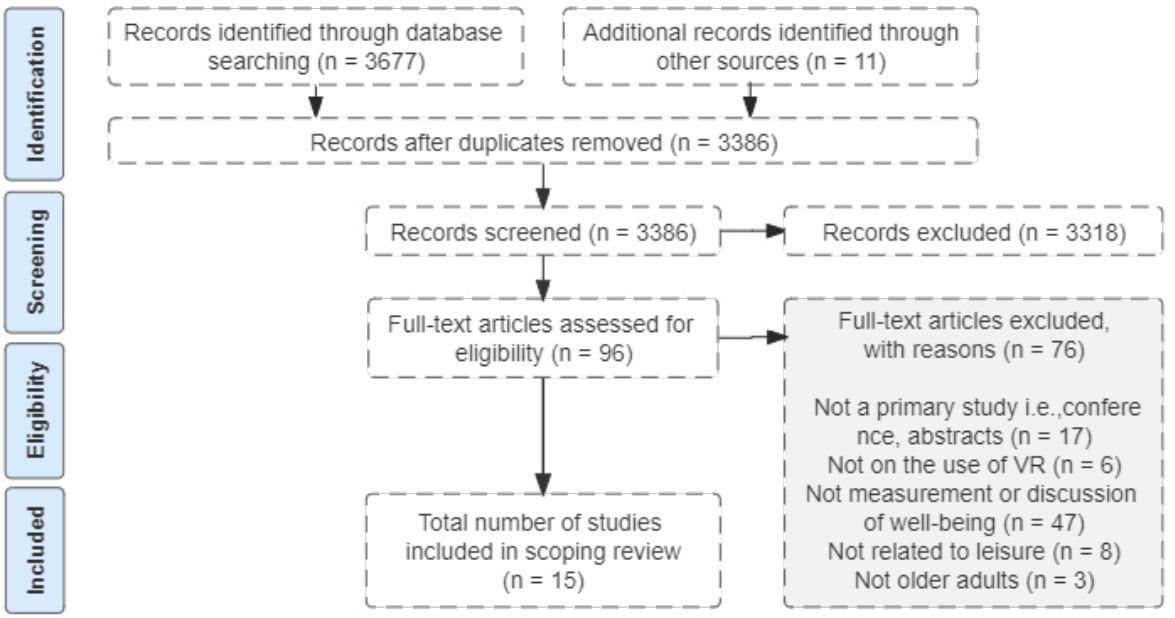

Figure 1. PRISMA flow diagram.

experimental study (Fan et al., 2022), one multisite nonrandomized controlled trial (Saredakis et al., 2021), and one evaluation study (Chau et al., 2021). The most common leisure activities in the studies were cultural (47%), followed by sports (27%) and practical (20%), with only one study on social activities (6%). These studies increase wellbeing in older adults, including psychological (53%), cognitive (33%), physical (27%), and social wellbeing (13%).

Intervention and Measurement of Wellbeing

Six studies used head-mounted displays and headphones (Lin et al., 2018; Appel et al., 2019; Afifi et al., 2021; Fiocco et al., 2021; Saredakis et al., 2021; Gruber et al., 2022), and two studies used computers for 360 ° non-immersive VR (Maho et al., 2021; Oliveira et al., 2021). Based on head-mounted displays, four studies added control devices (Park et al., 2015; Freed et al., 2021; Kang et al., 2021; Fan et al., 2022), and three studies added motion capture devices (Sato et al., 2014; Chau et al., 2021; Qu et al., 2022). The leading VR content was divided into games or physical training related to sports (62.5%) and cognitive training or courses related to cognition (50%).

Seven studies directly measured wellbeing (47%). Most studies use questionnaires, including the Quality of Life (QoL) (Fiocco et al., 2021; Kang et al., 2021), Subjective wellbeing (Appel et al., 2019), the Assessment of Happiness (Gruber et al., 2022), and Philadelphia Geriatric Center (Maho et al., 2021). The remaining two studies used interviews (Lin et al., 2018; Chau et al., 2021). Indirect measurement is divided into four directions: psychological (33%), cognitive (27%), physical (27%), and social (7%). Most use questionnaires, with only three studies measuring through observation coding or electronic devices (Park et al., 2015; Afifi et al., 2021; Qu et al., 2022). The Geriatric depression scale (Fan et al., 2022; Fiocco et al., 2021; Kang et al., 2021; Oliveira et al., 2021) is the most widely used psychological measurement questionnaire, and the Mini-Mental State Examination (Maho et al., 2021; Oliveira et al., 2021) is the most widely used cognitive measurement questionnaire.

Benefits and Drawbacks of VR in Enhancing Wellbeing

VR has promoted the improvement of the wellbeing of older adults (Afifi et al., 2021; Fiocco et al., 2021; Gruber et al., 2022; Kang et al., 2021; Maho et al., 2021). VR can improve social wellbeing: Older adults with cognitive impairments have the opportunity to interact with distant family members and maintain family ties (Afifi et al., 2021). Increase psychological well-being, such as reducing anxiety (Fiocco et al., 2021), depression, and loneliness (Lin et al., 2018; Freed et al., 2021; Fan et al., 2022). Improve physical well-being, such as enhancing leg muscle strength (Sato et al., 2014), upper limb flexibility (Chau et al., 2021), and dynamic and static balance ability (Park et al., 2015). Moreover, cognitive wellbeing is improved in healthy and dementia older adults (Chau et al., 2021; Kang et al., 2021; Oliveira et al., 2021; Qu et al., 2022).

Six studies (40%) report disadvantages. One study (Appel et al., 2019) mentioned that participants' negative emotions (loneliness and fatigue) increased because some older adults felt the VR device was too heavy to press on their noses when used. Another study (Chau et al., 2021) showed that older adults would feel physically tired or bored when using VR devices. Similarly, Saredakis et al. (2021) found that participants would feel nauseous, eye fatigued, and dizzy when using VR. Most seriously, one study (Sato et al., 2014) reported that one participant fell while standing on one leg due to insufficient risk management. In addition, three studies showed that participants' depression levels did not improve, and no positive effects were found (Fiocco et al., 2021; Oliveira et al., 2021), and the wellbeing of older adults did not change significantly (Chau et al., 2021).

Discussion

This review explores the effects of different VR tools used in leisure activities on the wellbeing of older adults and the measurement of wellbeing. The interaction types of VR interventions are divided into three categories. The first category, "non-interactive experience," uses displays to watch videos or photos. It can enhance older adults' psychosocial wellbeing, and is more effective than traditional photos (Maho et al., 2021). Repetitive content, low immersion, personal preferences, and heavy displays may affect the intervention effect (Appel et al., 2019; Fiocco et al., 2021; Gruber et al., 2022). Therefore, further exploration of the specific personal preferences and key factors affecting intervention effectiveness is necessary. The second category, "human-virtual environment interactive experience," requires controllers or motion capture devices. Mainly improve the physical and cognitive wellbeing. However, this intervention may cause fatigue or injury to older adults (Sato et al., 2014; Chau et al., 2021). Thus, when designing equipment, inclusive design concepts should be considered to meet the needs of older adults in order to balance risk better. The last category, "group-virtual environment interactive experience," has only one study (Afifi et al., 2021) that can improve social wellbeing. Therefore, more such studies should be carried out in the future.

Studies included are mainly subjective measures, lacking objective measures. Only one study used an electrode cap test wellbeing (Qu et al., 2022). Diener et al. (2018) reported that facial measurement, biographical text analysis, physiological measurement, and neuroimaging could also measure wellbeing. For cognitively impaired elderly, it is difficult to answer relevant questions accurately, so objective wellbeing measurement should be emphasized. Future studies can use objective measurements of wellbeing to obtain more accurate results.

Most of the 15 articles in this review were published in the past three years, so this field research is still lacking. Past research has yet to explore the long-term effects of VR on the wellbeing of older adults. The effectiveness of different VR types to increase wellbeing also needs to be researched. In addition, it is necessary to explore the

impact of personal preferences on VR content, which is more important than the objective classification (Gruber et al., 2022). The limitation of this review is that the included studies numbers are limited; specifically, some are pilot studies (27%), which leads to under-representation in research. So, this review cannot answer more complex or broader research questions.

Conclusion

VR can promote the well-being of older adults, and different interactions enhance the well-being of older adults in different aspects. Healthcare providers can use different VR interactions according to older adults' needs. Non-interactive experience can increase psychological wellbeing, and single-person interactive experience can enhance physics (balance and muscle strength) and cognitive wellbeing. Group interactive experiences can increase social wellbeing, promoting contact with family and reducing loneliness, depression, and anxiety. Designers need to improve equipment and VR content further because the existing VR content needs better risk balance and more group interactive VR content. In addition, future researchers should focus on the effectiveness of different VR interactions in improving wellbeing and use objective measures to evaluate. Finally, re-emphasize the importance of the support provided by healthcare management personnel and the potential opportunities in the elderly VR market.

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Research on the Safety of Urban Green Spaces Based on GIS Models

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Abstract

Urbanization has resulted into increased proportion of people living in urban areas and cities. However, the prospects of living in urban areas and cities means that one has reduced access to nature while at the same time exposing one to environmental hazards. These include air and noise pollution that the dwellers may face. In addition, most urban areas are feeling or facing the pressure of expanding populations, which would impact on the lives of the residents (Zlotnik, 2017). It has now emerged that green spaces have become a major talking point of attaining better quality of life in urban settings. They also assist in enhancing local resilience as well as promoting sustainable lifestyles. Moreover, these green spaces also promote the health and wellbeing of residents in urban areas (Douglas, Lennon and, Scott, 2017). Critically, the parks, playgrounds or vegetation in the public and private places are important in ensuring that people are well exposed to nature. It also helps in ensuring that people have enough opportunities to be exposed to nature. Besides that, urban biodiversity will be maintained and protected for the benefit of all citizens of a country.Therefore, the monitoring and planning of green spaces provide a reference direction for improving the health and well-being of urban residents, enhancing their love for the city, and staying there for a long time. However, most studies focus on the benefits of green space systems and their impact on people. This article aims to use GIS systems to improve the analysis of security risks in green space systems, thereby enhancing the planning scope and orientation of green space systems. The green space system can better enhance people's subjective well-being and reduce safety hazards.

Author keywords

The pressure of expanding populations; Green space; The health and well-being of residents in design; Safety monitoring;GIS

Aims and Contribution

An evaluation of the two studies indicates that the authors sought to emphasize the importance of green spaces in the urban areas. However, in so doing, they also made certain assumptions that includes the belief that all urban areas develop at a higher rate. They also asserted the fact that all these urban areas need green spaces for the residents to prosper or live better lives. These are based on the view that the planning of urban areas must always consider factors that support sustainability (Fields, 2009). Despite this, it has to be restated that the knowledge that they sought within their studies was to show that the planning of cities, towns and urban areas must consider the creation of green spaces for sustainability.

The approach that is adopted by Fields (2009) and Xue, Gou and Lau (2017) is significant in the sense that they use real world examples to show how it is possible to create green spaces in urban areas. These include the use of New Orleans, Hong Kong and Singapore which have undergone massive transformation and construction of buildings. They emphasize that even as the constructions occur, these cities have been successful in integrating

open green spaces that have improved the quality of life of the residents as well as the general outward look of the places (Xue, Gou and Lau, 2017). Essentially, the authors have demonstrated that the planning and designing of urban areas requires that the issues concerning sustainability are upheld at all times. It covers such aspects like the actual construction and organization of the infrastructure within the cities or urban spaces.

Underlying Assumptions

On evaluation, it is evident that the two scholarly articles by Fields (2009) and Xue, Gou and Lau (2017) assume that green urban spaces guarantee better lives to the residents of a city or urban space. In reality, the articles seek to find out the reasons for establishing urban green spaces with the aim of modifying the quality, quantity and accessibility of such places for residents in major urban areas and cities. They also agree that this can be achieved by creating new urban green spaces or modifying the features and functions of those that have already been established. Additionally, the authors argue that there is a broad spectrum of interventions that may be applied within the public and private places. This may be in the form of developing new residential neighborhoods while at the same time ensuring that the community has the necessary facilities. In other instances, there will be need to create viable infrastructure and transport facilities. Additionally, these authors agree that the benefits of green space urban are many. One of them includes the improvement of the quality of air and water in such an environment. Moreover, Fields (2009) supports the idea that the green urban spaces help in reducing the environmental health risks that people are likely to suffer in the cities or towns. Besides, the planning of these areas helps in the alleviation of stress to the benefit of the residents that are found in these areas. In essence, these urban green spaces and the interventions that are associated with them can help in ensuring that people live fruitful lives in urban areas or cities.

In this case, it can also be assumed that green urban spaces play an important role in ensuring that there are smart, safe and politically viable cities. In addition, they help in ensuring the sustainability of cities and urban areas. For example, the redevelopment of New Orleans after the Hurricane Katrina emphasized the significance of green spaces in creating resilient and compact communities (Fields, 2009). This means that the desire to build in safer places also helps in the mitigation of possible risks associated with living in urban areas. However, this also requires the proper framing, planning and implementation of plans that support the sustainability of such communities. Similarly, the use of sustainability planning principles also apply in ensuring that people can live well in the urban areas. This has obtained more credence in the arguments presented by Xue, Gou and Lau (2017) who also support the establishment of green spaces to revitalize the urban environments. All these observations confirm the need to ensure that all urban areas have plans that can ensure the sustainability of the communities and people that live within these urban areas.

The principle of GIS technology

GIS technology is a cross-discipline between earth science and information science. It combines geospatial data and computer technology through system establishment, operation, and model analysis, it produces resources, environment, regional planning as well as management and decision-making, disaster prevention, and control (Tao 2013). It can be used in environmental protection and other aspects of the application. It is a technical system that realizes the input, storage, management, inspection, processing and comprehensive analysis of geospatial data with the support of computer hardware and software equipment.

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Research Design

The research design for this research is the case study method which will seek to establish how urban areas can adopt green spaces for sustainability. The choice of a case study is informed by the fact that this research study will need to generate an in-depth and multi-faceted information about an issue within a real life situation. As a matter that is found within social science, the use of case study method in the study that is to be accomplished is meant to explore it in-depth and ensure that the results that will be obtained can be applied from a natural context (Crowe et al, 2011). Essentially, this is naturalistic method design would provide the results as would have been anticipated in the real context.

In explaining the issue of urban design and planning, the case study will be used to explain, describe and explore

occurrences and phenomena that happen in daily contexts. This will help in understanding and explaining the causal links that exist between urban designs aand planning and green spaces (Crowe et al, 2011). The case study method has also been selected with the aim of offering additional insights on the gaps that may exist or the strategy that is appropriate for the chosen topic. Additionally, the case study method is suitable for this research in that it focuses on the pertinent stages of research activity (Crowe et al, 2011). These include the definition of the case, selection, collection and analysis of data, interpretation as well as the reporting of these findings.The south-western part of United States has suffered frequent and server wildfires over the past decade. Among the south-western regions, California is under the first high risk of extreme wildfires. Wildfires cause large amount of property losses and loss of life. Therefore, it is important to have a clear understanding of the risks of wildfire in different regions throughout the state so as to make proper planning decisions at the very beginning of the development.

This set of data displays the risks of wildfire in the County of Los Angeles in California. The data is divided into various scores (-1,1,2,3,4) according to the risk level. Hence, the method used to visualise the data is symbolised by classification. Colours applied to the visualisation are graduate, from blue (which indicates little or no threat) to red (which indicated extreme threat). It can be clearly seen from the map; the ridge (Angeles National Forest) of the County of Los Angeles has the highest rate of wildfire coupled with the northern valley and the western coastal forest park (Topanga State Park).This visualisation intuitively shows the distribution of wildfire-prone land throughout the County of Los Angeles.

The result should call the planner’ s attention to take wildfire constraints into account in urban design and planning. In the contrast, the north-eastern area and southern area are safe from wildfires which are more suitable for green spaces in the urban areas development and construction without being highly restricted by wildfire requirements.

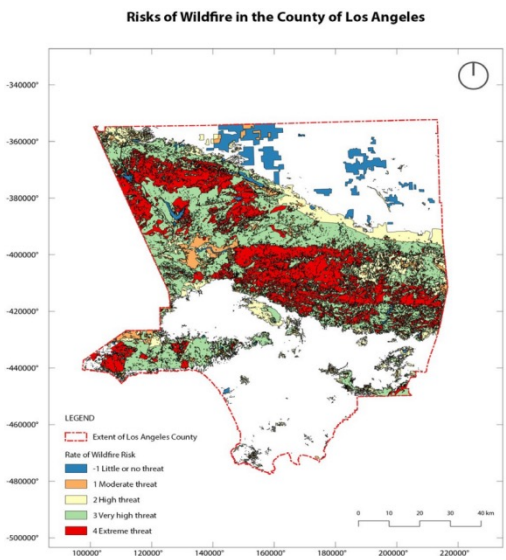

Figure 1. Mapping made by author.
Data source: http://frap.fire.ca.gov/data/frapgisdata-sw-fireperimeters_download

By understanding the risks of wildfire across the County of Los Angeles, it is also essential to identify where are the fire stations and firefighting services located in the county. This will undoubtedly help with accessing assistance from a fire rescue place promptly.

The location of fire services is located as per their geographical coordination. The two pieces of information are linked through dropping the fire services shapefile and the Los Angeles wildfire risks shapefile into QGIS. Cartographically, the latter is used to provide geographical boundaries through a single symbol in white colour with black outline. The former is shown by using the proper icon in the appropriate colour and size.

This visualisation articulates the distribution of fire services countywide. The location and density of fire services can be easily seen from the map.

Generally speaking, fire services in the County of Los Angeles are mostly located close to the built areas in which lives large population group. Some of the fire services are scattered in the land with high wildfire risk, the Topanga State Park. Apart from this, fire services are distributed along the foot of the mountain and southern valley in order to quickly respond to possible wildfires in their proximity.

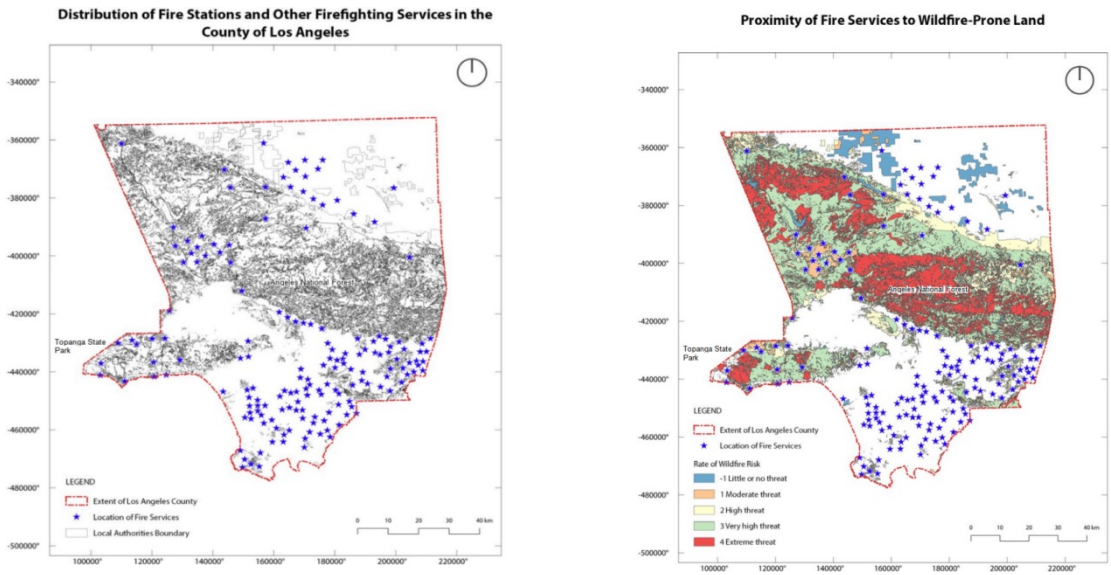

Figure 2. Mapping made by author.
Datasource: http://frap.fire.ca.gov/data/frapgisdata-sw-fireperimeters_download

An overlap of these two visualisations is significant by simply displaying the two layers at the same time. The superposition of these two sets of information can clearly show whether the distribution of fire services is reasonable and sufficient. This will facilitate the planning of fire facilities across the county.

From the map, we can see that where the wildfire risk is an extreme threat, the fire services are not directly located in the land but to its perimeter and surroundings. Where the wildfire risk is in moderate threat, fire services are densely scattered in the land. Besides, the majority of fire services are located in the built areas although they have little or no threat in wildfire risk.

All in all, this set of data already reflects the important information included. The limitation of this set of data is the lack of place name information that can be used to create labels. Apart from that, the extent of local authorities is omitted which can narrow down the wildfire information to individual districts or suburbs. The connection between the allocation of fire services and the fire hazard situation requires further verification of

data. This needs much more complex cross factors analysis rather than simply visualising the data.

Conclusion

The studies provide a firm foundation for the design and planning of urban areas or cities.Critically, the relevance of these studies is that they are applicable in today’ s planning and designing of urban areas.On the one hand, from a people-oriented perspective, this topic contributes to how to achieve the safety of urban planning and provide more love and well-being to residents. On the other hand, the use of gis technology to detect the safety of green spaces also make up for the deficiency of quantitative analysis data in the simple case study method, and make the overall research more adequate and complete. They offer appropriate lessons on how urban planners can perform their duties in the twenty first century. Fields (2009) has been successful in showing that even with the demanding requirements and needs of an evolving world, it is still possible to exercise the social and political goodwill to establish sustainable cities or urban areas. As long as there is goodwill and resources to create green spaces in the urban areas, communities stand to benefit from the advantages offered by the sustainable environments (Garcia, 2017). They offer appropriate lessons on how to create these all important green spaces or integrate them within the concrete buildings or structures which have become the norm in cities or urban areas (Xue, Gou and Lau, 2017). Essentially, the papers succeed in emphasizing the fact that it is possible to establish thriving cities that also guarantee the dwellers the better lives that they deserve in a fast-growing world.

The application of GIS technology in urban planning can effectively make up for the shortcomings of traditional urban planning and management, and reasonably combine the attribute information of related objects and analyse them to meet the planning requirements for spatial information and spatial visualisation (Tao 2013).The calculation of the development intensity of plots, building density, population density and other indicators has greatly improved the scientificity of urban planning and design. On the other hand, GIS technology can carry out classified storage and scientific management of massive data to ensure the accuracy and scientificity of the data, and then reflect it correctly for the reference of urban planning. The application of GIS technology in all aspects of urban planning can effectively improve the accuracy of urban planning, improve the efficiency of urban management, and provide decision-makers with a scientific and reasonable basis.

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Exploration of Color Design for Efficient Office Space

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Abstract

In a society with rapid development of information technology, people's pursuit of work efficiency is increasing day by day. The humanization and rationality of office space design are the prerequisites for achieving efficient office work. Currently, research on creating efficient office spaces through color design has not received sufficient attention, and people are prone to weakening or ignoring the impact of color on users. Utilizing the physiological effects of color on people, as well as designing the distribution of colors reasonably in office space, is beneficial for having a positive impact on office workers and achieving efficient work. This article summarizes the research results on the impact of color on the performance of office workers, as well as its psychological and physiological effects on the human body. A case study was conducted on the color matching principles of efficient office space color design, and design strategies were proposed for future research in order to provide reference for further research and application of color.

Author keywords

Environmental color; interior design; color psychology; color effect; efficient office space

Introduction

Office space is the third type of space outside of living and entertainment. As a service-oriented architectural space, the design should reflect humanistic value (Han & Mei, 2021). However, a considerable portion of traditional office environments lack consideration for human psychological and physiological needs, which goes against the disciplinary theories involved in good work environment design, especially neglecting the important factor of color environment design. An efficient office space can be defined as a fixed and efficient space environment with emotional communication and competition (Zhu, 2006).

Studies have shown that color has impacts on the physical and mental health of the users. The regulatory effect of color on indoor space, temperature, light, and other aspects can affect physiological reactions such as heart rate, human comfort, and visual fatigue. It can also have an impact on emotional stimulation or suppression, stability, or anxiety. The creation of a good office environment can satisfy employees from both physiological and psychological levels, give them a sense of belonging, and release their work pressure, making them love their work, thereby further improving the efficiency and productivity of the enterprise (Wang, 2022). Therefore, in the design of office spaces based on human text, analyzing the effects of color on the human body and

proposing scientific and effective color design strategies for office spaces plays an important role in creating an efficient office space.

The relationship between efficient office space and color design

The impact of color on job performance

The color design of the office environment is an important factor in creating efficient office spaces. Different color designs can create an environmental atmosphere and guide people to generate and express individual emotions in this environment. The communication of visual color information can be both negative and positive. The common indoor environmental colors, in addition to the basic five solid colors of red, orange, yellow, green, and blue, there are also four mixed colors: white, gray, beige, and purple (Kwallek, 1990). The color design of office space has an impact on the performance level of the office workers and is also a reflection of the impact of environmental color on the psychological and physiological aspects of the population.

Physiological effects of different color schemes

In the environmental color, the colors that can most alleviate people's visual fatigue are green, blue-green, yellow-green; The colors that are most likely to cause visual fatigue are blue and purple; Red and orange have a lower visual fatigue sensation than blue and purple, but there are also fatigue stimuli on the human visual system (Jiang, 2011).

Psychological effects of different color schemes

The psychological effects of different colors on people are diverse, mostly including positive and negative psychological effects. For example, the positive effect of red is reflected in its warmth, excitement, and easy stimulation of emotions; the negative effects are reflected in causing distraction and lack of concentration (Mehta & Zhu, 2009) (Table 1).

Table 1. Psychological effects of common colors (Source: Mehta & Zhu,2009)

Psychological effects	Red	Blue	Green	Yellow& orange	Pink
Positive effects	Warm, Exciting, Emotional	Cool, Calm, Comfortable, Relaxed	Comfortable, Calm, Relaxed, Relieve anxiety	Warm, Exhilarating, Soothing	Pacify emotion, Relax
Negative effects	Causing distraction, Poor concentration	Leading to depression	Cold, Loss of appetite	Depression, Pessimism	Repression

The impact of color matching on performance

Research found that overly complex color environments, prolonged working hours can cause dizziness, dizziness, and even anxiety, making it difficult to concentrate and efficiently complete work tasks; while with monotonous color designs, prolonged time can easily lead to distraction and even loss of work motivation (Table 2).

Table 2. Degree of discomfort in using office space colors (Source: Peng, 2016)

Your comfort level in the office space	Responses
When you enter the office space, you feel bored until you leave the office.	6
For a long time will feel dizzy and the heart inexplicable congestion irritability.	44
In general, you can maintain a good mental state.	34
The color of the office environment is very comfortable, which makes me work efficiently.	16

Compared to monotonous or colorless environments, a colorful work environment can help improve job performance (Ozt ü rk E, Yilmazer, & Ural, 2012). Peng has compiled four different types of color environments for the office workers. Group A is a relatively traditional and conservative warm color environment, B is a rich and lively color environment, C is a simple and elegant pure color environment, and D is a color environment with obvious contrast between light and dark but single hue (Figure 1). Most of the participants chose A or C and expressed that group A brings peace and comfort, while C brings vitality.

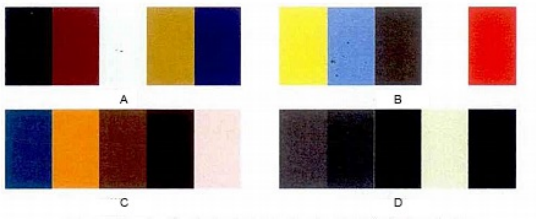


Figure 1. Actual space of four-color types in office space (Source: Peng, 2016)

Case study of Efficient Office Space Color Design

The design team of Schneider Electric Company has created a simple, pure, natural, and "green" working environment by fully utilizing the warmth and lightness of colors, as well as the excitement and composure of colors, showcasing the company's brand values of sustainability, efficiency, and safety for customers.

Different office areas create corresponding environmental atmospheres through colors

In the blueprint stage of the early stage of design completion, the design team divided the functional categories of office space through color and determined the environmental atmosphere of different office areas through color. As shown in Figure 2, red represents the "customer zone" customer zone, creating a proactive, joyful, and enthusiastic environmental atmosphere dominated by red environmental colors; Blue represents the market sales area of the "Sales/IPO zone" in the figure, creating a calm, composed, and rational environmental atmosphere dominated by blue environmental colors; The pink color in the picture represents the office space for global quality testing, creating a soothing and relaxing atmosphere; Green in the figure represents the "Finance zone" in the field of finance and finance, creating an environment dominated by green to release pressure, alleviate emotions, and promote sustainable development. Yellow in the figure represents the "HR zone" human resources department, creating a warm, progressive, and positive environmental atmosphere with yellow.

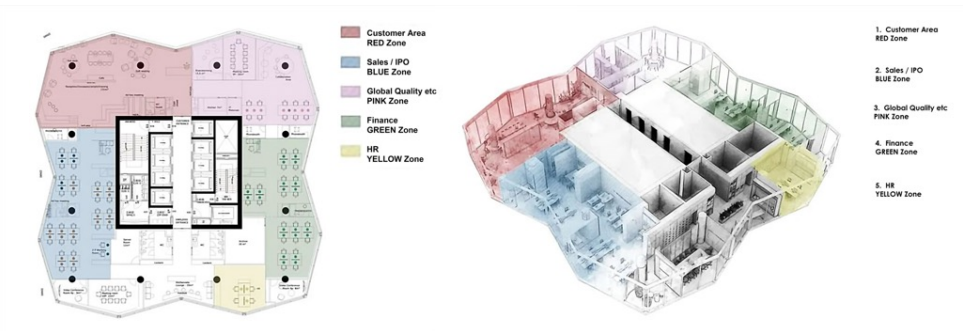


Figure 2. Schneider Electric Company's division of office space colors (Source: Schneider Electric Company)

The Application of Color Cooling and Heating in Office Space

Schneider Electric's employee office space uses "orange, green, and blue" of different brightness and purity as decorative colors of the office environment.

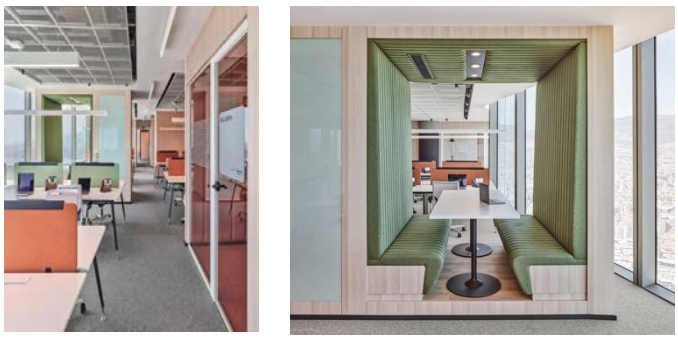


Figure 3. Schneider Electric Company Employee Office Area (Source: Schneider Electric Company)

Red, orange, and yellow represent warm colors, while blue, green, and purple represent cool colors. The former gives people a positive and warm feeling, while the latter gives people a sense of efficiency and calmness. The office space features both warm colors dominated by orange and cool colors dominated by green, creating a pleasant and lively environmental experience. The embellishment tone mainly composed of orange can to some extent stimulate employees' enthusiasm, while also giving people a sense of belonging and warmth; The embellishment color with green as the main color can to some extent relieve employees' tense nerves and provide a hint of relaxation and relaxation.

Control of color intensity in office space

Humans have almost the same visual perception of color intensity, but according to relevant research, high brightness colors feel lighter than low brightness colors; The order of color lightness in hue is slightly more complex than brightness, with the order of lightness to heaviness being: white, yellow, orange, green, blue, purple, and black (Peng, 2016).



Figure 4. Color matching of the office area environment for Schneider Electric employees (Source: by author)

The "orange" and "green" color groups used in the office space of Schneider Electric Company's employees are located in the middle of the color order, giving a harmonious sense of weight. They do not make people feel too heavy or oppressive, nor do they feel too light or insecure. Therefore, it can give people a certain degree of "color balance".

Positive emotional effects of color layout

The color layout in the space can easily bring different emotional impacts to the office crowd. Considering the diversity and diversity of human emotions, the author categorizes the feeling of emotions into excitement and calmness. When a person is in a warm, high-purity, and high-definition color environment, it is easy to be aroused and generate excitement; When people stay in a color environment with cool tones, low purity, and low

brightness, their emotions will be calmed and stabilized, resulting in a sense of tranquility. Therefore, a warm tone, high purity, and high brightness color environment can bring us more stimulation to the retina and brain nerves than a cold tone, low purity, and low brightness color environment (Peng, 2016).

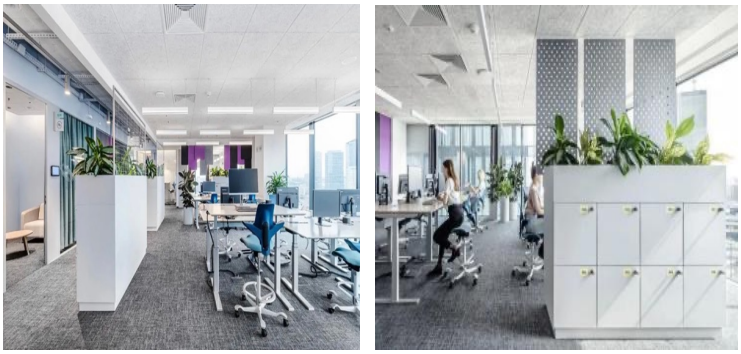


Figure 5. Color matching of office environment (Source: Pfizer Pfizer Pharmaceuticals Hong Kong)

As shown in Figures 5, Pfizer Pharmaceuticals mainly uses cool tones of "gray, blue-grey, blue, and purple" in its office space color design, giving people a sense of calmness and calmness. Schneider Electric Company also uses cool colors such as "blue, green, and gray" in the color design of office spaces, but due to the addition of warm colors such as "orange", the space has a certain degree of liveliness. However, this liveliness will not cause an imbalance in the atmosphere of the office space. In terms of controlling the color area, the design team adjusts the corresponding color area when designing the office space, achieved a balance of color vision, creating an office space that combines excitement and composure.

Color Design Strategies for Efficient Office Space

Based on the literature review and case study above, this article provides the following color design strategies for the efficient office spaces.

Choose appropriate color tones based on the area of office space

The application of color aesthetics can compensate for the shortcomings of spatial structure layout. Due to the psychological and physical illusions caused by color, visual illusions can regulate people's perception of internal space. High brightness and high purity warm tones will show a sense of expansion, while low brightness and low purity cold tones will show a sense of contraction. For example, when the space is too narrow and natural lighting is insufficient, low brightness colors can be used to treat walls, ceilings, etc., creating a bright and spacious internal space (Xia, 2022). If the office space is too spacious and needs to appear compact and substantial, then it is necessary to choose warm colors with high brightness and purity; conversely, choosing low brightness and low purity cool tones can make the space appear spacious.

Use different colors to adjust employees’ mood

Different office spaces require different environmental colors leading to positive emotions (Table 3). Red is suitable for use in dry and monotonous work environments, serving as a "trigger" and inducing appropriate levels of arousal for individuals, thereby improving employee performance (Kwallek, 1990); Mehta and Zhu found that blue triggers approaching motivation, so the two researchers claim that blue contributes to the completion of creative tasks (Mehta & Zhu, 2009); After working with a computer for a long time, the green or

blue color in the environment can make people feel cool, calm, comfortable, and relaxed, which can to some extent reduce employees' anxiety levels (Clarke & Costall, 2008).

Table 3. Color Emotion Regulation Table (Source: by author)

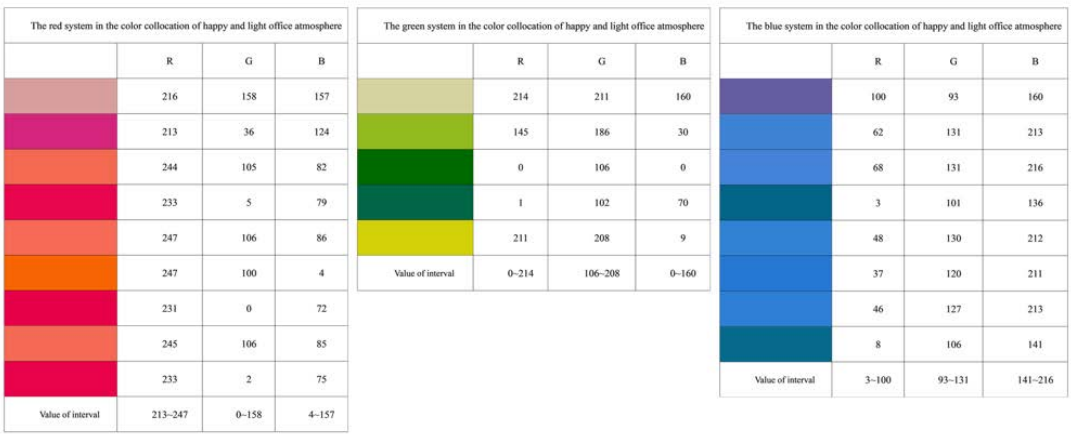
Negative emotions （✖）	**Guided positive emotions**（✔）	**Recommended colors**（✔）
Tense, Tired, Stressed	Calm, Rational, Release pressure	Blue, Green
Pessimism, Depression, Loss	Optimistic, Motivated, Positive	Red, Yellow, Orange, Pink
Upset, Suspicious, Irritable	Calm, Steady, Relaxed	White, Black, Pink, Light blue, Light yellow
Dull, Dreary	Proactive, Enthusiastic, Excited	Red

Use color combinations to create an efficient atmosphere

The office environment is divided into different office spaces based on the position of employees, such as administrative office, commercial office, technical office, design office, comprehensive office, etc. Different positions require different office environments with different functional requirements, as different job requirements can shape different psychological needs of employees. Considering the diversity of the psychological environment for office work, this article categorizes the psychological environment for office space into three common color shaping atmospheres: a pleasant and relaxed office color atmosphere, a calm and elegant office color atmosphere, and a meticulous and quiet office color atmosphere (Ai, Liu, Qi, Lei, Chen, Li & Yang, 2015).

1. A pleasant and relaxed office environment

A pleasant and relaxed office environment is composed of colors with high brightness and purity (Figure 6). Appropriately adjusting the brightness and purity of such colors and using one to multiple colors as auxiliary colors of the environment to integrate with the overall environmental colors can create an active and innovative space (Ai et al., 2015). It's usually found in jobs that require creativity. Such as planning and other design work. From a psychological point of view, such office groups often mobilize personal emotions, and need to maintain an excited and full mental state and active thinking to improve work efficiency.



The red system in the color collocation of happy and light office atmosphere

	R	G	B
	216	158	157
	213	36	124
	244	105	82
	233	5	79
	247	106	86
	247	100	4
	231	0	72
	245	106	85
	233	2	75
Value of interval	213–247	0–158	4–157

The green system in the color collocation of happy and light office atmosphere

	R	G	B
	214	211	160
	145	186	30
	0	106	0
	1	102	70
	211	208	9
Value of interval	0–214	106–208	0–160

The blue system in the color collocation of happy and light office atmosphere

	R	G	B
	100	93	160
	62	131	213
	68	131	216
	3	101	136
	48	130	212
	37	120	211
	46	127	213
	8	106	141
Value of interval	3–100	93–131	141–216

Figure 6. RGB values of the primary colors of red, green, and blue in a pleasant and cheerful office atmosphere (Source: Organized by author, Han & Mei, 2021)

2. A calm and elegant office environment

A calm and elegant office environment with gray as the leading office environment color collocation, thereby increasing the solemn and stable, atmospheric down-to-earth office atmosphere. Since gray is a color between black and white, it has a stable temperament of balance and coordination, and is usually dominated by gray and blue close to gray. This color is generally used by administrative departments making decisions about deployment.

The red system in the color collocation of calm and elegant office atmosphere			
	R	G	B
	98	45	51
	102	66	90
	93	31	37
	94	46	57
	149	90	0
	156	0	4
	209	142	97
	159	0	1
Value of interval	93–209	0–142	0–97

The green system in the color collocation of calm and elegant office atmosphere			
	R	G	B
	7	29	19
	2	45	0
	205	203	152
	148	142	2
Value of interval	2–205	29–203	0–152

The blue system in the color collocation of calm and elegant office atmosphere			
	R	G	B
	119	150	154
	0	0	18
	124	155	160
	0	2	85
	95	133	154
	1	2	86
	0	1	91
	5	53	73
Value of interval	0–124	0–155	18–160

Figure 7. RGB values of the primary colors of red, green, and blue in the calm and elegant office atmosphere (Source: Organized by author, Han & Mei, 2021)

3. A quiet and peaceful office environment

A quiet and peaceful office environment is most suitable for those who need to be careful and calm in their work. The use of simple low brightness and low purity color matching will create a relatively calm working environment atmosphere. A quiet and peaceful atmosphere often appears in office spaces such as finance and accounting, auditing, government enterprise, and precision experimental spaces (Zhu, 2006).

The blue system in the color collocation of meticulous and peaceful office atmosphere			
	R	G	B
	165	196	249
	56	132	215
	1	3	87
	2	51	67
	93	131	212
	164	191	245
	100	134	145
	1	0	75
Value of interval	1–165	0–196	67–249

The green system in the color collocation of meticulous and peaceful office atmosphere			
	R	G	B
	1	47	67
	101	135	145
	139	140	133
Value of interval	1–139	47–140	67–145

Figure 8. RGB values of the primary colors of green, and blue in the quiet and peaceful office atmosphere (Source: Organized by author, Han & Mei, 2021)

Conclusion

For office users, the color environment of the office will have an effect on work efficiency and work performance. The color design of efficient office space is ultimately to serve the human comfort and psychological comfort

of the people in the space, so it is necessary to design based on the area of the space, the function of the space and the nature of the work, so as to achieve the aesthetic function and emotional adjustment function of the space. Based on the research and examples of the effect of color on the physical and mental health of office workers, this paper puts forward the design strategy of office space in the main color, emotional color, and color collocation. Therefore, it can provide reference for the design of high efficiency and humanized office space.

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Design for the Deprived: Lamp Design for Underprivileged Children Based on the Cradle to Cradle Concept

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Abstract

This study explores the application of the Cradle to Cradle (C2C) concept in lamp design for underprivileged children through the illuminable stationery box design case. Firstly, the relevant theoretical knowledge of the C2C concept is reviewed. Then, the unsustainable problems of the existing lamps for underprivileged children are identified. Finally, the illuminable stationery box is designed based on the unsustainable problems of the existing lamps for underprivileged children and the three principles of the C2C concept. By integrating the C2C concept into the design process of lamp for underprivileged children, sustainable lamps that meet local situations can be developed, thereby better solving the challenges faced by underprivileged children.

keywords

Cradle to cradle; C2C; Lamp design; Sustainability; Sustainable design; Design for poverty alleviation; Underprivileged children; Poor children; Stationery box design.

Introduction

Light is very important for people's visual activities, without it, there is no vision (Wang et al., 2014). Especially at night, artificial light sources are an important guarantee for production and life. For people in developed regions, obtaining light at night is a quite easy thing because they have high brightness lamps and sufficient electricity. However, for the poverty population in underdeveloped regions, nighttime lighting is a luxury. Due to the impact of geographical environment, these areas often face power outages or insufficient power supply, and it's hard for people here to afford expensive electricity bills. Therefore, they rarely use light bulbs and instead use candles or kerosene for lighting. However, living in an environment with insufficient light for a long time can have serious psychological and physiological impacts on people. Although adults can tolerate such living environments, children are unable to learn normally and grow healthily. At the same time, the United Nations has also proposed sustainable development goals such as no poverty, quality education and affordable clean energy. So, the researchers believe that this is an urgent problem to be solved, and designers also have a responsibility to contribute their meager efforts to the vulnerable groups in society and help them

live better. In summary, this study aims to develop a sustainable lamp based on the C2C concept for children in underdeveloped regions, solving a series of challenges they are currently facing.

Overview of Cradle to Cradle Concept

Since the Industrial Revolution, product design and manufacturing have followed a linear pattern from cradle to grave, extracting resources from nature, processing them into products, and discarding them after use (Chen, 2022). People not only view the environment as an inexhaustible warehouse of resources, but also as a garbage bin with no capacity limit (Shedroff, 2009), arbitrarily extracting and discarding resources, which leads to severe resource depletion and environmental pollution. To address this challenge, people have adopted the 3R (Reduce, Reuse, and Recycle) principles throughout the product lifecycle, which aims to slow down resource consumption and mitigate environmental pollution by reducing resource use and waste, repeatedly using products, and reprocessing waste into raw materials. Nevertheless, the product will eventually enter the grave, consuming resources and polluting the environment. So, William McDonough and Michael Braungart further proposed the Cradle to Cradle concept (McDonough & Braungart, 2002).

Cradle to Cradle is a sustainable design approach, inspired by nature and aims to encourage designers to develop high-quality products that are ‘eco-effective’ instead of eco-efficient. This means that this approach is used to develop truly sustainable products, rather than products that merely reduce environmental impact (van Boeijen et al., 2013). Compared to the traditional design approach, it views the product lifecycle as a closed-loop process, ensuring that products do not become waste at the end of their lifespan, but rather transform into resources that can be reused, thereby preventing resource depletion and environmental pollution.

The Cradle to Cradle concept includes two cycles: biological cycle and technical cycle, as shown in Figure 1. Products for biological cycle are made of 100% biodegradable materials that can be returned to natural environments such as soil and oceans after use to provide nutrients for other organisms. Products for technical cycle can be returned to the factory after use to make new products. Everything is a resource for something else. Additionally, it also follows three principles: waste as raw materials, using renewable energy, and respecting diversity (McDonough & Braungart, 2002).

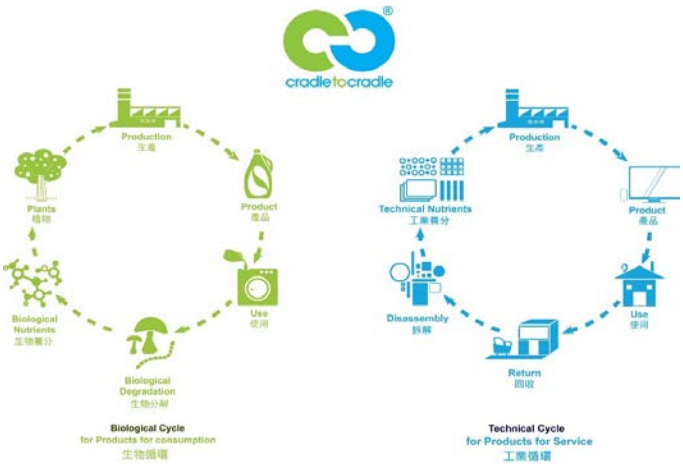

Figure 1. Two cycles of Cradle to Cradle (Source from https://www.c2cplatform.tw/en/c2c.php?Key=1)

Existing lamps for underprivileged children and their unsustainable problems

At present, lamps for underprivileged children mainly include two types. The first type is the universal lamp, which refers to the ordinary lamps currently available on the market. These lamps generally rely on traditional power supplies. For example, Philips has previously collaborated with government departments to develop donation activities of LED light bulbs in Xinjiang and Yunnan, China, aiming to improve the lighting environment of underdeveloped regions with green and energy-saving lamps, further improving the living standards of local residents and students' learning conditions (Signify, 2017), as shown in Figure 2. These lamps are not only suitable for people in underdeveloped regions, but also for the general public. So, these lamps lack pertinence in design, which not only can't adapt to the actual usage environment of certain underdeveloped regions but also can't meet the lighting needs of people in that area. The second type of lamp is specifically designed based on the actual situation in underdeveloped regions. For example, the team of "Heart Lamp Action" designed solar LED lights for children in underdeveloped regions to improve their learning environment, as shown in Figure 2. These lamps do not rely on traditional power supplies and can be charged through solar energy ("Design for Public Benefit - LED Lights Designed for The Faraway Children," 2014). Another example is the Gravity Light, designed by Martin Riddiford and Jim Reeves for populations in underdeveloped regions of Africa, which can generate electricity and provide lighting for people through gravitational potential energy (Santos, L. A, 2014). People only need to install it on a sturdy crossbeam, and then hang some heavy objects on the chain. As the heavy objects slowly fall, the chain drives the DC generator inside the lamp to generate electricity and lighting, as shown in Figure 2. However, Gravity Light is not convenient to carry and requires the coordination of heavy objects and supports to work, making it more complex to use.



Figure 2. Existing lamps for underprivileged children (Philips LED light bulbs(a), source from https://www.signify.com.cn/zh-cn. Solar LED lights(b), source from https://mp.weixin.qq.com/s/QobQHoPQCSE7MbQbudq5tg. Gravity Light(c), source from https://mp.weixin.qq.com/s/F2dJAPkuEP5fv-Vzf-xJrg)

After analyzing the existing lamps for underprivileged children, it can be seen that these lamps have provided light to underprivileged children and improved their learning and living conditions. However, these lights still have certain unsustainable problems. The first problem is that the lamps have limited functionality. Currently, most lamps only provide lighting functions, but the challenges faced by underprivileged children are diverse and not limited to lighting. They also face other challenges, such as a lack of stationery, clean water, and toys (Chen, 2018). However, current lamps cannot address these additional challenges. The second problem is that the materials used in lamps are non-degradable or difficult to recycle. Currently, most lamp components are mainly made of non-degradable or difficult-to-recycle plastic or metal. Once the lamps reach the end of their lifespan, these materials can only be discarded, resulting in resource waste and environmental pollution. The third problem is the lack of flexibility in the power supply type of the lamps. Currently, most lamps rely solely on traditional electricity or renewable energy sources, which leads to poor adaptability, making them unsuitable for long-term and effective use in underdeveloped regions. Because traditional electricity supply in these areas is often interrupted due to geographical limitations (Chen, 2018), lamps powered solely by traditional electricity are frequently unusable. Additionally, for lamps that rely solely on renewable energy sources, when the energy module fails, these lamps also become unusable.

Illuminable Stationery Box Design Case

Through theoretical research on the C2C concept and an analysis of the unsustainability problems of existing lamps for underprivileged children, the researchers aim to design a sustainable lamp based on the C2C concept, in order to better address the challenges faced by these children. The following sections will focus on the design process of this lamp.

Design Investigation and Conceptualization

The researchers first visited primary schools and families in Zhuolu County, Zhangjiakou City, Hebei Province, where they interviewed local teachers, children, and parents. They then summarized the findings from the investigation from both user and environmental perspectives, as shown in Figure 3. Finally, they conceptualized and proposed design solution based on the investigation findings, the unsustainable problems of the existing lamps for underprivileged children, and the C2C concept.

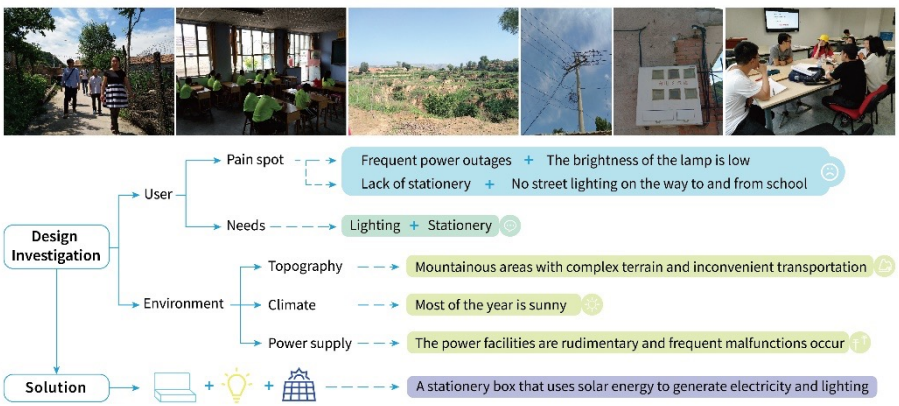

Figure 3. Design investigation and conceptualization (created by the author).

Design Principles and Solution Display

Waste as Raw Material

It is also the first principle of the C2C concept, aiming to make materials or products beneficial to humans and the environment during production, use, and recycling, and ultimately safely enter biological or technical cycle, once again becoming equivalent or higher quality materials or products. Based on this principle, the researchers determined the shell material of the illuminable stationery box as polylactic acid (PLA) plastic through comparison and analysis of existing materials. This is a new type of bioplastics made from starch extracted from plants, which has good biodegradability and can be degraded by nature after use (Huang et al., 2020). After the life cycle of the stationery box ends, PLA plastic can not only enter the biological cycle as a biological nutrient, but also enter the technical cycle to become a new material or product again.

Using Renewable Energy

It is also the second principle of the C2C concept. Instead of passive energy conservation and reducing traditional power generation usage such as thermal power, it is better to actively develop and use renewable energy, such as solar energy, wind energy, hydro energy, and biomass energy. Through field investigation in Zhuolu County, the researchers found that the local sunshine is very abundant, and this region often faces power failure problems, so solar power generation is a good choice. During the day, the solar panel can charge the internal rechargeable battery, and at night, the rechargeable battery can power the lighting module to achieve lighting functions, as shown in Figure 4. In addition, to ensure the flexibility of energy supply types, the researchers have also incorporated charging ports into the illuminable stationery box. When the solar panel malfunctions or is temporarily unable to generate electricity due to weather conditions, underprivileged children can use an external power source to charge the illuminable stationery box, ensuring its continued operation.

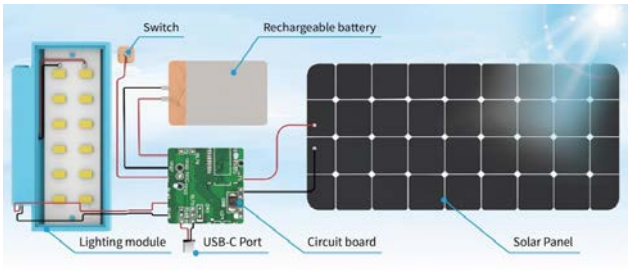

Figure 4. Design investigation and conceptualization (created by the author).



Figure 5. Usage scenario of illuminable stationery box (created by the author).

Respecting Diversity

It is also the third principle of the C2C concept, aiming to demonstrate the importance of diversity factors such as natural ecology, local culture, and individual needs in the product design process, which can be understood as localized product design. In the conceptualization of the design, the researchers thoroughly considered the unique needs and living conditions of local underprivileged children in order to propose effective localized solution. In addition to using sufficient solar energy for power generation, the illuminable stationery box also has dual functions (Chen et al., 2018). It can not only provide lighting functions for children in underdeveloped regions, but also help them store stationery or items, as shown in Figure 5.

Additionally, the illuminable stationery box is also equipped with a lanyard, making it convenient for children to carry it with them for charging or lighting purposes.

Prototype Test

In order to test the feasibility and effectiveness of the illuminable stationery box, the researchers created a prototype. First, 3D printing technology and PLA filament were used to construct the shell of the stationery box. Next, electronic components such as solar panels, wires, LED lights, switches, batteries, and circuit boards were connected using soldering equipment. Finally, the shell and electronic components were assembled together. After testing, the prototype implemented all the expected functions, as shown in Figure 6.



Figure 6. Prototype of the illuminable stationery box (created by the author).

Conclusion

Many underprivileged children around the world are facing various challenges, with even their most basic living needs not being met, such as lighting. Although there are existing lamps that meet the lighting needs of underprivileged children, these lamps still have certain unsustainable problems. Therefore, this study designed an illuminable stationery box for underprivileged children based on the three principles of the C2C concept. It not only provides them with lighting functionality but also helps them store stationery. By applying the C2C concept to the design of lamps for underprivileged children, sustainable lamps that are adaptable to local environments and meet local needs can be developed, thereby better addressing the challenges they face. However, this study still has certain limitations. The illuminable stationery box is currently a conceptual solution at the product level, and several important questions remain to be addressed, such as

how to produce and repair it, and how underprivileged children can obtain it. Firstly, due to the financial constraints of underprivileged families, it may be difficult for them to purchase this stationery box unless it is donated. Secondly, if the stationery box is damaged and cannot be repaired in a timely manner, its value will be significantly reduced. Therefore, future research should consider the production, maintenance, and donation of stationery boxes from a service design perspective to provide more comprehensive solutions for underprivileged children.

Acknowledgements

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Enhancing Family Relationships Through Quality-Oriented Service Design: A Case Study on Divorced Families in China

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Abstract

This paper examines service design as a way to improve the quality of life in divorced families. The changing family structures in China, such as "reorganized families", "divorced families" and "single-parent families", present unique challenges that require customized solutions. Conventional service design often falls short in addressing these specific needs. By introducing quality management methodologies into service design research, this study investigates the application of Quality Function Deployment (QFD) and the KANO model to create targeted service products that cater to the distinct requirements of divorced families. The study categorizes user needs, prioritizes attributes, and develops a service product prototype named the Kite Family Efficiency Management Application (APP) as a practical manifestation of quality-oriented service design principles. Through an exploration of user requirements, functional organization, and design strategies, this research underscores the potential of service design to transform family relationships within the context of divorced families.

Author keywords:

Quality-Oriented Service Design, Divorced Families, Quality Function Deployment (QFD), KANO Model, Family Relationships, User Requirements Introduction

Introduction

The terms "reorganized families", "divorced families" and "single-parent families" have entered the Chinese public's lexicon. These families experience membership changes and distinct challenges in daily life compared to conventional families. Conventional service design falls short in addressing their targeted needs. This paper focuses on divorced families, investigating service product design to reshape family dynamics and improve family life quality.

Marriage's essence lies in establishing a fundamental social triangle, where a couple forms a partnership that shares responsibility for their children [1]. For the divorced family, the couple wishes that the connection between them could be broken, but it cannot be literally broken because of the children. Unlike typical family relationships, this connection is intricate yet tangible, represented as an essential dotted line. Disconnecting this line fully could lead to a shift from bilateral to unilateral child-rearing [1], depriving children of comprehensive

familial education. Thus, nurturing a positive divorced family relationship becomes crucial, along with bolstering social support and services system.

The "Outline for Building a Quality State," issued by the Chinese Communist Party（CPC）and the Chinese State Council, puts forward that "quality is an important guarantee for human production and life, and quality, as a key element in prospering international trade, promoting industrial development, and enhancing people's well-being, is increasingly becoming a focal point in the fields of economy, trade, science and technology, culture and other areas, underscores quality's significance in enhancing people's lives, industry, and international trade [2]. However, China's quality level lags behind economic development. This paper introduces quality management into service design research, aiming to establish quality principles from inception and optimize service and product quality.

Service Design's Role in Transforming Family Relationships

Reconstructing users' lifestyles through service design, lifestyles are regarded as design objects from design contexts. [3] Service design holds the potential to reconfigure intricate family relationships prevalent within divorced families. Domestic and international research and design practice pay attention to Mobile app and its impact on lifestyle is explored, indicating their potential to shape long-term behaviors. [3] [4]

For this study, seven international apps for divorced families, collectively termed "Co-Parenting APPs," were analyzed. They are We-Parent, Our family wizard, 2 houses, Famcal, Coparently, Parentship and Cozi. [5] These apps prioritize efficient management, ease daily life, and neutrally address post-divorce relationships, enhancing child-rearing responsibilities.

Unlike foreign markets, China lacks divorce-specific apps. Current communication relies on WeChat and phone calls, insufficient for divorced families. Language and cultural barriers impede foreign app usage. This paper, focusing on divorced families within China's cultural context, seeks to reinvent relationships. Quality management methodologies are applied to extract user needs, screen solutions, [6] and enhance product appropriateness for divorced families.

Quality Function Deployment (QFD) and Research Context

This study categorizes user requirements and designs using the QFD method and KANO model. Determining user requirements is a very important step in the traditional service design process, but it is also often encountered that there are too many requirements and it is difficult to determine the priority. Therefore, using the QFD method in the service design process is conducive to determining the basic attributes of the requirements, enhancing the effectiveness and practicality of the final design results, and providing referable design cases for quality development in China.

Quality Function Deployment (QFD) is a tool to link user needs with design and production stages, unfolding user needs into the design process, combining different functions in all stages from design to production [7]. House of Quality (HOQ) is a core QFD tool, which is a graphical method to establish a link between user requirements and the functionality, quality and other elements of a product or service.[6]

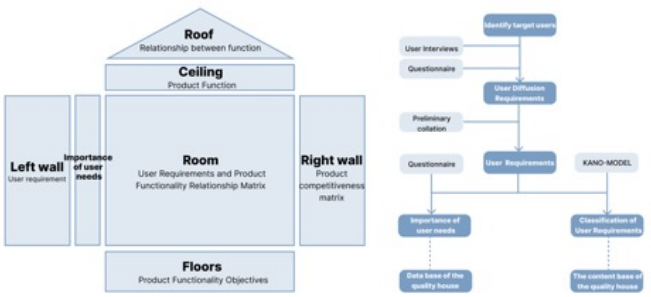

Figure 1. Quality house model[6] and QFD method design application process for this project

The KANO model evaluates functional importance and satisfaction levels. The KANO questionnaire categorizes product features as Must-have attributes (M), Expected attributes (O), Attractive attributes (A), No-difference attributes (I), Reverse attributes (R) and Questionable attributes (Q).[6] According to the information collected from the KANO questionnaire, calculating the Better-Worse user satisfaction coefficient and drawing the coefficient coordinate graph, the corresponding demand attributes of each function can be obtained. User satisfaction coefficients are calculated, guiding function positioning and product optimization.

By amalgamating these methodologies into the service design process, divorced family relationships can be effectively reshaped, leading to purpose-driven service products that cater to their distinctive needs.

Service Product Design with Quality Function Deployment (QFD)

1. Identifying Target Users and Unveiling User Needs

Addressing family-based diversity, this study generalizes relationships based on sample descriptions, identifying four distinct divorced family relationships: Mutually Exclusive Relationship, Single-Exclusive Relationship, Intimate Relationship and Air Relationship.

i. Mutually Exclusive Relationship: A relationship in which both parties dislike each other and don't want to have much contact with each other, commonly found between divorced parents.

ii. Air Relationship: There is no special emotional connection between the two members. It is often seen when one parent is out of work for a long period of time and there is a lack of contact and communication with the child. It may also exist between divorced parents. Air parents are more receptive to contact about their children than mutually exclusive relationships.

iii. Single-Exclusive Relationship: A relationship in which one parent wants to facilitate the relationship, but the other parent often does not understand and expresses resentment and rejection. It is common between one parent and the child.

iv. Intimate Relationship: Very good relationships between relatives who share and care about each other. Although there is inevitably some friction, it doesn't affect the relationship.

Delving into the specifics of divorced families, characterized by their unique dynamics, this study explores the distinct needs within various relationship dynamics. This detailed analysis lays the foundation for the service product functions (Figure 1). Level 1 functions are divided into four main categories, namely, efficiency management, family sharing, communication facilitation and psychological care. This was further subdivided into secondary and tertiary functions (Figure 2).

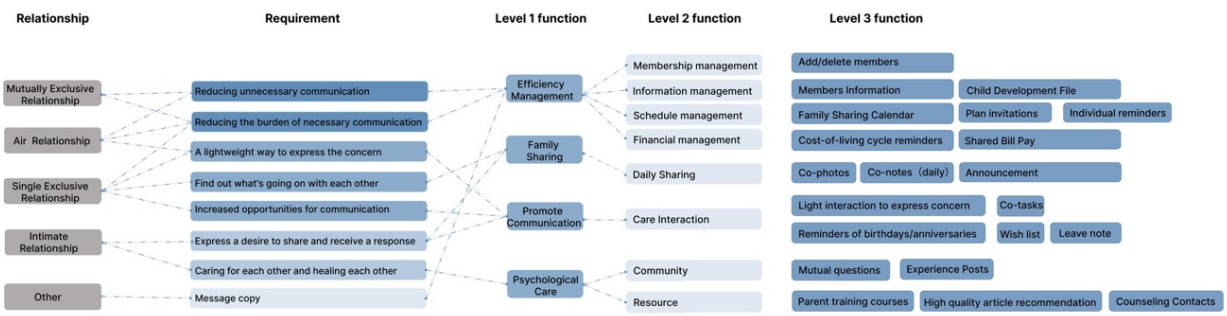

Figure 2. User requirements and function landscape

2. Analyzing User Needs

A questionnaire was designed based on preset features and issued within the user community. The audience was invited to evaluate the level of feature liking and importance. Using the Kano model Better-Worse coefficient analysis (Figure 3), the attributes of each function were categorized and the degree of their influence was judged. Based on the calculation results of each function, the requirements were prioritized (essential attributes > desired attributes > attractive attributes > undifferentiated attributes).

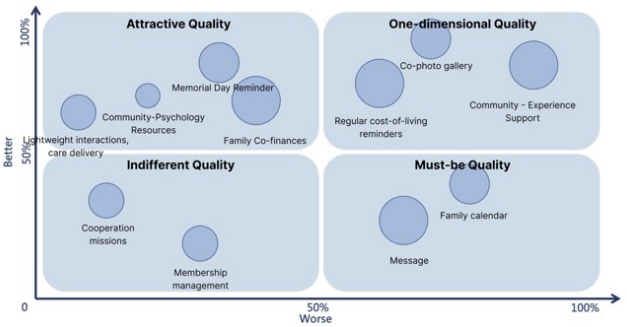

Figure 3. Kano Model Assessment on Functions

3. Crafting a Quality House of Functionality

The Quality House model, integral to the QFD method, assumes a central role in translating user requirements into functional features. Through an eight-step process, this model creates a tangible link between user needs and product attributes. As divorced families navigate their unique relationships, the Quality House model helps to assess attribute relevance and interplay. For example, the feature of regular reminder of living expenses serves those children in divorced families who feel pressured to ask for living expenses from both parents. These children would not choose to tell their parents that it is time to transfer living expenses for this month by leaving a message. It does not mean that the feature of leaving a message should be deleted, because replacing real-time communication with a message can reduce the barrier of communication between the members of a divorced family on other issues. By scrutinizing correlations and potential conflicts, the model empowers designers to shape a cohesive and harmonious functional architecture that caters precisely to the needs of divorced family members.

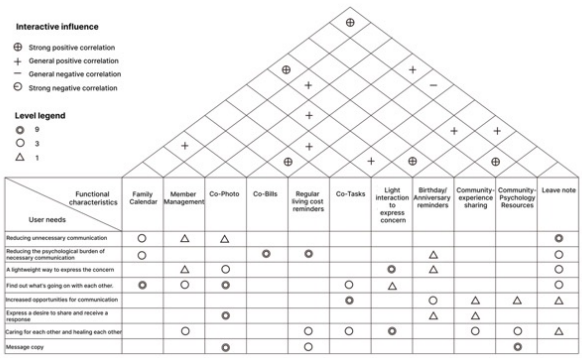

Figure 4. Quality House of Functionality

Service Product Design in Action

1. Target User Definition and Theme Conceptualization

According to the preliminary analysis of user needs, this study focuses on relationship reshape and communication for divorced families. Therefore, the service product designed for divorced families is positioned as a family efficiency management APP, which prioritizes solving the daily difficulties in family management that are prone to psychological pressure for divorced family members.

In identifying the theme of the product design, the authors invited members of divorced families to participate in a brainstorming session, describing their family relationships with appropriate intentions, and producing concepts such as "Sandwich", "Tidal Wave", "Refrigerator" and so on. In the end, the design theme centers on the concept of kite flying, symbolizing freedom and attachment. And the hidden kite strings are like the delicate relationship between divorced family members. Kite flying is suitable for the whole family to participate in the spring season, resembling new beginning and hope. Replacing the expression of divorced families with kite families is the beauty of traditional Chinese metaphors.

Starting from the theme concept of kite flying, three more images was extracted:Sky , Kite and Field. It was designed to be three sections in the function menu bar: **Sky Community, Kite Family** and **Field Space.** The Kite Family segment contains the basic family management functions. Field is the space for family activities, so the Field Space board is primarily for family schedule management. Sky is where kites fly, and the Sky Community section is a space for individual kite families to communicate and share.

2. Interface and Functional Designs

Based on the user requirements of divorced families derived from the QFD method, three segments, namely Kite Family, Field Space, and Sky Community, are designed.

Kite family is the core section of the app. The family cards can be switched to different families by sliding left and right, and the corresponding family tools on the top will be switched as well. When the family card is switched up and down, you can view your own message interface. This app doesn't design the instant message board between family members. Through mutual messages, it helps family members to convey information and express their emotions. The family business card will show the family members whose accounts have been successfully bound. Tapping the avatar to view the member's information and edit the message card, especially suitable for parents to share their children's information with each other. A long press will bring up the function of message and care interaction. The three tools at the top are Co-Notes, Co-Bills and Co-Tasks.

Field Space assumes the main function of the family calendar. When the family card is switched, Field Space also switches to the corresponding family schedule. All family members can add agendas and collaborators and set reminders for them in Field Space. The items that can be added include short-term plans, long-term plans, and anniversaries, etc.. In addition to generating the to-do-list to Field Space, users can also publicize their upcoming schedule, which is more suitable for children to inform their parents of their plans.

The Sky Community is a forum for the exchange of experiences between divorced families. Here members of divorced families can post questions that they would like to receive answers, look up related topics, and comment on other people's topics and replies. It also provides some resources for family relationship reinvention, including psychological articles, columns of famous writers, and recommendations of counseling clinics. Should a metaphorical barrier enclose the emotions of a divorced family member, rendering them inaccessible and resistant to external engagement, the Internet serves as an aperture upon this metaphorical wall. This virtual window affords users the opportunity to witness a multitude of individuals beyond the confines of their emotional enclosure, individuals who share analogous experiences. Moreover, this window

reveals a vast community of empathetic souls ready and willing to offer assistance and support.

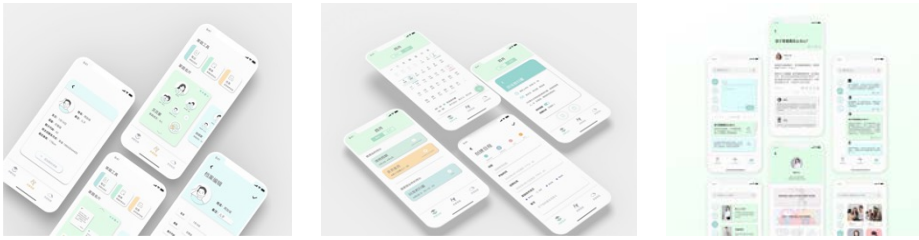

Figure 5. Part of the interface of the Kite Family, Field Space, and Sky Community boards

The Kite Family Efficiency Management app, in terms of its overall functional architecture, consists of three major sections, namely, Field Space, Kite Family and Sky Community, each of which in turn contains two to four functions. It is worth noting that when family members use the sharing tools, such as editing the family schedule together, adding shared bills, etc., they can't give feedback directly in these functions. They are linked to the message board function in the family business card, an alternative to the instant message. Although not convenient, the delayed feedback mechanism is more suitable for the divorced family.

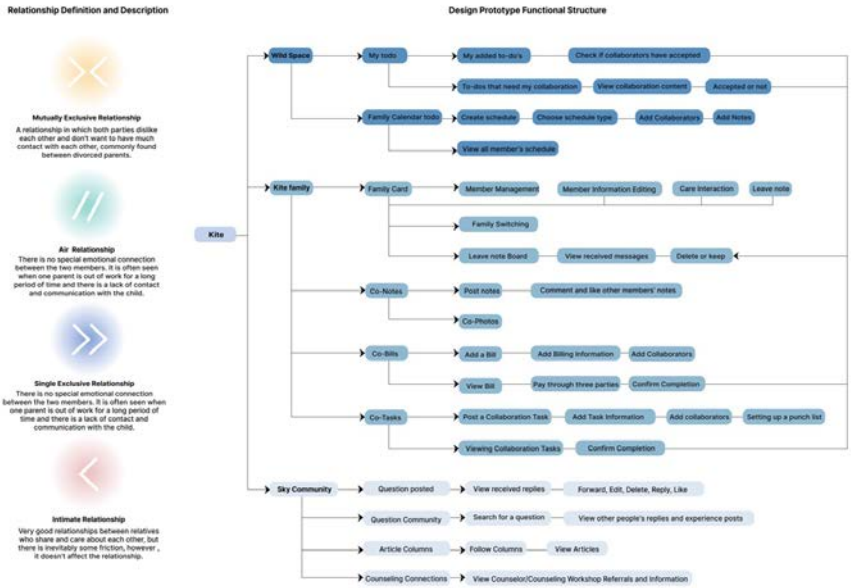

Figure 6. Kite Home Management App Functional Architecture Diagram

3. Tests and results

In order to test whether the service product can better serve for users, the design prototype is shared with pre-recruited divorced family members for real user testing and feedback. The overall satisfaction score of the KITE application reached 87.92, including an average score of 90.5 for appearance and 85.33 for functionality. Many users gave feedback that the design could effectively help them reshape their family relationships.

Conclusions

In a society marked by shifting family structures, the role of service design emerges as pivotal. The convergence of rising divorce rates and the imperative to nurture unique family relationships underscores the need for innovative approaches tailored to specific requirements. This paper's exploration, anchored in Quality Function Deployment (QFD) and the KANO model, sets forth on a transformative journey to reshape family dynamics within divorced families. By methodically categorizing user needs, prioritizing attributes, and crafting a functional architecture, this research manifests its insights into the Kite Family Efficiency Management Application APP. In a landscape marked by evolving family dynamics, this study stands as a testament to the potential of quality-oriented service design in shaping a more harmonious and cohesive society.

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Inclusive Digital Interactions: Love-Oriented Pedagogical Reflections in Interaction Design

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Abstract

In the field of digital media art and design education, both interaction design and inclusive design are increasingly becoming focal points. This study explores an "affection-oriented" pedagogical approach in interaction design education, aiming to enhance the humanistic qualities and social responsibility inherent in design education. Initially, the paper outlines the fundamental concepts of interaction design and inclusive design and provides a historical overview of their development. Subsequently, through empirical case studies, the study examines the role of interaction design in multicultural and diverse social structures, as well as the significance of inclusive design in addressing the needs of specialized and marginalized populations. Ultimately, the paper introduces an "affection-centered" pedagogical model for interaction design, emphasizing its value in fostering social responsibility among students and its practical applications in design practice. The findings suggest that integrating "affection" into design education and amalgamating inclusive and interaction design not only cultivates designers with a heightened sense of humanistic care but also effectively addresses the challenges posed by social diversity and complexity.

keywords

Interaction Design; Inclusive Design; Humanistic Concern; Social Responsibility; Teaching Model

Introduction

With the increasing ubiquity of digital technologies, interaction design as an interdisciplinary field is facing challenges related to diversity and inclusivity. This paper aims to explore how love-oriented pedagogical methods can enhance inclusivity in interaction design education. We argue that centering the core value of "love" can promote a more human-centric and inclusive design thinking, thereby advancing the diverse development of interaction design.

Overview of Interaction Design and Inclusive Design

Interaction Design

Interaction Design is a design discipline focused on creating meaningful interactions between users and products or services. Its origins can be traced back to the 1980s when computer science and Human-Computer Interaction (HCI) research began to emerge. Originating in the 1980s and evolving with the proliferation of computers and the internet, interaction design has expanded from simple interface design to more complex system and service design. Its core objective is to optimize user experience by meeting user needs and solving real-world problems through intuitive and efficient design solutions. Interaction design is not just about technology and aesthetics; it is a human-centered design approach that emphasizes user participation and

interdisciplinary collaboration.

Inclusive Design

Inclusive Design is a design methodology aimed at meeting the needs of all people, especially those who are easily overlooked or marginalized. The core philosophy is that design should serve as many people as possible, including those of different ages, genders, cultural backgrounds, and physical conditions. This concept was initially propelled by social movements and disability rights campaigns in the 1990s. Inclusive design is not just a moral or ethical responsibility but also a driver for innovation. In practice, it often involves special design and adaptation for specific needs groups, such as those with visual, auditory, or mobility impairments, aiming to eliminate social inequality and discrimination through design, thereby achieving a more equitable and inclusive social environment.

The Role of 'Love' in Design

"Love," as a universal human emotion and value, also holds a significant place in the field of design. It serves not only as an emotional driver but also as an embodiment of social responsibility and humanistic care. The role of "love" in design is mainly manifested in two aspects: humanistic care and social responsibility. From the perspective of humanistic care, design should focus on the emotional needs and psychological experiences of users, rather than just functionality and efficiency. This "love"-oriented design thinking can help designers understand users more deeply, thereby creating more humanized and emotionally resonant designs. From the perspective of social responsibility, design centered around "love" places greater emphasis on social equity and inclusivity, stressing that design should serve everyone, not just specific groups or interests. This not only enhances the social value of design but is also an important pathway to achieving sustainable development.

The Ubiquity and Importance of Interaction Design

In contemporary society, interaction design is no longer an isolated concept or limited to specific fields of application. Rather, it has become a universally present and significant design thinking and methodology. The following comprehensive analysis aims to reveal the ubiquity and importance of interaction design in modern society.

From Narrow to Broad: The Expansion of Interaction Design's Scope

Initially focused on computer interface design, interaction design has now expanded to encompass broad interactions between humans and society, as well as humans and the environment. This shift not only broadens the application range of interaction design but also elevates its importance in addressing complex societal issues. This resonates with Jennifer Preece's perspective, who argues that interaction design has transcended traditional human-computer interaction to cover broader social and environmental issues.

Technologically Driven Natural Interaction

With the advent of multi-channel interaction technologies and brain-computer interfaces, natural interaction has gradually become the core research direction in interaction design. This trend is not only strongly supported by technology but also aligns with the growing demand for diverse interaction modes, thereby highlighting the ubiquity and importance of interaction design in today's society.

Interaction Design and Human-Computer Interaction: A Dynamic Relationship

Although interaction design and human-computer interaction share common origins, they have diverged in research directions and content over time. This divergence has not diminished the importance of interaction design in society; on the contrary, its intersection with various technologies and fields has made it an even more diverse and integrated research area.

Social Characteristics: The Humanistic Concerns of Interaction Design

Interaction design is not merely a technology or tool; it is a social design thinking. It focuses on the interactive relationships between humans, society, and the environment, striving to improve these relationships through design, thereby emphasizing its ubiquity and importance in modern society.

In summary, interaction design is not only universally present in today's society but also holds significant social, cultural, and technological implications. It is an integrated design thinking and methodology capable of addressing diverse and complex societal needs and thus deserves increased attention and emphasis.

The Necessity and Social Responsibility of Inclusive Design

Social Diversity and Individual Needs

In the context of globalization and multiculturalism, social diversity is increasingly prominent. Inclusive Design is not just a design philosophy but also a social responsibility, aimed at meeting the needs of individuals with different cultures, ages, genders, and physical conditions (Shinohara & Wobbrock, 2011)1. This approach emphasizes human-centeredness, striving to eliminate social inequality and discrimination, thereby facilitating broader social participation.

Technological Advancements and Accessibility

With the rapid development of technology, digitalization and intelligence have become vsignificant trends in the design field. However, technological advancements have also led to the issue of the "digital divide," where certain groups are unable to access or use high-tech products for various reasons (Bridging the Digital Divide, Communications of the ACM, 2021). Inclusive design plays a crucial role here by enhancing the accessibility of products and services, allowing more people to equally benefit from technological conveniences.

Aging and Sustainability

The global aging issue is becoming increasingly severe. In 2020, the number of people aged 60 and above surpassed that of children under 5. By 2030, one in every six people worldwide will be over 60, and by 2050, this number will double to 2.1 billion. Various policies have been introduced by governments to address this trend. Inclusive design, in this context, offers sustainability by catering to the needs of different age groups.

Research and Practice Diversification

Inclusive design is not only a design philosophy but also a research methodology and practice. It encompasses multiple disciplines and fields, including sociology, psychology, and engineering. This diversified research and practice offer more possibilities for solving complex social issues.

Social Responsibility and Ethical Considerations

Designers must consider not only the aesthetics and functionality of a product but also its social impact and ethical responsibility (Design Ethics and Social Responsibility, Design Issues, 2017). Inclusive design emphasizes a "human-centered" design philosophy, focusing on social equity and ethical cultivation. Major

technology companies like Apple, Google, Microsoft, and Facebook are all paying attention to and promoting inclusive design to varying degrees (Table 1). These examples demonstrate that major tech companies are actively promoting inclusive design to meet the needs of a broader user base.

Table 1. Overview of Inclusive Design Tools and Features in Select Technology Companies

Company	Inclusive Design Tool or Feature	Description and Use Cases
Apple	VoiceOver	A screen reader that provides auditory descriptions of elements on the screen, aiding visually impaired users.
	Magnifier	A built-in magnification feature that helps visually impaired users read small text or see details.
	Switch Control	Allows users with limited mobility to control their device using adaptive switches.
Google	Lookout	An app that helps visually impaired users identify objects through the camera.
	Live Transcribe	Provides real-time transcription for deaf or hard-of-hearing users.
	Google Search Algorithm Optimization	Optimized to serve users from different cultural and linguistic backgrounds.
Microsoft	Inclusive Design Toolkit	Provides guidelines and resources for designers to create more inclusive products.
	Xbox Adaptive Controller	A game controller designed for gamers with physical disabilities.
Facebook	Automatic Image Descriptions	Uses AI to provide textual descriptions of images for visually impaired users.
	Multi-language Translation	Translates posts and comments into multiple languages to serve a global audience.
Amazon	Alexa Accessibility Features	Includes simplified voice commands and visual feedback for users with various disabilities.
	VoiceView	A screen reader feature for Amazon's devices.
Adobe	Color Accessibility Tools	Helps designers choose color schemes that are friendly to color-blind users.
	Text Recognition (OCR)	Optical Character Recognition feature to convert image text into selectable and searchable text.

Business Value and Market Potential

Beyond social responsibility and ethical considerations, inclusive design also holds significant business value. As society ages and individual needs diversify, products and services with high inclusivity will have broader

market potential. This not only contributes to sustainable business development but also enhances brand image and social responsibility, serving as an important force for overall societal progress.
In summary, inclusive design is not just a design method or trend but also embodies social responsibility and ethical considerations. It covers various aspects such as social diversity, technological advancements, aging, and research diversification, holding extensive social impact and business value.

Pedagogical Reflections on the Integration of Inclusive Design and Interaction Design

Teaching Experience and Summary

In the course of research and practice in interaction design education, I have come to realize that a singular design thinking paradigm is no longer sufficient to meet the diverse and inclusive needs of contemporary society. Hence, I began to integrate the "love-oriented" philosophy of inclusive design into the interaction design curriculum. This endeavor not only enriched the course content but also prompted us to pay greater attention to user experience, particularly for those groups often overlooked in traditional design education.

Through the introduction of inclusive design, we were able to more comprehensively understand and apply human-centered design principles. Students became more focused on user experience and social responsibility, thereby cultivating designers with a heightened sense of social responsibility.

Curriculum Content Reconstruction and Integration

To achieve this goal, the curriculum underwent significant restructuring and integration. Firstly, we explicitly outlined the importance of inclusive design in the syllabus and organically combined it with the core concepts of interaction design. For instance, while teaching interface design, we also discussed how to improve product accessibility and usability through design. Secondly, we introduced social issues such as multiculturalism, gender equality, and aging to cultivate students' global perspectives and social responsibilities.

Classroom Assessment and Planning

In terms of classroom assessment, in addition to traditional project evaluations and theoretical exams, we added "love-oriented" design case studies. Students are required to improve existing products or services from an inclusive standpoint and present and discuss their work in class. This not only tests their understanding and application of inclusive design principles but also encourages them to continuously focus on this issue in their future work.

Comprehensive Assessment Plan：

1. Classroom Interaction and Case Studies: Combining classroom discussions with design case studies guided by "love," we assess students' understanding and application capabilities of interaction design theory and inclusive design principles.
2. Design Research and User Persona Refinement: Students are required to conduct user research and improve existing products or services from an inclusive standpoint.
3. Mid-term Project Report and Feasibility Iteration: Halfway through the project, students need to report on their progress and preliminary results, and make iterative improvements based on feedback.
4. Final Assessment and Classroom Presentation: Upon project completion, students present their improvement plans and design outcomes in class and engage in questioning and discussion with classmates and teachers.

5. Team Collaboration and Humanistic Care: Throughout the assessment process of the entire project, teachers aim to discover students' strengths, emphasize teamwork, and observe their performance in terms of humanistic care.

This comprehensive assessment plan aims to holistically evaluate students, not only focusing on their technical skills but also on their social responsibility and ethical considerations. This multi-faceted approach ensures that students are well-equipped to tackle real-world challenges in their future roles as designers.

Teaching Outcomes and Practice

After a series of educational reforms and practices, we found that students have significantly improved in design thinking, teamwork, and social responsibility. More importantly, they have begun to proactively apply the principles of inclusive design to actual projects, enhancing not only the user experience of the products but also imbuing the design with far-reaching social value.

By integrating the philosophy of inclusive design into interaction design education, we have not only enriched the course content but also elevated the students' overall quality and sense of social responsibility. This attempt indicates that design education should not merely be the imparting of technical and aesthetic skills but should also cultivate a comprehensive humanistic literacy and sense of social responsibility.

Conclutions

This study reveals the profound educational and social significance of the integration of interaction design and inclusive design in pedagogical practice. This integration not only promotes the diversification and humanization of design education but also fosters a deep understanding of social responsibility and ethics among students. More importantly, this integrated approach aids in cultivating designers with interdisciplinary thinking and innovative capabilities, which are indispensable in the increasingly complex and diverse context of contemporary society.

Future research should further delve into the practical applications and impacts of the integration of interaction design and inclusive design in education, particularly its applicability in different cultural and social contexts. Additionally, educators and researchers should consider developing more systematic and comprehensive teaching modules and assessment mechanisms to quantify the long-term effects and social impacts of this integrated pedagogical model.

In summary, the integration of interaction design and inclusive design in education is not only an innovation in education but also a social innovation. It not only challenges the limitations of traditional design education but also provides new perspectives and tools for solving real-world social issues. This integrated model is expected to cultivate future designers with a more comprehensive quality, social responsibility, and innovative spirit. Therefore, this study not only provides robust theoretical support for current design education but also opens up new directions for future pedagogical practice and research.

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