

Research on the Application of Chinese Traditional Pattern in Museum Space Design and Science and Technology Presentation

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Abstract: Objective To explore how to better present traditional patterns in museum space design, align with international design trends, and integrate digital technology to showcase unique cultural charm and artistic atmosphere. The research methods include quantitative analysis, qualitative analysis, case analysis, and trend. The conclusion is that by combining pattern deformation with digital media interaction technology, a composite display space is created to provide visitors with a better visual sensory experience and information communication. By showcasing the traditional cultural heritage while keeping up with the times, visitors can immerse themselves in a unique cultural experience, which also brings new design ideas for future cultural inheritance methods.

Keywords: Traditional pattern; Museum design; Technology presentation; Interaction design

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1. Introduction

Traditional Chinese patterns carry a profound historical and cultural heritage and are the crystallization of the wisdom and aesthetics of the Chinese nation. In the museum space design, its unique artistic charm and cultural connotation can not only bring a visual feast to the audience, but also effectively convey historical information and promote cultural inheritance and exchange. With the support and promotion of scientific and technological development and continuous improvement of economic level, many museums have successively set up cultural venues related to local culture, but most venues still retain traditional display methods. Therefore, it is also necessary to further explore how to better integrate the relationship between tradition and modernity. This topic has improved the current museum's relatively old-fashioned and single presentation method to a certain extent, so that traditional patterns can better reflect the vitality in the space and better integrate traditional Chinese patterns with technological presentation.

2. Concept Explanation

(1) Traditional Chinese pattern decoration

Traditional Chinese decorative patterns are an important part of Chinese cultural heritage, containing rich cultural connotations and artistic values, and have different styles in different periods.

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(2) Museum development trends

Museum design shows a variety of development trends, digital exhibitions and intelligent experience devices are constantly emerging; experience optimization, storytelling narrative and diversified expansion are reflected in the construction of composite functions and the enhancement of social interaction; personalized development and diversified exploration trends are gradually emerging, and economic promotion and museum development complement each other and have a joint impact. For example, Suzhou Silk Pattern Digital Museum integrates Suzhou embroidery fabric pattern design in the exhibition hall, using digital reconstruction technology to put the audience in it.

3. Research Status

In terms of domestic development history and prospects, Chinese traditional patterns have a long history, patterns in various dynasties have continued to evolve, and reached their peak in the Ming and Qing dynasties. In terms of museum space design, early traditional patterns were mainly used for simple decoration, but now they pay more attention to combining them with modern design concepts and scientific and technological means. For example, the Huamao Art Education Museum cleverly incorporates traditional pattern elements in architectural shapes and spatial layouts to show unique cultural connotations. The application of traditional patterns will also be more extensive and in-depth, strengthening visitors' impression of traditional patterns and allowing them to understand the exhibition hall more deeply.

In terms of foreign development history and prospects, traditional patterns in different regions abroad have their own characteristics. For example, traditional Arabic patterns are used in museum space design with their unique geometric shapes and lines. For example, the Dubai Museum design works by a student at the University of Pennsylvania translates traditional Arabic patterns into architectural languages to echo local culture.

4. Specific Case Analysis

1)The presentation of traditional Chinese patterns in spatial design—taking Shandong Museum as an example

In terms of architectural appearance, the architectural appearance of Shandong Museum takes square and circle as the basic design elements. This design inspiration comes from the cosmic view of "the sky is round and the place" in traditional Chinese culture; in the internal space design of the museum, traditional patterns are cleverly integrated into the decorations of walls, grounds, ceilings and other decorations. The welcome hall was decorated with traditional patterns such as the jade wall of Lu State; the exhibition hall was made of Baoxianghua, cloud patterns and other patterns, and modern design techniques were used to refine traditional patterns to design an exhibition background that was both in line with modern aesthetics and rich in cultural heritage.

The direct application of patterns in space has enhanced the cultural atmosphere and historical sense of the space to a certain extent. However, there are still shortcomings in the application of traditional pattern elements in design and shape. It is further possible to construct digital experience space with traditional culture, combine new technologies and new ways of thinking, break the limitations of physical space, and enhance the audience's immersive experience.

(2) Questionnaire survey method

Scale questions and non-scale questions were set through the questionnaire method, and SPSS software was used to conduct quantitative analysis of the survey population. The results are shown in Table 1. The proportion

of women in the survey data was high, and the age distribution was 18-25 years old was relatively distributed. In terms of visit frequency, most of the visits were 3-4 times. By setting non-scale questions, the target population's preferences for museum pattern design are determined for description and analysis, Table 1 .

name	Factorload coefficient		Common
	Factor 1	Factor 2	
How to understand traditional Chinese patterns	0.656	-0.302	0.521
The degree of interest in the application of traditional patterns in museums	0.826	-0.017	0.683
The degree of interest of the museum in the digital experience area	-0.009	0.962	0.926
Creating a cultural atmosphere by traditional patterns in museums	0.775	0.142	0.620
KMO value	0.609		-
pvalue	0.034		-

The KMO value is used to judge the suitability of information extraction, and the common value is used to exclude unreasonable research items. From the above table, we can see that the common value corresponding to all research items is higher than 0.4 and the KMO value is greater than 0.6, indicating that the amount of information in the research items is valid.

The results were obtained through Cronbach's reliability analysis, Table 2. Comprehensive explanation of the high reliability and quality of data, which can be further analyzed.

name	Correction term total correlation (CITC)	Cronbach α coefficient
The degree of interest in traditional Chinese patterns	0.619	
The degree of interest in the application of traditional patterns in museums	0.621	
The degree of interest of the museum in the digital experience area	0.674	
Pattern display method tends to	0.696	
Creating a cultural atmosphere in museum exhibitions	0.665	
Museum space layout display method	0.659	

5. Pattern Description

(1) Characteristics of water lines and evolution of different periods

Water patterns first appeared on Hemudu cultural pottery in Yuyao, Zhejiang in the early Neolithic period, and water patterns appeared in painted pottery in the middle and late periods; during the Shang and Zhou dynasties, water patterns gradually retreated to border decoration or as shading, and water patterns in lacquerware often appeared as shading or decorated around; during the Qin and Han dynasties, water patterns were more realistic and vivid, with wave patterns and font-shaped water patterns that express the wave shape. The combination of water patterns and cloud patterns also appeared, called vortex patterns; during the Sui Dynasty, landscape paintings were popular, and water patterns and cloud patterns appeared in combination, which had a dynamic beauty, giving people a sense of unity of heaven and earth and majestic. Mainly curves and fold lines, the image simulates the shape of rivers and waves. The more representative one is the S-shaped curve as the bone, and this pattern arrangement has a strong sense of rhythm and rhythm^[1]. It is more romantic and elegant; the use of water ripples on Han Dynasty porcelain not only enriched the decorative art of porcelain, but also reflected people's pursuit and yearning for natural beauty at that time.

Water ripples, also known as water ripples, mean that they carry things with virtue and embrace all rivers. Such pattern translation and presentation make the display area unique.

The endless flowing water and ten thousand characters combined to form the "ten thousand characters flowing water pattern", which means auspiciousness and wealth; landscape paintings in the Tang Dynasty emerged, and water patterns were often combined with aquatic animals, such as fish and water patterns, double carp ripples, etc., which also mean that water patterns gradually move towards water ripple shape; in the Song and Yuan Dynasties, with the development of navigation technology, water patterns were widely used, which was a prosperous stage of water patterns development, with the meaning of wealth and auspiciousness. It includes sheet-shaped, hooked water patterns and fallen flowing water patterns that usually appear in the form of a shading. Falling water patterns are also called curved water patterns. This pattern was also widely used in traditional brocade decorations in the Song Dynasty.

During the Ming and Qing dynasties, water patterns gradually developed in the direction of standardization, and there were scaly water patterns and standing water patterns, which were similar to fish scales, which mostly appeared on the cuffs and hem of dragon robes and official uniforms, which were symbols of identity, Figure 1.

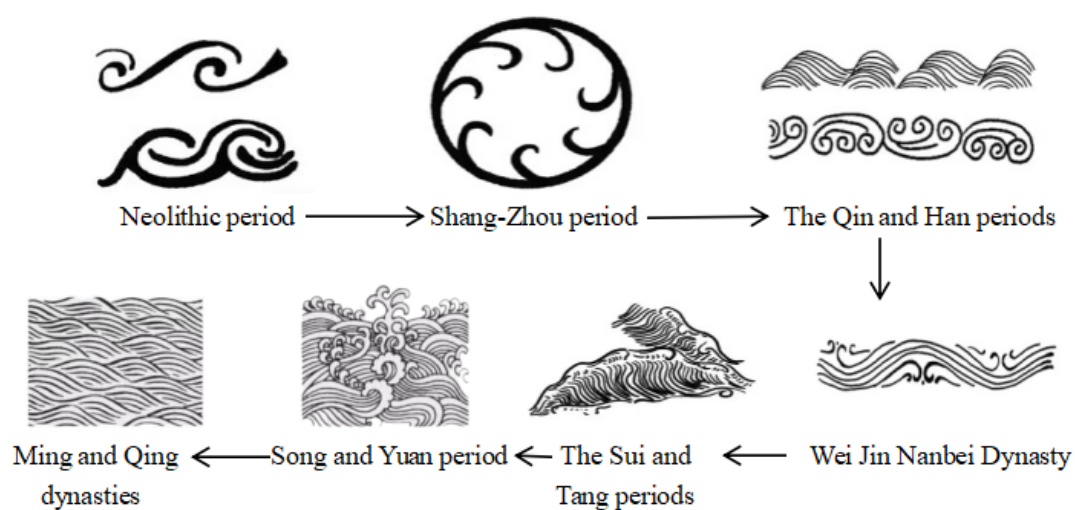


Figure 1. The presentation styles of water patterns in different periods.

(2) Characteristics of rebroken lines and evolution of different periods

Hui pattern is also known as Hui pattern, one of the traditional patterns of the Chinese nation. The expression of Hui pattern is mostly in two continuous modes: "two squares" and "four squares".

The Majiayao culture originated from the Neolithic Age laid the foundation for the development of Hui patterns; during the Shang and Zhou dynasties, Hui patterns were widely used in bronzes in the Shang and Zhou dynasties, and Taotie patterns were often used as the main patterns, Hui patterns were used as the ground patterns. The patterns during this period had a sense of majesty; during the Spring and Autumn Period and the Warring States Period, Hui patterns continued to be used, and the arrangement of the two sides or four sides appeared. At the same time, gold and silver wires or gold and silver pieces were inlaid and decorated, making Hui patterns more gorgeous; during the Han Dynasty, new material technology appeared, lacquerware, painted pottery, etc. gradually replaced bronzes, but Hui patterns did not develop; Tang Dynasty society prevailed in the rich and gorgeous style of Baoxiang patterns, tangled branches and other flower and grass patterns, and Hui patterns returned to the public's vision; Song Dynasty's theory of gold and stone set off an antique trend, which was in line with the aesthetic interests of the Song people. At this time, the decorative patterns began to show the trend of "the picture must be intentional, and the intention must be auspicious"^[2]. This period is divided into four types. The square-brush monomer type is a square monomer, extending outward through horizontal and vertical twists; the simple combination type reduces

the number of turning circles of the loop-shaped line, and the style is regular and simple; the positive and negative "∞" type is formed in reverse by the pen-brush combination type monomer, and the decorative style is lively and lively; a stroke-brush chain type is made with uninterrupted lines in one go^[3], Figure 2.

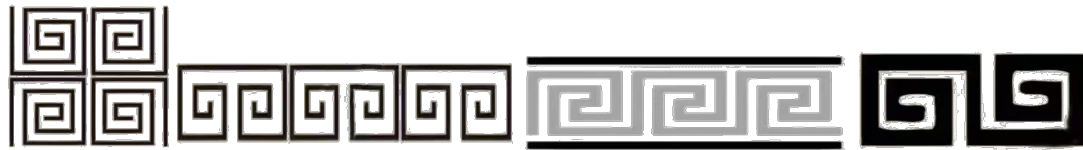


Figure 2.Four types of patterns.

6. Museum Space Design under the Influence of International Development Trends

(1) Space diversity display form

Museum space is a special cultural institution and a carrier of knowledge dissemination, and it is necessary to present culture and specific historical background to visitors.

First of all, from the perspective of exhibit furnishings and space tones, traditional patterns can be presented in categories such as clothing, porcelain, and cloth. In different regional spaces, the size of the furnishings should be fully considered. Secondly, the layout of the space should also be reasonable, and appropriate observation angles and dynamic lines should be considered. Finally, the research results of the exhibits, the cultural connotation of the historical background and other contents should be conveyed to the audience, so that the audience can be immersed in the scene.

(2) Multi-perception interaction and emotional design

Spatial multi-perception interaction mainly refers to interacting with the spatial environment through multiple perception methods, thereby enhancing the user's sense of immersion. For example, using modern interactive experience design in museums, users can perceive the details and atmosphere of exhibits; interactivity is also a way for museums to develop in accordance with the times and gradually adapt to conception, and users can freely interact with the spatial environment. Through the clever use of traditional pattern design elements, users' emotional reactions are triggered, making them resonate and identify.

(3) Museum design development trends

In terms of some foreign theoretical research on the combination of new media art and museum exhibition space, they tend to study the research results of the construction intervention and artistic nesting of emerging media technologies from the perspective of architectural symbols and planning schemes. For example, in the book "Media City: Media, Architecture and Urban Space" written by Scott McQuille, the application of new media technology in the development of cultural museums, proposed the concept of urban new media development. Domestic architects and scholars are gradually based on the historical background of the rise of information technology and local characteristics, and their requirements for visual aesthetics are getting higher and higher. According to statistics, 26,000 exhibitions were held in museums across the country in 2018, with 1.008 billion visitors, and gradually shifting from "food-oriented" to "people-oriented"^[4].

7. Design Practice

(1) How to refer to water and backline elements

Most of them use design techniques of different dimensions such as straightforward method, combination

method, and metaphor method. The straightforward method is to directly apply traditional Chinese patterns or other typical images to the space decoration design plan, and visitors can intuitively experience the application of traditional pattern elements; the combination method is to combine multiple traditional elements and modern elements through continuous combination and matching, and highlight culturality and modernity through the use of these characteristics; the metaphorical method deforms concrete pattern elements to form the rationalization and adaptability of space.

(2) The application concept of traditional Chinese patterns in museum space design

traditional Chinese patterns are the inheritance of culture and another interpretation of innovative design thinking. In the thousands of years of development of my country, traditional Chinese decorative patterns have diverse characteristics, including back marks and water ripples, etc. ^[5]. These different patterns are the highlights of the culture and carry unique symbolic meanings.

(3) Application practice of digital fusion space in museums

With the popularization of multimedia technology and the improvement of people's requirements for visual beauty, more intuitive and vivid information dissemination forms are needed. The design of interactive experience space integrated with traditional patterns is becoming more and more important in the presentation and application of design Figure 3.

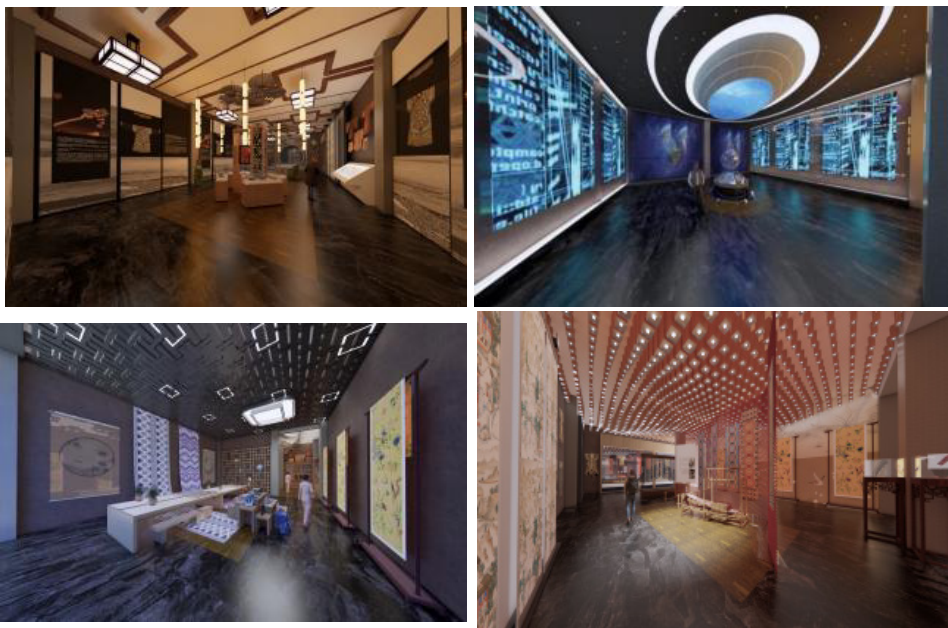


Figure 3. Partial rendering display

8. Conclusion

To sum up, as society continues to develop, museums face more challenges and updated choices. Seize opportunities, face challenges, accelerate your own transformation, create a new interactive museum, integrate with traditional cultural elements, constantly innovate, and give traditional patterns more possibilities for development, so as to better serve social progress and its own development. The combination of interactive exhibition and traditional culture will become an inevitable trend in the development of museum exhibition space design.

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