

# Color Dialogue between Tradition and Modernity: The Color Aesthetics of the Forbidden City and the Design Performance of Pantone Color in the Cultural and Creative of Museums

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**Abstract.** The integration of color aesthetics and Pantone color in the Forbidden City is an important dialogue between traditional aesthetics and modern design systems in the field of culture and creativity. This study takes the color system in the architectural paintings and cultural relics decoration of the Forbidden City as the research object, systematically sorts out the similarities and differences between it and the Pantone color card in terms of color origin, cultural expression and application practice, and reveals the complementary mechanism between the traditional mineral pigment chromatography and the modern standardized color value system. This paper aims to explore the similarities and differences in color aesthetics and their impact on the design of cultural and creative products by comparative analysis of "Color Aesthetics in the Forbidden City" and the application of Pantone color in the design of cultural and creative products in museums. This study uses the literature analysis method to systematically sort out the theoretical basis of traditional color aesthetics and the specific application cases of Pantone color in cultural and creative design. The study found that the color aesthetics of the Forbidden City focus on cultural inheritance and historical accumulation, while the Pantone color emphasizes modernity and fashion trends. Both show unique charm in the design of cultural and creative products, but each has its own focus. The conclusion points out that combining the advantages of the two can better meet the needs of different consumers and promote the innovation and development of cultural and creative products.

**Keywords:** Color aesthetics, Pantone color, museum cultural creativity, Forbidden City color, design performance.

## 1. Introduction

With their unique cultural genes and market transformation potential, museum cultural and creative products have become an emerging growth point for cultural inheritance and economic development. As the core language of visual communication, color assumes the dual functions of cultural symbol translation and emotional resonance construction in cultural and creative product design. The color system contained in the architectural paintings and cultural relics decoration of the Palace Museum has formed a color spectrum with the characteristics of the times through the scientific ratio of mineral pigments and plant dyes. For example, the colors presented by the layers of over dyeing process not only highlight the solemnity and elegance of the royal building, but also imply the color-making wisdom of "following the color image" in traditional chromaticity [1]. In contrast, the Pantone color system has built a color management paradigm in the field of modern commercial design through a standardized color card system and an annual trend color release mechanism. This dialogue between traditional and modern color systems provides an opportunity for aesthetic integration across time and space for contemporary cultural and creative product design.

In the practice of cultural and creative product development, the modern expression of color aesthetics in the Forbidden City faces the problem of adapting traditional color spectrum with modern production system. Although the color rendering characteristics of traditional mineral pigments have timeless quality, their production process is difficult to meet the needs of industrial mass production. The digital standard of Pantone color system based on CMYK and RGB color modes has the advantages of efficient production, but it is easy to lead to the loss of cultural meaning. This contradiction highlights the practical value of color system fusion research [2]. By establishing a

corresponding conversion model between the traditional color spectrum of the Forbidden City and the Pantone color code, it can not only maintain the recognition of cultural symbols, but also achieve a smooth transition from handicrafts to industrial design. This integration strategy can not only enhance the market acceptance of cultural and creative products, but also open up a new path for the modern expression of traditional colors at the technical level.

Domestic academics have carried out systematic research in the field of integration of traditional color aesthetics and modern color system. Scholars have excavated the symbolic symbols, material expressions, and cultural genes of the Forbidden City's color system, revealing the unique value of traditional colors in emotional communication and spatial narrative. At the same time, the researchers set their sights on the modern design context, and tried to establish a correspondence with the standardized system of the Pantone color card by deconstructing the hue, brightness and purity parameters of the Forbidden City [3]. For example, some studies have extracted the color spectra of mineral pigments in the architectural paintings of the Forbidden City through digital means, converted them into CMYK and RGB values, and provided cross-media color conversion schemes for cultural and creative product design. Existing research mostly focuses on the single-dimensional transformation of color elements, and lacks systematic discussion on the dynamic adaptation mechanism of color aesthetics and Pantone color in cultural and creative scenes.

## 2. Background

The color aesthetics theory of the Forbidden City is rooted in the deep soil of ancient Chinese natural philosophy and humanistic spirit, and its core is to construct a visual symbol system with cultural connotations through color. The color system with the "five-color view" as the core takes the five basic colors of red, yellow, blue, white and black as the core elements, and forms a unique aesthetic paradigm in the architecture, cultural relics and various cultural carriers of the Forbidden City through different combinations and layers. This color system not only carries the ancient Chinese cosmology of "the unity of heaven and man", but also shows the dual influence of Confucian etiquette and Taoist philosophy through specific material forms [4]. For example, the paints such as "stone blue" and "cinnabar" used in the architectural paintings of the Forbidden City are not only derived from the refining process of natural minerals, but also given specific symbolic meanings through documentary research. Through rigorous research, scholar Guo Hao's team accurately located and established a color spectrum of 384 traditional colors in the color system of the Forbidden City, so that ancient colors such as "sky blue" and "moon white" can be reproduced in the field of modern design [5].

Among the cultural and creative products launched by the Palace Museum, designers extract classic colors such as "Lang kiln red" and "secret color porcelain" from traditional color spectrums, and transform them into a malleable modern design language through digital technology. This approach not only maintains the purity of cultural genes, but also enhances compatibility with contemporary aesthetics.

The theoretical system in the field of international color research presents distinctive empirical characteristics. Western scholars have constructed a complete theoretical framework in the management of color standardization. In the field of color psychology applications, foreign studies have formed a mature user preference prediction system, such as analyzing the perceptual differences of color combinations in different cultural contexts through eye movement experiments and neuroaesthetic techniques. As the core framework of modern color management, Pantone color system theory realizes the accurate transfer of color in cross-media applications through a standardized color value coding system. The system uses the Pantone color card as the carrier to transform colors into quantifiable digital codes, thus providing a unified color language benchmark for the design field [6]. The Pantone color system is built on a deep combination of color science and market demand. Its color card system uses three sets of digital codes (such as Pantone 19-4052 TCX) to identify the printing ink ratio, textile fabric dyeing parameters and digital screen display values of

colors, forming a full-chain color solution covering printing, textile, digital and other fields [7]. This multi-dimensional quantitative management mechanism enables color to maintain a high degree of unity in creative design, manufacturing and market communication, and provides a methodological reference for the integration of Forbidden City color and Pantone color, especially in the study of color cross-media performance and audience cognition.

Cross-verification of domestic research and international experience shows that the modern transformation of color aesthetics in the Forbidden City needs to take into account the fidelity of cultural genes and the functionality of the color system. Existing research has achieved phased results in the digital collection of architectural paintings in the Forbidden City and the replacement of traditional pigments with modern materials, but how to inject the cultural narrative of Forbidden City colors into the standardization system of Pantone colors still needs to break through the cognitive gap between color parameter matching and cultural symbol translation. In the design of cultural and creative products, the hue and brightness characteristics of the traditional colors of the Forbidden City can be restored through the Pantone color value, and the color accuracy of large-scale production can be ensured with the help of its quantification mechanism. The intervention of this technical means not only retains the cultural connotation of traditional colors, but also enhances the practical value of modern design, providing a feasible path for the contemporary transformation of cultural heritage.

As a medium bridge between cultural inheritance and modern life, museum cultural and creative design has always sought a balance between cultural expression and market adaptability. Its core goal is to transform the history and culture carried by museums into cultural experiences that the public can perceive and participate in through design language, while ensuring that products can gain market recognition and commercial value. This process requires designers to dig deep into cultural connotations and achieve symbolic transformation and emotional connection through modern design methods. At the level of color application, museum cultural and creative needs to combine the traditional color system with modern aesthetic needs, which not only reflects the symbolic value of cultural origin, but also meets the dual expectations of contemporary consumers for visual experience and functional needs.

In terms of cultural expression, museum cultural and creative design needs to establish a systematic cultural interpretation framework. Deconstructing traditional colors from the perspective of semiotics can effectively refine the symbolic meaning and aesthetic value of cultural elements. Taking the cultural and creative design of the Jiahu site as an example, its color selection transforms the colors with special ritual functions in ancient times into cultural symbols in modern products through archaeological evidence and semiotic analysis, so as to realize the contemporary translation of historical information [8]. This process of symbolic transformation emphasizes the signifier and referent relationship of color as a cultural carrier, making the product a visual link connecting the past and the present.

Market adaptability requires that the design strategy should take into account the realization of functionality and commercial value. The modern transformation of traditional colors needs to follow the principles of modern design aesthetics, and improve the market acceptance of products through the comprehensive application of proportion, material and color psychology. The design case of Huxiang cultural and creative products shows that designers can use modeling methods such as "cutting, wrapping, twisting, pulling, and pulling" to reconstruct traditional colors and patterns, and combine natural aesthetic proportions and color psychology laws to harmonize regional cultural elements with modern aesthetic trends [9]. This transformation process is not a simple collage of elements, but a systematic design approach to achieve contemporary reconstruction of cultural symbols.

At the level of integration strategy between tradition and modernity, color, as the core medium of cultural dialogue, needs to establish a two-way intertextual expression system. The classic colors such as vermilion, golden, and blue in the color aesthetics of the Forbidden City can be digitally translated through the Pantone color system, which not only maintains the spiritual core of traditional colors, but also meets the requirements of industrial design for color standards. For example, the Forbidden

City Red (X9F0032) can be used to support the Pantone 18-1539 Classic Red, enabling color consistency in mass production through digital management of color parameters [10]. This transformation not only solves the application of traditional colors in modern craftsmanship, but also builds a visual dialogue across time and space through a standardized color system.

This paper uses the method of comparative analysis to systematically sort out the similarities and differences between the color aesthetics of the Forbidden City and Pantone color, and deeply explores the integration strategy of the two in cultural and creative products. In the research process, this paper focuses on the combination of theory and practice, and verifies the effectiveness and feasibility of the fusion strategy through specific case analysis. The research innovation is to propose a color fusion strategy based on cultural depth and market adaptability. This strategy breaks through the limitations of traditional color research that only focuses on formal aesthetics, and constructs a cultural gene decoding mechanism through empirical analysis of cultural and creative product development cases in the Forbidden City, providing an operational methodological framework for the integration of traditional color aesthetics and modern color system.

### 3. Literature Review

#### 3.1. Comparative Analysis of Color Aesthetics and Pantone Color in the Forbidden City

##### 3.1.1 Comparison of color sources

The color aesthetics of the Forbidden City and Pantone color show significant differences in three dimensions: origin, cultural expression and application practice, which stem from the differences in the historical background, cultural context and functional positioning on which they are based. The formation of the Forbidden City's color system can be traced back to the observation and refinement of natural objects in the pre-Qin period, and its color concept was deeply influenced by Taoist philosophy, the theory of yin and yang and the five elements, and Confucian etiquette. For example, the order of "vermillion" and "mysterious" colors corresponds to the cosmology of the unity of heaven and man, and the color of "green" carries the artistic conception of landscape painting and the elegance of literati. During the Ming and Qing dynasties, the court color system was further institutionalized through classics such as the "Code of Engineering Practices", forming the dual characteristics of naming with mineral pigments (such as "cinnabar" and "stone blue") and naming with natural images (such as "autumn fragrance" and "green onion") [11]. Its color evolution has always echoed the natural rhythm, etiquette norms and literati aesthetics of agricultural civilization, and has become an important carrier of symbolic expression of Chinese civilization.

The birth of Pantone color cards is rooted in the urgent need for color standardization in industrial civilization in the 20th century. The Pantone Matching System, launched in 1963, converts colors into accurate numerical codes through laboratory spectroscopic analysis and colorimetric theory, solving the problem of inconsistency in color transmission across fields such as printing and textiles. Its color naming eschews cultural metaphors and uses pure numeric numbers like "Pantone 19-1846 TCX," emphasizing technical neutrality and global circulation [12]. This color system based on scientific measurement is essentially a technical response to the process of modern design industrialization and globalization, and its core value is to eliminate the subjective bias of color transmission, rather than carrying specific cultural connotations.

At the level of cultural expression, the symbol system of the Forbidden City's colors is polysemantic and open. For example, "moon white" not only points to the textile processing technology, but also metaphorically refers to the poetic artistic conception of the clear moonlight; Colors such as "gold", "purple" and "yellow" became symbols of power through the hierarchy. Its color matching follows the traditional aesthetic principle of "weakening the contrast of complementary colors and strengthening the gradual strengthening of similar colors", paying attention to the harmony and unity of color and the shape and pattern layout of utensils, forming the aesthetic characteristics of "the extreme of splendor returns to the plain". Although Pantone color

incorporates social and cultural issues into some color series (such as "Pantone Color of the Year"), its main function is still focused on the quantitative management of color. Designers can accurately convert colors between different modes such as RGB and CMYK through Pantone color charts, which makes them indispensable standardized tools in modern design processes.

The difference in application practice is intuitively reflected in the functional focus of the two. The design strategy emphasizes the narrative and emotional resonance of color, and the color selection is often based on cultural relics or historical allusions, and reconstructs traditional cultural symbols through modern materials and forms. Pantone color plays a technical supporting role in industrial design, brand vision systems and other fields, such as Apple uses Pantone color charts to achieve global unification of product series colors, and architects use Pantone coding to ensure the color difference control of architectural skin materials. Although this standardization application weakens the depth of cultural expression, it greatly improves the design efficiency and the accuracy of cross-media communication. The essence of the difference between the two is the division between the traditional cultural symbol system and the modern technical system at the level of color cognition, and also provides a complementary path for exploring the modern expression of traditional culture.

### 3.1.2 Cultural expression contrast

As the core carrier of ancient Chinese court aesthetics, the Forbidden City's color system carries profound philosophical concepts and historical memories. Its color naming dimension is mostly based on natural phenomena, classic allusions and traditional color spectrum, such as "rouge purple" is derived from the raw materials of court women's makeup, "autumn fragrance color" echoes the phenological characteristics of the season, and "smoke blue" is in line with the artistic conception of literati ink painting. These names are not simple visual symbols, but construct a color discourse system of "unity of nature and man", conveying the symbolic meaning of "etiquette" and "auspiciousness" through the correlation between color, nature and humanities. In stark contrast, the Pantone color system uses numeric codes as a standardized naming method [7]. For example, the numbering system such as "19-4052 TCX" completely strips away the direct relationship between color and specific cultural context, and its naming logic focuses on the quantitative expression of hue, brightness, and saturation, which is essentially the product of modern industrial civilization's reproducibility management of color.

At the paradigm level of color matching, the colors of the Forbidden City present a strict hierarchical order and symbolic system. Taking the architectural color of the Forbidden City as an example, yellow glazed tiles symbolize the sole supremacy of imperial power, the red palace wall implies the meaning of exorcising evil spirits, and the green eaves correspond to the philosophical concept of "wood makes fire" in the five elements, forming a visual coding system of "representing etiquette with color". The color combination follows the hierarchical structure of "main color, auxiliary color, and embellishment color", and realizes the spatial narrative through the gradation of color brightness and purity.

The color aesthetics of the Forbidden City have accumulated the condensed color philosophy in the design of Ming and Qing court buildings and utensils, and its traditional color spectral system with "positive color" as the core carries the etiquette culture and aesthetic connotation. For example, the classic colors of the walls of the Forbidden City symbolize power and good luck. Its application in cultural and creative products such as silk scarves and jewelry needs to be combined with the transparency of modern materials to harmonize color brightness and saturation, and the texture integration of traditional mineral pigments and modern textile fabrics through digital printing technology in the design of cultural and creative products can be realized, so that the depth of culture can be concretely presented through color texture. On this basis, the precise color value management and global trend prediction function of the Pantone color system provide technical support for the modern expression of traditional colors. By establishing a corresponding conversion system between the traditional colors of the Forbidden City and the Pantone color card, the color consistency of cross-media design is ensured. This strategy has been effective in the development of beauty products of the Forbidden City, and the lipstick series not only retains the cultural imagery but also conforms to

the fashion trend of contemporary beauty products by deconstructing "Lang kiln red" and "moon white" into gradient color gradations in line with modern aesthetic trends.

### **3.2. Application of Color Fusion Strategy in Museum Cultural and Creative Products**

The application of color aesthetics and Pantone color system in museum cultural and creative design shows a significant difference between traditional aesthetics and modern design methodology. As the visual carrier of cultural symbols, the core of color integration strategy lies in building a value dialogue system between traditional aesthetics and modern aesthetics. Designers often transform traditional color spectra such as vermilion, gilt and dai blue into modern visual language through precise color extraction and proportional reconstruction. The Pantone color system is characterized by market-oriented trendy color prediction, and its application practice pays more attention to the standardization and commercial value of color in cross-industry design. The integration of the two is forming a new design paradigm. Some cultural and creative projects try to digitally compare the color system of the Forbidden City with the Pantone color card, and establish a modern color scale system of traditional color spectrum through color space conversion technology.

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## **4. Conclusion**

These practical examples reveal the core path of color fusion strategies: The modern translation of cultural symbols is realized through the deconstruction and reconstruction of color semantics; second, the digital color management system is used to establish the quantitative correlation between traditional chromatography and popular color systems; Third, with the help of materials science and digital technology, the perception dimension of color is expanded. The practice of cultural creativity in the Forbidden City shows that when traditional color aesthetics dialogue with contemporary design language through scientific color management tools, it can not only effectively activate the visual genes of cultural heritage, but also build a cultural symbol system with global dissemination.

It is found that the etiquette norms, philosophical connotations and natural views carried by the colors of the Forbidden City provide a profound cultural gene pool for modern design, while the standardized color language of the Pantone color system effectively solves the communication barriers of traditional colors in the digital age. The integration of the two not only realizes the modern expression of historical symbols, but also builds a visual bridge connecting cultural heritage and contemporary aesthetics. This integration strategy shows significant cultural expression effectiveness in the design of cultural and creative products.

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