

# *A Study on the Reproduction and Innovation of Dunhuang Fresco Colors in APP Interface Design*

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**Abstract:** Driven by the 5G era, ushering in the world of Internet of everything with artificial intelligence + cloud computing + big data, interaction design, new media design has been unprecedented development, and the innovation of APP interface design is imperative. Users not only pursue the practicality and functionality of interface interaction, but also pay more attention to emotional intelligence. Color is a powerful language to convey emotion, tone and atmosphere, and it has an important position in APP interface design. Dunhuang fresco color contains rich aesthetic and cultural connotations, and has a lot of creative space for APP interface design. Discovering the charm of Dunhuang fresco colors and applying them to APP interface design is a creative transformation of traditional Chinese culture and a new way of thinking for the innovative application of APP interface design. This study explores the reproduction and innovation of Dunhuang colors in APP interface design in a way that meets the needs and perceptions of modern people, digitizes Dunhuang culture, and spreads it all over the world through the Internet and cell phones, so that more people can understand the art of Dunhuang, thus realizing the living inheritance of Dunhuang culture.

## 1. Foreword

In the era of big data and fast pace, users will be flooded with massive information when they open their cell phones, and their brains need to process new information quickly. Reasonable use of color can better convey the features and themes of APP, make the product stand out in the fragmented information, and strengthen the user's memory. The first interaction between the user and the APP interface usually occurs at the color level, so the choice and application of color is crucial and needs to take into account the user's cultural background, emotional needs and the overall design of the interface. With the rise of the national trend, Dunhuang fresco colors are constantly being mined, forming their own unique performance charm, the urgent pursuit of consumers for spiritual and cultural products, so that the combination of traditional Chinese culture and modern art design has become an inevitable trend of design development, the combination of Dunhuang frescoes colors and APP interface design is to follow the fashion trend. Dunhuang mural color unique cultural connotation highlights the personality of the product, so that consumers close to the product, improve competitiveness. It is through the ancient and modern oriental aesthetics, a perfect embodiment of the interpretation of traditional Chinese culture for the field of artistic aesthetics, so the use of Dunhuang fresco colors in APP interface design can bring more creativity

and cultural connotation.

## **2. Dunhuang murals color art features**

### **2.1. Artistic sources of Dunhuang mural colors**

"A thousand years at a glance, a thousand years in an instant". Dunhuang is a treasure trove of art, shining with the light of history, a cultural exchange that transcends time and space. From the perspective of artistic origin, Dunhuang mural color includes two aspects. On the one hand, it is the origin and development of Dunhuang Mogao Grottoes. It was the fortress of the Silk Road, connecting the Middle Kingdom on one side and the Gobi Desert on the other. During the Eastern Jin Dynasty, a monk named Le Cong came to Mogao Grottoes across thousands of miles and excavated the first cave on the Sanqi Mountain to view Buddha's statue for cultivation, and Buddhism has taken root here ever since. Through the sixteen countries, the Northern Dynasties, Sui, Tang, Five Dynasties, Western Xia and other generations of construction, the formation of a huge scale. Early Dunhuang murals had a more practical than aesthetic function, and were actually intended to publicize Buddhist ideas. On the other hand is the origin and development of Dunhuang color. When people are in the Mogao Grottoes will be shocked by the color, the color acts as a bridge in the middle, making the murals have both cultural and artistic value. As early as in the Neolithic Age, colored pottery of the Half-slope Culture and the Majiayao Culture appeared. Beautiful patterns in ochre, black, white and many other colors were presented on the orange-red carcass, and from then on, colors began to be given meaning. From the first simple color decoration to the traditional Chinese "five-color system" of the pre-Qin period to the rich Dunhuang mural color is a continuous development, through the veins of history. Dunhuang frescoes have lasted for more than a thousand years, and the inheritance of color has never been interrupted. The colors of Dunhuang frescoes can be seen in the entire lineage of ancient Chinese color development, condensing Chinese art and history.

### **2.2. The cultural connotation of the color of Dunhuang murals**

Dunhuang murals reflect the Buddhist view of life, world view, but also recorded a lot of folk customs and stories, including a lot of national songs and dances food culture, it is more like a Chinese art history. Dunhuang color is a product of the combination of Buddhist culture, traditional Chinese color, and historical culture. First, Buddhist culture. Dunhuang murals were made to publicize the teachings of Buddhism, and each work vividly shows the story of a practitioner who became a Buddha. The reason why Dunhuang murals are so full of passion and fiery colors is precisely because of these painters' yearning for heaven and the spiritual realm. Second, traditional Chinese colors. Dunhuang colors have been inheriting and developing traditional Chinese colors since the Wei and Jin dynasties, and have undergone the cultural baptism of more than a dozen dynasties from establishment to maturity. The five colors in traditional Chinese painting originated from the five elements in the I Ching, generally refers to the five categories of green, red, yellow, white and black colors, in addition to the earth red, stone green, stone green is also commonly used in Dunhuang colors. Third, history and culture. Due to the different cultural atmospheres of the various dynasties, Dunhuang colors also show different emotional expressions, mainly with the Sui and Tang dynasties as the dividing line. Before the Sui and Tang dynasties, Dunhuang color is still in the early stages of development, mainly to the earth red as the base color, to the stone green as the auxiliary color, coupled with the black and white and gray toned, heavy and simple tone, color contrast is strong, and its cultural connotations are mainly derived from Confucianism. Sui and Tang dynasties is the heyday of Dunhuang color development, this period is also the country's

economy, culture, art unprecedented prosperity, the Silk Road friendly diplomatic relations, the Central Plains and the Western region more closely interact. Dunhuang murals in the use of color more bold, the emergence of a number of blue colors, the use of a large number of contrasting colors, adjacent colors, rich color levels, sharp and strong hues. After the Sui and Tang dynasties, China returned to a state of disintegration from the great unification, and the situation was turbulent, the use of color was fresh and elegant, and mostly used light colors such as blue, green and white. Dunhuang color through the test of the millennium is still glittering, is extremely gorgeous cultural treasures.

### **3. Dunhuang mural color reproduction and innovation in product packaging design**

#### **3.1. Reproduction design of Dunhuang mural colors in APP interface**

"Mountain splashed with indigo, water combed in blue, intertwined with emerald" Color can make people produce a mood, this is the psychological and emotional role of color. Dunhuang fresco color is precipitated thousands of years of color, it has a high degree of infectious force and the artistic charm of traditional Chinese culture. Combining Dunhuang mural colors with modern design can bring new artistic sense and innovative elements to APP interface. This cultural integration not only demonstrates the value of traditional Chinese culture, but also makes it more attractive in modern society.

##### **3.1.1. Increase product attractiveness**

With the explosive growth of information and diversified access to information, attracting the user's eye has become crucial. The Dunhuang frescoes are so attractive not because they use a lot of colors, but because they are unique in their color scheme. Contrast, complementarity and harmony make the Dunhuang frescoes dynamic and full, setting up a unique visual identity attribute for the product, which can instantly capture the user's attention. This visual impact helps to direct the user's attention to the important elements of the web page, be it products, services or information. This deep impression creates a distinctive imprint in the user's mind, establishing a long-term impact for the brand and product.

##### **3.1.2. Building a brand image**

Color emotion has a strong sense of stimulation and affects mood. The visual impact of color has an important impact on human perception and action. <sup>[1]</sup>Dunhuang colors have cultural connotations rooted in people's hearts, and designers can create a special emotional connection in the minds of users, and this kind of benign communication and emotional connection is of great significance to brand loyalty and user retention. Therefore, giving full play to the potential of Dunhuang colors in design can inject more cultural depth and emotional resonance into web design, allowing consumers to consciously produce associations, establish goodwill, establish a good brand image, highlight brand differentiation, and obtain traffic value.

##### **3.1.3. Creating Trends**

Colors have fashionable attributes and can create popular trends to a certain extent. For example, in recent years the more popular Klein Blue, Tiffany Blue, Hermes Orange and so on. Dunhuang color creates a visual contact point, which makes the resonance between the product and the consumer, emotionally accepting the product, and achieves the efficient dissemination of the attributes of Dunhuang color among consumers. The reproduction of Dunhuang colors in the APP

interface has the possibility of creating a popular trend. Firstly, from a stylistic point of view, it is a high-level color scheme of national style inherited for thousands of years with decorative properties; secondly, from a cultural point of view, it is a continuation of traditional Chinese culture, reflecting the development of traditional Chinese paintings; and lastly, from the point of view of value, the current research on Dunhuang colors is more extensive, but the creative conversion of Dunhuang colors into modern design applications has yet to be strengthened. Finally, from the value point of view, there are more studies on Dunhuang color, but the creative conversion of Dunhuang color and modern design application is still to be strengthened, so it is a potential treasure, which can inject a strong potential for APP interface design.

### **3.2. Innovative design of Dunhuang mural color in APP interface design**

Dunhuang color is the crystallization of the exchange of culture and time, the treasure of the integration of Chinese and Western cultures, and the source of aesthetic inspiration for designers. In-depth study of the innovative design of Dunhuang color in the APP interface, combining the artistic characteristics of Dunhuang color with the APP interface, from the user's point of view, can improve the sensory experience of the interface, reduce the distance between the product and the user as much as possible, and enrich the user's entertainment life.

#### **3.2.1. Take food interface design as an example**

Contemporary young people pursue both emotional and functional pleasure consumption, Dunhuang color and modern design, on the one hand, Dunhuang color to attract consumers with brilliant colors, on the other hand, to establish an emotional connection with consumers to improve consumer trust in food safety. First, Dunhuang colors have national attributes. "Ten miles of red makeup" is an ancient Chinese wedding ritual, red symbolizes joy and peace, this tradition has been used to this day, usually used in the wedding candy, cakes and cakes packaging. The use of Dunhuang colors in the food interface carries a sense of trust, which comes from the national cultural identity of the country, a kind of support from the heart. Secondly, Dunhuang colors have warm attributes. Food mainly to meet the physiological needs of people, in the case of the quality of the product, taste are similar to meet the emotional needs of consumers can create differentiation for the product advantage. Food interface in addition to vibrant multi-tone design to meet the consumer's individuality, but also warm colors to embrace the consumer's self-expression. Dunhuang color saturation is not high, so it can give people a warm, elegant feeling, in the fast-paced life brings a lot of pressure, there is a warm food is more able to bring consumers emotional comfort.

The use of Dunhuang fresco colors in food interface design can give the interface a rhythmic sense of beauty. In order to make full use of Dunhuang colors, first of all, define the main color. Different colors have specific symbolism and associations, so the choice of the main color needs to match the characteristics of the product or food. For example, the color yellow is suitable for snacks and snack products because it brings a feeling of deliciousness and pleasure. Green is often used to represent health and ecology, especially suitable for interface design related to organic food or healthy eating. Secondly, use the secondary colors. Auxiliary colors can better help the main color to express the content, and contrasting and neighboring colors enrich the picture to create a positive and warm appearance. For example, for the casual food packaging interface, you can use warm colors such as earth red and yellow as the main color, and then use auxiliary colors such as warm white, pink green and blue to embellish and balance the overall color of the interface. This collocation not only conveys the product concept, but also attracts the user's eye. The color composition of Dunhuang murals shows a certain regularity, no matter what kind of color matching,

can express the product concept.

### **3.2.2. Take the interface design of cosmetics as an example**

Cosmetics itself is the use of color to modify and beautify the human face. In cosmetic packaging design, color always occupies an important position because of its function of highlighting and beautifying the product. <sup>[2]</sup> In cosmetics APP interface design, color is also of great significance. First of all, Dunhuang color can enhance the corporate image. Good makeup is built on the basis of healthy skin. Therefore, consumers will be more attentive in the choice of cosmetics, corporate image and product quality complement each other, Dunhuang color cultural connotation to help create a good corporate image. Secondly, Dunhuang color can enhance the value of the product. Dunhuang mural color style and consumer expectations for the utility of cosmetics is very close to its use in cosmetic packaging more more able to impress consumers.

The application of Dunhuang colors from the consumer's psychology. Some consumers focus on its natural ingredients when choosing cosmetics. Dunhuang murals have a lot of green water and mountains expression, brown as the background of a large area of the use of stone green, stone green, the color sense of elegant and not lose the calm, will be applied to the cosmetic interface to meet the color aesthetic laws, fit the product of "natural safety". Some consumers will also pay attention to the brand grade when choosing cosmetics. Ordinary consumers pursue cost-effective mass brands and can use more lively colors; high-end consumer groups prefer gorgeous and noble texture. Dunhuang murals are often dominated by golden yellow, and their colors are applied to the interface of cosmetics, full of mystery and sacredness, which can meet the high-end needs of consumers.

### **3.2.3. Take the design of the interface for agricultural product promotion as an example**

In the context of rural revitalization strategy, it is imperative to strengthen the promotion of agricultural products and awaken the new vitality of agricultural products. The interface of agricultural products promotion can bring more attention to the agricultural characteristics of the brand, but also can shape a unique brand image, promote the industrial brand to all aspects of society, and trigger the consumer's interest in purchasing. <sup>[3]</sup> China has been an agricultural country since ancient times, and agricultural Chinese language has a long history, which is consistent with the development of Dunhuang mural color in the long history. Dunhuang mural paintings are rich in color, and their pigments are mainly mineral pigments, natural gems and so on. Therefore, the early Dunhuang colors were mainly paired with earthy red, blue and green, contrasting, balanced, rhythmic and unified, with a simple and mellow interest, in line with the product attributes of agricultural products. The use of Dunhuang colors in agricultural products is actually a blend of national cultures, conveying local friendship, consumers will have a sense of intimacy when they see the goods, guiding consumers to consume.

For fruit products, we can use the intrinsic color of the fruit as the main color to highlight the visual recognition value of the product, which can let users recognize the type and characteristics of the product at a glance. For vegetable products, we can choose green as the main color to reflect the freshness and health characteristics of the product. Green represents the vitality and energy of nature, which complements the healthy attributes of vegetable products. For coarse food products, we can use Dunhuang five colors to match, Dunhuang five colors come from the earth, in line with the growth characteristics of coarse food. Using this traditional color in the APP interface can give people a sense of natural simplicity, and give a unique cultural connotation and brand value to the coarse grain products.

## 4. Conclusion

In recent years, the Forbidden City series, Li-Ning "Wudao" series, flowers and other national brands continue to popularity, is the publicity of national culture, for the national cultural self-confidence to add bricks and mortar. Dunhuang fresco colors in product packaging reproduction and innovative design is actually for the inheritance and development of traditional Chinese culture, design forms, but the lack of cultural connotations of the design must be "floating weeds without roots, between the river and the sea". Dunhuang mural color is the fruit of the Chinese earth, no matter its historical value, cultural value or artistic value are worth exploring. Dunhuang colors used in APP interface design on the one hand is to realize the creative transformation and innovative inheritance of traditional culture, through the universal fashion consumption to develop an effective shortcut, so that Dunhuang culture "live" up. On the other hand, in order to meet the needs of users for emotional intelligence, human-centered user interface design can better achieve the communication between the product and the user. Dunhuang color has a deep cultural connotation and color emotion, equipped with APP interface design, making the product more humane, more understanding of the human heart.

In summary, this study provides an innovative path for the integration of traditional culture and modern technology. There are fewer cases of Dunhuang color design applications, so there is a lot of space for research on the reproduction and innovation of Dunhuang mural colors in mobile APP interface design. This study explores the application of Dunhuang colors from a completely new perspective, which is the fusion of culture and science and technology, so that the Dunhuang culture can form an interaction with the user's perception, emotion, and behavior, and establishes an innovative model for the fusion of cultural heritage and new technology to achieve the fusion between traditional culture and Dialogue between traditional culture and modern civilization, so that more people understand Dunhuang culture, renewing the vitality of traditional culture in the new era.

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