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# Study of Color Configuration of Dunhuang(敦煌)Grottoes(石窟) Murals(壁画) in Tang Dynasty under Traditional Chinese “Five Colors” View of Color System

<sup>1</sup>Chun Wang, <sup>2</sup>Albert Young Choi

<sup>1</sup> Doctoral Candidate., Dept. of Visual Communication, Hanyang Univ., Korea

<sup>2</sup> Prof., Dept. of Visual Communication, Hanyang Univ., Korea

E-mail: 844690517@qq.com, aychoi@hanyang.ac.kr

## Abstract

Dunhuang murals are one of the most outstanding achievements in the art of traditional grotto painting in China, and are known as a “Wall Museum”. As a representative of the heyday of Dunhuang murals, an in-depth exploration of Dunhuang murals from the perspective of color will help researchers understand the laws and connotations of color in Dunhuang murals during the Tang Dynasty and fully grasp the art of Dunhuang murals. The color system of the traditional Chinese “Five colors” concept expresses the cultural attributes and emotions of the Chinese people and has distinctive national characteristics.

This thesis provides a theoretical grasp of the traditional Chinese “Five colors” view of color system, the Dunhuang murals of the Tang Dynasty, and the color configuration of the color composition principles, and uses the modern design principles of color composition to conduct an in-depth analysis of the configuration of the Dunhuang murals’ use of color. Explore the unique characteristics of Tang Dynasty Dunhuang murals, and help modern designers master richer color application techniques by learning from and studying the harmonious patterns of Dunhuang murals to provide a new path for the dissemination of excellent Chinese traditional culture.

**Keywords:** Tang Dynasty Dunhuang Murals, “Five colors”view of Color system, Color composition, Color configuration

## 1. INTRODUCTION

### 1.1 Research Background and Purpose

In the 3rd century AD, the Dunhuang region was influenced by foreign Buddhist culture, which was combined with the local traditional culture of Dunhuang and the traditional culture of the Central Plains to form the most representative form of Buddhist art in the process of nationalizing Chinese artistic identity, resulting in the longest, richest, most extensive and best-preserved treasure trove of Buddhist cave art in ancient caves in world history[ 1 ]. Among the Chinese painting arts, the most emblematic of the Chinese approach to color is the Dunhuang murals. The Dunhuang murals are the best example of Chinese painting’s approach to color, with their richness, variety of hues, regularity of color use, and delicacy of color, all

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Corresponding Author: [aychoi@hanyang.ac.kr](mailto:aychoi@hanyang.ac.kr)

Tel:\*\*\*-\*\*\*\*-\*\*\*\*

Professor, Dept. of Visual Communication, Hanyang Univ., Korea

reflecting high artistic and aesthetic value[ 2 ].

The application of the traditional Chinese "Five colors" view of color system and modern color composition theory to the analysis of the color configuration of the Tang Dynasty Dunhuang Mogao Grottoes Murals expresses the essence of Chinese culture in terms of cultural heritage. It not only gives Dunhuang murals a national character, but also gives the world a better understanding of Dunhuang murals and Chinese traditional color culture.

### 1.2 Research Scope and Methods

The focus of this paper is on the color of the murals in the Dunhuang Mogao Grottoes of the Tang Dynasty (rather than on the color of the Tang Dynasty after oxidative discoloration), because the colors of the murals in the Dunhuang Mogao Grottoes of the Tang Dynasty that can be seen today have largely oxidized and changed, and there is a need to study the color of the murals in the early Indian grottoes and Xinjiang grottoes, as well as early Chinese paintings. In order to explore the color performance of the murals in the Dunhuang Mogao Grottoes of the Tang Dynasty before they changed color, as well as their intrinsic laws of expression and artistic value.

This paper begins with the collection of relevant materials, reading books and literature on color and its cultural and historical development, and the mastery of the traditional Chinese "Five colors" view of color system and the principles of modern design color composition. A detailed comparison of the color block classification of the Tang Dynasty Mogao Grottoes murals summarizes the color configuration characteristics and color patterns of the Tang Dynasty murals, deepening the understanding and perception of traditional Chinese formal beauty and enriching the aesthetic experience.

## 2. THEORY

### 2.1 Overview of the traditional "Five colors" view of the color system

The color system of the traditional Chinese "Five colors" view of color system that has been increasingly perfected by the ancestors in their long-term practice and accumulation of life, in combination with their concepts of nature and society. The color structure of cyan, red, white, black and yellow appeared very early in the Chinese civilization, and matched with the five elements of wood, fire, gold, water and earth, which also reflected the philosophical thinking of ancient Chinese culture (Table 1).

**Table 1. Overview of Five Elements**

Traditional Five colors	White	Cyan	Black	Red	Yellow
Five Elements	Gold	Wood	Water	Fire	Earth
	Represents nobility, wealth and power.	Represents vitality and health.	Represents clarity and purity.	Represents enthusiasm and vitality.	Represents stability and reliability.
Five Elements Characteristics	This color is bright, magnificent and dazzling.	This color is warm, comfortable and natural.	This color is crystal clear, elegant and fresh.	This color is bright, warm and strong.	This color is heavy and solid.

	Gold is often used as a royal symbol.	Wood is often used to describe the revival of life in spring, and is a color of hope and vitality.	Water is often used to symbolize purity and longevity.	Fire is often used to symbolize the passionate pursuit of life and effort.	Earth symbolizes solidity and security.
Five Elements Symbols	The gold symbolizes wealth, light and auspiciousness.				

Integrate the Chinese people’s understanding of the universe, philosophy, ethics and other ideas under different natural conditions in the color to form a traditional color culture with local Chinese characteristics[ 3 ].The traditional Chinese five colors are the five monochromatic colors formed by the two colors black and white and the three colors red, cyan and yellow as the positive colors. The five colors are strung together with the five emperors, the five gods, the five elements and the five virtues to form the five elements theory (Figure 1). The ancients finally chose the three primary colors and the most dialectical black and white in the color system today to form the unique colorless system of ancient China centered on yellow. This color system is very solid in the hearts of Chinese people and has a very important social status[ 4 ].

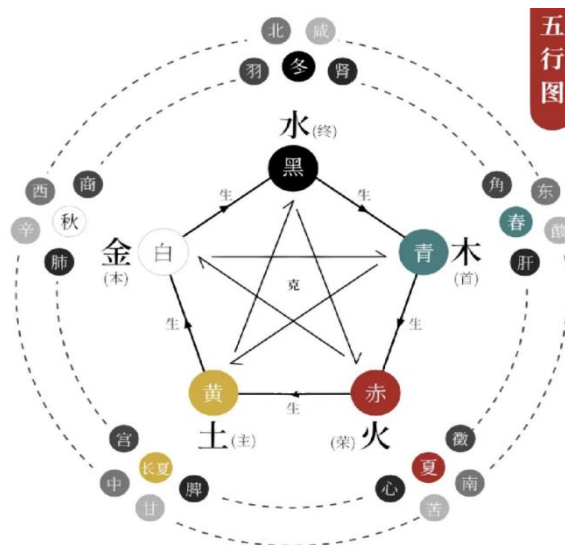


Figure 1. Five Elements Chart

**A. Origins and Development**











The Chinese concept of five colors originated from the primitive clan society's reverence for color, which sprouted in the Yin and Shang periods of the slave society, formed in the pre-Qin period, and perfected in the Qin and Han periods. From the very beginning, the five colors did not only refer to the five colors, but were more of a cultural carrier. In the Qin and Han dynasties, influenced by religion and other aspects, the understanding of the five directions was combined with the worship of the five emperors and the five gods. From the Zhou dynasty onwards, the ruling class began to start from the concept of ritual hierarchy, and made the five colors representing the five elements the proper colors[ 5 ]. The five colors are still alive in our real life, and are the solid aesthetics of the Chinese nation, as well as the essence of Chinese traditional culture.

**B. The association and symbolism of the “Five colors” view of color system symbols**

People have a direct response to the psychological reactions and emotions of color. The figurative five colors make people associate with objective things, just as cold colors make people calm and rational, and warm colors give people a sense of warmth and harmony. And color symbolic association and symbolism is a complex system, that is, through the color of the appearance of people with different aspects of thought, philosophy, emotion, experience and other psychological associations. Under the symbolic association of color, each of the five colors has its own emotional expression(Table 2).Through the long-term accumulation of practice, the ancients used the symbolism of color as well as the application of color performance, color matching through the physical laws of color and the intrinsic significance of color, which not only presents the instinctive impulse to the original color, but also reflects the intrinsic need for color instinct.

The early “black, white, red, cyan, yellow” five monochromatic colors is the accumulation of the most direct feelings of the ancients to the natural color.Early in the Neolithic period unearthed colored pottery in color is mainly red, black, white mainly monochrome decorative pigments, then people use pigments from nature’s hematite extracted. In ancient times, red represented blood, as the source of life[6].After that, people extracted the color “Cyan” from natural grasses and trees, and symbolized the direction from which the sun rose - the east. In the ancient Chinese primitive color concept, the worship of heaven and earth has the saying “Heaven, earth and yellow”.

**Table 2. “Five Colors” view of the color system symbols**

Trandit i-onal Five colors	White	Cyan	Black	Red	Yellow
Use of Colors					
Color Selecti on					
Color Symbo lism	White was regarded by the ancients as the basic color, corresponding to the West among the Five Directions, and the God of the West is the White Tiger.	Cyan is a color that wanders between blue and green in the traditional Chinese color spectrum. Mostly it symbolizes good luck and harmony, giving people a quiet and indifferent psychological feeling. Chinese Taoist philosophy believes in the	In traditional Chinese culture black has the connotation of sternness and righteousness, and was once the color of the emperor in the Qin Dynasty. As the darkest color on the color scale, black can easily cover other colors. Black symbolizes deep,	Red was the first color worshipped by the first people. It is the color of power and nobility in political culture. It represents authority and solemnity. It is also regarded as the cultural and spiritual totem of the Chinese people. Reflects the long history	Yellow has been the exclusive color for emperors in feudal China since the Song Dynasty. It has noble and auspicious cultural meanings, signifying warmth, splendor, bountiful harvest and hope, and is

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power of nature, and the color closest to nature is cyan, so cyan is used as a visual symbol of the “unity of heaven and man”.	heavy and mysterious.	of conversion of Chinese color symbols, deep cultural content and rich psychological meaning.	one of the elements and symbols of the inception of civilization.
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## 2.2 Dunhuang Murals of the Tang Dynasty

### A. The Prosperous Period of Tang Dynasty Mural Painting

The Tang Dynasty was the most prosperous period in Chinese history. The Mogao Grottoes at Dunhuang are the richest and most extensive of the surviving murals from the Tang Dynasty. The use of color in Dunhuang’s murals reached a technical peak during the Tang Dynasty, and a large number of works are shown in exquisite color. The scale, quantity, style, and artistic level of the work is even more praiseworthy, giving a strong visual impact with its unique lines and colors, thus causing a psychological resonance in the viewer. The Tang Dynasty was also the heyday of China’s painting. All kinds of painting subjects embodied the style of rich colors and grandeur, showing the prosperity of the Tang Dynasty everywhere.

### B. The Color Uniqueness of Dunhuang Murals in the Tang Dynasty

Dunhuang murals of the Tang dynasty have a very important place in traditional Chinese painting, with their two outstanding features of strong visual impact: line and color. Professor Huang Jun suggests that “Color is one of the important features of the art of Tang Dynasty Dunhuang murals, which inherits the symbolic, decorative, and color-changing techniques of traditional painting and creates the beauty of color in Dunhuang art.”[7]. Tang Dynasty Dunhuang murals have their own characteristics in terms of performance, it is rich and varied in color, giving people a brilliant and colorful visual impact, in the practical use of color, gorgeous colors, graceful and luxurious. The expression is real and delicate, and the conception is rigorous and thorough[8].

## 3. ANALYSIS OF THE COLOR CONFIGURATION OF DUNHUANG GROTTOES MURALS IN THE TANG DYNASTY

### 3.1 Definition of color configuration

Color configuration is in a certain sense the arrangement of colors and the arrangement of different colors, in order to achieve a specific purpose, to comply with certain rules of re-matching and combining to form a new color. The boundary between the color configuration of painting and the color configuration of design has become increasingly blurred in modern times. The only prominent difference between the two is that the color configuration of painting focuses more on reproducing reality, while the color configuration of design focuses more on reflecting abstract beauty, but their theoretical guidance is the basic theory of modern color composition.

### 3.2 Dunhuang Mural Color Configuration

By collating prior research findings, in the study of Chen Jiangxiao master’s thesis, analyzes in detail the color configuration of the Dunhuang Mogao Grottoes Murals, and combines the basic principles of

contemporary color with case studies of the color settings of several grottoes[9],as well as in-depth research on the color ratios, color use, color application techniques, and the production of grotto battles.

The three perspectives of color expression are described in terms of homogeneous, similar,and contrasting colors.

### A. Same Color Configuration

This type of color configuration is more common in the early grottoes murals at Dunhuang. In Grotto 428(Figure 2), of the Northern Zhou Dynasty, there is basically no major change in color throughout the entire mural, with the figures covered in black, white, and gray, all three of which are uncolored. The base color is the natural earthy red of the walls after baking, and the large area is a single earthy red and colorless configuration that emphasizes the antiquity and majesty of the building and the deep solemnity of the Buddhist Bodhisattva Vajra, which is also visually striking. Not only did the Dunhuang murals of the Northern Zhou period use such a color configuration, but the murals of the Northern Wei period also used such a color configuration. Grotto 254 (Figure 3),of the Northern Wei Dynasty, a large area of varying degrees of gray in the configuration of white and different levels of blue, the whole picture makes people feel unified, quiet, steady in a vivid, elegant and lively.



Figure 2. Grotto 428



Figure 3. Grotto 254

### B. Similar Color Configuration

Similar color configurations are a combination of similarly colored concentrations, commonly seen in Dunhuang murals painted during the Yuan dynasty, such as Grotto 95 (Figure 4), where pink, purple, red, and orange-red colors are mixed over a large area, then paired with large areas of black, white, and gray colorless, complemented by changes in brightness, bright and lively without losing stability. In addition to similar colors in the red family, yellow-green is also a classic color configuration for Dunhuang murals, as in Zhong Tang Grotto 195 (Figure 5), where yellow-green of varying brightness is paired with black and gray to highlight the calm and generous nature of the figures in the murals. As a color close to nature, yellow-green is also in line with China's ancient "Five colors" view of color system.



Figure 4. Grotto 95



Figure 5. Grotto 195

### C. Contrasting Color Configuration

As ancient Chinese painting by the “Unity of Heaven and Man”, and philosophical of “Harmony” thinking is more serious, so Dunhuang mural paintings in the strong contrasting color configuration of the early and not uncommon, the most classic is a variety of color contrast configuration, such as white, red, green, The most classic is the contrasting configuration of multiple colors, such as white, red, green, azure, pink five color scheme. Grotto 303 from the Sui dynasty (Figure 6), where the color effect is strong and lively, rich and powerful. The use of large areas of black, brown-black and darker red with bright blue and white feels majestic, deep and explosive.

The 180-degree contrasting color configuration on the color ring is one of the most common strong contrasting color configurations in Dunhuang murals. At right, Grotto 290 of the Northern Zhou Dynasty (Figure 7), with a flat-topped flying celestial. The two opposing color configurations of blue-violet and orange-violet and orange-yellow with bright white, light gray and deep black, with great contrast between light and dark, give the overall effect of bright and loud, giving a sense of primitive, brash, etc.

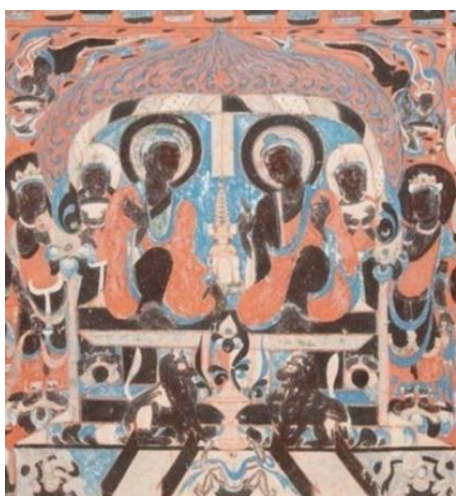


Figure 6. Grotto 303



Figure 7. Grotto 290




### 3.3 Overview of the traditional “Five colors” view of the color system

Generally speaking, the principles of color matching for murals vary on top of different grottoes, and through archaeological research, several principles of color configuration for Dunhuang murals have been summarized.

#### A. Red, Green and Blue Configuration

Pink or clay backgrounds are the most common color scheme in the Dunhuang Mogao Grottoes Murals, matching red, green, and blue. Red and green are also more common with their matching color configuration rules (color scale 1). Red and green, a complementary relationship, red and blue is a contrasting relationship between the three colors when juxtaposed with strong contrasts, bright and colorful (color scale 1-1). In addition, the murals in the Mogao Grottoes at Dunhuang often use earthy red with blue-green for a more brilliant picture with strong light effects [10]. For example, in Grotto 237 of the Middle Tang Dynasty (Table 3), the figures are dressed in large earth-red robes with bright green belts and headbands, and light blue and bright green on the earth-red robes, which show the silk texture and luster very well.



**Table 3. Grotto 237**

Grotto 237	Color scale1	Color scale1-1
		

**B. Green and Blue Configuration**

Blue gives a sense of calm and simplicity, while stone green gives a sense of lightness and freshness, and the two together give the effect of calmness with lightness and freshness with simplicity. The green water and green hills of the Dunhuang Mogao Grottoes murals are colored with stone green for the stone base and stone green for the stone moss, giving a wonderful sense of both thickness and lightness(color scale 2). For example, the landscape paintings in Grotto 45 during the Five Dynasties and Ten Kingdoms period(Table 4). The large area of green hills and water on the clay background with pink walls and blue tiles show a smooth and peaceful, fresh and elegant idyllic scenery.

**Table 4. Grotto 45**


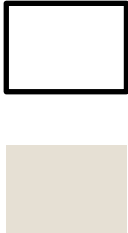

Grotto 61	Color scale2
	

**C. Yellow and Red Configuration**

Yellow pigments are used less frequently in the Dunhuang Mogao Grottoes murals, but were used more often by ancient painters in the Tang period. When dealing with the base color of the Dunhuang Mogao Grottoes Murals, clay or powder was used as a base color in most cases, and only in the early frescoes was an earthy red used as a base color. In the Dunhuang Mogao Grottoes Murals, yellow was not reused by ancient painters, may also be because yellow and white hue is closer, not easy to distinguish(color scale 3). but if the professional increase the contrast between the two sides of the color, the color is much brighter. Thus avoid the yellow and white color direct ratio(color scale 3-1), in this case can play a complementary effect of the strengths and weaknesses. For example, "Lotus Child" on the north side of the niche outside the west wall of Grotto 329 in the early Tang dynasty (Table 5).





**Table 5. Grotto 329**

Grotto 329	Color scale3	Color scale3-1
		

**D. Gold Accents**

In the Dunhuang Mogao Grottoes Murals, in order to show the opulence of life at the time, ancient painters would often use gold as a decorative color or to embellish. Thus the use of gold in the Dunhuang Mogao Grottoes Murals is very common, but in order not to show, gold is mostly used in small places for embellishment, to play a decorative role in the gold by the light, it will give off a sense of bright glow, and when it is backlit, gold will be mixed with a gray color. Such special characteristics create the quality that gold can be matched with many colors, so gold can be formulated with both blue and green pigments, and can also be combined with red and yellow pigments. For example, in Grotto 61 (Table 6) (color scale 4), the twenty-eight constellations and the twelve palaces are decorated with golden sleeves, breaking the dull effect of a large area of gray and black with a more subdued blue and light green configuration, making the picture full of a mysterious and sacred feeling.

**Table 6. Grotto 61**

Grotto 61	Color scale4
	

**4. CONCLUSION**

Dunhuang murals of the Tang Dynasty are a splendid treasure of ancient Chinese painting, and the color characteristics embodied in Dunhuang murals of the Tang Dynasty have had a profound impact on later generations of painting. In this paper, we analyze the color configuration of Tang Dynasty Dunhuang murals based on the traditional Chinese "Five colors" view of color system and modern design color composition principles, and gain a deeper understanding of the history of color development in Tang Dynasty murals.

As an important part of China's traditional painting, the study of color in Tang Dynasty Dunhuang murals

can not only make up for the lack of theoretical research in the field of painting in China, but also bring a lot of useful inspiration to modern art design. From a realistic point of view, this is an attitude towards national culture. Chinese painting is based on emotion, and the emphasis on emotion inevitably pursues the expression of mood, forming an artistic system of realism. Embodied in the Dunhuang murals, the expression of emotion in color and the decorative nature of the picture. The murals use a lot of primary colors, simple and bright and reveal strong contrasts, and pay great attention to the unity and harmony of colors on the screen, giving the overall feeling of intensity and magnificence, so that people can not help but have a sense of admiration. There is much more to be discovered and absorbed from the Dunhuang murals. It is a concentrated expression of the spirit of traditional art, which we must learn from and carry forward. The color of Dunhuang murals from different eras can reflect the aesthetic ideals of different eras, and the principles and laws of color matching are a concrete reflection of color. Combining the color configuration characteristics of Dunhuang murals with contemporary art design can produce many new visual elements with a sense of beauty. By drawing on and learning from the harmonious and unified patterns of Dunhuang murals, we can help modern designers master a richer range of color application techniques that can be practically applied while appreciating Dunhuang art.

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