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Color Characteristics of Traditional Chinese Auspicious Patterns

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Abstract:
This study aims to investigate the color characteristics of traditional Chinese auspicious patterns. Qualitative analysis was used in this study. The analysis is mainly carried out using the observation method combined with color expertise. By analyzing the hue, brightness, saturation, and contrast of the colors in auspicious patterns, people can better understand the color characteristics of auspicious patterns. The study found that auspicious patterns are commonly used in six colors: red, yellow, blue, green, orange, and pink, and the most commonly used main colors are red and yellow. They are colorful, vivid, bright, and contrasting. In addition, the color analysis model of auspicious patterns, referred to as the HBSC model, is summarized. It can be used in color analysis of a single pattern or some patterns of the same type, and the specific steps of their analysis are explained in this study. It sets the standard of each analysis item scientifically according to the professional knowledge of color to ensure the objectivity of its analysis.

Keywords: Chinese tradition, auspicious pattern, color characteristics, color analysis.

中国传统吉祥图案的色彩特征

摘要：
本研究旨在探讨中国传统吉祥图案的色彩特征。 本研究采用了定性分析。 主要采用观察方法结合色彩专业知识进行分析。 通过分析吉祥图案色彩的色相、明度、饱和度、对比度，人们可以更好地了解吉祥图案的色彩特征。 研究发现，吉祥图案常用红、黄、蓝、绿、橙、粉六种颜色，其中最常用的主色是红色和黄色。 它们色彩丰富、生动、明亮、对比鲜明。 此外，还总结了吉祥图案的色彩分析模型，简称 HBSC 模型。它可用于单个图案或同一类型的某些图案的色彩分析，本研究解释了其分析的具体步骤。 它根据色彩的专业知识，科学地设定各个分析项目的标准，保证其分析的客观性。

关键词：中国传统、吉祥图案、色彩特征、色彩分析。

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1. Introduction

Chinese traditional auspicious pattern art is the result of the cultural accumulation of the Chinese nation for five thousand years, and it is an essential embodiment of traditional culture and national art. "Auspicious patterns" are patterns that contain good wishes or blessings. It has a long history from the primitive period; during the Song Dynasty, several elements of the combination of particularly significant patterns appeared, and the Ming and Qing Dynasties developed the most prosperous and used today. This study examines these auspicious patterns often based on auspicious animals, plants, and auspicious characters. Its use can be divided into daily, celebration, and festival classes. The most common types of auspicious patterns are paper cutting, New Year pictures, embroidery, and engraving (Liu & Li, 2022).

Most traditional auspicious patterns are bright, strong, and gorgeous in color, which express an auspicious celebration and have solid artistic appeal (Shen, 2022b). The red, yellow, blue, black, and white of traditional Chinese auspicious patterns originated from the theory of the five elements, which were the "normal colors" of auspice and auspice by the ancients. It was an essential criterion for the use of colors in Chinese traditional art (Yang, 2020). Figure 1 shows an auspicious pattern "Nian Nian You Yu" with fish and lotus in the pattern. The moral is that life will be rich every year in addition to its colors, including black, white, red, blue, yellow, orange, pink, rich, and bright colors.

Figure 1. Auspicious pattern "Nian Nian You Yu" (The authors)

This study uses the qualitative research method to analyze ten typical auspicious patterns in detail from the aspect of color, and a conclusion is drawn. The color setting of traditional Chinese auspicious patterns is similar to that of most folk arts and crafts and pays more attention to the contrast of color matching, area, hue, and brightness (Yang, 2020). There are references to color matching, hue, lightness, and contrast. Color has three basic properties, namely hue, brightness, and saturation; therefore, the factors related to color are hue, lightness, saturation, and contrast. The research is carried out from these aspects, the corresponding characteristics are obtained, the color characteristics are summarized, and the pattern color analysis model is deduced according to the research process.

2. Literature Review

Most studies on the characteristics of Chinese traditional auspicious patterns are devoted to their source development, classification, and creation, but few are devoted to the angles of color characteristics. There are some sporadic contents in books and literature but no specific studies. Color collocation commonly uses five colors and their bright, intense, and gorgeous characteristics (Shen, 2022a). The Chinese traditional auspicious pattern color view can be called the "five-color view," with blue, yellow, red, white, and black representing all colors. Red, yellow (or gold), cyan (blue or green), and other popular colors have become almost indispensable in traditional auspicious patterns (Yang, 2020). The five colors are traditional Chinese and the most commonly used for auspicious patterns. Traditional auspicious patterns are the pursuit of prosperity and joy in the contrast of colors and pay attention to harmony and unity; the overall color effect is bright, warm, relaxed, and bright (Shen, 2022b). Here, we talk about color matching and how it looks. However, these studies only make some points and do not conduct specific research. There are a few mentions of color characteristics in some books and literature because no researchers have performed particular color analyses; therefore, the research should be more comprehensive.

2.1. Color Attribute

The three attributes of color are the basis of the definition of color sensory recognition, and the flexible use of the changes of the three attributes is the basis of color design (Yu, 2019). When humans recognize color, they first recognize hue, lightness, and purity.

Hue refers to the texture and appearance of the color, which is the standard for distinguishing various colors. In other words, hue is the color we usually see.

Purity, also called saturation, is the brightness of the color; simply put, the color people see is pure or not pure, bright or not bright, but also for the visual feelings of people's eyes.

Brightness refers to the brightness of the color. The visual feeling of the color is bright or dark. It represents the brightness of the light. Adjusting brightness is equivalent to adjusting the amount of light by adding white light.

2.2. Color Contrast

It refers to the strength between colors; generally, the more substantial the contrast, the stronger the visual impact. People can use the color palette to better understand the contrast of colors. Figure 2 shows a full-color palette. On this color ring, there are roughly five colors that can be distinguished according to the angle

(Yu, 2019):

A. In the range of 15 degrees, they can be called the same colors; the colors are relatively similar. Close color pairs are weak, such as green and grass green, red and orange, and yellow and medium yellow.

B. It can be called the neighboring color in the 15-45-degree range. The color is relatively close. Therefore, the neighboring color contrast is not strong, such as green and blue, red and orange, and yellow and green.

C. When the span between two colors is 120 degrees, it can be called a contrasting color. People can have extreme contrast, for example, green and red or yellow and blue.

D. When the span between the two colors is 180 degrees, it is a complementary color, and the two colors can be called complementary colors. The distance between these two colors in the hue ring is the farthest, the most intense contrast, and also called a contrast color. Like red and blue, yellow and purple, green and rose.

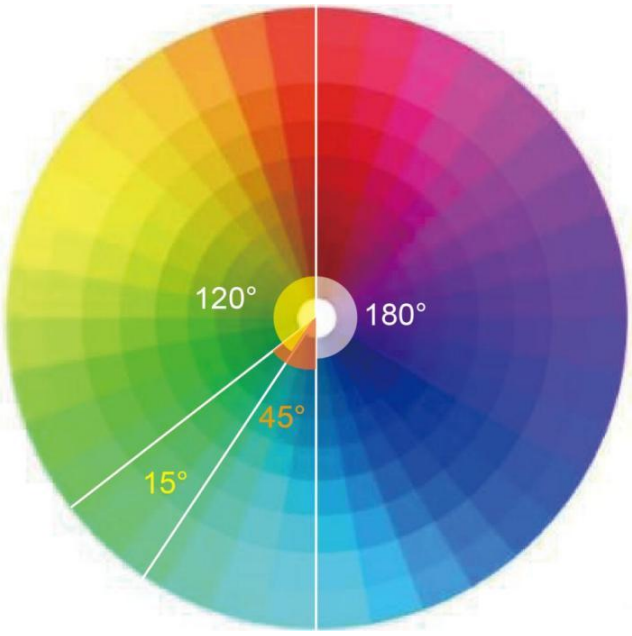

Figure 2. Panchromatic disk (The authors)

3. Research Method

3.1. Variables in the Study

The color characteristics of the pattern are determined by the hue, brightness, purity, and contrast of the pattern color. Therefore, color characteristics are dependent variables, and hue, brightness, purity, and contrast of the pattern color are independent variables. Pattern color characteristics can be summarized from the analysis of these independent variables. The following table illustrates the variables used in the study and the specific analysis.

Table 1. Analysis of variables in the formal characteristics of auspicious patterns (The authors)

Dependent variable	**Independent variable**	**Analysis of independent variables**
Color characteristics of auspicious patterns	Hue	Hue and its number, dominant color and its number
	Brightness	Low, medium, and high
	Purity (saturation)	Low, medium, and high
	Contrast	Low, medium, and high

In hue analysis, the colors used in the main auspicious patterns represent different colors. It is necessary to analyze the color and quantity used. Black and white are colorless; only color was analyzed in this study. In addition, the pattern's primary colors affect the pattern's color bias. Therefore, it is also necessary to analyze the primary colors of the pattern. From the specific use of color and quantity, the primary colors and quantities of these two aspects are analyzed. To facilitate the analysis of brightness, purity, and contrast, three grades are divided into low, middle, and high.

3.2. Research Plan

As shown in Table 2, the research question is as follows: What are the color characteristics of traditional Chinese auspicious patterns? The subjects were ten colorful, auspicious patterns. The object is selected purposefully and belongs to purposeful sampling. The research method was a qualitative analysis of patterns. The primary method summarizes the color characteristics of 10 auspicious patterns by analyzing hue, brightness, purity, and contrast.

Table 2. Research proposal (The authors)

Research question	**Research object**	**Research method**	**Data collection**	**Data analysis**
What are the color characteristics of traditional Chinese auspicious patterns?	Object: auspicious patterns Number: 10 *Sampling method:* purposive sampling, selecting commonly used patterns of different forms, contents, sorts and typical patterns with	Qualitative pattern analysis Way: This study was conducted by analyzing ten auspicious patterns. Color characteristics are summarized by analyzing the pattern's hue, brightness, purity, and	Data are derived from analyzing patterns. *Hue:* hue and its number, dominant color and its number *Brightness:* low, medium, and high *Purity:* low, medium, and high *Contrast:* low, medium,	Descriptive statistics *Hue:* color quantity > 3 = ?% *Color:* ?% red, ?% green, and ?% yellow *Main color:* ?% red, ?% green, and ?% yellow *Brightness:* low - ?%, medium - ?%, high - ?%

	universality and comprehensiveness	contrast.	and high	*Purity:* low - ?%, medium - ?%, high - ?% *Contrast:* low - ?%, medium - ?%, high - ?%

The collection on hue includes two aspects: 1. all colors in the pattern and their quantity; 2. primary color and number of patterns. Hue, brightness, and purity data were collected from the HSB values in the graphic software. The human eye can also judge hue to obtain its color data. Brightness and purity are collected on low, medium, and high scales.

Descriptive statistics were used for the data analysis. It obtains the corresponding proportion by analyzing the color type, quantity, color purity, brightness, and contrast data of 10 auspicious patterns. For example, in terms of hue, that is, color types, among the ten auspicious patterns, what is the percentage of red, yellow, green, purple, blue, orange, brown, and pink? In terms of the number of colors, what is the percentage of more than three colors? In terms of primary colors, what percentage of them are red, green, and yellow? Moreover, what are the color brightness, purity, contrast, and high, medium, and low percentages? Based on the ratio analysis of these aspects, the characteristics of auspicious patterns are summarized.

4. Research Analysis

4.1. Object of the Study

In analyzing auspicious pattern color characteristics, the selection of research objects should be comprehensive to ensure the accuracy of the analysis results. This study chose different types and themes of auspicious patterns as the research objects. Auspicious patterns are divided into three categories according to their scope of use: festival, celebration, and daily. The study selected ten colorful auspicious patterns. As shown in the following table, ten research objects were selected, including four festival categories, four celebration categories, and two daily categories. The patterns cover various subjects, including people, animals, plants, Chinese characters, and everyday objects. These ten auspicious patterns relate to all categories, and the subject matter is comprehensive.

Table 3. Description of the research objects (The authors)

Classification	Name	Subject and Content	Number
Festivals	Na Fu Ying Xin	People, animals, and objects	4
	Nian Nian You Yu	People, animals, and plants	
	Ji Qing You Yu	People and objects	
	Zhong Kui	People, animals, and objects	
Celebration	Qun Xian Gong Shou	People, animals, plants, objects, landscapes, and Chinese characters	4
	Ma Gu Bai Shou	People, animals, and objects	
	Qi Lin Song Zi	People, animals, and plants	
	Lian Sheng Gui Zi	People, plants, and objects	
Daily	Ping An Ru Yi	Objects	2
	Zhao Cai Jin Bao	People and objects	

4.2. Standard for Color Analysis

In the specific analysis of color hue, saturation, and brightness, the HSB value in the color palette of the plane software is used to check the hue, saturation, and brightness of the color of the pattern. H is the hue; its value range is 0°–360°. S refers to the saturation; its value range is 100%–0%. B is brightness; its value ranges from 100% to 0%. The data were collected based on these specific values to make color and grade judgments of brightness and saturation or purity.

Table 4. HSB classification criteria (The authors)

H (0°-360°)		S (0%-100%)		B (0%-100%)	
Red, pink, and brown	346°–360°, 0°-15° (Pink and brown show both brightness and saturation.)	Low	0%-33%	Low	0%-33%
Orange	16°-45°	Medium	34%-67%	Medium	34%-67%
Yellow	46°-75°				
Green	76°-165°				
Blue	166°-255°	High	68%-100%	High	68%-100%
Purple	256°-315°				

Traditional patterns are rich in color; commonly used colors are red, orange, yellow, green, blue, purple, and pink and brown (Shen, 2022b). H values are 346°–360° and 0°–15° for red, pink, and brown, respectively. The range of H values is 16°–45° for orange, 46°–75° for yellow, 76°–165° for green, and 166°–255° for blue. Purple ranges from 256° to 315° (Yu, 2019). The saturation and brightness values range from 0% to 100%. If divided into three levels, the value range is low saturability from 0% to 33%, medium saturability from 34% to 67%, and high saturability from 68% to 100%. The level of brightness is also divided in this manner.

Table 5. Division standard of contrast (The authors)

Grade	Demarcation (D-Value of Color)
Low	D-value < 45° (< 15° similar color, 15° < D-value < 45° adjacent color)
Medium	D-value 46°–119°
High	D-value 120°–180° (120° contrast color, 180° complementary color)

(The authors)

The contrast is divided into three levels according to the color difference between colors. As shown in the table above, the low contrast range includes the following: 1. a color difference of less than 45º includes similar colors with a color difference of less than 15º; 2. the color difference is more than 15º but less than 45º of the neighboring color. The contrast range is the color difference between 46º and 119º. The high contrast range is between 120º and 180º, including contrasting colors with a 120º color difference span and complementary colors with a 180º color difference span (Yu, 2019).

4.3. Color Analysis

The color characteristics of auspicious patterns are analyzed by hue, brightness, saturation, and contrast. The analysis of hue needs to be performed by the number of colors and the main color of the pattern. Black and white are not counted in the number of colors in this study but referred to in the purity, brightness, and contrast analysis. Finally, the brightness, purity, and contrast of the main colors greatly influence the pattern colors' brightness, purity, and contrast. The main color is the focus of the analysis.

In Figure 3, the picture is divided into two parts. The top half is the color analysis of the pattern. To facilitate people's understanding of these analyses, the figure marks the colors used in the pattern. It uses the AI color picker tool to absorb the colors in the pattern and write the HSB values of hue, saturation, and brightness. It is convenient for readers to observe the size of the pattern area occupied by different colors, and a grid is added to the pattern analysis. The second part is a summary of the analysis data. Here is a closer look at the colors of the ten auspicious patterns.

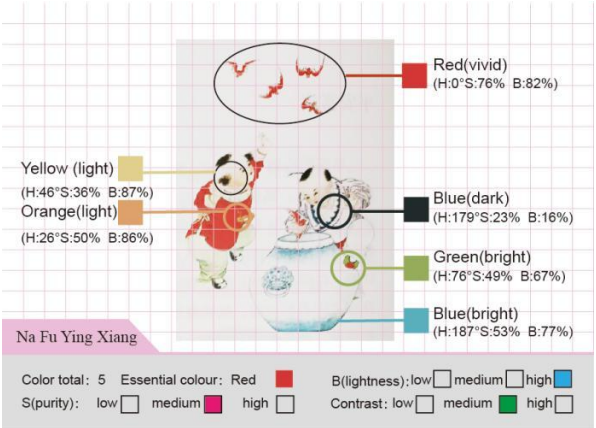

Figure 3. Na Fu Ying Xiang color analysis of auspicious patterns

In the upper part, the colors drawn from the circled colors are divided into five: red, yellow, orange, blue (dark blue and light blue), and green grass, from top to bottom, according to the H value. Regionally, the five bats in the picture and the children's clothes are all red, larger than the other colors. Therefore, the pattern is mainly red. The red S value is 76%, in the range of high saturation, relatively bright, full color, or high purity. For example, the S value of light yellow is 36%, that of light blue is 53%, and that of light green is 49%. Together, the average S value is 46%. This value is in the medium saturation range, and the overall area of these colors is visually larger than the area of red; therefore, the overall purity of the pattern is medium.

Then, look at the brightness. Red B is 82%, and the brightness is high. For the rest of the light color system, the brightness is higher. The dark blue B value of 16% is relatively low, and the overall color in the figure is less than others, which has little influence on the overall pattern brightness, although its brightness is still high. As for contrast, the pattern has some visual contrast between the vivid red and white background. However, at higher brightness, blue and white background contrast is weak. In addition to some light application, the overall pattern contrast is general. Therefore, the content is summarized as follows:

Number of colors: 5;
Primary color: red;
B (lightness): high;
S (purity): medium;
Contrast: medium.

Figure 4 has five colors: blue (light blue and dark blue), green, yellow, orange, and pink. There are also black fish heads and children's hair in the pattern. There is no color bias between black and white, which is not counted in the total number of colors in hue. According to the area's color and how much can be seen, the carp is red, accounting for a larger area. Children's clothes, lotus leaves, and carp glasses are all blue, making up more space than other colors. The primary colors are red and blue. Red and blue are contrasting colors, so the contrast is strong. Moreover, the black carp's head and the red carp's body in the picture also have a strong visual sense. Children's hair and black and white faces strongly contrast with light and shade. Therefore, the overall color contrast is strong. The main colors are red with S value of 86% and blue with S value of 27%,

65%, and 81%, and the total average is approximately 72%, in the range of high purity, which makes the pattern look bright. Therefore, the pattern color purity is high. Regarding brightness, the red B value is 76%, and the blue B value is 71%, 42%, and 87%, respectively, with an average of 69%, which is within the range of high brightness of 68% to 100%. There are also some pink colors in the figure, whose B value is 100%, so the overall brightness of the pattern color is also high. The above analysis can be summarized as follows:

Number of colors: 5;
Main colors: red and blue;
Color brightness: high purity;
Contrast: high.

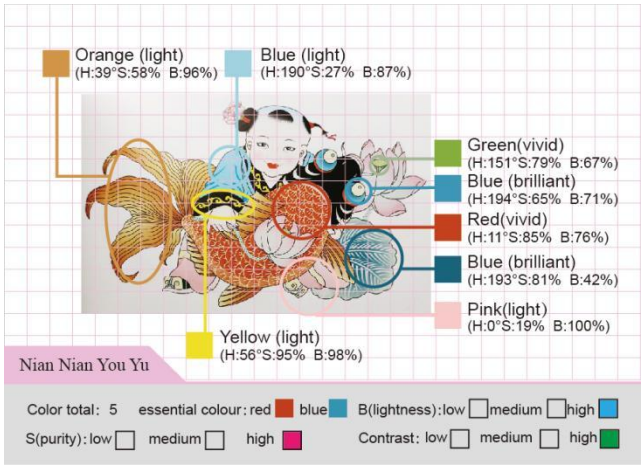

Figure 4. Nian Nian You Yu color analysis of auspicious patterns (The authors)

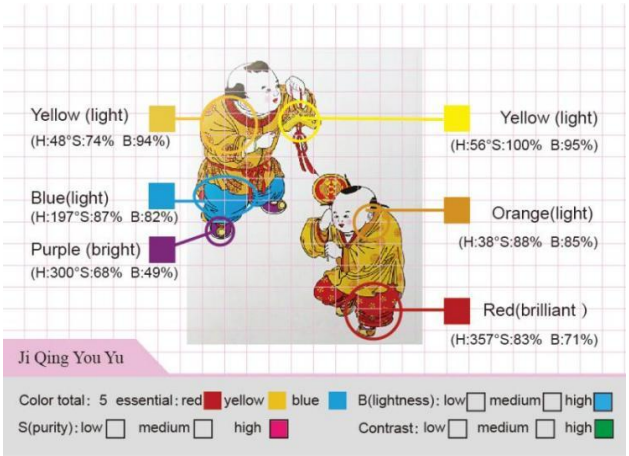

Figure 5. Ji Qing You Yu color analysis of auspicious patterns (The authors)

As shown in the picture above, the pattern has five different colors: yellow, blue, orange, purple, and red. Both children's jackets were yellow, one child's pants were blue, and the other's pants were red. Yellow, blue, and red occupy most of the area of the entire pattern, so yellow, blue, and red are the primary colors of the pattern. They are the three primary colors of color with strong contrast. They are visually bright, with red having an S value of 83% and a B value of 71%, yellow having an S value of 74% and a B value of 100%, and blue having an S value of 87% and a B value of 82%. These values show that their saturation and brightness are high, so the pattern color brightness and purity are naturally high. The overall contrast of the pattern is also high. The above analysis is summarized as follows:

Number of colors: 5;
Primary colors: red, yellow, and blue;
Color brightness: high purity;
Contrast: high.

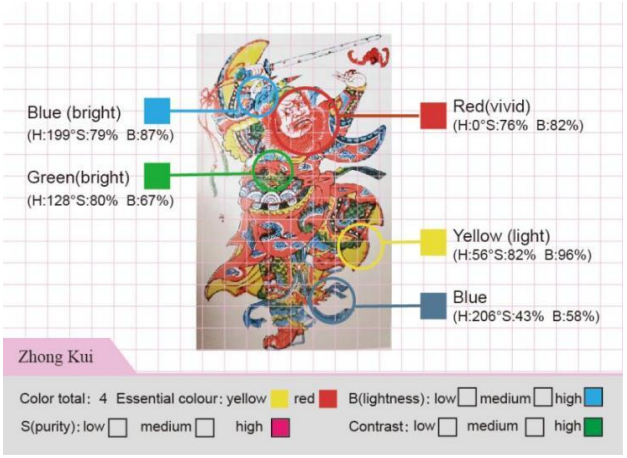

Figure 6. Zhong Kui color analysis of auspicious patterns (The authors)

As shown in the figure above, extract the color and write the corresponding SHB value. The colors marked from top to bottom in the pattern are blue, red, green, and yellow. As shown in the picture, red and yellow are used a lot and occupy most of the area of the whole pattern, so red and yellow are the primary colors of the pattern. Red and yellow are contrasting colors, and the color contrast is strong. The value of red S is 76%, and the value of B is 82%, indicating that the red is bright and bright. The S value of yellow is 82%, and its B value is 96%, indicating that yellow has high purity and brightness. Checking the color HSB value in the whole pattern, except for one blue with medium saturation and brightness, the other colors have high saturation and brightness. Therefore, the pattern color analysis summary is as follows:

Number of colors: 4;
Main colors: yellow and red;
Color brightness: high purity;
Contrast: high.

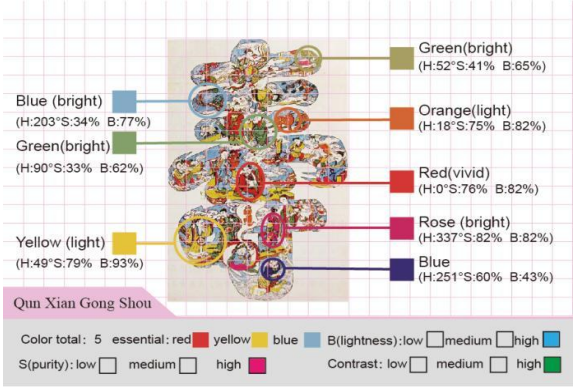

Figure 7. Color analysis of auspicious patterns in Qun Xian Gong Shou (The authors)

The colors circled from top to bottom are grass green, light blue, orange, green, red, rose, yellow, and dark blue. Among them, grass green and green are both in the green range, and light blue and dark blue are both in the blue range, so there are five colors in total. The pattern has many colors. According to the area occupied by the colors, the three colors in the figure, blue, yellow, and red, occupy a larger area than the other colors. Therefore, the primary colors are yellow, blue, and red. Moreover, these colors are the three primary colors, and the angle difference between them is 60 from the panchromatic disk. Red and blue are complementary colors, and red and yellow are contrasting colors. These colors have strong visual contrast, so the contrast of the pattern is high. Looking at the S-values of these colors, 76% and 82% of red belong to high, 34% and 60% of blue belong to medium, and 79% of yellow belong to high, so the overall purity is still high. It can be seen that the colors in the figure are mostly bright and full, namely of high purity. As for the brightness of the primary colors, the red B value of 82% is high; light blue is 77%, dark blue is 43%, and the two colors average 60%, which belongs to medium. Yellow B value of 93% is high brightness, so the brightness of the main color is high, and the brightness of the pattern color is also high. Therefore, the contents in the bottom half of the figure are summarized as follows:

Number of colors: 5;
Primary colors: blue, yellow, and red;
B (lightness): high;
S (purity): high;
Contrast: high.

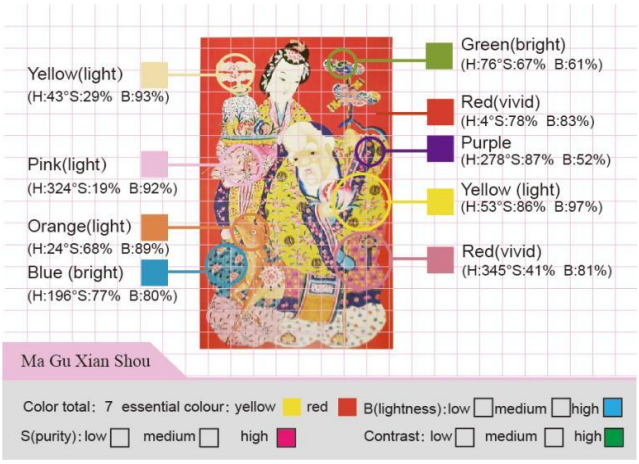

Figure 8. Ma Gu Xian Shou color analysis of auspicious patterns (The authors)

As seen from the above figure, the colors marked on the left of the pattern are light yellow, pink, orange, and blue, while those marked on the right are green, red, purple, yellow, and light red. Among these colors, according to the previous hue range, light yellow and yellow are both yellow and red and light red are both red, so there are seven different colors in total. The figure shows that the background color is red, which occupies a large proportion of the area. It can be seen from the pattern that yellow clothes comprise a large proportion of the pattern. Red and yellow are the main colors of the pattern. The previous analysis often mentions these two colors, and their contrast is strong. Yellow has purple edges. Yellow and purple are complementary colors that contrast strongly. Therefore, the pattern color contrast is higher. In the pattern, the S value of red is 78%, that of yellow is 86%, that of purple is 87%, and that of blue is 77%. These colors are very bright, including the main color. Therefore, the overall color purity of the pattern is higher. The brightness of the main color, the red B value is 83%, and the yellow B value is 97%; both colors are very bright, so it is judged that the color brightness is higher. The above analysis summary is as follows:

Number of colors: 7;
Main colors: yellow and red;
Color brightness: medium;
Purity: high;
Contrast: high.

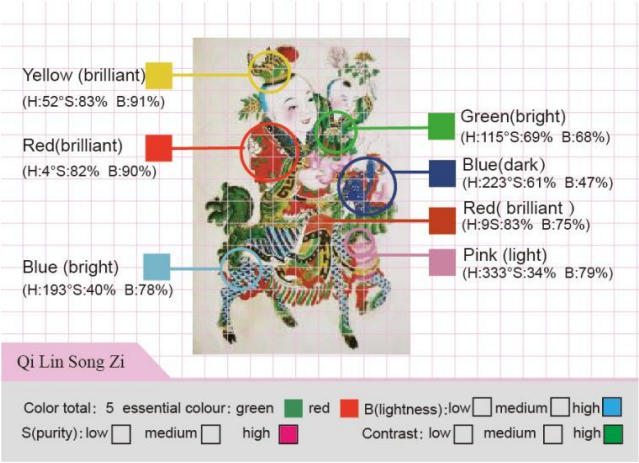

Figure 9. Qi Lin Song Zi color analysis of auspicious patterns (The authors)

The pattern has five colors: yellow, green, red, blue (dark blue and light blue), and pink. There are many colors. Observe the pattern of red and green, which are used more, almost throughout the whole pattern, and occupy a much larger area than other colors, so red and green are the primary colors of the pattern. Red and green are complementary colors. They contrast strongly. It can be judged that the pattern color contrast is high. The purity and brightness of the pattern color are the same as in the previous pattern analysis. The red has an S value of 83% and a B value of 75%, indicating that it is very pure and bright. It is bright red. The S value of green is 69%, and the B value is 68%. Therefore, the saturation and brightness of green are also high. Therefore, the purity and brightness of the pattern color are higher. In particular, because the pattern has several different green colors, such as dark green, green, and yellow-green, the feeling is gradual

discoloration, which is not easy to absorb. The study chose only one for analysis. The above analysis can be summarized as follows:

Number of colors: 5;
Main colors: red and green;
Color brightness: high purity;
Contrast: high.

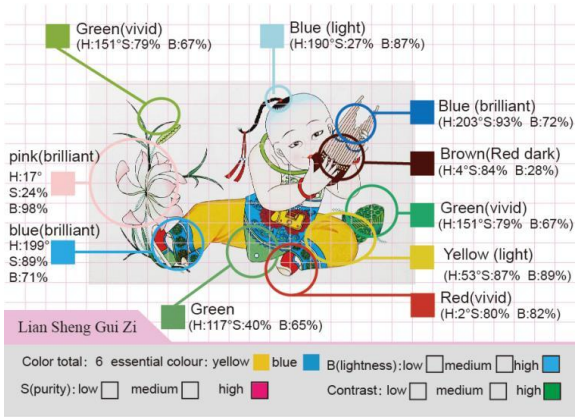

Figure 10. Lian Sheng Gui Zi color analysis of auspicious patterns (The authors)

Among the six colors in the figure, the S value of yellow is 87%, and its B value is 89%; the S value of blue is 87%, and its B value is 71%, indicating that these two colors are vivid and bright. Saturation and lightness are high. According to the primary color, the pattern's overall color can be considered vivid and bright. Looking at the other colors in the picture, red and green also occupy some areas. The S value of red is 80%, and the B value is 82%, indicating high color purity and brightness. The three green S values in the figure are 79%, 40%, and 79%, respectively. The mean value is 66%, while the B-values of green are 67%, 65%, and 67%, respectively, and the mean value is 66.3%, indicating that green saturation and brightness are medium. The previous central color saturation and brightness are high; therefore, the saturation and brightness of the pattern together are not affected. The above analysis summary is as follows:

Number of colors: 6;
Main colors: yellow and blue;
Color brightness: high purity;
Contrast: high.

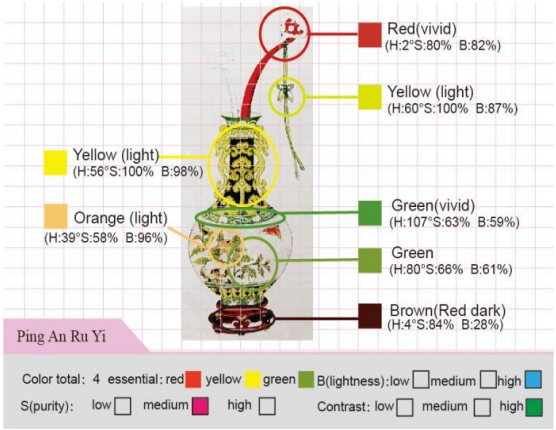

Figure 11. Ping An Ru Yi color analysis of auspicious patterns (The authors)

Different colors are marked in the pattern. According to the range of color H value, it is determined that the hue of the pattern color includes red, yellow, green (yellow, green, and green), orange, and brown. Black and white do not count as colors. Therefore, there are five colors in full, rich colors. Looking at the area occupied by the colors in the pattern, it is found that red, yellow, and green occupy significantly more area than the other colors. Therefore, the primary colors are red, yellow, and green. Red has an S value of 80%, which is high saturation; yellow has an S value of 100%, which is also high saturation; green has an S value of 63% and 66%, respectively, which is in the medium range. The overall color of the three combination patterns is bright and of high purity. Red, yellow, and green are also the basic colors; visual contrast is strong. Bright yellow and green are adjacent colors with low contrast. Nevertheless, red and green are contrasting colors, and there is a strong contrast between yellow and black at the mouth of the bottle and a particular contrast between the green and white background color at the body of the bottle; therefore, the overall contrast is strong. In addition, to analyze the brightness of their colors, red has a B value of 82%, which is very bright; yellow is bright at 87% and 98%; green has a B value of 59% and 61%, respectively, with medium brightness. With the three colors as a whole, the brightness is relatively high. Therefore, the above content is summarized as follows:

Number of colors: 5;
Main colors: yellow and green;
B (lightness): medium;
S (purity): high;
Contrast: high.

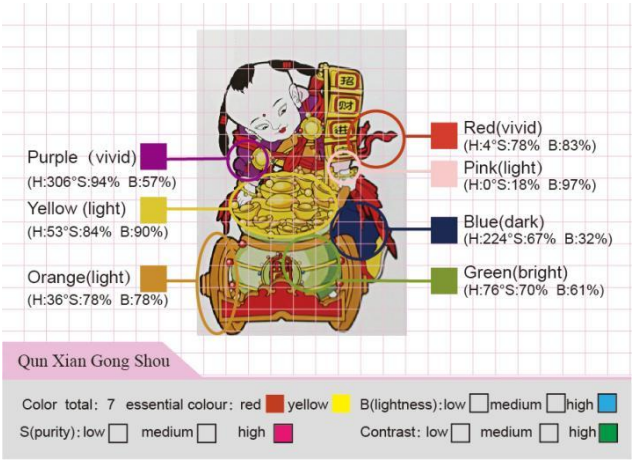

Figure 12. Zhao Cai Jin Bao color analysis of auspicious patterns (The authors)

Drawing tools are used in the pattern to extract colors and record their corresponding HSB values. Different colors are marked according to the range of H values, including red, purple, pink, yellow, dark blue, orange, and light green. The children's hair in the pattern is black, which is not counted in the number of colors. So, there are seven colors. Red is used

extensively in the image, including but not limited to that. The head rope, streamers, rectangular boxes on the lettering, and the bottom of the cart are all red in about six places in the pattern. Yellow is also widely used, e.g., in yellow gold ingots, yellow shoes, yellow ornaments, and yellow lettering. Therefore, red and yellow colors occupy more area and are the main colors of this pattern. Red S value is 78%, and yellow S value is 84%, which indicates high saturation and bright color. They are the main colors of the pattern, so the pattern is highly saturated. Again, the B value of red is 83%, and that of yellow is 90%. The pattern has a high brightness because of the high brightness. Visually vivid yellow and red are contrasting colors with high contrast. There are also black hair and white faces of children in the design, which also have a strong contrast between light and dark so that the overall contrast is strong. Therefore, the above content is summarized as follows:

Number of colors: 5;
Main colors: yellow and green;
Color brightness: high purity;
Contrast: high.

In short, the color analysis of the ten auspicious patterns above is mainly carried out by hue, saturation, brightness, and contrast. According to the color theory previously understood, the analysis standard is specified. The color picker in the AI design software is used to absorb the color of the pattern, record the HSB value of the corresponding color, and analyze its hue, saturation, and brightness accordingly. Because the pattern has many colors, it is easy to get confused without a full focus analysis. This requires finding the main color first and judging the saturation, brightness, and contrast of the pattern color according to the saturation, brightness, and contrast of the main color. Therefore, the study only analyzed some of the patterns' colors in detail.

5. Research Findings

5.1. Summary of the Color Characteristics of Auspicious Patterns

Table 6 shows the data analysis of 10 colorful auspicious patterns. In the color column, red, yellow, and blue are in all ten patterns, and their usage ratio is 100%. That of green is 90%, orange and pink - 50%, purple - 30%, and brown - 20%. Red, yellow, blue, green, orange, and pink accounted for more than 50% of the use of color. Therefore, the colors commonly used in auspicious patterns are these colors. In the central color sequence, red accounts for 90%, yellow for 70%, blue for 40%, and green for 20%; therefore, red and yellow are the most commonly used primary colors for auspicious patterns.

Table 6. Color data analysis (The authors)

Name	Color	Mail Color	Total	B (Lightness)	S (Purity)	Contrast
Na Fu Ying Xiang	Red, blue, yellow, orange, and green	Red	5	High	Medium	Medium
Nian Nian You Yu	Red, blue, yellow, pink, and green	Red and blue	5	High	High	High
Ji Qing You Yu	Red, blue, yellow, orange, and purple	Red, blue, and yellow	5	High	High	High
Zhong Kui	Red, blue, yellow, and green	Red and yellow	4	High	High	High
Qun Xian Gong Shou	Red, blue, yellow, orange, and green	Blue and yellow	5	High	High	High
Ma Gu Xian Shou	Red, blue, yellow, orange, green, pink, and purple	Red and yellow	7	High	High	High
Qi Lin Song Zi	Red, blue, yellow, pink, and green	Red and green	5	High	High	High
Lian Sheng Gui Zi	Red, blue, yellow, pink, green, and brown	Blue and yellow	6	High	High	High
Ping An Ru Yi	Red, blue, yellow, orange, green, and brown	Red, yellow, and green	5	Medium	High	High
Zhao Cai Jin Bao	Red, blue, yellow, orange, green, pink, and purple	Red and yellow	7	High	High	High
Proportion analysis	Red, blue, 100% yellow, 90% green, 50% orange, 50% pink, 30% purple, and 20% brown	90% red, 70% yellow, 40% blue, 20% green One is 10%, two are 70%, and three are 20%.	More than 4 colors 100%	Medium - 10% High - 90%	High - 90% Medium - 10%	High - 90% Medium - 10%
Summary	Commonly used red, yellow, blue, green, orange, and several pink colors	Red and yellow are the most common, usually no more than 3.	More than four colors	High brightness, bright color	High purity	High contrast

Moreover, observe the number of primary colors used in the pattern, in which the use of one primary color accounts for 10%, the use of two primary colors accounts for 70%, and the use of three primary colors accounts for 20%. Thus, the number of primary colors used in auspicious patterns is generally 2, not more than

3. In the number of colors column, 4 colors are least used, and 7 colors are most used. Thus, the colors are rich. In the brightness column, there is no low brightness, 90% brightness, and 10% high brightness; therefore, the color of the auspicious pattern is relatively moderate. In the purity column, there is no low purity, 10% purity, and 90% high purity; therefore, the color of the auspicious pattern has high purity and is bright. In contrast bars, the medium contrast ratio accounts for 10%, and the high contrast ratio accounts for 90%. Therefore, the color contrast of the auspicious pattern is high, and the visual effect is strong. In short, after the above analysis, it can be concluded that the auspicious color pattern is commonly used in six colors: red, yellow, blue, green, orange, and pink. The pattern is mainly red and yellow, generally not more than three main colors, and generally more than four colors. The overall color is rich and bright, without pink and dark, and has high purity and contrast.

5.2. Pattern Analysis Model

The analysis of the color characteristics of auspicious patterns, referred to as the HBSC model, is summarized in Figure 13.

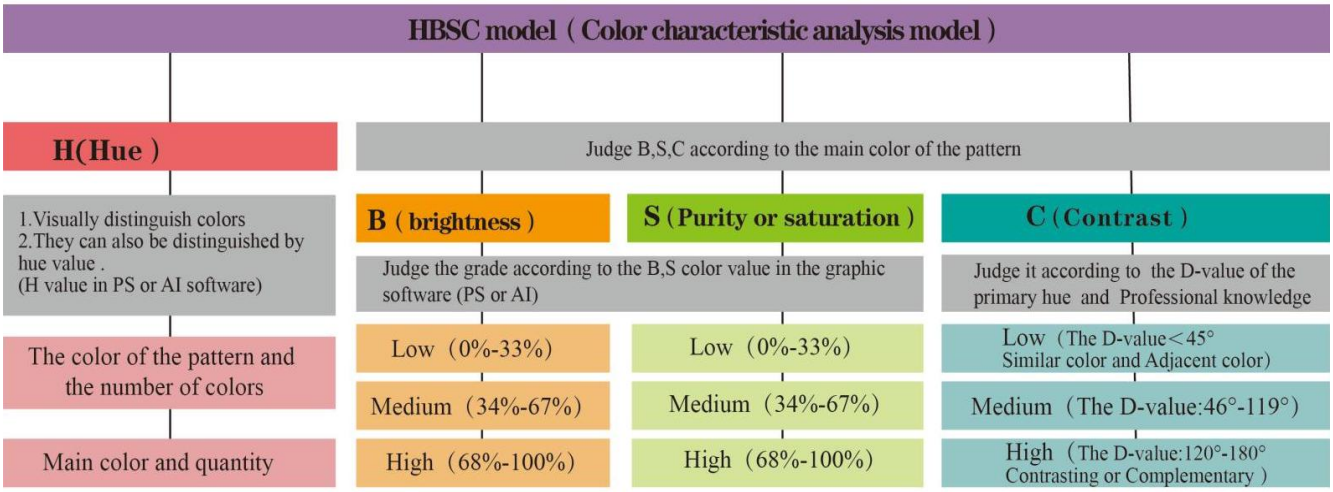

Figure 13. Pattern color analysis mode (the HBSC model) (The authors)

The HBSC model, that is, through the color hue, brightness, saturation (purity), and contrast, is used to analyze the color characteristics of the pattern. Hue, brightness, saturation, and contrast are independent variables, and the color characteristics of the pattern are dependent variables. Every color has hue, lightness, and saturation. Combining different colors will produce contrast; therefore, analyzing brightness, saturation, and contrast is essential. The primary color of the pattern has a significant influence on the hue, brightness, saturation, and contrast of the pattern; therefore, it is necessary to analyze the four independent variables of the primary color.

H is hue; a pattern generally comprises several colors; therefore, analyzing the type and quantity of pattern colors is necessary. If a pattern has more color types and quantities, it can be judged that its color is rich. Although there will be more colors in the pattern, there will be primary colors, a more extensive color block, and its primary color determines its pattern as a color bias, so it is also necessary to analyze the primary color and quantity of the pattern, and it can also be judged by the H value in the graphic software (PS or AI).

The B and S values in PS or AI can be used to analyze B (brightness) and S (purity or saturation). The study divided them into low, medium, and high grades. The brightness and purity characteristics of this pattern can be understood by analyzing the brightness and saturation levels of the primary colors.

C is contrast; the study divides it into three stages: low, medium, and high, and judges the contrast of the pattern according to the contrast of the primary colors. The judgment of contrast level needs to be based on the relevant professional knowledge, that is, the value of the color difference. Generally, the contrast between similar and neighboring colors is weak, such as grass green and green, green and blue, which can be divided into low grades with color difference value > 45°; color difference value of 46°–119° is particular, and its contrast is moderate, which is of a medium grade; contrasting colors have difference values of 120°, i.e., thay are intense contrast colors, such as red and blue; the color difference value of 180° belongs to complementary colors with the most intense contrast, such as yellow and purple; therefore, the color difference value of high contrast ranges from 120° to 180°, and they can be divided into high grades.

5.3. Model Application

This model can analyze the color characteristics of a single pattern or a type of patterns. The steps of analyzing the color characteristics of a single pattern are shown in Figure 14.

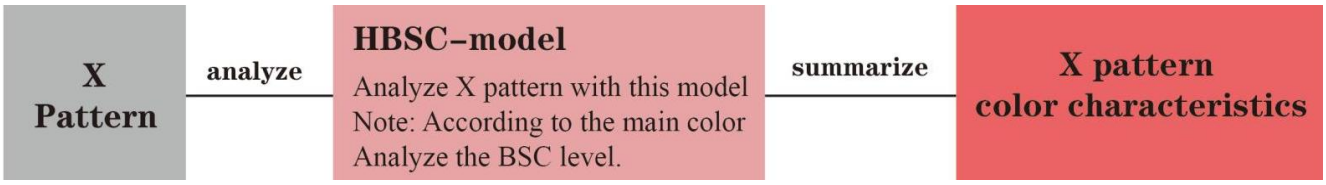

Figure 14. Steps of pattern analysis (The authors)

As shown in the figure, if people need to understand the color characteristics of the X pattern, it only takes two steps to complete. The first step is to analyze the X pattern using the HBSC model. This pattern is analyzed according to its classification and analysis criteria. It is an analysis of the color of the pattern. The grades of B (brightness), S (purity), and C (contrast) are analyzed according to the primary color. The second step summarizes the corresponding content to obtain the color characteristics of the X pattern.

When analyzing a specific type of pattern (some similar patterns), there are two more steps than analyzing a pattern, as shown in Figure 15.

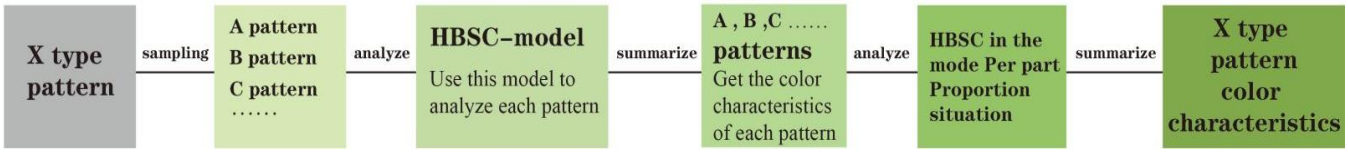

Figure 15. Description of the steps for analyzing the color characteristics of the X-type patterns (The authors)

As shown in the figure, it takes five steps to understand the color characteristics of X-type pictures:

Step 1: Sampling selects some patterns as analysis objects, such as patterns A, B, and C;

Step 2: Analyzing each pattern using the HBSC model. Each pattern is analyzed according to its classification and analysis criteria;

Step 3: Determining the color characteristics of each pattern. Through the analysis using the HBSC model, the color analysis data on each pattern are obtained;

Step 4: Analyzing the percentages of H, B, S, and C in these patterns;

Step 5: The color characteristics of the X-type pattern are summarized according to the proportion.

The HBSC model is a pattern analysis summarized from the color analysis of auspicious patterns. In this model, the analysis criteria are explained in detail and can be used to analyze the color characteristics of one or more patterns. The above steps can be followed to apply this mode.

6. Conclusion

This study attaches more importance to scientificity and objectivity. The analysis of the color characteristics of auspicious patterns was carried out using the observation method combined with professional knowledge of color. This differs from previous studies that rely on researchers to observe colors subjectively.

Through the analysis of the hue, brightness, purity, and contrast of 10 typical auspicious patterns, we conclude that the color features of auspicious patterns contain three points: 1. auspicious patterns often use red, yellow, blue, green, orange, and pink colors; 2. the pattern is often red and yellow as the primary colors; they are also the most common color collocation, the pattern is generally not more than three primary colors, and its color is clear; 3. it is rich in color, bright, and has intense contrast. The summary of the color characteristics of these auspicious patterns fills the gap in the study of auspicious patterns and enriches people's understanding of auspicious patterns. It provides a reference for similar research in the future.

This study involves a great deal of color knowledge, which requires a specific professional foundation to understand. Therefore, it is recommended that the researchers posess this color knowledge when using this mode to gain accurate results.

The pattern color analysis model (the HBSC model) obtained in this study is summarized in the analysis of auspicious pattern colors, and there was no such model before. It sets the standard of each analysis item scientifically according to the professional knowledge of color to ensure its analysis's objectivity. In addition, the research explains the specific application steps of this model, which is more convenient for people to analyze the pattern's color characteristics, so it has practical significance.

7. Limitations and Further Study

The auspicious patterns in this study are from the Ming and Qing dynasties, which are symbolic auspicious patterns of multi-element combinations. Only ten auspicious patterns were analyzed in this study, and further research is needed. When observing colors, similar colors are subjectively summarized; if there are two light green colors, one of them will be selected for analysis. The results are warranted but should be more comprehensive. When using the

software to absorb the picture's color, there will be errors in the color values of different parts. Despite these limitations, the error was small and did not affect the study results.

This study can also continue to explore and simplify its research model. Further research is needed to determine whether some items that do not affect the study results can be simplified.

Acknowledgement

We express our deepest gratitude to our supervisor, Dr. Arba'iyah Ab Aziz, for her exceptional guidance, unwavering support, and invaluable insights throughout our research. Her expertise and encouragement have been instrumental in shaping our academic journey.

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Authors' Contributions

The summary of the color characteristics of auspicious patterns fills the gap in the study of auspicious patterns and enriches people's understanding of auspicious patterns, which provides reference value for future research. The HBSC model was summarized in the analysis of auspicious pattern colors, whereas previous studies did not have such a model. In addition, the specific application steps of this model are explained in the research, which is more convenient for people to use to analyze the color characteristics of the pattern and has practical guiding significance.

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