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Color Analysis of Red and Green in Thangka

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Abstract: *This article delves into the application of red and green in thangka art and its visual effects. Through various dimensions such as complementary color theory, the disappearing green and the radiant green, The domain of color application, the connecting colors, and color direction, a detailed analysis of three thangka works is conducted focusing on the red-green color scheme. By integrating theoretical analysis with examples from thangka artworks, it reveals the unique charm of red and green color usage in thangka art.*

Keywords: *Color, Red and green, Thangka*

1. Introduction

Red and green are widely recognized as complementary colors. On the color wheel, complementary colors are situated directly opposite each other along the diameter. The three primary pairs of complementary colors include red and green, orange and blue, and yellow and purple. Each pair possesses its own distinct characteristics. The uniqueness of red and green is particularly evident when both colors are at their most saturated state, as they exhibit equivalent brightness[1], as demonstrated in Figure 1. However, this distinctiveness is only observable when both colors achieve maximum saturation: red must be a pure hue, free from yellow or blue undertones, while green must be the most neutral color, containing equal parts of yellow and blue. The fascinating aspect of complementary colors is their dual nature of being both opposing and interdependent. When placed in close proximity, they generate the highest contrast; yet when blended, they neutralize each other akin to fire and water, resulting in a grayish-black tone.

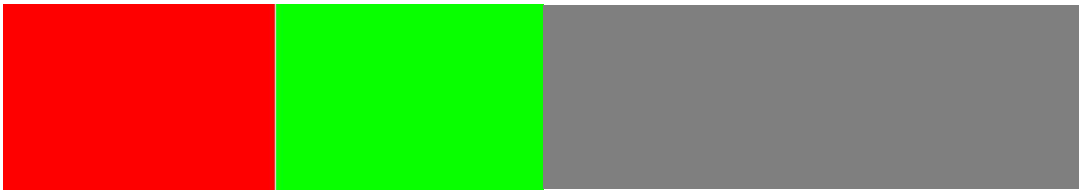

Figure 1 The highest purity of red and green.

The principle of complementary colors is rooted in the visual effects perceived by the human eye. The eye instinctively adjusts color variations to produce corresponding complementary colors that balance specific hues. This phenomenon has been substantiated through various experiments. In Itten's studies, when a pure red is juxtaposed against a neutral gray background, prolonged observation reveals a subtle green hue in the gray area. This physiological phenomenon can be observed in experiments involving visual afterimages and simultaneous contrast, reflecting the normal visual function of the human eye. The physiological attributes of the eye influence our color perception; thus, when analyzing color, one should not only consider the colors themselves but also our visual instincts.

In Buddhist art, whether in the extant thangkas or the murals of the Dunhuang caves, numerous works prominently feature red and green. Although time has altered these pieces, obscuring the original colors, we can analyze the interplay of red and green in these artworks by applying the theory of complementary colors.

2. The Disappearing Green

The thangkas "Manjushri" and "White Tara," created by the master Langka Jé and Situ Panchen of the Gama Gachi painting school, are depicted in Figures 2 and 3.

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Figures 2 Manjushri,Langka Jé

Figures 3 White Tara,Situ Panchen

The primary colors in "Manjushri" are orange-red, yellow-green, and blue. Blue serves as the background color, a common choice in thangka. The orange-red and yellow-green are the main contrasting colors in the composition. Against the deeper blue, the orange-red and yellow-green appear even more pronounced. Upon observing this painting, the orange-red and yellow-green seem to possess similar brightness and saturation, with neither color dominating our attention. Instead, these two colors create a tranquil and harmonious atmosphere throughout the piece. The forward-pushed orange-red and yellow-green generate an impression of comparable brightness and saturation.

Figures 4 Manjushri,Langka Jé

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When we reduce the saturation of the image to zero, we find that the brightness values of the orange-red and yellow-green areas are remarkably close. After desaturation, we can no longer distinguish the positions of the orange-red and yellow-green; the boundary between these two colors vanishes, as illustrated in Figure 4.

Similarly, in "White Tara," we observe a comparable situation. The intertwining ribbons of red and green lose their boundaries upon desaturation, as shown in Figure 5.

Figures 5 White Tara,Situ Panchen

The disappearance of boundaries imparts a sense of completeness to the painting's contour shapes, stemming from the similar brightness of red and green.

Upon reviewing the colors, it appears that red is more visually striking. We extract the contrasting red and green colors from "Manjushri" and "White Tara." In both sets of colors, the purity of the orange-red hues surpasses that of the yellow-green hues. In other words, under similar brightness conditions, the purity of red is significantly higher than that of green, as depicted in Figure 6.

Figure 6 Red and green in Manjushri and White Tara

We extract the green observed in the images, as illustrated in Figure 7.

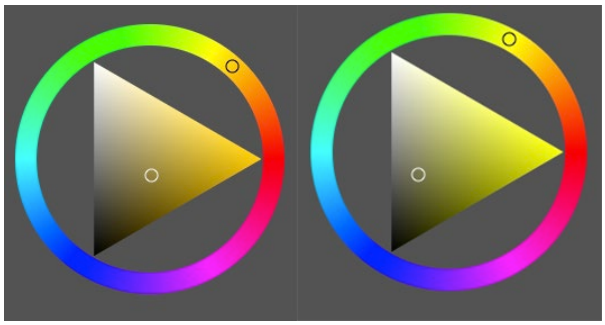

Figure 7 The green observed in the images

Upon examining the above image, we find that the green hues in both works are actually situated within the yellow hue range. Therefore, the "green" we perceive is not true green. As previously mentioned, the human eye instinctively generates corresponding complementary colors to balance

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specific hues. This means that due to the eye's visual adjustments, the "green" we see is actually a low-brightness, low-saturation yellow. In the context of high-purity red's visual contrast, our eyes automatically generate a greenish sensation. The tranquil "green" we perceive originates from the eye's self-regulation.

If we were to replace the green portions of the painting with a hue that is more distinctly green, while maintaining the same brightness and purity values, the colors we would see would resemble those shown in Figure 8.

Figure 8 Replace the green portions of the painting

In other words, the "green" that the artist presents in these two works leans more towards yellow in the actual pigments used. It is not the complementary color of red, but due to the characteristics of the eye, the complementary color of red—green—emerges.

3. The Radiant Green

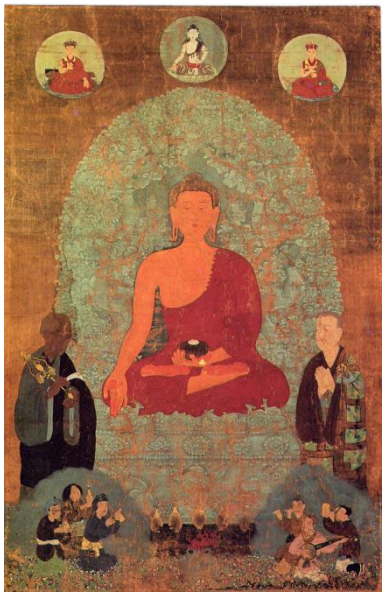

Figure 9 Shakyamuni,Kunga Dorje

The painting "Shakyamuni" is historically attributed to the Tenth Garmapa, Kunga Dorje. The colors employed in this painting are simple and cohesive. The red robe worn by the main figure and the stone green background are the two primary colors in the composition. The skin tone of the main figure is a bright orange-yellow, delicate and even, with high saturation and brightness. Although the red robe differs in hue from the skin tone and is significantly darker, both exhibit similar saturation. This similarity in saturation has the power to eliminate boundaries. Despite the brightness contrast, where the skin tone is brighter than the red robe, the similar saturation allows for a seamless transition between the red robe and the skin tone. The coloring of the main figure is straightforward, lacking

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complex shading or intricate line work, resulting in a clean and crisp color palette. In stark contrast, the stone green background is rendered with great complexity and detail. The background merges with the throne, unified under a subtle stone green hue. Despite the intricate patterns and subtle variations in light and dark, the excellent control of color brightness ensures that these fine details do not appear chaotic.

In fact, the brightness of the background color is similar to that of the main figure's red robe, but its saturation is significantly lower than that of the red. When we isolate the brightest and darkest colors from the background, we find them to be quite dull, lacking the luster of jade, and appearing unexpectedly muted, as shown in Figure 10.

Figure 10 The green in Shakyamuni

The human eye instinctively generates complementary colors based on its physiological needs when viewing specific hues. This creates a sensation of "excited emotions and a vibrant tremor of intensity"[2] . If gazed at for an extended period, due to eye fatigue, the specific color seems to lose intensity, while the perception of the simultaneously generated hue is enhanced. Therefore, in the contrast between the main figure's bright skin tone and the red robe, the eye generates the complementary color of red—green—causing the extremely muted gray-green to emit a jade-like glow. The entire thangka exudes a unique elegance, ethereal and refreshing.

The simultaneous emergence of complementary colors is a sensation that occurs within the observer's eye, rather than an objective fact. Simultaneous contrast illustrates that our senses can only function through comparison; just as with the length of lines, our eyes only recognize one line as long when compared to a shorter line. When this long line is compared to an even longer line, it becomes short again. The effects of color are similarly enhanced or diminished through comparison. As Goethe stated, simultaneous contrast determines the aesthetic utility of color. The effects of simultaneous contrast occur not only between complementary colors like red and green but also between any two colors that are not exact complements. Each color tends to shift the other towards its complementary hue, often causing both colors to lose certain inherent characteristics and transform into tones with new effects. In this case, colors lose their objective characteristics and move within a realm of non-reality, as if operating within a new area.[3]

The use of red and green to create a sense of luminosity can also be observed in other Buddhist paintings, as shown in Figures 11 and 12.

Figure 11 Complete Collection of Dunhuang Murals in China, Song Dynasty

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Figure 12 Complete Collection of Dunhuang Murals in China,mid-Tang dynasty

Many depictions of Buddha feature red and green contrasts in their backgrounds. In the murals of Dunhuang, several Buddha figures from the Middle Tang period utilize red and green color schemes, with large areas of green accented by red halos. This demonstrates that the presence of small red areas, through simultaneous contrast, stimulates our vision, thereby intensifying the sense of green luminosity.

4. The domain of color application

The potency of a pure color is determined by two primary factors: brightness and area. Itten noted that when assessing the brightness and luminosity of colors, "pure colors should be compared against a medium-brightness neutral gray background. We find that the intensity or luminosity of several hues varies. Goethe devised a simple numerical ratio for these light and dark tonal variations. They are approximate, but the same-named commercial pigments can differ significantly. Ultimately, visual perception is what matters. Moreover, the color range in a painting is often discontinuous and complex in shape, making it difficult to categorize them into simple numerical ratios. As long as one possesses appropriate sensory abilities, the eye is entirely trustworthy".[4]

These ratios are only valid when all hues exhibit their maximum purity. However, once brightness and area relationships are introduced, these ratios lose their effectiveness.[5]

In "Manjushri," it is precisely due to the inclusion of other contrasts that the brightness of orange, which should be higher than that of green, appears to be similar to green. Nevertheless, the inherent power of the orange-red still allows the small proportion of orange-red in the composition to quickly warm the larger areas of blue-green cool tones, even imparting a warm quality to the yellow-green. The colors in the painting are not pure hues, but the power of the orange-red remains dominant.

In "White Tara," attention must also be paid to the area of color. The main figure is bare from the waist up, dressed in red below, with a black skirt at the waist. The ribbons display yellow-green on one side and red on the other. Starting from the head, the yellow-green side of the ribbon is visible, with only a small amount of red showing in the folds. As we move downward, the red side of the ribbon becomes more prominent around the forearm. The red seems to expand progressively from top to bottom. The yellow-green occupies a larger area around the main figure's head: the yellow-green of the ribbon, the yellow of the main figure's headdress, and the green of the flower held by the main figure. Gradually, as red is introduced, the yellow-green diminishes and eventually disappears. Within a certain range, the alternating areas naturally connect the red and green, maintaining the tension between the two colors. Area contrast possesses the characteristic of altering and enhancing other contrasting effects. In fact, area contrast is also a form of proportional contrast.

As Itten stated, subtle variations in color contrast do not require data for expression; we cannot use a precise term to describe a color because colors, under the artist's blending, are ever-changing and extremely nuanced. Visual perception is our experience within the world of color.

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5. The Connecting Colors

In "Manjushri," connecting colors play a crucial role. The two primary hues in the composition are orange-red and yellow-green. Orange-red is an intermediate color between yellow and red, while yellow-green is an intermediate color between yellow and blue. When viewed separately, orange = yellow + red, and yellow-green = yellow + blue, making yellow the natural connecting hue. All elements in the composition, including the main figure's skin, ribbons, lotus seat, background, and the figures on either side, are unified within this hue. The only exception is the purplish blue background, which contains no yellow whatsoever. Thus, the yellow subtly balances the entire composition. The skin tone of the main figure is the area with the most yellow in the painting, possessing low purity and high brightness, gently balancing the surrounding colors.

The role of connecting colors can also be traced in Situ Panchen's "White Tara." The ribbons in "White Tara" display yellow-green on one side and red on the other. The green portion of the ribbon contains yellow (not excluding fading factors), while the red portion is not pure red, still slightly tinged with yellow, albeit in minimal amounts. The gold adornments of White Tara's earrings, necklace, arm rings, and bracelets also serve a transitional role visually. On the color wheel, yellow and red are adjacent colors, allowing for the intermediate color—orange—and also serving as the complementary color to blue. Therefore, using yellow as a bridge perfectly connects the two complementary colors of red and green. Unlike "Manjushri," the amount of yellow contained in the red of "White Tara" is minimal. Both works share this characteristic, but their applications differ significantly.

6. The Direction of Color

In "Manjushri," another method of expressing the interaction between orange-red and yellow-green is through the direction of color. The orange-red primarily forms the halo behind the main figure, followed by the ribbons, which reveal less orange-red in the upper body, increasing in the waist area, and more prominently positioned beneath the halo on either side of the seated figure. The red in the main figure's clothing contains a lower proportion of yellow. However, the proximity of the colors makes the two hues appear very similar. The orange in the ribbons concentrated beneath the halo seems to extend the direction of the orange halo inward, abruptly halted by the yellow-green's obstruction. Orange-red is inherently an outward-expanding hue, yet in terms of direction, it converges inward; conversely, yellow-green, with its lower brightness and saturation, is typically characterized by retreat, yet in the arrangement of color direction, it exhibits an expanding tendency.

Yellow-green centers around the lower part of the main figure's seated legs, with the leaves of the surrounding flowers and the ribbons extending outward, seemingly moving off the canvas. The yellow-green background of the two figures at the top of the painting brings the focus back to the main figure's headlight. The direction then flows down along the ribbons, returning to the starting point, creating a complete cycle.

The orange-red forms a circular inward-converging trend centered on the halo, extending through the main figure's clothing and ribbons, reaching the headdress on either side of the main figure. In contrast, yellow-green, primarily represented by the accessories, creates an outward-expanding butterfly-shaped trend. The tendencies of orange and yellow-green in the painting are inward and outward, respectively, mutually constraining each other.

7. Conclusion

Red and green are colors that are relatively difficult to manage. If we can appropriately utilize the proportions of complementary colors, it will create a static sense of stability. Our visual principles influence our perception of color. Although we cannot precisely understand the reasons behind the eye's self-balancing of colors, we can grasp this principle and explore the broader possibilities of color.

References

[1] Johannes Itten, The Art of Color,World Book Publishing, 1999, 58.
[2] Johannes Itten, The Art of Color,World Book Publishing, 1999, 63.
[3] Johannes Itten, The Art of Color, World Book Publishing, 1999, 73.
[4] Johannes Itten, The Art of Color, World Book Publishing, 1999, 75.