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INTERACTION OF COLORS AND THE THEORETICAL-PRACTICAL FOUNDATIONS OF CREATING COLOR HARMONY

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Abstract: This article provides a scientific analysis of the physical, psychological, and aesthetic characteristics of color. It examines the interaction between light and color, including the processes of absorption, reflection, and refraction, as well as the role of fundamental parameters such as hue, saturation, and brightness in visual art. The study also explores simultaneous and complementary contrasts, the spatial functions of color, and its psychological influence on human perception and emotion. The findings demonstrate that color should be understood not only as an artistic tool but also as a "living and dynamic" perceptual aesthetic phenomenon.

Keywords: color, light, hue, saturation, brightness, color contrast, complementary colors, color psychology, color harmony, visual art, color perception.

Color is a physical property of objects perceived by the human eye and interpreted through cognitive processes. The visibility of color depends on three essential factors: light, the eye, and perception. Light serves as a crucial source of energy in nature and manifests in two forms – natural (sunlight) and artificial (illumination devices). Sunlight refracts at various angles through transparent raindrops to form a rainbow, which demonstrates that light undergoes absorption, reflection, or refraction upon encountering a material surface.

If light is completely reflected from a surface, the object appears white; conversely, if it is fully absorbed, the object is perceived as black. When only part of the incoming light is absorbed and the rest is reflected, the color of the object corresponds to the spectrum of the reflected wavelengths. For example, if only red wavelengths are reflected, the surface appears red. Thus, the appearance of any color is primarily determined by the spectral composition of light and its interaction with the surface.

Colors are divided into achromatic (shades from white to black, including all grays) and chromatic (all hues possessing a distinct tint). The human eye can distinguish approximately 2,100 chromatic variations. In color theory, three primary colors – red, yellow, and blue – serve as the basis from which all other colors are derived through combinations. Colors also differ in their emotional expression: dark and black tones are classified as "heavy," while light and white tones are considered "light." The psychological impact of color on perception is often

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determined by its placement within a composition [1]. For instance, when “heavy” colors are positioned at the lower part of an artwork, visual stability is achieved.

The physical nature of color is determined by wavelength: short-wavelength colors include blue and violet; medium-wavelength colors include green; and long-wavelength colors encompass yellow and red. As the wavelength changes, the emotional expression of color shifts accordingly for example, blue evokes coolness and tranquility, while red is associated with warmth and movement [2], [3].

Each color possesses three fundamental attributes:

Hue – the name of the color and its position within the spectrum;

Saturation – the degree of color purity or mixture;

Lightness – the perceived brightness or darkness of the color.

These attributes shape the sense of volume, distance, light-shadow relations, and the overall mood of an artwork. Colors also behave as dynamic phenomena when placed adjacent to one another: complementary pairs red/green, blue/orange, and yellow/violet mutually enhance each other and intensify compositional dynamism [4], [5].

The psychological influence of color plays a crucial role in art:

- red symbolizes energy and passion;
- blue conveys calmness;
- green represents harmony and stability;
- yellow expresses joy and luminosity;
- violet reflects deep emotional states;
- while brown signifies earthiness and tranquility.

By selecting specific colors, the artist forms the viewer’s initial impression [6], [7], making color choice an essential tool for reinforcing the artistic message.

One of the fundamental concepts in painting is color harmony (colort), which refers to the coherent combination of all colors used in a composition. A color harmony can be warm, cool, contrasting, or subdued, and it defines the temporal, spatial, and emotional characteristics of an artwork [8]. For instance, a warm color scheme may evoke the glow of sunrise or the warmth of summer days, while a cool color scheme can convey a winter landscape or a sense of tranquility.

The distinctiveness of a color is revealed through its interaction with other colors. A color perceived in isolation appears differently when placed next to other colors. For example, yellow appears extremely bright against a blue background, but when positioned next to white, it seems relatively darker and more subdued. Furthermore, colors change over time: the morning blue appears light and transparent, whereas the evening blue takes on a deeper and richer tone. In this sense, color is interpreted as a living and dynamic phenomenon [9], [10].

Personal observations and practical experience demonstrate that color constitutes not only a physical property but also a complex system with aesthetic and psychological dimensions. When working with color, an artist engages not merely with pigments but with human perception, emotions, and the interactive “dialogue” between colors [11], [12]. A

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thorough understanding of color properties enhances artistic practice, compositional design, and everyday visual perception.

The color system is one of the primary tools in visual arts for defining content, rhythm, spatiality, and compositional harmony. The variability of color, its interaction with light, the degree of contrast between colors, and their psychological impact enhance the artistic value of an artwork. The phenomenon referred to as the “movement” of color the property of changing its hue under the influence of surrounding colors represents one of the most subtle practical challenges for the artist. Consequently, during the creative process, the artist must continuously observe color and make decisions based on its dynamic changes.

In art theory, the spatial function of color holds particular significance. Warm colors possess a visually advancing quality, making them suitable for foreground elements, whereas cool colors create depth by receding into the background. However, the spatial properties of colors are influenced by numerous factors, including light intensity, the chosen color harmony, contrast relationships, and compositional solutions. Therefore, the spatial function of each color is not fixed but manifests as a context-dependent and dynamic system. This phenomenon is linked not only to the objective physical properties of color but also to subjective perception.

Simultaneous (simultaneous) contrast is especially important in the interaction of colors. In this type of contrast, a color positioned next to another can either intensify or diminish its perceived hue. For example, a neutral gray background may make a colored shape appear brighter or darker depending on the background’s tone. This effect allows artists to control color psychologically and optically. Simultaneous contrast is significant not only in fine arts but also in design, stage decoration, interior aesthetics, and advertising imagery.

Another complex aspect of color is its sensitivity to lighting and atmospheric conditions. Changes in natural light alter the perception of color: morning light renders colors soft and flowing, midday light makes them clear and precise, and evening light imparts deeper, calmer, and warmer tones. This process requires artists to perceive color not merely as an object but as a “living phenomenon” dependent on time. The approach of Impressionist painters such as Monet, Pissarro, and Sisley exemplifies this principle, capturing the continuous transformation of color under the influence of time and light.

The aesthetic nature of color is also significantly influenced by cultural and historical factors. Across different cultures, the symbolic meaning of colors varies: for instance, in Eastern traditions, green represents nature, purity, and benevolence; yellow signifies enlightenment and light; red symbolizes vitality and energy. In Western art, red is more often associated with passion and power. The semantic weight of color is thus shaped by social thinking, spirituality, and aesthetic perspectives.

Furthermore, the emotional impact of colors is grounded in psychological principles, as colors influence mood, emotional states, and even associative memory. Blue is associated with calmness and stability, green with naturalness and balance, red with activity and strength, and purple with psychological depth. These emotional characteristics of colors can be applied

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pedagogically to develop students' visual thinking, creative reasoning, and artistic imagination [1]-[12].

Another fundamental function of color in art is characterizing the subject. Artists convey the psychological state, mood, and personality of figures through color. For example, dramatic scenes are often depicted in deep, contrasting hues, whereas calm or romantic scenes are rendered in soft, harmonious tones. Color thus serves as an artistic language that enhances the character of the subject and enriches the semantic layer of the artwork.

The multifaceted properties of color further complicate its role in art [13]. Mastering the color system requires not only technical skill but also the integration of perception, psychology, physics, and aesthetic judgment. Therefore, working with color is one of the highest levels of artistic practice, demanding acute sensitivity, experience, and creative thinking from the artist.

In conclusion, studying the nature of color demonstrates that it is not merely a visual phenomenon but a complex system encompassing physical, psychological, and aesthetic dimensions. While the interaction of color with surfaces through absorption, reflection, and refraction defines its physical essence, human perception and cognition translate this into emotional and aesthetic meaning. Thus, understanding color involves not only visual observation but also cognitive perception, personal experience, and emotional response.

The three primary attributes of color hue, saturation, and lightness further confirm its fundamental importance in visual art [14]-[15]. These three properties allow artists to shape compositional weight, rhythm, mood, and character. Each color possesses spatial and emotional strength, and its effect changes depending on adjacent colors, demonstrating a "living" quality. Color is never a static entity; it constantly adapts its intensity according to light, time, background, composition, and even the psychological state of the observer.

Analyses indicate that the most essential characteristic of color is its interactivity. A color's value is not absolute; its essence is fully revealed only in relation to neighboring colors. For instance, red intensifies beside green, yellow appears luminous against a blue background, and warm colors visually advance over cool backgrounds. This principle of relativity is crucial for achieving compositional harmony in art.

Furthermore, the temporal and light-dependent variability of colors links their nature to natural rhythms. Morning colors appear light and transparent, midday colors are more defined and firm, and evening hues tend to be rich, deep, and calm. This phenomenon allows the artist to harmonize color with the concept of time. Understanding the "daily life" of color that is, how it manifests under different lighting conditions serves as an essential practical experience in artistic practice.

From a psychological perspective, colors have a profound impact on human emotions. Red evokes energy and strength, blue conveys calmness and stability, green represents natural harmony, yellow brings joy and warmth, and purple expresses profound psychological states. By selecting specific colors, the artist directly influences the viewer's mood, making color a key instrument for revealing the semantic content of the artwork. The cultural and spiritual

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symbolism of colors further demonstrates that their meaning is closely intertwined with social memory and historical consciousness.

These studies indicate that color holds immense significance not only in visual art but also in everyday human perception. Through color, individuals perceive their environment, assign emotional value to events, and classify reality, making color a natural component of human cognition. Scientific understanding of colors enhances creative activity, making it more deliberate and effective. For an artist, working with color is not merely applying paint; it is engaging in a dialogue with a "living language." The harmony of colors, their mutual "interaction," and their role in establishing mood and rhythm within a composition are fundamental.

In general, a deep study of color properties develops the artist's creative thinking, supports well-founded compositional decisions in visual art, and enriches aesthetic perception. Such knowledge is valuable not only for practical artistic activity but also for daily life, enabling a deeper understanding of surrounding color relationships and fostering visual literacy. Therefore, mastering the color system is an essential skill and aesthetic experience for both professional artists and attentive observers.

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