

Research on Emotional Expression of Color in Visual Design

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Abstract: With the advent of the digital age, individuals have gained the ability to establish connections and express their emotions freely through online platforms as communication mediums. In the realm of visual design, the application of color to convey emotional aspects in artworks has become crucial. This study employs an interview-based approach to examine whether color can effectively alter or transform the audience's emotions. The primary objective of this research is to identify the audience's specific demands regarding color emotion; to achieve this, the findings from the interviews will be summarized and synthesized. The results of this study reveal that color emotion holds a significant impact on visual design. Therefore, designers should strive to enhance their theoretical understanding of color, analyze and comprehend its effects, and acknowledge the influence of different communication mediums on the perception of color emotion. This knowledge will enable designers to adapt to the evolving trends of the digital age and create visually appealing artwork that resonates with the target market.

1. Introduction

Visual design involves the communication of specific elements through visual forms, thereby exerting an impact on the intended audience. As the Internet has developed and ushered in the digital age, people's lifestyles, ways of thinking, values, and aesthetic preferences have undergone significant transformations. This shift towards digitization has given rise to novel design forms, while new media have revolutionized design concepts and thinking. Designers aim to convey emotions and elicit resonance by employing both similarities and differences in their works. Although expressions and forms may vary across different works, most creators rely on relevant color theory to analyze and shape their artistic endeavors. Through conveying emotional messages via color, designers effectively cater to the audience's emotional needs, facilitating a deeper understanding of the essence embedded within the works.

In China, as visual design has evolved with the times, there has been increasing research on the emotional aspects of color. A search on the CNKI (China National Knowledge Infrastructure) database using the keyword "color emotion" yielded approximately 72 master and doctoral theses. It was found that these theses primarily focused on the field of fine arts, such as "An Analysis of Color Emotional Expression in Contemporary Fine Brushwork Figure Painting" by Yao Shiyan from Xi'an Academy of Fine Arts [1] and "Color Expression in Oil Painting Creation" by Chen Man from Hubei Institute of Fine Arts [2]. These theses provided some theoretical references for this paper under certain conditions. However, only about 44 studies were explicitly related to the design field, mainly in independent design disciplines such as packaging design, poster design, product design, UI design, Etc. There needed to be more comprehensive research on visual design as a whole. By reviewing the available literature, it became evident that the current research in China focuses on the saturation of color emotions and their expression and application in various design forms. Furthermore, most of the studies were conducted several years ago (with over 80% of the theses published between 2014 and 2015), and there needs to be more research specifically addressing the broader context of the era and the overall environment.

Research in foreign countries generally focuses on the data system and adopts more scientific

methods to demonstrate the application of color emotion. Regarding the traditional proposition of color psychology—warm colors evoke positive emotions, while cool colors evoke negative emotions—Tavarag and Sushma explored the psychological associations of primary colors through data analysis [3]. Domicela Jonauskaitė et al. used technological means and conducted data analysis to quantitatively study the relationship between color emotion and design works, finding that the correspondence between color and emotion can vary significantly in specific cultural contexts [4]. Debbie J. Pope's research indicates that gender differences also influence the understanding and communication of color emotion, with women generally having a more sensual perception of color [5]. Some foreign scholars believe transmitting color emotion is a subjective "emotional perception skill" acquired through nurture. In contrast, others argue that audience responses to color are instinctive receptions of transmitted color emotion. A. Hettiarachchi and N. De Silva draw conclusions based on the analysis of innate learning and innate responses [6]. These studies provide partial references for the research in this paper.

This study will employ the qualitative research method of in-depth interviews to complement the existing research in China. The main research objective is to explore the characteristics of color emotion expression and analyze the application of color in visual design. By examining whether color can be used to change or transform the audience's emotions in visual design, the study aims to summarize the audience's needs for color emotion. It seeks to enhance the understanding of how visual design works and utilize different media carriers, particularly paper printing media, to express emotions through color and even alter audience emotions in the digital age, where electronic products are challenging traditional print media.

2. Relevant Theoretical Foundation

2.1. Visual Design

2.1.1. Concept of Visual Design

Visual design is the process of communicating specific elements through the visual organs. In simple terms, visual design involves designing various elements, such as text, color, images, Etc., to convey relevant information to a broad audience. Visual design encompasses various disciplines, including visual communication design, architectural design, and craft design [7].

2.1.2. Design Elements in Visual Design

Visual design encompasses various elements, but shape and color are two of the most essential elements. In his book "Art and Visual Perception," author Rudolf Arnheim mentioned, "Shape and color are both essential components in visual communication, each playing its role in conveying relevant information" [8].

2.2. Color Emotion

2.2.1. Nature of Color

The essence of color is light, and its principle is based on the reflection and refraction of light on different surfaces, resulting in different wavelengths and creating various color perceptions in the audience. Red has the longest wavelength in the visible light spectrum that the human eye can perceive. Therefore, in psychology, red often provides a strong visual impact on the audience. The book "Visual Communication Effects and Analysis of Traditional Chinese Art Colors in Graphic Design" by Zhao Xuejing mentions that red often evokes strong visual sensations and sensory impact in graphic design [9]. However, foreign scholar Wilms L conducted research and analysis on factors such as color tone, saturation, and brightness and concluded that color emotion is not solely expressed through a single-color tone but is often influenced by the combined effect of these three factors. Nevertheless, it is generally concluded that high brightness, high purity, and high saturation color tones are more effective in conveying positive emotions [10].

2.2.2 Color Emotion and Related Concepts

Color emotion refers to using color to stimulate visual perception and evoke a range of psychological responses, ultimately leading to emotional resonance among the audience. In the realm of visual design, color plays an indispensable role. While color lacks inherent meaning, it establishes a connection with the audience and exerts a specific psychological impact through communication. For instance, warm tones such as red, orange, and yellow can be employed in artwork to intensify excitement, liveliness, and happiness. On the other hand, cool tones such as blue, green, and purple can accentuate emotions of silence, coldness, and solitude.

Regarding the characteristics of color emotion, the book "On the Form Beauty of Color Language in Painting" by Wang Yiming from Harbin Normal University [11] summarizes the features of color emotion as being expressive, symbolic, and decorative. Through different characteristics of color, creators generate aesthetic appeal and convey emotions.

3. Research Questions

After conducting an extensive literature review, it was discovered that there needs to be more research on the emotional aspects of color in visual design. Although it is widely acknowledged that color can evoke emotions and convey feelings in artistic works, the existing research treats color emotion and visual design as separate entities, needing an effective theoretical framework to establish a mutual influence between the two. This paper addresses this gap by employing a qualitative research approach, specifically in-depth interviews, to examine several classic cases of color application in visual design. The goal is to explore whether color can be utilized in visual design to alter or transform the audience's emotions. More specifically, the research focuses on the following questions: (1) How do audiences perceive and evaluate the application of color emotion in visual design? (2) Can color be used to transform the audience's emotions in visual design? (3) Does the conveyance of color emotion vary across different mediums? (4) How can color effectively communicate positive emotions in visual design?

4. Research Methods

This study employed a qualitative research approach using an interview guide for open-ended interviews, each lasting approximately 40 minutes. The interviews were conducted with audiences of different age groups using platforms such as Tencent Meeting and WeChat voice calls. During the interviews, discussions were held with each participant to clarify their preferences, aesthetic tastes, and other relevant characteristics. By analyzing the descriptions provided by the interviewees, the study aimed to assess whether emotional expression in visual design works can be altered or transformed through the use of color. While efforts were made to consider factors such as gender and age, this study still has certain limitations.

5. Research result

5.1. Profile of Participants

Table 1 Attention to the Application of Color in Visual Design

Age	Whether Attention is Given	The reason of Attention
5-10 years old	Yes	In the classroom or daily life, it is commonly observed that different colors elicit different visual sensations.
20-30 years old	Yes	People often pay attention to color selection when enhancing aesthetics, such as choosing colors for coordinating outfits.
31-40 years old	Yes	Seeing favorite colors can evoke a sense of enjoyment.
Above 50 years old	Yes	There is a preference for vibrant colors as they are bright and eye-catching.

This study involved a total of 10 participants. Among them, there were three female participants

and three male participants. The participants' ages were categorized into four groups: 5-10 years old, 20-30 years old, 31-40 years old, and 50 years old and above. Each age group exhibited different levels of understanding of color, perceptions of color emotion, and experiences regarding the application of color in visual design. (See Table 1)

5.2. Main Finding

The study focused on two main variables, visual design works, and color, and posed questions to the participants. By analyzing the research findings, it was discovered that individuals of all age groups generally pay great attention to the application of color in their daily lives. Due to differences in gender, age, and aesthetic preferences among the participants, the emotions elicited when encountering visual design works varied. Most participants believed that color is crucial in visual design applications. However, a small portion also acknowledged the importance of combining color with shapes and text to create a compelling visual language that can better highlight the emotional core of the works (See Table 2 for details).

Table 2: Views on the Application of Color in Visual Design

Age	Attention to the Application	Preference for Types	Factors Influencing Attention
5-10 years old	Yes	Pink and Sky Blue	Aesthetic Appeal and Associations with Objects
20-30 years old	Yes	Bright Colors like Orange	High Usage of Colors in Daily Life
31-40 years old	Yes, but there is a greater emphasis on the use of graphics.	Color Application in Images	Diverse Messages Conveyed by Different Colors
Above 50 years old	Yes	Vibrant Colors like Bright Red	Desire to Reduce Perceived Age through Color

During the interviews, the author surveyed whether different colors convey different emotions and the reasons behind them. The findings were consistent with the assertions of many scholars. From the viewers' perspective, many participants believed that colors with high purity, brightness, and saturation are more effective in conveying positive emotions. In contrast, colors with low purity, low brightness, and low saturation tend to evoke negativity and feelings of depression, conveying negative emotions (See Table 3 for details).

Table 3: Different colors convey different emotional values.

Age	Colors that convey positive emotions	Colors that convey negative emotions	Reasons
5-10 years old	Pink and Yellow	Black	Associations with objects and children's cognition
20-30 years old	Vibrant colors such as Bright Yellow and Grass Green	Dark Blue, Gray, and other muted tones	Associations with objects and the cognitive understanding of colors by children are often influenced by what is commonly observed in daily life and conforms to common sense.
31-40 years old	Red and Orange	Black and Brown	These associations are formed through word associations, such as linking red to festive occasions and black to darkness.
Above 50 years old	Red	Black and White	Color associations

In Table 4, the analysis of interview results indicates that color can be used in visual design to convey emotional information and transform or change the emotional experiences of the audience. For example, participants mentioned that when they were feeling extremely agitated, seeing the vibrant greenery outside the window and the bright green color would help calm their inner turmoil and improve their negative emotions (See Table 4 for details).

Table 4: Opinions on whether the application of color in visual design can change the emotional experiences of the audience

Age	Whether it can alter or modify the emotions	Reasons
5-10 years old	Yes	Experiencing joy when encountering favorite colors
20-30 years old	Yes	Feeling a sense of relief and upliftment when observing greenery outside the window during negative emotional states
31-40 years old	Yes	Preferring to purchase and wear brightly colored clothes to maintain a positive mood throughout the day
Above 50 years old	Yes	Perceiving a sense of festivity when observing children wearing red clothing during the Chinese New Year celebrations

Regarding whether there is a difference in color emotion when using different media in visual design, the majority of participants expressed a significant difference, and they tend to prefer using traditional media to convey emotions. This preference is attributed to the stimulation of the five senses, particularly tactile stimulation and visual impact, which can create a stronger emotional resonance with the artwork (See Table 5 for details).

Table 5: Opinions on the conveyance of color emotion through different media

Age	Commonly used visual media	Preferences	Reasons
5-10 years old	Tablet PCs, Textbooks, Books	Tablet PCs	Watching animations on a tablet PC brings joy due to the rich visuals
20-30 years old	Mobile phones, Tablet PCs, Books	Tablet PCs and Books	Tablet PCs are more convenient, but the emotional warmth conveyed through printed materials is greater
31-40 years old	Mobile phones, Computers, Tablet PCs, Magazines, Books	Magazines and books	Printed materials are classic, durable, and easy on the eyes
Above 50 years old	Mobile phones, Books, Magazines, Newspapers.	Books	Some individuals find it difficult to adapt to using smartphones and feel that mobile phones cannot effectively convey emotions

6. Discussion

This paper draws corresponding conclusions by examining the colors favored by different age groups, the application of color in visual design, and whether the color is believed to have emotional value and can change audience emotions in visual design. Firstly, when appreciating different visual design works, 90% (nine out of ten respondents) consider using color particularly important. Secondly, the analysis found that if color is considered the primary element in visual design, it is responsible for conveying emotions. Nearly 100% of the audience believes that transmitting color emotion can establish consensus between the audience and visual design works. After "empathizing," they can appreciate the design's charm. Finally, regarding different media, 90% (nine out of ten respondents) believe that traditional media, such as books and newspapers, are better suited for expressing the application of color emotion in visual design. Therefore, the conclusion is that color can be the primary element in visual design to shape people's emotions. However, the general audience believes that traditional media, such as print newspapers provide a more emotional outlet. Based on these conclusions, this chapter discusses the expression of color emotion in visual design and provides corresponding suggestions to creators.

6.1. The application of color emotion should align with the aesthetic preferences of the audience and fulfill their aesthetic needs

Perception of color varies among different age groups and genders, resulting in diverse aesthetic preferences and needs. Design creators should pay attention to understanding the aesthetic values of the audience and design works that cater to specific demographics. Taking Coca-Cola as an

example, most young individuals enjoy drinking cola. Therefore, Coca-Cola Company uses the color red to convey a sense of youthful vitality and energetic positivity, which aligns with the purchasing power of the youth demographic.

6.2. The application of color emotion should take into account specific cultural and regional backgrounds

Design cannot be separated from the cultural and regional context of the design creator or brand. Designers should consider using colors that best showcase local characteristics and highlight cultural heritage. For example, in China, red represents celebration and enthusiasm. Therefore, when designing products or works for the Spring Festival or specific festivals, it is essential to focus on using different brightness, purity, and saturation levels of red to showcase the enthusiasm of the Chinese people.

6.3. The application of color emotion should also consider the use of media

Design has become more diverse in the digital age, and the expression of color emotion can vary depending on different media. Design creators should consider whether the application of color in different media may be affected by technical issues such as color differences or codes, as well as the perceived coldness of digital media, which may hinder the effective communication of the true emotional core to the audience.

7. Conclusion

This paper focuses on the research questions of whether color emotion in visual design can resonate with the audience and whether it can change the audience's emotions. These aspects have received less attention in previous studies. The literature review reveals that previous research mainly concentrated on analyzing the influence of color emotion in the field of painting or certain specific independent disciplines. There was a limited exploration of the impact of color on visual design and its connection with the audience. Through practical research, it was found that creators should strengthen their theoretical understanding of color, analyze and grasp color better, and understand the influence of media on color emotion. This will enable them to better adapt to the development of the times, and design works that have market appeal.

However, this study has several limitations. Firstly, only ten samples were selected for analysis, indicating that the chosen samples possess uniqueness and specificity, thereby providing insights into research conclusions under specific conditions. Secondly, the duration of the in-depth interviews conducted in this study was relatively short, and there was a lack of extensive communication with the participants. Addressing these limitations, future research could focus on specific colors and explore the significance of color emotions in visual design using specific color emotion frameworks. This study can provide more assistance for subsequent investigations in this field by conducting further research and analysis.

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