Computer-Aided Design is a New Manifestation of Color Composition

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Abstract. The color composition is a designer to design must pay attention to the problem, the traditional color composition mainly through the form of printing, this way due to backward technology, appear very big error, often makes the constitute of the color affect the accurate color performance, thereby affect the colour of the designer cognition and learning. With the rapid development of information technology in China, computer-aided design emerges as The Times demand, and is gradually applied to the parts related to color composition. The purpose of this paper is to make an in-depth study of the new manifestation of color composition in computer-aided design, to help designers establish a new cognition of color composition, and to promote the further development of design work. Firstly, this paper gives an overview of the computer-aided design and color composition of computer aided design. With the help of color reduction algorithm, experiments on the color composition of computer aided design are carried out. Through the analysis of the experimental results, several new manifestations of the color composition of computer aided design are obtained. The experimental results show that computer aided design (cad) gives a new expression to color composition.

Keywords: Computer Aided Design, Color Composition, New Performance, Color Reduction Algorithm

1. Introduction

With the development of network science and technology and the continuous progress of computer level, computer-aided technology came into being, and gradually applied to various design fields, among which the most prominent is the application of color composition, realizing a new performance of color composition. Color composition occupies an important position in the three components and has been playing a key role in the design work. The main research object of color composition is color. Taking the color principle as the starting point, it combines with the original perception of designers to master the changes and collocation of colors so that designers can realize reasonable and accurate application of colors in relevant designs. Due to the limitations of traditional means, the expression of color composition is also limited. Therefore, it has become an urgent problem to solve the technical limitation of color composition. In this case, computer-aided design begins to be applied to relevant drawing design, such as Photoshop technology is widely used in drawing design. The application of
computer-aided design breaks through the expression limitation of color composition in the traditional drawing method, and makes color composition appear new expression, which promotes the efficiency of design drawing and the improvement of color accuracy.

From the current situation, computer aided design has been widely used in the field of graphic design. Moreover, with the continuous maturity of this technology, its application prospect will be broader [1-2]. The current domestic and foreign scholars on the composition of computer aided design and color, a series of research through the summary of the related resources we found that the research of scholars both at home and abroad mainly focused on the application field of computer aided design, computer aided design of the working principle and the technology in the application of color composition teaching, etc., are focused on the overall research on the application of the computer aided design, few studies have specific to a particular module, computer aided design color constitute a new performance research are much rarer [3-4]. Therefore, from this point of view, there is still a big theoretical gap in the current research.

Blank in order to effectively make up for this theory, the article first computer aided design and color composition has carried on the summary of relevant, using color reduction algorithm, on the computer aided design of the related experiments of color composition, through the analysis of the test results on several kinds of new computer aided design constitute of the color performance [5-6]. Through the research in this paper, the author intends to deeply explore the new manifestation of color composition of computer-aided design, help designers establish a new cognition of color composition, and promote the further development of design work [7-8]. On the one hand, it is beneficial to establish people's in-depth cognition of color composition under computer-aided technology; On the other hand, it provides a theoretical basis for future relevant studies [9].

2. Method

2.1. Overview of Computer-Aided Design and Color Composition

Computer-aided design referred to as CAD technology is the inevitable result of the development of computer technology to a certain extent. Specific can be summarized as the use of computer fast computing and graphics processing functions to carry out related product design. When designing related products, the computer is mainly responsible for calculation, data storage and drawing [10-11]. In product design, it is necessary to process various types of data information, including digital types, text types and image types. Manual processing alone cannot accurately complete a series of complex tasks, so it needs to be assisted by computers. Computer-aided design first makes a comparative analysis of the scheme, then stores relevant data and completes data retrieval at the fastest speed [12-13]. As long as designers do simple sketch processing, other work can be replaced by the computer, the computer can be associated with the image data processing work. Computer aided design (cad) is composed of a variety of technologies, among which the key technologies mainly include the following aspects: graphics transformation technology, interactive technology, solid modeling technology and surface modeling technology. Among them, interactive technology is mainly used for information exchange between designers and computers, which can realize real-time modification of designs. This technology is the key to computer-aided design [14-15]. Computer aided design system mainly consists of main machine, display screen, plotter, printer and other software. Computer-aided design (cad) gives a new expression to color composition. As long as the corresponding value is input into cad software, the corresponding color can be produced, and the resulting color is unique. At the same time, computer-aided design itself has the characteristics of flexibility and immediacy, which can realize the flexible adjustment and real-time transformation of color collocation.

2.2. Color Reduction Algorithm

Color reduction algorithm is an important operation method to realize color reduction. This algorithm can realize accurate color reduction of images, help designers correctly understand and understand
color composition, and thus realize the scientific application of color composition in design. The specific algorithm is as follows:

\[ G = \frac{G_i + G_n}{2}(\beta + \alpha) \]  

(1)

Where G represents the value of color reduction, Gi represents the minimum error of color distortion, and Gn represents the maximum error of color distortion. The horizontal gradient and vertical gradient are represented by the horizontal gradient and vertical gradient respectively. The specific calculation formula is as follows:

\[ \alpha = |G_i - G_n| \text{ and } \beta = |G_i - G_n|/2 \]  

(2)

This algorithm makes the G component value reduced by the size of the gradient component weaken, and on this basis, the relevant pixel values of the image are obtained by formula (1). However, it must be noted that this algorithm should process the color of the edge image separately during the pixel restoration, instead of using the fast processing process under the unified algorithm to prevent the error of color restoration due to color chaos.

3. Computer-Aided Design Experiment of Color Composition

All The first step is the experiment object and the whole experiment process. In this paper, 84 students from A design major in an undergraduate college participated in the experiment. The experimental subjects were divided into two groups: traditional hand-drawn design and computer-aided design. The two groups were represented by A and B, with A as the experimental group and B as the control group. The two groups were subjected to design tests using different techniques. The period of the experiment was 7 days.

The second step is the main method of the experiment; During the experiment, research methods such as literature survey and interview were mainly used. In the early stage of the experiment, researches were conducted on the cognition and understanding of color composition of students majoring in design, and the cognition of the performance of color composition at the present stage was obtained. At the same time, through the analysis of literature, the relevant experimental details are designed. The experimental group used mathematical statistical theory and MATLAB software to analyze the data collected in the experiment.

The third step is the analysis and discussion of experimental results. Based on the analysis of experimental data, the relevant conclusions are drawn, and the conclusions are verified.

4. Discuss

4.1. Analysis of Experimental Results

Through the above experiments, we can draw a conclusion: computer-aided design changes the performance limitation of traditional color composition, and makes color composition have a new performance, which is conducive to the reasonable application of color composition in design work. The specific experimental results are shown in table 1 and figure 1. The data in the chart are the results of the author's experimental arrangement.

|   | 5. Ajz1 | 6. 83.5 | 7. 86.3 | 8. 122 | 9. 87 |
|---|---------|---------|---------|--------|-------|
| 10. Bjz1 | 11. 76.8 | 12. 70.4 | 13. 117 | 14. 170 |
| 15. Afz1 | 16. 3.4 | 17. 2.5 | 18. 5 | 19. 3 |
| 20. Bfz1 | 21. 3.2 | 22. 4.4 | 23. 6 | 24. 6 |
| 25. H | 26. 1 | 27. 1 | 28. 0 | 29. 1 |

30. *Data came from the in-depth analysis of financial data in the experiment

Table 1. Results of MATLAB operation under computer-aided design


Figure 1. Comparison of results and completion time of design works under different technologies

As can be seen from the data in figure 1 and table 1, the score of color composition in hand-painted design is lower than that in computer-aided design, and the time used in computer-aided design is also much lower than that in hand-painted design. This proves that the efficiency of CAD in design work is greatly improved, and the performance effect of color composition is far higher than the traditional way.

4.2 New Expression of Color Composition

(1) New manifestation of primary color cognition

Primary color plays an important role in the composition of color. Primary color is mainly divided into three parts: color light primary color and color material primary color. The three primary colors are mainly red, blue and green. The cognitive expression of primary color mainly relies on the traditional printing method, which seriously affects the accuracy of the recognition of primary color. With the help of computer aided design, such as photoshop software, can change the traditional primary color cognition, forming a new expression of primary color cognition. Using the RGB mode in Photoshop, you only need to set the value to 255 to establish an accurate understanding of the primary colors. With the help of CMYK model, by fixing the values of C, M and Y to 100%, we can establish an accurate cognition of the three colors of color materials and finally form a new manifestation of primary color cognition.

(2) New performance of color ring production

Color ring is an unreachable part of color composition. Color ring can help students correctly understand and understand the color relationship, especially the corresponding relationship between different colors. The correct production of color ring can help the establishment of color stereo. The uniform change of hue between adjacent colors is the basic requirement of color ring production. In traditional design, intelligence makes use of the designer's intuition to make color ring, often resulting in a large error. In Photoshop, for example, the HSB mode of the software is capable of accurate production of 360 color phase rings. The color parameters of this mode are multi-angle, including purity parameters, hue parameters and purity parameters, providing a new expression form for color ring production.

(3) A new manifestation of light mixing and space mixing

Adding light mixing and space mixing are two difficulties and key points in color composition. The effect of adding light and space mixing under traditional means is not obvious, which affects the
overall effect of color composition and thus hinders the designer's design work. By means of computer aided design, the light mixing and space mixing in color composition can produce new expression. For example, with the help of the lighting and rendering functions in 3DS MAX technology in computer technology, the simulation of tri-color light mixing can be carried out. Meanwhile, the related parameters can be flexibly transformed, and the color effect of adding light mixing will also change accordingly. In the design work, it is difficult to show the effect of space mixing in the design, but computer-aided design can be used to show the process of color mixing, through the conversion and combination with different colors, can get a more obvious color effect, that is, the effect of space mixing.

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5. Conclusion

The color constitution contains the designer to the color principle, the color collocation and so on different content, is the design work important constituent. With the continuous progress of social production and science and technology, the learning and understanding of color composition in design work can not only stay at the stage of manual color setting. With the help of computer-aided design, the realization of a new expression of color composition can improve the efficiency and economy of design, and constantly improve the actual effect of color composition in the design process. Generally speaking, computer-aided design has strong feasibility and reality in color composition.

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