

Deep Integration of Computerized Dynamic Visual Design and Environmental Design of Chinese Traditional Cultural Elements

Bingfu Wang^{1,✉}

¹ College of Art and Design, Sanming University, Sanming, Fujian, 365004, China

ABSTRACT

Visual design and security and communication network semantic technology are hot topics in recent years. As a typical representative of visual design and security and communication network semantic technology, visual design and traditional cultural element environment design have attracted many scholars' attention. With the rapid development of modern computer technology, contemporary visual design methods have also changed. It has great development space in conveying information and aesthetic feeling. The combination of Chinese traditional culture and visual design is not only the inheritance of Chinese traditional culture, but also the trend of visual design in the new era. China's traditional culture is a very valuable resource, which not only has a wide range of themes but also has rich connotations. It is incomparable to any other country. After thousands of years of development, China's traditional culture has no doubt about its artistic value. As a new design method, dynamic visual design is rising with the development of market economy. With the passage of time, all aspects of human life have encountered a variety of dynamic visual design. In further exploration, it was found that the highest score of users' visual perception of static visual design was only 6. The integration of cultural elements was also very low, and user satisfaction had not changed for a long time. The visual experience of dynamic visual design can often reach full score, but the integration degree of cultural elements is as high as 97%. High user satisfaction has laid a foundation for the inheritance of Chinese traditional culture. It can be seen that the latter has a broader development prospect and can better meet the requirements of the times. The research in this paper has important guiding significance for the application of visual design and security and communication network semantic technology.

Keywords: Computer Dynamic Vision Design, Traditional Cultural Elements, Environmental Design, Automatic Orchestration Algorithm

1. Introduction

With the rapid development of contemporary technology and social progress, environmental art

✉ Corresponding author.

E-mail address: 18065858517@163.com (B. Wang).

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design, as an important visual language, enriches our lives and elegantly decorates our living environment [1]. However, how to make art design out of the flashy, deep and evocative, designers began to think about such a problem [2]. Therefore, let traditional culture and modern environmental art design integration, become an important topic in the design community [3]. Traditional culture is a valuable wealth accumulated by history, which contains deep cultural connotation and unique artistic charm [4]. Introducing traditional culture into modern environmental art design can give deeper traditional connotation to the design works and make them have higher artistic value [5-6].

The connotation of traditional culture is extremely rich, it is not only a kind of inheritance and protection, but also a spiritual symbol and identity of a nation [7]. This cultural connotation provides the way people interact with nature and society, and also influences social values and aesthetics [8]. Philosophical ideas in traditional culture, such as the Confucian and Taoist concepts of harmony, which emphasize the unity and harmony between humans and nature and encourage moderation and balance, have become a source of inspiration in modern environmental art design. Such ideas are found in many fields such as architecture, gardening, and interior design, injecting a deep cultural heritage into the design [9-11].

Contemporary designers, in the process of borrowing traditional culture, need not only to understand its appearance, but also need to dig deeper into its connotations and intentions, in order to reflect the resonance of social history and the fit of modern aesthetics [12]. Tradition provides a rich source of inspiration for design on the one hand, and on the other hand, it also poses a challenge to design, requiring modern expression while maintaining the original cultural appearance [13-14]. By understanding and integrating the core concepts and connotations of traditional culture, modern environmental art design can reflect a unique cultural identity and artistic value in the wave of globalization [15]. This fusion of tradition and modernity not only promotes design innovation, but also, to a certain extent, promotes the dissemination and promotion of traditional culture, so that it can continue to develop in modern society [16]. Design is no longer an isolated form of creation, but has become an expression of cultural exchange and cultural continuity [17]. Traditional culture provides a constant source of inspiration for modern environmental art design, prompting the design to develop with the times on the basis of inheritance [18].

On the other hand, under the background of globalization, the protection and inheritance of traditional culture are facing unprecedented challenges. In order to give new life to traditional culture in modern society, it is especially important to combine it with dynamic visual design to realize digital and dynamic transformation [19-20]. And dynamic visual design combines the traditional cultural environment design method, integrates the modern technology means, and innovates the communication method of traditional culture [21]. The expected results include proposing a set of systematic dynamic visual design strategies for traditional culture, providing theoretical support and practical guidance for the modernization and inheritance of traditional culture, and at the same time, enriching the cultural connotation of dynamic visual design, and enhancing its artistic value and social influence [22-23].

2. Integration of Dynamic Visual Design and Environmental Design of Traditional Cultural Elements

2.1. Dynamic Visual Design and Traditional Cultural Elements

In today's world, one of the most intuitive changes is the dynamic visual design that can be seen everywhere in daily life. How to win the favor of consumers visually is an urgent problem for designers. The consumption concept and aesthetic level of consumers are constantly changing, and the demand for visual design is increasing. How to improve the visual attractiveness of products is the key to enhance consumers' attention to product quality. Under the background of computer technology, visual design has become an effective way to promote economic development and improve service

quality. Dynamic visual design for the public, regardless of age, income, industry, inadvertently or unconsciously receives visual transmission, and has different understanding of its connotation. Therefore, visual design should be guided by the habits and occupations of the target population. Among these factors, belief and country play an important role in promoting the creative connotation of visual design. Its shape and image show a strong sense of the times with the development of the times, which is a visual culture. Figure 1 shows the works related to the combination of visual design and traditional culture.

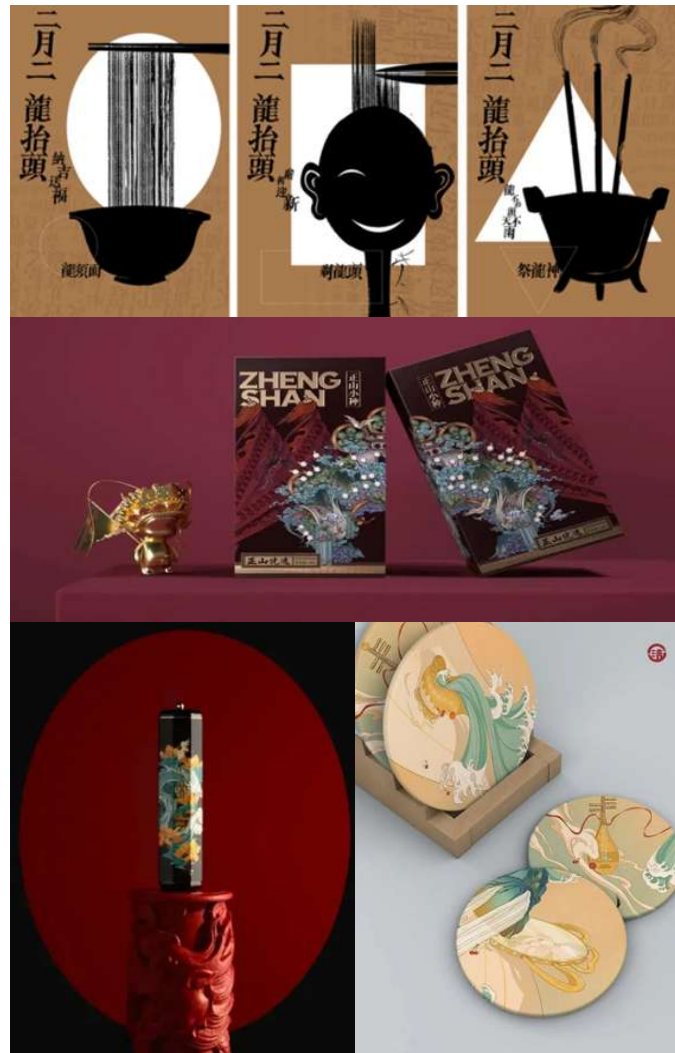


Fig. 1. Works related to the combination of visual design and traditional culture

Since the new century, China's economy has developed rapidly. The speed of social life has become faster and faster, and cultural diversity has made people have a personal experience. Literal culture has gradually been marginalized, while visual culture has become the focus of attention. People have better adaptation to the design mode of this situation. Any kind of design must be accumulated and spread by culture, otherwise it would become a big tree without water source, which is also a necessary condition for human beings to move towards civilization. Moreover, with the development of material culture, people pay more and more attention to the needs of spiritual life. The role of environmental art in education, display and inspiration become more and more important. Dynamic visual design should not only catch the trend of the times, but also absorb the nutrients of Chinese traditional culture. The Chinese traditional culture pays special attention to the unity of "truth", "kindness", "benevolence", "righteousness", "courtesy", "wisdom" and "faith", and also pays attention

to the integration of cultures from other countries. In the long history, various schools of thought collided with each other, thought-provoking, and had a profound impact on people's production and life. Many excellent art forms in China occupy an important position in the history of world art development. In the contemporary visual communication design, people often pay attention to the new, strange and special design and indulge in the high-tech and network world. One sidedly believes that mastering the advantages of visual design technology is the essence of design.

The education and guidance function of traditional culture in dynamic visual design has attracted people's attention again. In their own professional fields, it is incumbent on them to constantly strengthen themselves, while paying attention to the development of other disciplines. If people are only satisfied with their own careers and do not have the knowledge accumulation of other professions, they would be trapped in a dead end, and it is difficult to make great achievements. Cultivation of the ability of visual design is not a day's work. Some colleges and universities in other countries provide students with "visual literacy" courses. At present, Chinese visual design majors focus on technology and skill upgrading, lacking theoretical basis and language expression ability. The popularization of traditional cultural elements lags behind.

2.2. Relationship Between Visual Design and Environmental Design of Traditional Cultural Elements

1) The influence of Chinese traditional cultural elements on dynamic visual design:

(1) Improve the value of design works. After thousands of years of development, China's traditional culture has no doubt about its artistic value. In the visual communication design, the introduction of Chinese traditional culture can enhance the value and connotation of the works and make the works have more cultural connotation. The combination of the two can make the visual communication design change qualitatively, which not only enriches the cultural connotation of the works, but also enriches the expression methods and effects of the works. It can not only meet the psychological needs of the audience, but also meet the designers' pursuit of artistic works.

(2) Cultivate the aesthetic concept of the audience. The current trend of "Great Harmony" in the world makes other cultures deeply affect Chinese traditional culture. Due to some vulgar short videos, some people's aesthetic tendency is relatively vulgar. Some people have won a large number of fans by sensationalism. However, their performances are conventional and have no practical value. For a long time, there has been a serious deviation in the audience's aesthetic consciousness. The value of visual communication design is to convey the aesthetic information of art to the audience, which has a certain impact on the audience, so as to enhance the aesthetic awareness of Chinese people. Under the impact of the network, the traditional Chinese culture is integrated into the visual communication design. The cultural concept in the works is used to influence the audience, which has a positive significance for promoting the aesthetic concept of the public and establishing a correct aesthetic awareness.

2) The influence of visual design on Chinese traditional culture. The development of visual design is of positive significance for the development of culture. The inheritance of Chinese culture is also closely related to the economic development of the country. Healthy culture has a great influence on the prosperity of the Chinese nation. At present, culture is being weakened by other cultures. In the case of accepting the impact and corrosion of other culture, Chinese traditional culture is integrated into the visual communication design. Chinese traditional culture is spread through design. People understand Chinese traditional culture in the process of contacting works, so as to identify with traditional culture, thus promoting the development of Chinese traditional culture. Figure 2 better shows the relationship between the two.

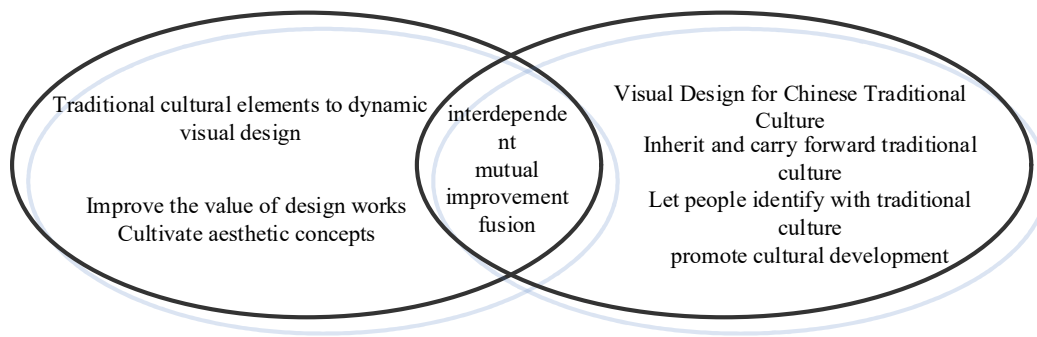


Fig. 2. Overview of the relationship between the two

2.3. Application of Chinese Traditional Cultural Elements in Design

Ancient buildings with oriental style are the most valuable cultural relics in the world. Many traditional buildings are full of Chinese characteristics, giving people a rich visual experience, and providing a lot of inspiration for contemporary environmental art creation. As long as they are properly used, Chinese traditional culture can shine again.

1) Copying and imitating traditional cultural elements. In contemporary environmental art, both visual design and environmental design can inject new forms into traditional culture and express new ideas through creative methods. While maintaining its cultural connotation, the patterns commonly used in traditional elements can also be used to combine the traditional elements together to create a new feeling. The above methods fully reflect the designer's culture and creativity through the transmission of image information.

2) Adaptation and transformation of traditional cultural elements. When designing, designers can dig out the beautiful elements from many traditional elements and refine them. Moreover, it is processed through the method of material innovation and transformation. According to the required images, combined with contemporary design ideas, it is necessary to excavate and reinterpret the traditional culture, so as to organically integrate Chinese and Western cultures to produce works full of the flavor of the times.

3) Metaphor and innovation of traditional cultural elements. Metaphor is ubiquitous in contemporary environmental art works. The so-called metaphor here is to use specific forms and elements to express specific emotions and values. The development of the times requires the innovation of traditional culture. The innovated works should not only have traditional charm, but also have a sense of modernity, especially highlight national characteristics and conform to local characteristics. Only this kind of work can be called a good one. It absorbs Chinese traditional culture, combines with contemporary aesthetics, reconstructs and refines traditional elements, which can be called an innovative model of Chinese traditional cultural elements.

2.4. Problems in Current Dynamic Visual Design

1) Old and single design method. Due to the short history of dynamic visual design, it lacks systematicness and continuity, which leads to the disconnection of knowledge links. In dynamic visual design, more clear dynamic effects are often pursued, while some professional system knowledge is ignored. Once it is not mastered well, the effect of the whole design would be affected. However, in the real dynamic visual design, it is often difficult to achieve a better design effect by focusing on a single design means, resulting in a relatively low quality and level of visual design. At the same time, it also has a certain impact on the effect of the whole design, making the optimization effect of visual communication design unsatisfactory.

2) Unclear design objectives. The ultimate goal of visual communication design is to serve the market and meet market demand. However, in actual design, visual communication designer is still main body of the design. They emphasize their own existence and adopt traditional visual design methods, which

can neither meet the market demand nor meet the needs of consumers. In essence, dynamic visual communication design also belongs to the service industry. Only by approving the designer's design can the designer's work become valuable. However, the current visual design can not grasp this problem well. The current visual design can not meet the requirements of the times, and is still relatively backward in design means and design concepts. Occupational adaptability also needs to be improved. At the same time, due to the problems of environmental protection and economy in dynamic visual design, there is a lack of targeted design ideas for specific industry development, and a specific development system has not been formed.

2.5. Computer Dynamic Vision Design Graph Automatic Layout Algorithm Experiment

This section describes the implementation of the graphic language layout control process. C language is used to edit and run the process to realize the automatic arrangement of graphic language. According to the syntax description of rules, the logical relationship between entities is defined. A set of rules is used to describe the process of automatic graphic layout algorithm in dynamic visual design. The description is as follows:

$$G = (Q, AG, CG) \quad (1)$$

Among them, G represents graphic language syntax. Q represents a finite entity set. AG stands for abstract syntax rules, as specified below:

$$AG = [s(q_1, q_2, n); q_1 \in Q, q_2 \in Q] \quad (2)$$

In Formula (2), s represents the connection between elements. q_1, q_2 represents the current element. N is a natural number. CG is used to represent specific syntax rules, as specified below:

$$CG = [(q, render, layout) | p \in P, render \in R, layout \in L] \quad (3)$$

In Formula (3), R represents the appearance category of the element. L indicates the location relationship of elements. $Render$ indicates the correlation between element features. $Layout$ represents different entity classes. P represents the symbol system of elements.

The algorithm is tested experimentally with an Internet processor to verify its effectiveness in visual design. The results are shown in Figure 3.

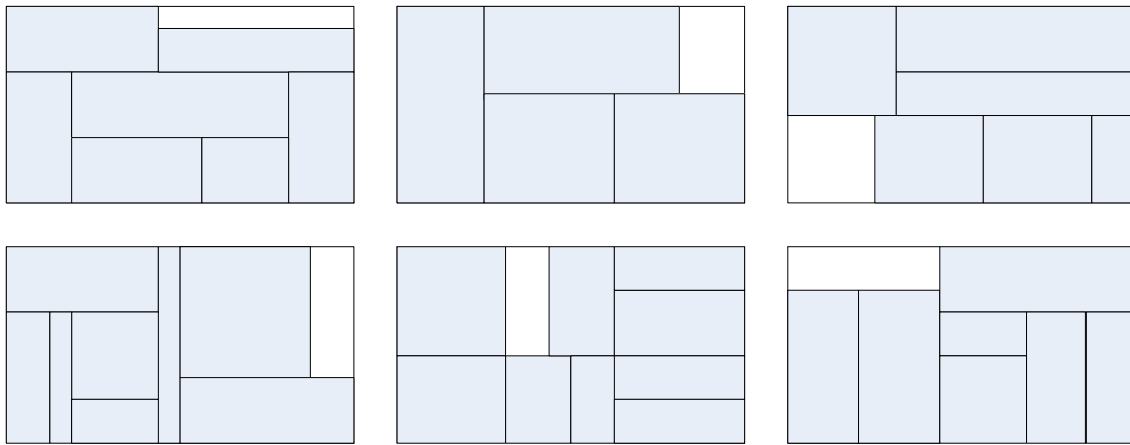


Fig. 3. Algorithm results

Figure 3 shows that the graphic language layout effect obtained by the automatic layout algorithm is more reasonable and certainly has a broader development prospect in the future.

Supposing W is used to describe the relationship between cognitive style and attention to design, and fixation amount and fixation time are expressed as BH_{xy} and BC_{xy} respectively. The model can be described as:

$$BH_{xy} = W(V_1, V_2, V_3 | \exists_1, \exists_2) \quad (4)$$

$$BC_{xy} = (V_4, V_5 | \exists_1, \exists_2) \quad (5)$$

In the formula, $V_1 \sim V_5$ represents five cognitive style dimensions. X is used to describe four visual design styles: complex, indirect, following and mainstream. Y represents the use of graphics and text. $\exists_1, \exists_2$ represents the control variable. The membership of a particular cognitive style in visual design is described by ω_τ , $\omega_\tau \in (0, 1)$. The problem framework of the experimental study is described in Figure 4.

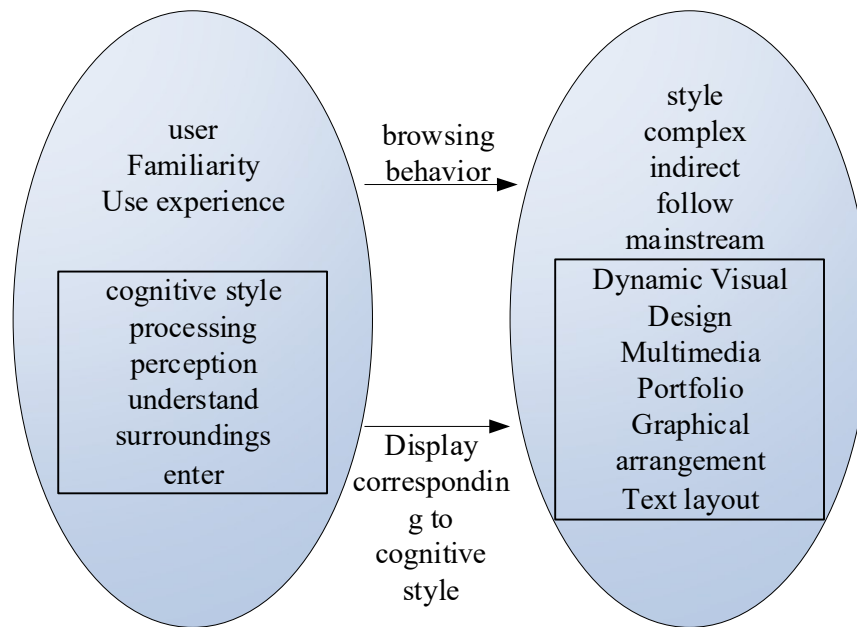


Fig. 4. Experimental research question framework

The attention degree H_{xy} of visual area and the membership degree C_{xy} of cognitive style are divided by the corresponding area adjustment coefficient α_{xy} to obtain the first adjustment values BH_{xy} and BC_{xy} . Then, BH_{xy} and BC_{xy} are divided by VH_x and VC_x respectively to obtain the values of AH_{xy} and AC_{xy} , as follows:

$$\begin{cases} BH_{xy} = H_{xy} / \alpha_{xy} \\ BC_{xy} = C_{xy} / \alpha_{xy} \end{cases} \quad (6)$$

$$\begin{cases} AH_{xy} = BH_{xy} / VH_x \\ AC_{xy} = BC_{xy} / VC_x \end{cases} \quad (7)$$

In the formulas, AH_{xy} represents the average fixation amount of each region. AC_{xy} represents the average fixation time of each region. VH_x indicates the total fixation area. VC_x indicates the

total fixation time. When $x=0$, AH_{xy} and AC_{xy} represent the minimum value of average fixation amount and fixation time in each region. The provisions are as follows:

$$AH_{0y} = \left(\sum_{x=1}^4 AH_{xy} \right) / g \quad (8)$$

$$AC_{0y} = \left(\sum_{x=1}^4 AC_{xy} \right) / g \quad (9)$$

It is assumed that the number of participants in the experiment is 300. There are 280 valid questionnaires. Table 1 shows the relevant information of the research objects and their satisfaction with this algorithm (1-10 points).

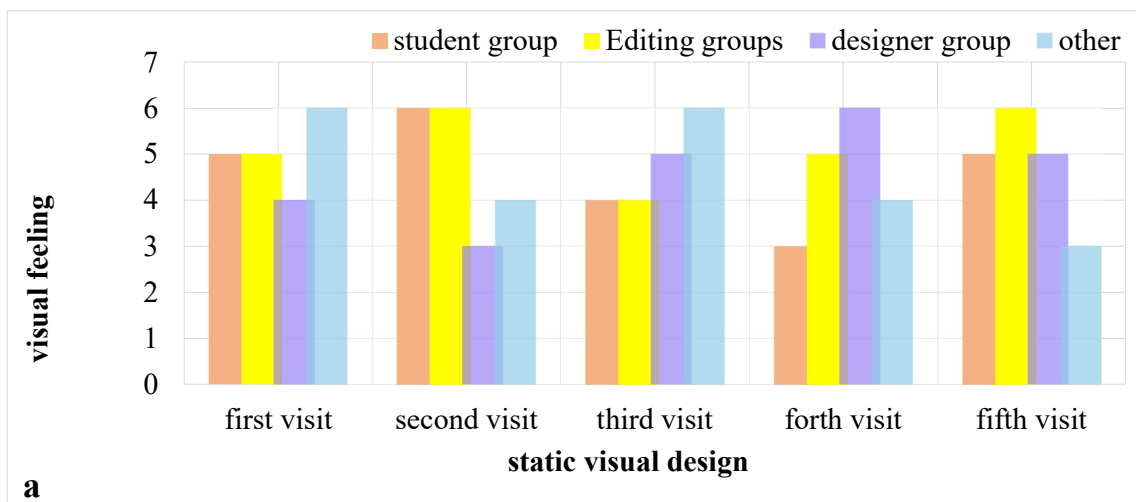
Table 1. Related information of the research object and satisfaction with this algorithm

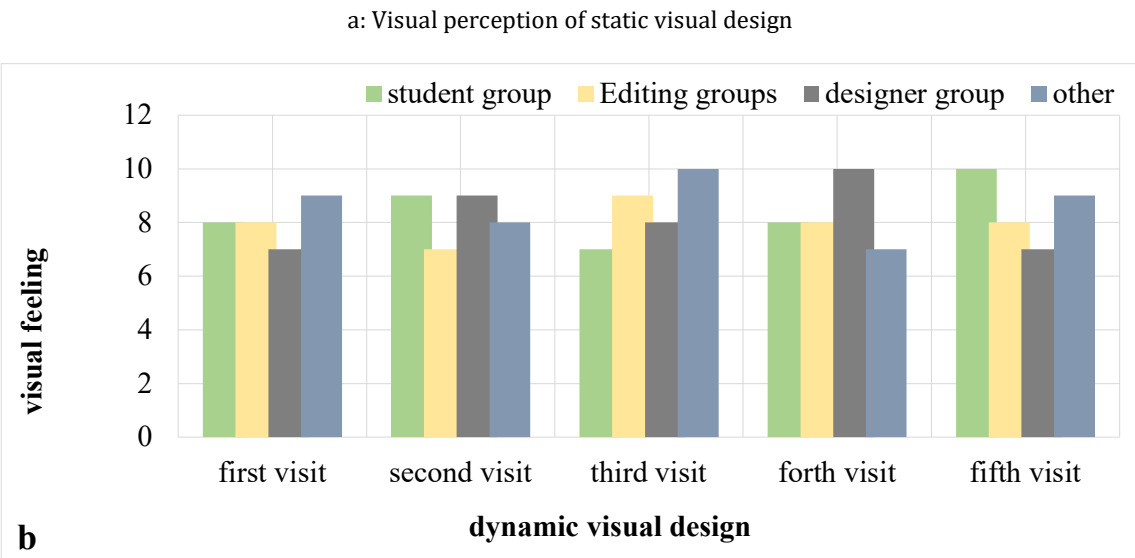
Profession	Number of people sampled	Age/year	Satisfaction
College Students	85	22.98±2.65	7
Edit	55	36.88±4.98	8
Designer	80	45.69±10.39	8
Other	60	37.99±17.86	7

Table 1 shows that users are relatively satisfied with the automatic layout algorithm of visual design graphics. This also laid the foundation for the further development of the design community, and further verified the reliability of this algorithm.

3. Comparison between Computer Dynamic Visual Design and Static Visual Design

From the perspective of visual design and security and communication network semantic technology, China has a long history, has many excellent traditional cultures, and also has some symbolic significance with cultural elements. This traditional cultural element provides a lot of materials for contemporary visual design. Today, when carrying out visual design, it is necessary to fully understand and apply these traditional cultures in order to better use them, so that the design has more Chinese personality and aesthetic dimensions. The static visual design, which is unchanging in the past, has gradually declined. The progress of the times depends more on the support of new technologies. There are obvious differences between the two in visual perception, cultural integration, user satisfaction, design sense, etc. As shown in Figure 5, the visual experience is compared.

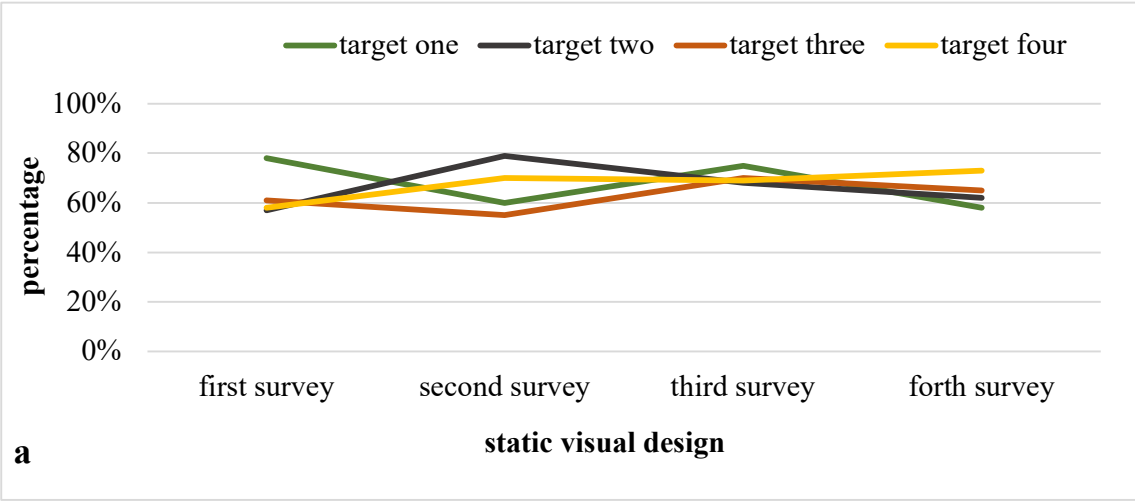




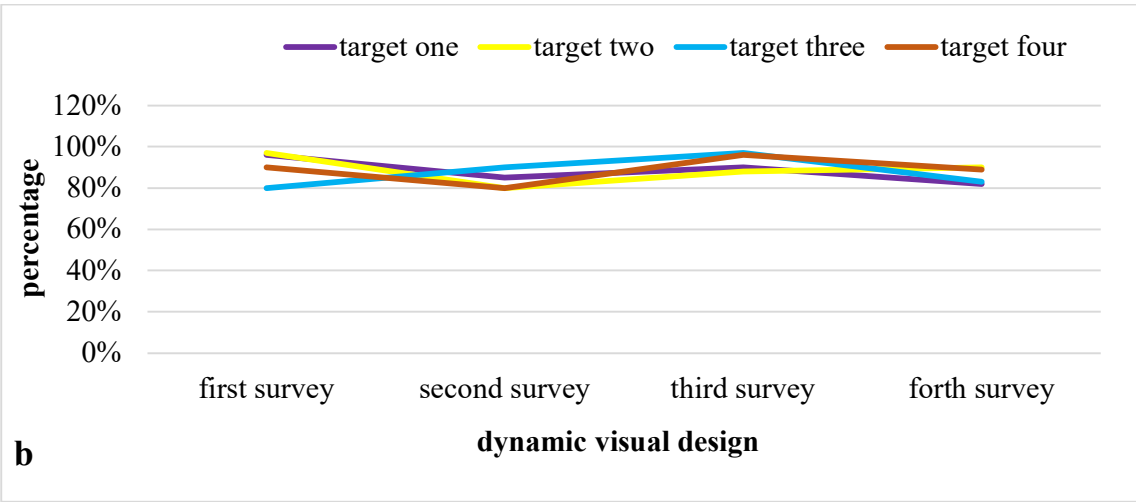
b: Visual perception of dynamic visual design

Fig. 5. Comparison of visual perception

Figure 5 shows the comparison of visual perception between the two by using the scoring system. (1-3 points) indicates poor. (4-6 points) mean average. (7-9 points) is good. 10 points is the full score. Figure 5a shows that the highest score of the visual experience of static visual design is only 6, which can be said that the user experience is basically average. The visual experience of dynamic visual design in Figure 5b can often reach a full score of 10, which shows that the latter has a broader development prospect. As shown in Figure 6, cultural integration is contrasted.



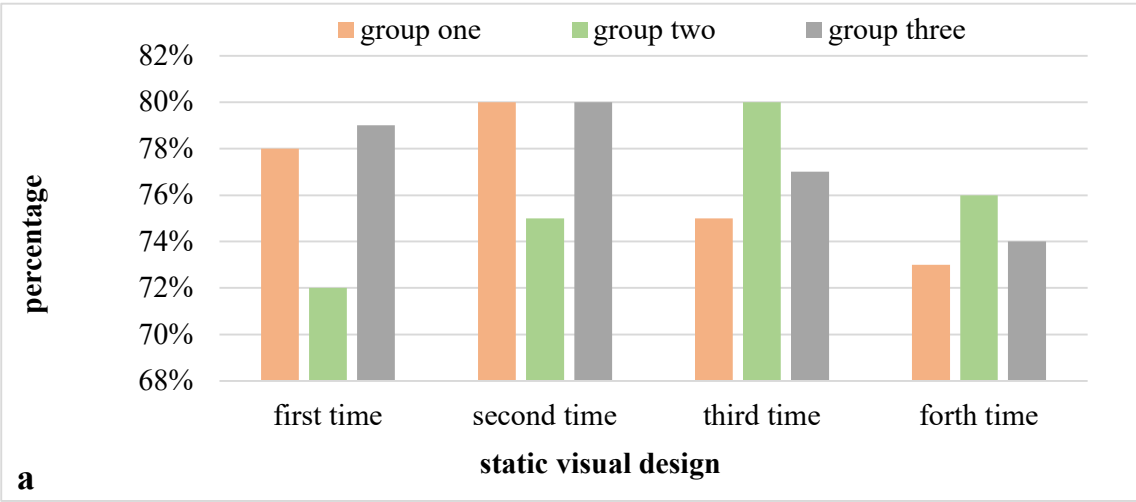
a: Cultural integration of static visual design



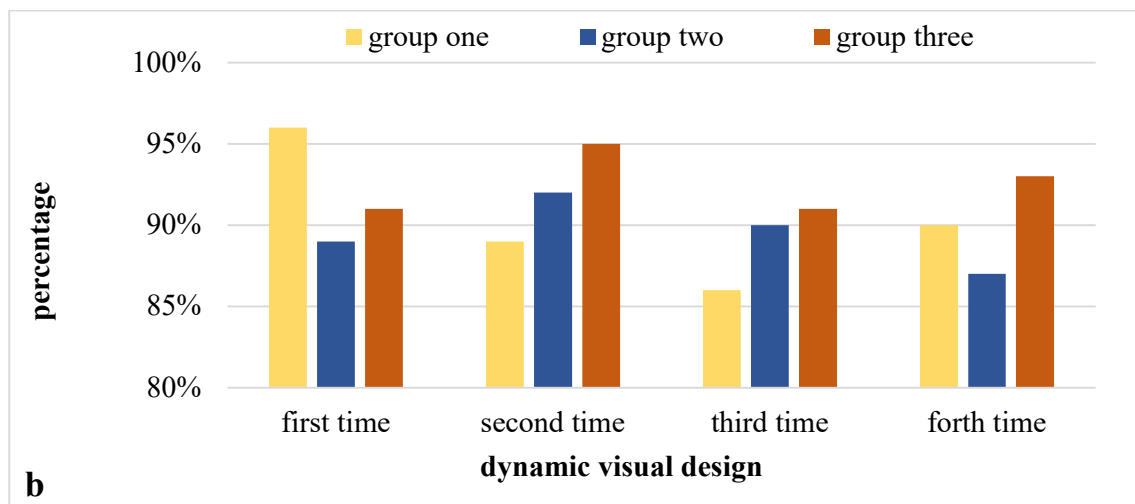
b: Cultural integration of dynamic visual design

Fig. 6. Comparison of cultural integration

It can be seen from Figure 6a that the lowest degree of integration of cultural elements in static visual design is 55%, and the highest is only 79%. It can be seen that it is very unstable. However, the fusion degree of cultural elements of dynamic visual design in Figure 6b is as high as 97%. Moreover, it has been generally no less than 80% for a long time, laying a foundation for the inheritance of Chinese traditional culture. Figure 7 shows the comparison of user satisfaction.



a: Static visual design user satisfaction



b: Dynamic visual design user satisfaction

Fig. 7. Comparison of user satisfaction

Figure 7 shows the comparison of user satisfaction under the two designs. It can be seen from Figure 7a that the user satisfaction of static visual design is up to 80%, which has been stagnant for a long time. However, the user satisfaction of dynamic visual design in Figure 7b can be as high as 96%. There is even a rising trend, which must be the development state required by the country.

4. Conclusion

Visual design and security and communication network semantic technology are hot topics in recent years. As a typical representative of visual design and security and communication network semantic technology, visual design and traditional cultural element environment design have attracted many scholars' attention. In a word, designers cannot simply copy and imitate when designing contemporary environmental art design. However, there must be a deep understanding of traditional culture and grasp its laws and profound meaning. On this basis, it is refined and absorbed to eliminate incompatible parts. Combined with practical experience, original opinions are created and then expressed by works of art. Computer dynamic vision design is based on new technology. If Chinese national culture can be used for reference flexibly, it can absorb the essence of traditional art to some extent, thus playing a positive role in promoting dynamic visual communication design. The dynamic visual communication makes the static art form vivid and visualized, frees the national culture from the shackles of museums, which enables Chinese culture to step onto the international stage. While using national traditional culture, designers should have a deep understanding of their own national traditional culture, actively study and discuss the design transformation language of Chinese traditional culture, so as to better express their design intent. Therefore, the rational application of Chinese traditional cultural factors to visual design can effectively inherit traditional culture. The research in this paper has important guiding significance for the application of visual design and security and communication network semantic technology.

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