



Information Visualization Design under Cognitive Thinking and Visual Thinking

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How to cite this paper: Chengzhi Xu, Yongzeng Xue. (2023) Information Visualization Design under Cognitive Thinking and Visual Thinking. *Journal of Humanities, Arts and Social Science*, 7(8), 1672-1676.
DOI: 10.26855/jhass.2023.08.035

Received: July 22, 2023

Accepted: August 18, 2023

Published: September 15, 2023

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Abstract

Information visualization design is the main trend of information transmission at present, and it is also one of the main forms of presenting information. In order to optimize the user experience and effectively improve the work efficiency, this paper will combine the characteristics of cognitive thinking and visual thinking to explore the visual design that is more suitable for people's subjective behavior. Information visualization is a branch of scientific visualization, which has a broad terminal market. It focuses on usability and information service evaluation, and pays attention to user experience. Visual design has been integrated into many fields, such as education, books, vehicle management and so on. Single-use technology is difficult to improve the quality of information visualization. It is necessary to further understand the characteristics of users' cognitive thinking and visual thinking, optimize the terminal reception effect, pay attention to visual thinking and cognitive thinking, pay attention to skills and information levels, people's visual processes and cognitive characteristics, and improve people's experience under the condition of ensuring information accuracy. Firstly, this paper expounds relevant theories, puts forward design strategies and puts forward useful suggestions for information visualization design.

Keywords

Cognitive thinking, Visual thinking, Information visualization design

Information visualization is a branch of scientific visualization, which has a broad terminal market. It focuses on usability and information service evaluation, and pays attention to user experience. Visual design has been integrated into many fields, such as education, books, vehicle management and so on. Single-use technology is difficult to improve the quality of information visualization. It is necessary to further understand the characteristics of users' cognitive thinking and visual thinking, optimize the terminal reception effect, pay attention to visual thinking and cognitive thinking, pay attention to skills and information levels, people's visual processes and cognitive characteristics, and improve people's experience under the condition of ensuring information accuracy.

1. The theoretical basis

1.1 Information visualization

Information visualization is a visual representation, which belongs to the field of computer graphics and is an important way to enhance people's cognition of abstract information. The spatial characteristics of information visualization resources are not obvious, the expression methods of image generation technology are diversified, and the visual effect is very innovative and unique (Du Zixuan & Member Bo, 2023). At present, with the advent of the experience economy and the development of the Internet, a variety of personalized and customized information

visualization works emerge one after another, which improves the information quality of users and challenges the new visualization design. How to improve the service level of visualization technology information users and help users solve problems quickly and effectively is an important topic in the current information visualization design.

1.2 Cognitive thinking

Cognition refers to the information processing process, including memory, attention and experience. Cognitive thinking has important application value in the image modeling design of information products. Understanding users' cognitive characteristics is helpful to create products with the concept of "people-oriented", including product modeling in product image modeling design. It is very important for products to express their desire to gain users' hearts through products and attach importance to users' cognitive thinking (Yao Qijie, Zhu Jihong, & Wang Ruoxu, 2022). Cognitive system is the main bridge between products and information. The products designed after mastering the basic theory of cognitive thinking can attract users' attention and interest in a short time, and make users use the products unconsciously.

1.3 Visual thinking

Visual thinking can help people observe the world better and reflect people's most intuitive feelings. Visual thinking has the characteristics of intelligence and creativity, and taking images as media plays an important role in design. Visual thinking can reflect people's subjective visual logic, including visual process and visual experience. Combining visual thinking to design information visualization can help users accept information and make decisions in time (Yan Mengda, 2022).

2. Information visualization design model under cognitive thinking and visual thinking

Cognitive thinking is the antecedent of visual thinking, which provides acquired experience for vision and has an important influence on visual thinking. Cognitive thinking and visual thinking should be used reasonably in information visualization design. Cognitive thinking includes deep memory, memory system and attention system, while visual thinking includes visual logic, visual beginning and objective world, which provides visual guarantee for cognitive thinking (Tan Cuiying, 2022). Cognitive thinking is the key to product information design, and visual thinking is the focus of visual performance design. The final design scheme can only be decided after unified follow of cognitive thinking and visual thinking. In short, understanding the world through the visual system, providing experience for the cognitive system, and introducing memory information will form a deep memory in the human brain.

Through the above analysis, it is concluded that both cognitive thinking and visual thinking play an important role in information visualization design. The former can optimize information reception and the latter can improve the display form. The amount of information that people can receive is limited, especially the attention mechanism and memory mechanism, so it is necessary to stratify the information to achieve the effect of optimizing the information. There are certain laws in vision, and the design conforms to the user's visual experience and human's visual laws, highlighting the aesthetics of design, which is of great help to improve product quality.

3. Information visualization design strategy under cognitive thinking and visual thinking

3.1 Information visualization design under cognitive thinking

Information visualization design under cognitive thinking includes attention function and information hierarchy, selecting attention-driven client establishment, and memory function and information capacity:

(1) Pay attention to function and information hierarchy.

Attention mechanism suggests that users are actively distributing information. Attention mechanism can be divided into arousal, selection, secondary attention and supplementary attention, in which arousal of attention suggests that the human brain is receiving information. Choosing attention suggests that people can solve problems according to their own needs. The second attention suggests that people can slowly search for information. Finally, supplementary attention reminds people to receive the remaining information and complete the whole attention process. In the design of information visualization, the complex information is combined with the user's needs, which matches the user's attention function, defines the information theme, and helps the user to choose the infor-

mation theme after identifying the information.

(2) Establishing a selective attention-driven client.

Different users have different needs, and there is a certain deviation in information interpretation. The knowledge structure of individual users will affect the attention function, and users may have certain differences in selection after attention is caused. Therefore, we should pay attention to users' needs in visual design, but it is very difficult to meet users' needs at the same time. Designers excessively pursue the inclusiveness of information maps, which will lead to the lack of design significance of information visualization. Therefore, targeted design is needed, which can create different terminals for different users and design information chromatography based on the actual needs of users (Zhang Xu, 2022). Design process of information visualization client: user process-actual demand-attention function-information hierarchy-information visualization design.

For example, the welcome page of the education APP is different between the student client and the teacher client; The users of the photography APP are different from the photographer's welcome page. The photographer's welcome page accurately grasps the characteristics of the photographer's work status and grasps the photographer's cognitive thinking. The page displays keywords such as "Refuse to be unfair", "Refuse to run too fast" and "Refuse to deduct commission", and matches them with corresponding visual pictures. The user's welcome page is dominated by "tens of thousands of photographers", "the simplest operation" and "hook up" with one button. Accurately grasp the user's psychology of learning photography.

(3) Memory skills and information capacity

Memory function pays attention to the effect of users receiving information, and people's memory in a period of time, including memory capacity, time pressure and accuracy (Du Hemin & Jiang Junjie, 2022). In the visual design, the image is the main expression content, and the public can easily remember the image, so the influence should be mainly based on the image, and less words should be used to improve the accuracy of the user's memory. For example, in the information visualization design of coffee (Figure 1), coffee graphics are mainly used. Different types of coffee are only introduced in one word, and the rest are introduced in graphics, so that the audience can receive information at the first time.



Figure 1. Coffee information visualization design.

4. Information Visualization Design under Visual Thinking

Information visualization design under visual thinking should pay attention to attracting reasonable attention and ensuring visual clarity; Reduce interference information and use multi-channel sensory input to enhance stimulation. Visual thinking can also help people better remember more information and present their thinking in the form of vision. The focus of visual thinking lies in thinking. Whether learning painting or learning art, we need to pay attention to visual thinking and application. The advantages of visual thinking are:

First, vision is more intuitive than words and numbers. For example, at Apple's mobile phone conference, if you

hear someone say: Apple has a new walkman called ipod, which is small enough to put in your pocket. Or I heard someone say that Apple has a new computer and put it in an envelope pocket. The above two statements are difficult to achieve good communication results. But if someone says: Apple has a large-screen collection, with a total of 6.44 inches. This is more conducive to communication, which is also the advantage of visual thinking. The magic of visual thinking is that research shows that more than half of human brain activity is used to support visual function, and one third of brain neurons can process visual information, so a lot of energy has been spent in processing visual information and other sensory information, so it is difficult to start people's vision by using concepts or ideas to spread information. The human eye is a thinking organ, and most of the information transmitted on the network is visual data.

Second, visual thinking is more intuitive and memory is more profound. Just like the concept of "unconditional love", if you explain this abstract concept, most people will not be able to explain it for a while, but if you use visual thinking, such as symbols, you can immediately understand what "unconditional love" means. Use "acceptance"+"consideration"+"respect". Using square, triangle and circle at the same time will make people understand the specific concept of "unconditional love" immediately.

Third, improve the communication effect. Visual products designed by visual thinking can improve users' visual comfort, make people have positive emotions, make people understand the products subjectively, and help improve the communication effect.

The original concept of visual thinking appeared in a book to help people understand more complex business and professional logic by using diagrams. When using visual thinking, we should pay attention to the following points:

(1) Attract reasonable attention

In order to improve the visual effect, we can ensure the visual clarity by changing the color, size and position, for example, Figure 2 can be expressed in different ways, which can change the visual characteristics and highlight the key information. However, it is necessary to ensure the unity of design style, avoid users' distraction, organize information in an orderly manner, and not confuse visual thinking activities, so as to make users' thinking clearer.

(2) Avoid information interference.

Interference information refers to information that has nothing to do with visual query, which will affect the effect of users receiving information, so it is necessary to avoid information interference. Under normal circumstances, the design purpose can be achieved through the background or strengthening the target, so as to avoid the user's visual query of irrelevant information from disturbing the user. Strengthening background can improve the accuracy of attention mechanism screening, avoid too much information interference and help users understand information. In addition, it can also highlight the entity characteristics, so that users can fully understand the information.

(3) Multi-channel sensory enhancement stimulation is adopted.

Enhancing the stimulation of information input can improve the effect of users' receiving information. Enhanced information can not only come from vision, but also be combined with hearing, vision and taste to attract users and attract users' attention to information. For example, a website not only simulates the carbon dioxide emission visually, but also makes people feel the frequency of human breathing combined with the background sound. The playing rhythm corresponds to the frequency of carbon dioxide, and users are constantly impressed under different stimuli, making users understand the meaning of the website better.

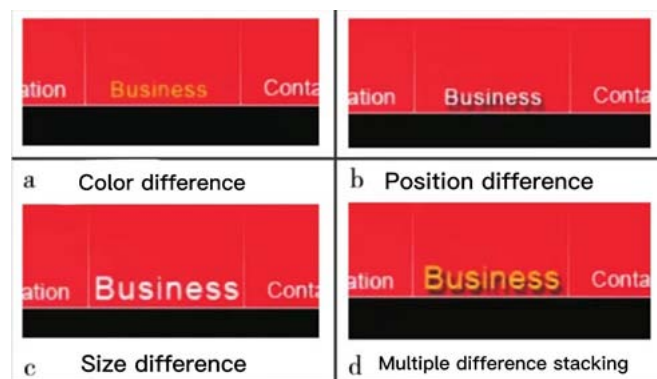


Figure 2. Comparison of different representations of differences.

5. Conclusion

In a word, information visualization design needs to pay attention to users' cognitive thinking and visual thinking to help users better understand and obtain information. Reasonable design can help users allocate attention effectively and make full use of experience and memory knowledge to understand products. In the era of paying attention to user experience, the future information creation will focus on human vision and thinking, which is also the main tool for human beings to understand the world. It is hoped that visual design through thinking cognition can effectively improve the overall effect of visual design.

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