



Research On The Response Of Information Visualization Design To User Behavior

Zhang Shengxuan^{1*}, Zainudin Bin Siran², Hew Soon Hin³

^{1*}Faculty of Creative Multimedia, MMU, Email:1211400249@student.mmu.edu.my

²Faculty of Creative Multimedia, MMU, Email: zainudin.siran@mmu.edu.my

³Faculty of Creative Multimedia, MMU, Email: shhew@mmu.edu.my

*Corresponding Author Zhang Shengxuan

*Faculty of Creative Multimedia, MMU, Email:1211400249@student.mmu.edu.my

Citation: Zhang Shengxuan, et al. (2024), Research On The Response Of Information Visualization Design To User Behavior, *Educational Administration: Theory And Practice*, 30(4), 8925-8929

Doi: 10.53555/kuey.v30i4.2926

1 INTRODUCTION

1.1 RESEARCH BACKGROUND

With the continuous development of information technology, information visualisation has been widely used as an effective way to communicate and understand information. Information visualisation helps users to understand information more intuitively by displaying data graphically, thereby facilitating decision making and action. However, different information visualisation designs can elicit different user behavioural responses, which are critical for understanding and applying information. Therefore, studying the impact of information visualisation design on user behavioural responses is crucial to improving the effectiveness of information transfer and user experience.

1.2 RESEARCH PURPOSE

This study aims to explore the impact of information visualisation design on users' behavioural responses, and to conduct an in-depth analysis of behavioural response patterns.

Specific objectives include:

To analyse the impact of different information visualisation designs on user behaviour;

To identify and interpret typical behavioural response patterns of users in information visualisation environments;

To explore the relationship between visual information design strategies and user behaviour.

Through empirical research and case analysis, this study aims to provide more effective guidelines for information visualisation design and to improve its effectiveness and user experience in practical applications.

2. OVERVIEW OF INFORMATION VISUALIZATION DESIGN

Information visualization is the process of converting data into visual graphics or images. Its aim is to help users understand data and information more intuitively. By presenting data visually, information visualization facilitates the discovery of patterns, trends, and connections, which can support decision-making and action. Information visualization design is the process of using visual elements, design principles, and human-computer interaction techniques to create effective visual representations of information.

2.1 DEFINITION AND IMPORTANCE OF INFORMATION VISUALIZATION

Information visualization involves transforming abstract information into a perceivable form, not just presenting data as charts or graphs. This allows users to quickly and intuitively understand and apply data, making it valuable for data analysis, decision support, scientific research, education, and other fields.

2.2 THE ROLE OF USER BEHAVIORAL RESPONSES IN INFORMATION VISUALIZATION DESIGN

User behavioural responses are essential in the design of information visualisation. They provide valuable feedback and guidance for the design process, evaluate design effects, promote information understanding and decision-making, and improve user participation and satisfaction. Observing users' behaviour when using

information visualisation interfaces can help designers understand their preferences, habits, and difficulties. This understanding can then be used to optimise the design and improve the user experience. User behaviour directly affects their understanding and application of information. Effective information visualization design can direct users to produce accurate behavioural responses, aid in the rapid comprehension of information, facilitate pattern recognition, decision-making, and ultimately, the achievement of desired goals. In summary, user behavioural response is a crucial factor that must not be overlooked during the information visualization design process. Detailed observation and analysis of user behaviour can provide designers with valuable support and guidance, thereby enhancing the design's effectiveness and user experience.

3. RECOGNITION AND INTERPRETATION OF BEHAVIORAL RESPONSE PATTERNS

Behavioural response patterns are the behaviours and reactions displayed by users after being exposed to visual information. These patterns can be direct behavioural changes, such as changing walking direction, following safety instructions, or more indirect, such as emotional responses and cognitive changes.

In information visualization, orientation and navigation response is one of the most direct behavioural response modes. It refers to the user's orientation and navigation response in public space. Effective visual guidance design can significantly reduce users' confusion and improve space accessibility and efficiency. The success of wayfinding design can be identified by observing the path and speed of movement of users following specific visual guidance. Compliance with safe behaviours involves following safety signs and warning messages in visual information design to inspire safe behaviour. The effectiveness of safety message designs can be assessed by monitoring how well users follow these visual messages, such as avoiding hazardous areas. Visual information design can also elicit emotional responses from users, which can be identified through their expressions, verbal feedback, and shared experiences. Design can enhance the user experience by eliciting positive emotional responses such as pleasure and satisfaction. Visual information design can also promote social interaction in public spaces, as seen in discussions sparked by public artworks. By observing the frequency and quality of interactions between users, the role of visual information design in promoting social connections can be revealed.

The cognitive mechanisms that underlie behavioural response patterns include attention guidance, memory triggering, and emotion stimulation. Visual information design can influence users' behaviour and decision-making processes by attracting their attention and evoking specific memories and emotions. A user's cultural background can have a significant impact on their behavioural response patterns. Visual information can be interpreted differently by people from different cultures, depending on their interpretation of symbols, colours, and graphics. Other factors in the spatial environment, such as spatial layout, environmental atmosphere, and the behaviour of other users, can also affect how users understand and respond to visual information. Therefore, it is important to consider these factors when designing visual information. Other factors in the spatial environment, such as spatial layout, environmental atmosphere, and the behaviour of other users, can also affect how users understand and respond to visual information.

Identifying and interpreting behavioural response patterns in public spaces can help designers and researchers understand the impact of visual information design. This can lead to optimised design strategies, improving the functionality, safety, and enjoyment of public spaces. Designers must possess a thorough comprehension of the user's psychological, cultural, and social background, as well as the comprehensive impact of the spatial environment. An interdisciplinary approach to comprehensive design and evaluation is necessary.

BEHAVIORAL RESPONSE PATTERN CATEGORIES	RECOGNITION METHODS	EXPLAIN
GUIDANCE AND NAVIGATION RESPONSE	Observe the user's movement path and speed under visual guidance	Based on psychological cognitive mechanisms, such as attention guidance and spatial memory stimulation
FOLLOW SAFE BEHAVIORS	Monitor users' compliance with safety signs and warning messages	Reflects the user's safety awareness and sensitivity to visual warnings
EMOTIONAL RESPONSE SOCIAL INTERACTION	Share recognition through user expressions, verbal feedback and experience	Involves the arousal of emotions and the impact of emotions, including pleasure and satisfaction

PATTERNS	Observe interactions between users triggered by visual information design	Revealing the role of design in promoting social connections and cultural exchange
CULTURAL BACKGROUND INFLUENCE	Consider users' culturally specific interpretations of symbols, colors, and graphics	Highlights the importance of considering cultural diversity and adaptability in design
INTERACTION OF SPATIAL ENVIRONMENT	Analyze the relationship between user behavior, spatial layout, and environmental atmosphere	Reveals the comprehensive impact of spatial environmental factors on user behavior patterns

Table 1 Reaction pattern identification methods and explanations behind them

Table 1 presents a structured overview of methods for identifying behavioral response patterns and their explanations. The methods cover multiple dimensions, including oriented behavior, emotional responses, and cultural and spatial interactions. This organization helps designers and researchers to better understand and apply these concepts to optimize the visual information design of public spaces.

4. THE RELATIONSHIP BETWEEN VISUAL INFORMATION DESIGN STRATEGY AND USER BEHAVIOR

In public spaces, visual information design serves the purpose of conveying information and influencing users' behaviour, emotions, and social interactions. By employing strategies such as clarity, accessibility, cultural adaptability, technology integration, and participatory design, visual information design can encourage positive user behaviour and enhance the overall experience on multiple levels. Clarity and simplicity are fundamental to visual communication. Intuitive design not only helps users quickly find the information they need but also reduces the feeling of being lost in complex public spaces. For instance, clearly marked path guidance can effectively direct users to their destination, while concise and clear safety instructions can be quickly recognized, thus improving the safety of public spaces. Accessibility and inclusion strategies ensure that visual information designs serve all users, including those with special needs. Designers can achieve this by creating easily recognizable icons, using contrasting colours, and providing information in multiple sensory modalities, such as visual and auditory cues. This creates a more friendly and inclusive environment for all users.

When designing for cultural adaptability, it is important to thoroughly study the cultural background of the target audience. Visual elements that can communicate across cultures should be selected, and cultural misunderstandings should be avoided. This deep cultural sensitivity can make the design more attractive and effective in the context of globalization, enhancing the sense of belonging and comfort of users from different cultural backgrounds.

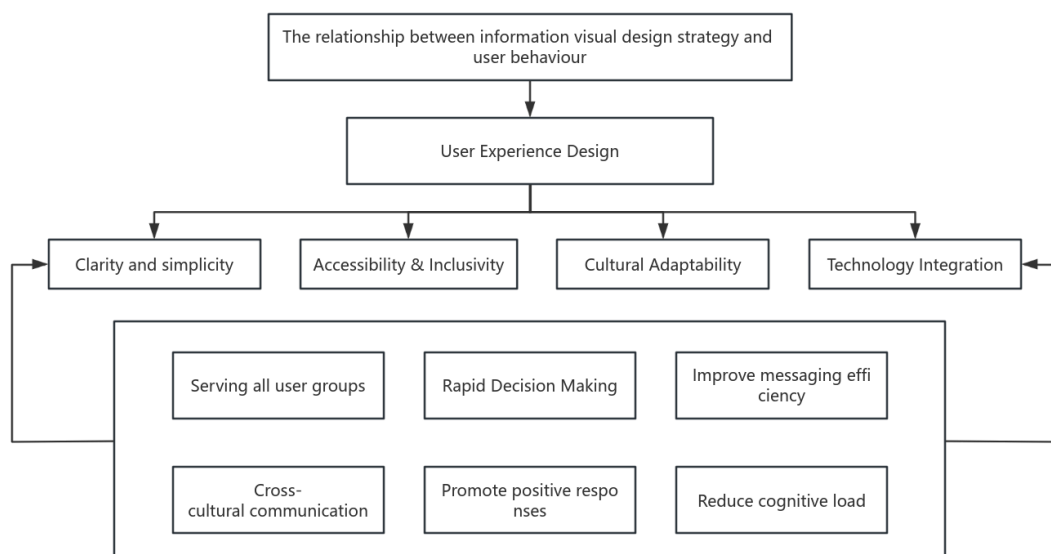


Figure 1 The relationship between visual information strategy and user behavior

User experience design aims to create a comprehensive user experience when interacting with a product or space. This includes aspects such as usability, emotional response, value perception, and user engagement. The key to successful user experience design is a thorough understanding of user needs and expectations, which are then translated into specific design practices. By adopting user experience design strategies, visual information design can more effectively guide user behaviour and improve the quality of user experience in public spaces. This user-centred design methodology not only improves the practicality and satisfaction of the design but also promotes the harmonious use of public space and social interaction. The application of user experience design to visual information design demonstrates a design strategy that comprehensively considers user interaction, experience, and behavioural responses. To successfully implement this strategy, designers must possess a deep understanding of user behaviour, sensitivity to technological developments, and respect for cultural differences. This will enable them to create public spaces that are both beautiful and functional, promoting positive user behaviour.

5. The relationship between behavioral response patterns and visual information design practice

Behavioural response patterns are closely related to visual information design practices, and there is a mutual influence and promotion relationship between the two. A behavioural response pattern is a series of repeated or similar behavioural responses produced by users in a specific situation, which has a certain degree of regularity and predictability. In information visualization design, identifying and interpreting behavioural response patterns provides designers with important clues to guide the adjustment and optimisation of design strategies. By observing users' behavioural responses, designers can understand users' preferences, habits and cognitive needs, thereby improving the design and user experience in a targeted manner. Furthermore, identifying patterns in behavioural responses can assist designers in evaluating the effects of their designs, promptly identifying any issues, and making necessary adjustments and optimizations. Additionally, visual information design practices have a direct impact on users' behavioural responses. Reasonable visual information design strategies can guide users to produce specific behavioural responses, enhance the understandability and attractiveness of information, and thereby improve users' comprehension and application of information. By closely integrating with behavioural response patterns, designers can achieve continuous optimisation and improvement of information visualisation design, enhancing design effects and user experience. In summary, the relationship between behavioural response patterns and visual information design practice is a dynamic and complex process. It is of great significance to have an in-depth understanding and application of this relationship to optimize the effect of information visualization design.

CONCLUSION

In information visualization design, the relationship between behavioral response patterns and visual information design practices is crucial for improving user experience and optimizing design effects. By understanding users' behavioral response patterns, designers can better grasp users' cognitive and emotional states, guide the adjustment and optimization of design strategies, and thereby improve information transmission effects and user satisfaction. Optimised design strategies can not only guide users to have more positive behavioural responses but also enhance the understandability and attractiveness of information, and improve users' awareness and acceptance of information visualisation interfaces. Continuously optimising the design process requires designers to continuously observe and analyse users' behavioural responses and timely adjust and optimise design strategies to meet user needs and improve user experience. Therefore, it is significant to have an in-depth understanding and apply the relationship between behavioral response patterns and visual information design practices to improve the effect and user experience of information visualization design. Future research should further explore the relationship between user behaviour response patterns and design practices, as well as investigate more effective design strategies and methods. Additionally, providing support and guidance for the optimization and development of information visualization design should be a priority.

REFERENCES

1. Wu Qingwen & Huang Zhiyu. (2023). Research on the application method of storyboard in information interaction design. *Art and Design (Theory)* (08), 35-38.
2. doi: 10.16824/j.cnki.issn10082832.2023.08.004.
3. Lu Zhixiang, Wang Jichao & Lu Hao. (2023). Research on the problem of guide signs in shopping malls in mainland China based on the service design concept. *International Public Relations* (12), 82-84. doi:10.16645/j.cnki.cn11-5281/c.2023.12.060.
4. Zhang Jingwen. (2023). Master's thesis on user experience design of Qingcheng subway guidance signs based on situational cognition, Inner Mongolia Normal University).

6. <https://link.cnki.net/doi/10.27230/d.cnki.gnmsu.2023.000444>
7. [doi:10.27230/d.cnki.gnmsu.2023.000444](https://doi.org/10.27230/d.cnki.gnmsu.2023.000444).
8. Zhang Shengxuan & Feng Ye. (2021). Experimental study on the visual communication of intangible cultural heritage with Guangzhou characteristics. *Times Report (Benliu)* (08), 60-61. [5] Zhang Shengxuan. (2020). Research on the integration of design aesthetics in modern visual communication design. *Western Leather* (14), 132-133.