Highlights in Art and Design
ISSN: 2957-8787 | Vol. 14, No. 3, 2026

Design of Interactive Visual Communication Device in Public Landscape: Research on Behavior Guidance and Emotion Experience

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Abstract: As an important component of urban space, public landscape has changed from single function to multi-dimensional value integration, but it still has problems such as uneven resource allocation, cultural homogeneity and weak interaction. Therefore, this paper proposes to explore how to use interactive visual communication device to achieve the two-way optimization of behavior guidance and emotional experience. Specifically, the interactive visual communication device is an innovative medium integrating digital technology, artistic design and user behavior. Therefore, it can effectively improve the dynamic interaction of landscape space, and is more beneficial to create a sense of user immersion. Therefore, it is also an excellent tool for realizing the multi-dimensional value of public landscape. Therefore, this paper expounds the logic clearly and progressively: Firstly, it takes the two-way optimization of behavior guidance and emotion experience as the basic thinking to promote the intelligent upgrading and humanization design of public space, then discusses the concrete path of technical intervention to realize the precision of behavior guidance, then analyzes in detail the cultural narration and sensory design to improve the emotion experience resonance and continuity, finally, it puts forward the construction strategy of the coordination mechanism between behavior guidance and emotion experience in a systematic and rigorous way.

Keywords: Public Landscape; Interactive Visual Communication Device; Behavioral Guidance; Emotional Experience; Multimodal Interaction Design.

1. Introduction

As a part of the organic integration of the elements of contemporary urban culture, ecology and social life, public landscape has a very clear and important mission: To improve the quality of life of citizens and to improve the image of the city. This kind of device is not only an excellent combination of technology and art, but also an extremely powerful and delicate multi-dimensional information transmission medium, which actively attracts public participation and naturally promotes communication by dynamic vision and interaction. However, the research of this kind of devices is still worth exploring, especially the design strategy and user experience. More fundamentally speaking, a truly excellent interactive visual communication device must not only be beautiful in form, but also coordinate its functions, experience and environment.

As behavior guidance is the most basic and important research dimension in public landscape interaction design, there has been a clear and systematic discussion on how to guide public behavior and influence space use by design methods.

In the public landscape interaction design, behavior guidance is the most basic research dimension, scholars are devoted to explore how to influence the public behavior mode and space use mode through design means.

In the aspect of interaction mechanism, Yao Lu and Wang Wei clarified the relationship between interaction and landscape and the practical significance of interaction experience from the perspective of outdoor activities, laying a conceptual foundation for subsequent research[1]. Yang Yuanjun discussed the site design of interactive devices naturally and properly from the spatial logic and interface characteristics derived from interactive behaviors[2].

In the aspect of constructing spatial order, Liang Yaxin put forward the method of "information construction-visual communication-cognitive behavior" combining with the public spatial visual order management [3]. Foreign scholars have also explored this in depth, Jakaitis, J. Et al. studied intuitive spatial interaction in historical green space and clearly demonstrated its potential to improve site participation [4].Olanusi and Oluwadepo systematically combed the influence of interaction space design elements on behavior, and clearly pointed out that both spatial layout and lighting are beneficial to enhance interaction comfort[5].

In addition, the role of visual elements in behavioral guidance has also received attention. Rice and Shellhorn et al. Based on the evolution of visual communication design, Carlos Antonio Valverde Lojano systematically and logically discusses the influence of graphic symbols on social behavior[6,7].

Emotional experience is one of the core objectives of interactive design. The researchers explore how to trigger, strengthen and continue the user's emotional reaction from different theoretical perspectives.

At the theoretical framework level, Gu Shaojie uses the emotion experience level theory to solve the problem of individual cognitive differences in interactive imaging devices [8].Providing theoretical support for differentiated user experience. Guo Hengrui, through combing the evolution history of interactive devices, naturally draws out the strategy framework of emotion construction [9].Which shows the evolution logic of emotion dimension in the historical vein.

On the correlative level of situation and experience, Yu Yimiao and Li Jian take the situation experience as the starting point to construct the product framework of

interactive behavior closed loop, emphasizing the triggering effect of situation on emotion generation[10]. Zhou Shiyu, aiming at the problem of spatial design convergence of interactive video devices, puts forward the specific direction of strengthening the audience's emotional experience, which provides a way to break through the homogenization dilemma [11].

Foreign scholars are also rich in empirical research on emotional experience. Szubielska et al. took the influence of physical field and artistic knowledge on aesthetic experience of audiences as the starting point, and carried out rigorous experimental verification of emotional reaction with the aid of Self-Assessment Manikin[12]. Kong Fanqi has analyzed the value of interactive devices in building immersive scenes and promoting cultural communication with great temperature and depth, highlighting the extension significance of emotional experience in social culture[13].

The application of technology is an important support for the implementation of interactive design.

In terms of interface and interaction technology, Wang Yuhao combined eye movement experiment with questionnaire results to make rigorous and empirical optimization for interactive window design, showing the value of quantitative method in design evaluation[14]. Zhao Danyang applies user experience interaction design to the public space of the airport, cleverly improves the cultural atmosphere of the space, and expands the application field of interaction design[15]. Biedermann et al. conducted a thorough analysis of 40 public display interfaces, clarified their various limitations in constructing a sense of place, and proposed improvement ideas based on this[16].

In the aspect of device application and social participation, Jin Fengya makes an excellent induction to the advantages of interactive device, and proposes the application path of integration with urban space [17]. Based on cognitive behavior theory, Bai, N., & Shan, N. set up a user demand prediction model to guide the interactive design of digital scene, which reflects the trend of data-driven design[18].

Foreign scholars present a stronger social perspective in this field. Hirsch conducted a substantial study of interactive prototypes to maintain natural beauty in places of rest such as decommissioned cemeteries [19].Sung Hee Ahn, combining qualitative and quantitative methods naturally and properly, investigated the urban design mode of enhancing sensory interaction in public space[20]. Zhongshu W. Et al. put forward the insightful viewpoint of creating dynamic interactive devices with digital technology to promote community participation and shape urban aesthetics [21]. Enyutina, E. D. The interactive artwork is regarded as the "attraction" of urban environment, which naturally leads to the discussion of its influence on public aesthetic and social issue consciousness [22]. The concept of "Art in Action" put forward by Zhou Yanhua and Wang Meiqin has made an excellent interpretation of the social participatory art of art intervention in reality, providing theoretical support for the social value of interactive design [23].

In terms of macro trend control, FIL, O. The framework of interactive typology is proposed, and the elements of interactive propagation in public space are analyzed very well [24]. Khaleghimoghaddam, N. Six design elements of social interaction in public space are determined by field research method, and the elements of security, accessibility and visibility are highlighted appropriately [25]. Lijun S. et al. established a complete framework in the form of a literature review, providing excellent analysis on how landscape installation art can improve the emotions of the elderly and meet their social needs [26]. Petković, G. Et al. summarize the evolution and trend of experience graphic design (XGD) with rigorous and innovative methods of bibliometrics and systematic review [27].

2. Design Principles and Behavior Guidance Mechanism of Interactive Visual Communication Device

2.1. Interactive Principle and Technology Integration

The principle of interactivity is a very clear and extremely important guiding ideology in modern public landscape design: That is to say, design should be used to actively arouse people's perception and create a public space experience with a sense of participation and interaction. Therefore, the design process must be carried out systematically and consciously, that is, the interaction technologies in modern scientific and technological means must be naturally and properly integrated with visual communication design, so as to improve the level of public participation and the quality of spatial experience. Specifically, the sensor technology can perceive the user's behavior in real time and make accurate and timely response, so it can create dynamic and delicate interactive feelings. Augmented reality (AR) technology expands the performance dimension of the visual communication device in the form of virtual and real combination, thus providing a hierarchical and explorable information field for the user. Motion capture technology directly and reliably collects user actions, and then converts them into visual feedback to form a coherent, rhythmic and responsive excellent interactive flow. What is more rare is that the integration of technologies is not simply superimposition, but enriches the hierarchical sense of interaction experience and expands the creation dimension of design correspondingly. Therefore, the visual communication device used in public landscape is actually the most ideal and poetic medium connecting people and space, environment and interaction interface.



Figure 1. Chicago Millennium Park Crown Fountain

There are a large number of clear and hierarchical cases that can well illustrate the effectiveness of the principles discussed. The "Rain Room" device displayed at the Barbiken Art Center in London is an excellent demonstration: It uses the 3D motion sensor to obtain the position data of the viewer

in real time and accurately, so the viewer can walk through the environment of continuous falling without being wet, thus obtaining the wonderful experience of "people in the rain." What is more rare is the natural and proper combination of sensor technology and spatial narration, so the public will have the sense of trust and control when interacting with the device. The "Crown Fountain" of Chicago Millennium Park perfectly echoes this formation. As shown in Figure 1, It takes glass brick tower as the display interface, presents citizens' facial images by projection, and promotes direct and interesting interaction with the public by water spraying mechanism. For this reason, designers should always implement the basic concept of people-oriented when applying the principle of interactivity: Provide multiple participation methods, design several alternative paths, make the interaction design easy to use and accessible, and take initiative to fully consider the specific needs of different user groups [17]. Therefore, the design should not only be universal, but also have the foresight and durability of technology application, and reserve conditions for future use and renewal of visual communication devices in public landscape in a systematic and solid way.

2.2. Path and Method of Behavior Guidance

The application of interactive visual communication device in public landscape is essentially the combination of technology display and behavior guidance, so the logic of behavior guidance must be based on the basic principles of cognitive psychology. Therefore, Fogg behavior model (Fogg Behavior Model) is naturally and properly derived. The model generalizes three essential elements of behavior occurrence with extremely simple and powerful formula B = MAP: M (Motivation), A (Ability), P (Prompt). The three are premised on each other and cannot replace each other [27]. Therefore, the model provides an extremely clear and operable theoretical cut-in point for the behavior guidance design of the interactive visual communication device.

As shown in Figure 2, the concrete ways and methods of behavior guidance can be deduced naturally and logically from the Fogg model.

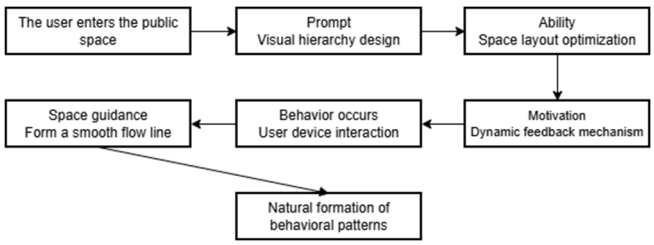


Figure 2. Flow Chart of Behavior Guidance Mechanism Based on Fogg Behavior Model

First of all, we should have a good visual hierarchy design, create clear and prominent visual focus with color, shape, light and dark elements, so that users can find the directivity information quickly and naturally in the complex environment. Therefore, it is very natural to correspond to the "trigger" element in the Fogg model, that is, effectively arouse users' attention with appropriate visual signals. Then it is necessary to make full use of the dynamic feedback mechanism, actively and timely adjust according to the real-time response of the user in the process of behavior guidance, and give clear and perceptible behavior prompt by means of sound and light effect, so the user will have a sense of trust to the device, and trust itself is the premise of excellent natural guidance of the behavior mode, so it also perfectly corresponds to the element of "motivation" in the model, that is, strengthen the willingness of the user to continue to participate with positive feedback. More rarely, the spatial layout optimization and the foregoing two form an extremely smooth and well-attached connection: Reasonably arrange the device so that it guides the user to flow in the public space, forming a smooth and controllable moving line. Spatial transparency and reachability are important principles that cannot be replaced in design. Users should be able to easily approach the device and understand its use mode. Therefore, they directly correspond to the "ability" element in the model, that is, reduce the participation threshold to ensure the smooth occurrence of behavior. More importantly, the systematic and rigorous analysis of various experiences and lessons of path guidance in real projects is the most practical and effective way to improve the scientific nature of design. Therefore, if the ultimate interaction design can combine the interaction mode, feedback mechanism and spatial layout naturally and organically, it can not only achieve the management purpose, but also improve the public experience satisfaction and participation enthusiasm, and truly achieve the benign interaction between design and people with respect and achievement.

3. Emotion Experience and Visual Communication Strategy in Public Landscape

3.1. Cultural Narration and Sensory Design

The visual communication device used in public landscapes has a very clear and self-conscious cultural narrative function, that is, as a connecting medium between regional memory and contemporary public experience, it is very natural and appropriate. Therefore, cultural symbols, as the basic elements of visual language, should be interpreted and re-created in the form of symbol system, so as to form cultural symbols with discernibility and temperature, and also to shape the identity of landscapes naturally and forcefully. What is more rare is that many cultural elements are integrated into the visual design reasonably and restrained, and the cultural level of the landscape is plentiful and plump, so the public is apt to have the sense of emotional identity and belonging. From the perspective of sensory design, it is natural to draw an important conclusion that visual experience is dominant, but the active and organic integration of multiple senses is the key, that is, to connect the senses of hearing, touch and smell to each other, so as to enhance the depth of public feeling and experience of immersion in space. Specifically, the visual communication device controls the spatial perception level by light and shadow change, dynamic effect and material texture, while the sound feedback and tactile interface make the interaction process more vivid and realistic. Therefore, the cultural narrative and multi-sensory design complement and reinforce each other. The device is not only a tool for information transmission, but also a practical carrier for shaping the spirit of the place. What is more rare is that the design makes a hierarchical and insightful historical interpretation and modern deconstruction of symbols in different cultural contexts. Therefore, the visual device itself becomes a medium for dialogue among various elements of time, space and culture. The basic purpose of sensory design is to create an organic and pleasant perception environment, so it is not only the amplifier of spatial

experience, but also the reinforcement of the relationship between emotion and cognition when the public participates in and feels space. Finally, through the visual transformation of the cultural image and the organic integration of the sensory system, the visual communication device infuses the public landscape with the cultural connotation of real weight and temperature, and gives it the vivid quality of perception, exploration and staying.

3.2. Construction and Maintenance of Emotional Resonance

Because the construction of emotional resonance has very clear and level-expandable logic, it is natural and appropriate to introduce the three-level theory of emotional design, namely the instinct layer, the behavior layer and the reflection layer, to systematically explain its construction mechanism.

Because the design of the instinct layer is based on the multi-dimensional emotion trigger mechanism, the visual elements and user feedback can be used to stimulate the emotion in real time and properly. More importantly, rigorous empirical research has been supported: Data analysis combining eye movement experiments with questionnaire results clearly demonstrates that the optimized interactive visual interface can most effectively attract public attention in the first place and arouse emotional pleasure at the instinct level.

Because the interaction mechanism in the behavior layer can guide the user to participate naturally and reasonably, the user is no longer the bystander of emotion experience, but the active bearer of emotion experience process. Therefore, the context construction is adopted as the basic means to create the specific sensible and immersive emotional field by the superposition of various factors such as spatial atmosphere, time rhythm and multi-sensory stimulation.

Because the storytelling elements embedded in the reflection layer have clear cultural connotations, and the emotion logic is constructed in the narrative way, so the device evokes the user's memory and triggers the user's emotion reaction are richer and more authentic, and the introduction of the community interaction function naturally strengthens the public expression, and the user's sharing experience and cooperative participation can easily produce the social identity and belonging, so the long-acting and stable emotion bond is formed naturally. What's more, some scholars have done rigorous and solid experimental verification with self-evaluation model (Self - Assessment Manikin), and the conclusion is very clear: The proper combination of artistic knowledge and physical field is helpful to promote the viewer's deep reflection aesthetic and emotional resonance.

The maintenance of emotion resonance itself has very ingenious and hierarchical design consideration: The interactive device is constantly updated and adjusted in time, and the expression mode is optimized by real-time data and user feedback, so it can naturally maintain the diversity of emotion expression, and actively and properly avoid emotion fatigue. What is more rare is that design has made a very solid attempt of multidisciplinary integration from methodology, which connects psychology, design and information technology together organically and fluidly, thus forming a real systematic and mature and complete emotional experience mode. Therefore, the emotional resonance created by the visual communication device in the public landscape is clear and sustainable.

4. Conclusion and Prospect

This paper makes a very hierarchical and logical analysis of the design strategies of interactive visual communication devices in public landscapes. Firstly, it systematically and rigorously discusses the two-way optimization mechanism of behavior guidance and emotion experience. From this, it draws the conclusion that the behavior guidance path based on Fogg behavior model is beneficial to improve the initiative of user participation and the spontaneity of path compliance. The combination of cultural narration and multi-sensory design can create and strengthen the emotion resonance at the instinct layer, behavior layer and reflection layer respectively. Therefore, it can form a design framework of coordination between function realization and human experience. What's more, the paper also demonstrates how technology fusion can open up new ways for the precision of behavior guidance and the continuity of emotional experience.

In the future, the research on interactive devices can be carried out naturally and properly from three more operational directions: First, a systematic empirical study on the perceptual differences and behavioral responses of different age groups (children and the elderly) to interactive devices, thus summarizing the design strategies for aging; second, a comparative study on different types of public environments (community parks, transportation hubs and cultural squares) to clarify the adaptation mechanism of device form, function and environment; and third, a rigorous quantitative analysis of user experience by introducing multi-modal interactive data (eye movement, gait and physiological signals) to truly support design optimization.

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