Journal of Electronic Research and Application, 2024, Volume 8, Issue 2
http://ojs.bbwpublisher.com/index.php/JERA
ISSN Online: 2208-3510
ISSN Print: 2208-3502

Research on Dynamic Graphic Features in Digital Media Interfaces

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Abstract: In digital media interfaces, dynamic graphics integrate elements of animation design, graphic design, and cinematic language, presenting in various forms and demonstrating significant inclusivity. From the perspective of visual cognition, by capturing dynamic graphics within the interface, three-dimensional information such as time and space is acquired, and the cognition process exhibits characteristics of spatial and temporal correlation. In terms of information cognition, dynamic representation fragments information, resulting in a sense of discontinuity and intermittent memory. The efficiency of information cognition and transmission is enhanced through the coordination of audio, video, and other elements. In aesthetic perception, with the rise of Internet culture, people's aesthetic perceptions towards dynamic graphic design have evolved, showcasing a generalization of form and the instantaneous nature of content. Technically, the complexity of design and the diversity of applications have established dynamic graphics as a typical design style label in digital media interfaces.

Keywords: Digital media; Dynamic graphics; Visual cognition; Information cognition; Aesthetic perception

Online publication: March 29, 2024

1. Visual cognition: The extension of space and the continuation of time

In traditional media, graphics are primarily utilized to present two-dimensional spatiotemporal information. However, within digital media interfaces, due to the variability of dynamic graphics, their design process itself represents an advanced method of informational visualization. At the level of visual cognition, individuals can capture temporal and spatial three-dimensional information through dynamic graphics, thereby endowing the entire cognition process with characteristics of spatial and temporal correlation [1]. Overall, dynamic graphics in digital media interfaces demonstrate features of spatial extension and temporal continuation in terms of visual cognition.

1.1. Extension of space

According to Newton, the space of existence has no actual boundaries and is deemed infinite. This perspective inspires the contemplation of different dimensions of space. Typically, we use the X, Y, and Z axes to represent

length, width, and height respectively. These three axes are widely employed in traditional flat design and 2D animation, mainly focusing on two dimensions of space, namely the X and Y axes. This traditional design paradigm imposes certain limitations on visual cognition because, regardless of how rich the content expressed in the design is, it is constrained by the limited spatial information available [2].

However, in the digital media interface, dynamic graphics, although displayed on a finite screen, expand one's spatial cognition due to their dynamic nature. This is what we refer to as the Z-axis. The introduction of this Z-axis allows the image to no longer be confined to a limited area. With the changes in dynamic graphics, the space presents an effect of infinite extension, allowing visual objects to exhibit the extension of space in the simplest form. This innovation is fully reflected in the interface, bringing users a richer and more diverse spatial perception experience [3]. The Z-axis in digital media expands our understanding of space, enabling design to be closer to human spatial perception and creating a more immersive user experience.

1.2. Continuation of time

In traditional media, graphic design lacks temporal attributes because the presented content is static and does not change over time. Therefore, time is regarded as the scale for measuring change, as it can describe the transitions of things. However, as we enter the era of digital media, dynamic graphics have become an important feature in digital media interfaces. This form of graphics showcases the passage of time through changes in states, providing users with a more vivid experience.

Technologically, through the setting of animation frames, we can express the style of dynamic graphics while describing the passage of time. Different digital media often come with different frame rates for dynamic graphics; for example, traditional film clips are typically set at 24 frames per second, while dynamic graphics in web media interfaces may be set at 15 frames per second. This technological flexibility provides designers with more creative possibilities, allowing dynamic graphics to better fit the needs of different media platforms and user experiences.

In terms of visual cognition, the continuity of time in dynamic graphics in digital media interfaces allows for the expression of the past, present, and future of things from different perspectives. Users can thus obtain visual information more comprehensively and multi-dimensionally, making digital media a more interactive and immersive medium [4]. This continuity of time provides users with a more profound, three-dimensional experience, enabling them to better understand and perceive the development and changes in media content.

2. Information cognition: The intermittency of memory and the efficiency of transmission

As a visual language in digital media interfaces, dynamic graphics convey information through the concepts of visualization, spatiotemporal hierarchy, and informational order, using dynamic visual elements such as images, text, symbols, colors, audio, and video. This approach enhances the infectiousness, richness, and efficiency of information exchange. Compared to traditional media graphic design, dynamic graphics offer a richer channel for information cognition. They not only convey information through two-dimensional and three-dimensional graphics but also assist cognition with audio and video technologies, forming a multidimensional and multisensory information system that allows users to receive and comprehend information more comprehensively. In summary, dynamic graphics in digital media interfaces are characterized by the intermittence of memory and the efficiency of transmission.

2.1. Intermittency of memory

In Newton's exploration of physics, we delved into the infinite extension of space. In the realm of digital media interfaces, the other dimension — the continuation of time — has prompted contemplation on the discontinuity of memory. Memory, as the process of recognizing, preserving, reproducing, or recalling experiences in the human brain, forms the basis for advanced mental activities such as thinking and imagination.

In digital media interfaces, various visual elements such as images, text, symbols, colors, audio, and video are presented to users with the characteristic of rapid and constant change. Users' memories of this information are also brief and momentary. In comparison to graphic design in traditional media, dynamic graphic design in terms of information cognition exhibits significant features of large capacity and fragmentation. During the reading process, the human brain's memory produces a sense of disconnection and intermittence as design elements express different colors, shapes, lighting, forms, and spaces in motion [5]. This dynamic form of expression leads users through a series of perceptual and cognitive transformations during information processing, resulting in the discontinuity of memory construction.

Memory is intricately linked to psychological activities and is a fundamental function for learning, work, and life. In digital media interfaces, dynamic graphics, through their unique design approach, transform abstract and unordered information into a structured and orderly process, which is crucial for memory. The discontinuity of memory allows users to handle and understand information more flexibly and creatively, making digital media a more engaging interactive platform.

2.2. Efficiency of transmission

For the interpretation of information transmission, eye-tracking instruments provide a powerful auxiliary tool. By measuring the gaze point position or relative movement of the eyes to the head, eye-tracking technology tracks eye movements. Data analysis indicates that users' attention to graphic information during interface usage far exceeds that of text information, especially with a more concentrated focus on dynamic graphics. This makes dynamic graphics a potent tool for guiding user attention in information transmission.

During the reading process, when dynamic graphics present a trajectory of motion, the user's brain perceives the existence of information first and stores it in memory through cognitive processes. This transmission process is not only efficient but also of high quality, as it better guides the user's cognitive process, improving the understanding and memorization of information. This forms an organic connection with the previously discussed discontinuity of memory, giving dynamic graphics in digital media a more substantive application significance.

It is well-known that dynamic graphics in digital media interfaces change over time. This evolution undoubtedly enhances the brain's ability to capture and remember information during the process of information transmission. Additionally, the coordination of elements such as audio and video further enhances the efficiency of information transmission, enabling users to obtain and understand information more comprehensively and multi-sensorially [6]. This multi-level information transmission not only enhances user experience but also makes digital media a richer and more engaging immersive platform.

3. Aesthetic perception: The generalization of form and the instantaneity of content

The most crucial medium for digital media's existence is the Internet, which has undeniably become a symbol of modern civilization. Within the context of Internet culture, we find that dynamic graphics in digital media interfaces can be infinitely replicated and magnified. The reprocessing of graphic images leads to the gradual

diminishment of the grandeur and uniqueness of some classic works. The forms of these classic works and images become increasingly abstracted in the evolution of dynamic graphics, eliminating any sense of distance and hence are characterized by generalization. Moreover, the transmission of dynamic graphics in digital media interfaces is not merely linear; the content can be infinitely expanded and extended. The appreciation and aesthetic judgment of graphic arts by individuals is often fleeting, rendering the content transient.

3.1. Generalization of form

We have delved into the extension of space, continuation of time, and efficient information transmission in digital media, and all these contribute to richer possibilities for the form of dynamic graphics. In digital media, aesthetic concepts have begun to transcend and become bold, rich, and exaggerated, forming a generalization of form. The aesthetic focus in traditional media is more on physical or static graphic images, while dynamic graphics in digital media interfaces break free from traditional aesthetic constraints in the environment of internet culture [7]. Users reading dynamic graphics through the interface are no longer limited to an appreciative state but instead experience a sense of freedom and informality, with forms becoming increasingly diverse, exhibiting the characteristics of generalization.

This generalized aesthetic experience makes the design of digital media interfaces more flexible. Designers can express creativity more freely, breaking the constraints of traditional aesthetics and allowing users to perceive a more diverse aesthetic enjoyment while browsing the interface.

3.2. Instantaneity of content

In digital media interfaces, the introduction of dynamic graphics is closely linked to the rapid development of Internet culture. In this form, users cannot fully concentrate their attention on a specific scene or object but instead, experience the instantaneous changes in content with the movement of dynamic graphics. This degradation of attention has given rise to a pursuit of more stimulating and novel elements, and dynamic graphics fulfill this demand.

Dynamic graphics involve a plethora of stimulating elements, and the instantaneous changes in the content lead to a more intriguing user experience. Various visual elements such as images, text, symbols, colors, audio, and video in digital media interfaces are in constant motion, not only increasing the amount of information but also making it prone to confusion. Simultaneously, users tend to browse content rather than deeply appreciate it. This situation cultivates users' associative thinking, gradually turning product content into momentary memory fragments.

In this momentary experience of content, users can freely choose focal points, quickly adapt to changes in information, and enhance their ability to filter and understand content. This makes digital media a more stimulating platform that captures users' attention.

4. Technical support: The complexity of design and the diversity of application

Compared to graphic design in traditional media, the threshold for dynamic graphic design is significantly higher. Dynamic graphics in interfaces require corresponding software production to ensure their application across various device media. Dynamic graphics incorporate elements of animation design, graphic design, and cinematic language, exhibiting a wide variety of forms with strong inclusivity, always capable of mixing with different forms and artistic styles. Thus, the entire process is characterized by the complexity of design and the diversity of applications at the technological support level.

4.1. Complexity of design

Designing dynamic graphics within digital media interfaces requires talents with multidimensional technical skills. Designers need to master graphic and animation design skills and possess cutting-edge aesthetic abilities to ensure the usability and readability of interface designs. Additionally, due to the specificity of the medium, designers must have certain programming skills and capabilities, undeniably making the design process complex and challenging. For instance, commonly used software for graphic design includes Photoshop and Illustrator; for animation design, Maya, Cinema 4D, 3ds MAX, and Flash; for video editing and special effects, Premiere and After Effects; and for web development design, Dreamweaver. The process of designing dynamic graphics in digital media interfaces is relatively complex, usually requiring the cooperation of multiple software tools [8]. Only by deeply understanding the essence of dynamic graphic design can one utilize software technology to create outstanding works.

4.2. Diversity of application

The primary application fields of dynamic graphics in digital media interfaces include program channel packaging, movie and television titles, commercial advertisements, music videos (MVs), live stage screens, interactive installations, and more. These applications require not only a rich and varied visual experience but also the integration of different media characteristics to ensure their operability. An indispensable process in practical applications is addressing the compatibility issues of computer programs to avoid special system vulnerabilities or program failures. Only by ensuring technical completeness can a seamless and smooth user experience be created from the perspectives of graphics, dynamics, visual style, and functionality. In such a diverse environment, the design of dynamic graphics in digital media interfaces is bound to welcome a more varied and rich development.

Funding

Faculty of Creative Industries at City University Malaysia

Disclosure statement

The author declares no conflict of interest.

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