

Exploring Visual Art Perception through Gamification and Intangible Heritage Elements in Game Design

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Abstract. This paper presents an innovative exploration of integrating Shanghai's intangible cultural heritage, specifically Haipai seal buttons, into 3D game art design. It comprises a multifaceted approach involving theoretical research, design surveys, and design processes to extract and analyze Haipai elements. The study then contextualizes these elements within modern 3D game art, adopting the perspectives of young gamers. Emphasizing the contemporary relevance of intangible heritage, it adopts Haipai ideology for creative style development. The paper utilizes 3D artistic expression, narrative integration in scenes, and real-time rendering capabilities to produce unique visual effects. A key focus is the amalgamation of Haipai elements with 3D game art, enriching game design and promotion of Shanghai's heritage. The study employs a 9-point Likert scale to evaluate the emotional and cognitive components in visual art perception, offering valuable insights and practical implications for the application of intangible heritage in gaming. This approach provides new perspectives for game entertainment creation and meaningful promotion of intangible cultural heritage in games.

Keywords: Game design; Visual art perception; Gamification; Intangible heritage elements

1 Introduction

In the contemporary era of rapid technological advancement, the integration of intangible cultural heritage elements in modern applications like game design presents both a necessity and an opportunity. This necessity arises from a growing concern: many young people, amidst the whirlwind of modernization, are gradually losing touch with the historical skills and traditions that form the fabric of intangible cultural heritage. This detachment has led to the gradual disappearance of many such heritages, underscoring the urgency to protect and pass on these significant cultural legacies. The incorporation of Shanghai's intangible heritage, specifically Haipai seal buttons, into 3D game art design, as explored in this study, is a response to this cultural risk and challenge, aiming to rejuvenate these heritage elements by embedding them in a contemporary context.

The integration of Haipai elements within modern 3D game art, as per this study, not only aligns with these research findings but also enriches game design, serving the dual purpose of promoting Shanghai's heritage and addressing the issue of cultural preservation in a technological era. The use of a 9-point Likert scale in the study to evaluate emotional and cognitive components in visual art perception aligns with the pursuit of deeper insights and practical implications for the application of intangible heritage in gaming.

By adopting this innovative approach, the study not only aims to protect and pass on cultural heritage but also to open new avenues for game entertainment creation, leveraging the power of visual art perception in gaming as a means of meaningful promotion of intangible cultural heritage.

1.1 Game design

In the realm of game design, the perception and evaluation of visual art play a pivotal role in shaping player experiences. Recent advances in game design emphasize the critical role of visual perception in shaping player experiences. One key aspect is the study of players' visual attention patterns within 3D game environments, as explored by Misztal and Schild, who emphasize the importance of understanding these patterns to improve game level design and graphics, enhancing overall player engagement [1]. This concept of visual attention is crucial when incorporating intangible heritage elements into games, as it influences how players perceive and interact with these cultural aspects.

1.2 The perception and evaluation of visual art

The perception and evaluation of visual art constitute a complex interplay of affective and cognitive responses. Hagtvedt, Patrick, and Hagtvedt developed a model integrating these components, emphasizing the significant roles of both emotional and cognitive factors in art evaluation [2]. Similarly, Martynova analyzes the phenomenology of visual perception in art, considering perception as a mental function that shapes our understanding of visual images [3]. Chatterjee et al. further explore this by introducing the Assessment of Art Attributes (AAA), which quantifies artwork attributes, highlighting the need for a structured approach to evaluate art [4]. Moreover, Xu introduced a Real-Time Dynamic Visual Evaluation protocol in game design, illustrating the importance of evaluating dynamic visual experiences in designed environments. This approach is particularly relevant for games that aim to simulate real-world experiences or historical settings, contributing to the preservation and appreciation of intangible cultural heritage [5]. In conclusion, the perception and evaluation of visual art are influenced by a complex amalgam of cognitive and affective processes, with significant implications for both the creation and appreciation of art. These studies collectively underscore the importance of a multi-faceted approach to understanding how art is perceived and evaluated.

1.3 Gamification and intangible heritage elements

Incorporating gamification and intangible heritage elements into game design presents a unique opportunity to enrich player experience. The integration of such elements not only adds depth to the game's narrative and artistic expression but also serves as a medium for cultural education and preservation. As players navigate through game scenarios imbued with intangible heritage, they engage in a form of interactive learning, experiencing the cultural nuances and histories represented in the game. In the realm of gamification and intangible heritage elements, contemporary game design strategies are increasingly incorporating these aspects to create richer, more engaging experiences. A notable example is the work by Jia Chao, who explored the 3D visual art design method based on virtual reality, demonstrating how modern visual art, when integrated with game design, can significantly enhance player interaction and engagement [6].

The fusion of visual art perception and gamification of intangible heritage in game design thus represents a symbiosis of artistic expression, cultural education, and immersive entertainment, promising a richer and more meaningful gaming experience for players.

2 Theoretical background

2.1 Theories of visual art perception

In the realm of visual art perception, the work by Hagtvedt, H., Patrick, V., & Hagtvedt, R. stands as a pivotal contribution. This study offers a nuanced understanding of how individuals perceive and evaluate visual art, a concept crucial to integrating visual art elements into game design. The key premise of the research is the complex interplay between affective and cognitive responses to visual art. They propose that the perception and evaluation of art are driven not just by the immediate aesthetic or sensory impact of the artwork but also by the viewer's cognitive processing. This dual perspective underscores the necessity of considering both emotional responses and intellectual engagement when assessing visual art [2].

The study establishes that both emotional and cognitive components contribute significantly to the overall experience of art. This includes scaled measurements that quantify these two facets, suggesting that art perception is not solely subjective but can be empirically assessed and analyzed. Further, their work emphasizes the importance of considering the individual viewer's emotional state in art evaluation. Emotions can significantly shape the perception of an artwork's attributes, suggesting that the experience of an art object is partially constructed by the viewer's emotional engagement [2].

In the context of game design, these insights are particularly relevant. The integration of visual art within games – through aspects like aesthetics, narrative, and thematic elements – necessitates an understanding of how players perceive and interact with these elements. Recognizing the impact of both affective and cognitive dimensions can lead to more engaging and immersive game experiences, especially when intertwining gamification with elements of intangible cultural heritage.

This approach aligns well with the current trends in game design, where there is a growing emphasis on creating emotionally resonant and intellectually stimulating experiences. By leveraging the principles outlined by Hagtvedt and colleagues, game designers can craft games that not only entertain but also engage players on a deeper, more meaningful level.

2.2 Mechanics and Dynamics in Gamification

Current research highlights the importance of integrating gamification principles effectively into the design process. Robson et al. define gamification as applying game design elements in non-game contexts, emphasizing the role of mechanics, dynamics, and emotions. This framework is crucial for creating gamified experiences that can enrich visual art perception in games [7]. Additionally, the cognitive-emotional perspective of gamification, as discussed by Mullins and Sabherwal, underscores the interactive processes between cognition and emotion in gamified systems. This perspective is vital in designing game experiences that evoke both emotional and cognitive responses, enhancing player engagement with visual art elements [8]. Furthermore, Helmefalk and Lundqvist's research suggests that different gamification

mechanics might be required in various domains to influence player motivation and engagement, an essential consideration for game designs incorporating visual art and intangible heritage elements [9]. These insights collectively highlight the potential of gamification in enhancing the player's interaction with and perception of visual art in game design, offering a more immersive and engaging experience.

2.3 Integrating Intangible Cultural Heritage

The integration of intangible cultural heritage (ICH) into modern applications, such as game design, is increasingly recognized as a vital component of cultural preservation and innovation. Recent studies emphasize the multifaceted approaches and methodologies employed in this integration. Hou et al. highlight the importance of capturing the living nature of ICH through digitization efforts, focusing on both the technological and curatorial complexities involved in communicating material and immaterial aspects within a meaningful context [10]. Xie discusses the role of artificial intelligence in the innovative design of ICH, pointing out how digital technologies can aid in the preservation and promotion of these cultural legacies [11].

Furthermore, the work of Koutsabasis et al. delves into the design thinking process applied in the development of location-based games that incorporate cultural heritage, stressing the significance of interactive digital media in enhancing the learning and experience of ICH [12](Koutsabasis et al., 2021). Wang et al. offer a perspective on the creation of digital content for ICH, utilizing artistic image enhancement algorithms to ensure high-quality digital representation, thus supporting the digital protection and engagement with ICH [13].

These studies collectively underscore the evolving methods and techniques in the digital integration of ICH, showcasing the potential of modern technologies in safeguarding and promoting these vital cultural elements. The integration of ICH in game design not only preserves cultural heritage but also opens new avenues for educational and interactive experiences, bridging the gap between traditional cultural expressions and contemporary digital platforms.

3 Materials and methods

This research meticulously delineates both design surveys, involving on-site field observations, and design processes. Utilizing a mixed methods approach, the study integrates a literature review to construct its theoretical background while also incorporating quantitative methods, specifically a quasi-experimental research design.

The research involves 30 art design students, augmented by the expertise of two associate professors and three lecturers. This blend of participants enriches the study with a variety of perspectives and deepens the academic rigor.

Furthermore, the study adopts a 9-point Likert scale as a methodological tool to assess the emotional and cognitive components involved in the perception of visual art in game design. This scale allows for a nuanced evaluation, capturing subtle gradations in responses, thereby facilitating a more detailed and comprehensive analysis of perceptual experiences.

3.1 Design research

This section explores the Haipai seal carving, a form of intangible cultural heritage, through the lens of the works of Chen Hailong, a masterful artisan in Chinese arts and crafts. The study investigates the diverse array of artworks in Chen's gallery, which exemplifies the Haipai style, a unique blend of various materials and intricate patterns in seal carving (Figure 1). This artistic approach incorporates a wide range of carving techniques including ivory, stone, wood, jade, and brick, and spans an extensive array of themes, from traditional to contemporary, such as mythical creatures, human figures, landscapes, and birdcage motifs.

The research emphasizes the Haipai seal carving as a crucial component of intangible cultural heritage, reflecting not just artistic finesse but also a deep cultural significance. It details an educational initiative in the form of a collaborative event between Shanghai Publishing and Printing College and Chen Hailong's studio, focusing on hands-on participation in Haipai seal creation. An illustrative instance is demonstrated in Figure 2 below. This event underscores the educational value of Haipai culture, showcasing its adaptive nature and its capacity for integrating traditional methods with contemporary artistic practices.



Fig. 1. Chen hailong's ivory seal carvings



Fig. 2. Students' Haipai seal creations

Overall, the study underscores Haipai seal carving's significance as an intangible cultural heritage, highlighting its role in preserving cultural identity, fostering artistic innovation, and promoting educational and cultural understanding.

3.2 The design process

This section analyzes the intricate process of designing props and scenes for a game, focusing on the integration of gamification with intangible cultural heritage. The game environment, enriched with Shanghai flair and Haipai seal carving cultural elements, leverages props as key instruments to enhance gameplay and deepen players' understanding of the game's worldview and character backgrounds.

The initial concept phase involved creating various props related to Haipai seal carving, such as jade Qingyun horse seals, Zitan wood monkey carvings, dragon crystal seals, and ivory elephant carvings (Figure 3). The harmonious blend of diverse materials and thematic elements in these props adds both functional value and cultural depth to the game.

Further development saw the transition from design sketches to three-dimensional modeling, utilizing Zbrush software for detailed sculpting of three characters and four Haipai seal props. Below is an example of one of the models, as seen in Figure 4. This phase involved

meticulous adjustments to the models' physical parameters and carving details, ensuring an authentic representation of the non-material cultural elements.



Fig. 3. Initial design draft - props



Fig. 4. Sculpting process in Zbrush

In the aspect of scene design, a focus was placed on showcasing the characteristics of Shanghai's intangible cultural heritage. The concept involved an exaggerated portrayal of seal engravings, incorporating distinctive elements like the Jing'an Temple pagoda and traditional Chinese architecture, as illustrated in Figure 5. This approach underlines the integration of gamification with intangible heritage elements, blending cultural representation with artistic exaggeration to create a unique and immersive game environment that educates and engages players in the rich tapestry of Shanghai's cultural legacy.



Fig. 5. Rendering of game scenery

This process not only illustrates the methodical approach to game design but also highlights the significance of incorporating intangible heritage elements in games. It demonstrates how gamification can be a powerful tool for cultural preservation, enabling players to experience and appreciate the unique charm of intangible cultural heritage in a dynamic and interactive way.

4 Results & Discussion

The study involved participants using 9-point Likert scales to evaluate the extent to which the game design evoked various emotions (1 = not at all, 9 = a great deal) and the appropriateness of perceived attributes in describing the game design (1 = not at all, 9 = extremely). Additionally, their overall assessment of the game design was measured using 9-point semantic differential scales, covering dimensions like unfavorable – favorable, negative – positive, bad – good, unpleasant – pleasant, dislike very much – like very much ($\alpha = .94$). This approach provided an in-depth analysis of participants' emotional responses and perceptions of the game's design.

The table 1 presents a comprehensive analysis of emotional responses and perceived attributes in game design evaluation. Notably, emotions such as Eagerness, Excitement, and Creative thought received high average proportions (88.9%, 77.8%, and 88.9%, respectively), indicating strong positive engagement and stimulation among participants. Similarly, attributes like Attractiveness, Distinctness, and Intellectual Stimulation scored high (88.9%, 88.9%, and 88.9%, respectively), suggesting that the game design effectively captured players' interest and intellectual curiosity.

Conversely, negative emotions like Loneliness and Sadness were rated low (22.2% and 11.1%, respectively), indicating minimal association with these feelings in the gaming experience. Attributes such as Rhythmicity received a moderate response (44.4%), possibly indicating variability in player perceptions of this aspect of the game design.

The findings suggest a predominantly positive reception of the game design, with high scores in both emotional response and perceived attributes. The results imply that the game effectively evokes a range of positive emotions and intellectual engagement, which are key factors in player satisfaction and interest. However, the varied responses to certain attributes like Rhythmicity indicate areas for potential improvement or further investigation. This analysis contributes to the understanding of player engagement and satisfaction in game design, emphasizing the importance of creating a gaming experience that resonates positively with players both emotionally and intellectually.

Table 1. Emotional responses and perceived attributes in game design evaluation

Emotion & Attribute	Average score	Average proportion
Stress	2	22.2%
Uncertainty	4	44.4%
Contentment	5	55.6%
Joy	7	77.8%
Eagerness	8	88.9%
Excitement	7	77.8%
Loneliness	2	22.2%
Sadness	1	11.1%
Creative	8	88.9%
Distinct	8	88.9%
Aesthetically pleasing	7	77.8%
Attractive	8	88.9%
Rhythmic	4	44.4%

Unified	7	77.8%
Intellectually stimulating	8	88.9%
Interesting	6	66.7%

Figure 6 indicates that the game’s design, which incorporates elements of gamification and intangible heritage, is generally well-received, with high average scores in favorability, positivity, and likability. The lower score for ‘pleasant - unpleasant’ suggests that while the design is appreciated, it may not uniformly translate to player enjoyment. These findings point to the effectiveness of integrating cultural heritage in game design, but also highlight the nuanced challenge of aligning heritage elements with universal appeal in gameplay experience.

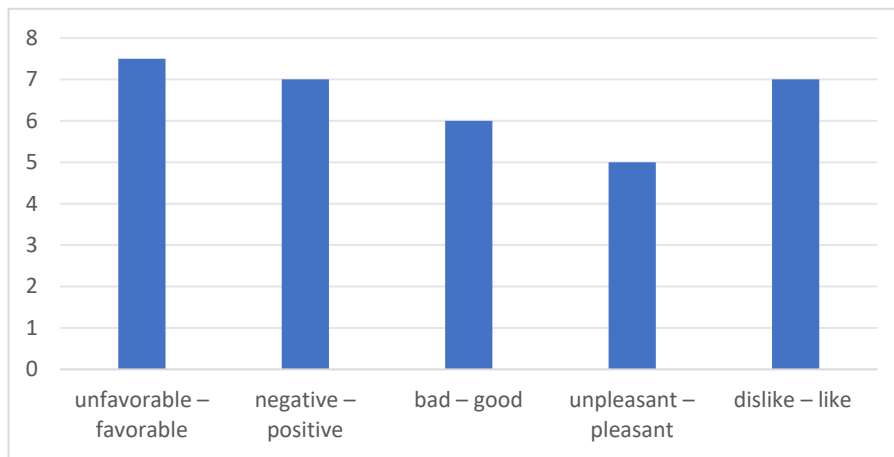


Fig. 6. Average score for game design assessment

5 Conclusions

The research concludes that the strategic incorporation of intangible heritage elements within gamification frameworks can lead to a positive reception and enhanced perception of visual art within game environments. The positive ratings in favorability and positivity suggest that players appreciate the cultural enrichment that such elements bring to the game’s design.

There is a complex relationship between cultural representation and individual player enjoyment, suggesting that while players respect and value the integration of intangible heritage, their personal enjoyment may be influenced by a variety of other factors within the game experience.

These findings underscore the potential of gamification as a tool for cultural preservation and education, by engaging players in a meaningful exploration of visual arts. However, the study also points to the importance of balancing educational and cultural objectives with the need to create an enjoyable and universally appealing game experience. Future design strategies could benefit from further research into how to optimize this balance, ensuring that games not only educate and inform but also deliver a universally enjoyable experience to a diverse audience.

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