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Article

Contemporary Chinese Shadow Puppet Character Design Inspired by Traditional Shadow Puppetry Culture

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Abstract: Chinese shadow puppetry, inscribed on UNESCO's Intangible Cultural Heritage list in 2011, faces a crisis of media disconnection and aesthetic mismatch with contemporary audiences. This research explores how the visual language of traditional shadow puppetry can be translated into contemporary game character design. By deconstructing the artistic features of six major regional schools (Shaanxi, Jinzhou, Wannan, Sichuan, Yunnan, Lufeng), we extract core genetic elements: contour, color symbolism, decorative patterns, and structural modularity. Using the classic narrative of Journey to the West as a content vehicle, we develop a four-stage design methodology—deconstruction, extraction, reconstruction, and adaptation—to create twelve game characters that retain traditional aesthetic genes while meeting modern digital media requirements. Expert evaluation using the Index of Consistency (IOC) confirms the cultural accuracy and design feasibility of the outcomes. This study provides an operational pathway for the creative transformation of intangible cultural heritage and demonstrates the potential of traditional aesthetics in the digital entertainment industry, offering both theoretical insights for heritage studies and practical guidance for game art design.

Keywords: shadow puppetry; game character design; cultural translation; intangible cultural heritage; Journey to the West; digital adaptation

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1. Introduction

Chinese shadow puppetry, known as the "living fossil of light and shadow art," originated in the Han Dynasty and has carried over two thousand years of cultural connotations. In 2011, it was inscribed on UNESCO's Representative List of the Intangible Cultural Heritage of Humanity, recognizing its outstanding universal value [1]. However, in the contemporary era, traditional shadow puppetry faces a severe decline in popularity due to competition from modern entertainment media such as film, television, and video games, as well as a disconnection between its stylized visual representation and the aesthetic preferences of younger generations [2]. The problem is twofold: first, the visual language of shadow puppetry—characterized by flat silhouettes, pierced carvings, and symbolic colors—has not been effectively translated into digital media; second, the dissemination of shadow puppetry often fails to achieve cross-cultural resonance, risking its gradual disappearance from active social life [3].

The 20th National Congress of the Communist Party of China emphasized the need to "creatively transform and innovatively develop" excellent traditional Chinese culture [4]. This strategic direction calls for integrating intangible cultural heritage genes into

contemporary design. The gaming industry, as one of the most dynamic entertainment media among youth, offers a promising platform for such transformation. With over 3 billion gamers worldwide and a rapidly growing market in China, games have become a primary gateway for young people to engage with cultural content. Games like *Black Myth: Wukong* have demonstrated that mythological themes combined with high-quality art can achieve both cultural influence and commercial success [5].

This research aims to study the artistic components of traditional Chinese shadow puppetry and apply them to the design of contemporary game characters. Specifically, we address two research questions: (1) What are the key artistic features of traditional Chinese shadow puppetry in terms of form, color, pattern, and structure? (2) How can these features be translated into game character designs that preserve cultural identity while meeting modern aesthetic and functional requirements?

The paper is organized as follows: Section 2 reviews related literature and proposes design hypotheses. Section 3 describes the research design, including data collection, expert interviews, and the design methodology. Section 4 presents the results of traditional feature analysis and the twelve character designs. Section 5 discusses the implications for cultural heritage preservation and game art. Section 6 concludes with limitations and future directions.

2. Literature Review and Design Hypotheses

2.1. Artistic Characteristics of Traditional Chinese Shadow Puppetry

Chinese shadow puppetry integrates folk carving, painting, music, and literature into a synthetic art form [6]. Its visual language is highly stylized and regionally diverse. According to Wei Liqun's comprehensive study [7], shadow puppetry can be classified into three major regional systems: the Northwest (Shaanxi, Gansu), the Northeast (Hebei, Liaoning), and the Southern (Sichuan, Yunnan, Guangdong). Each system exhibits distinct features in contour, color, and decoration.

Contour and proportion: Shaanxi shadow puppets are known for their "rock skull" high forehead and straight nose bridge, conveying strength and simplicity [8]. Sichuan puppets feature exaggerated "low forehead, pointed chin" shapes with a humorous quality [9]. Jinzhou puppets emphasize refined side profiles with "sky-piercing" nose bridges [10].

Color symbolism: Traditional shadow puppets follow the Five-Color theory derived from Chinese opera: red for loyalty (e.g., Guan Yu), black for righteousness (e.g., Zhang Fei), white for treachery (e.g., Cao Cao), green for impulsiveness, and gold for divinity [11]. These colors are applied with mineral pigments to enhance projection effects.

Decorative patterns: Patterns such as dragons (imperial power), clouds (immortality), flames (magic), and bones (evil) carry specific cultural meanings and are applied according to character identity [12]. The carving techniques of positive and negative engraving create rhythmic light-and-shadow effects.

Structural modularity: Traditional puppets are composed of separate head, torso, and limb pieces joined by threads or bamboo rods, allowing flexible manipulation [13]. This modular design is a functional adaptation to performance needs.

2.2. Game Character Design and Cultural Translation

Game character design requires a balance between visual appeal, narrative coherence, and technical feasibility [14]. Recent studies have explored the integration of traditional Chinese art styles into games. Parametric methods have been applied to extract and enhance the color features of Haining shadow puppetry for use in modern design contexts [15]. In addition, three key design dimensions for shadow puppet-based games—interactivity, sociality, and linear cognition—have been proposed as guiding principles for development [16].

While these studies offer valuable insights, they often focus on surface-level stylistic borrowing rather than systematic translation of the underlying cultural logic. The challenge is to move beyond superficial borrowing and achieve what we term "genetic translation"-extracting core cultural units (contour paradigms, color systems, pattern modules, structural principles) and recombining them within the digital medium in a way that retains their original semantic weight.

2.3. Design Hypotheses

Based on the literature, we propose the following design hypotheses:

H1: The visual genes of traditional shadow puppetry can be systematically deconstructed into four dimensions-contour, color, pattern, and structure-each providing measurable parameters for digital design.

H2: Using classic mythological IPs (e.g., Journey to the West) as narrative carriers facilitates cultural resonance and player acceptance.

H3: A four-stage design process (deconstruction → extraction → reconstruction → adaptation) can effectively transform traditional shadow puppet features into game characters that maintain cultural recognizability while meeting contemporary aesthetic and functional standards.

3. Research design

3.1. Research Scope and Data Collection

This study focuses on six representative shadow puppetry schools: Shaanxi (eastern and western styles), Jinzhou, Wannan, Sichuan, Yunnan, and Lufeng. Data were collected from three main sources: (1) a literature review of historical records and academic studies; (2) field investigation at a shadow puppetry museum in southern Anhui, including high-resolution photography and artefact analysis; and (3) semi-structured interviews with three categories of experts, including shadow puppetry practitioners, cross-media art designers, and game art professionals.

Each interview lasted approximately 60-90 minutes and addressed topics such as core techniques, symbolic meanings, visual translation strategies, and market feasibility.

3.2. Expert Interview and IOC Evaluation

Three semi-structured interview protocols were designed to target traditional practitioners, visual design experts, and game art directors. The interviews explored core techniques, cultural symbols, visual translation strategies, and market feasibility.

After transcription, key themes were extracted and transformed into evaluation items for the Index of Consistency (IOC) assessment. IOC scores (ranging from 0 to 1) were calculated for each design principle to ensure alignment with expert consensus. IOC is a widely used method for validating content validity in design research, with scores above 0.7 indicating strong agreement among experts.

3.3. Design Methodology: Four-Stage Genetic Translation

Based on the analysis, a four-stage design methodology was developed:

1. Deconstruction: Traditional puppets are analyzed in terms of contour silhouettes, color values, pattern units, and joint structures. Parameters such as line curvature, RGB color values, and pattern repetition rules are systematically recorded.

2. Extraction: Core "genetic" elements are identified, such as the "rock skull" contour of Shaanxi, the "flame pattern" of Sichuan, and the "lacquer coloring" of Yunnan. These elements are abstracted into modular design units.

3. Reconstruction: The extracted elements are recombined with contemporary design principles, including proportion adjustment (e.g., head-to-body ratios of 1:3 to 1:4), expanded digital color schemes, and the narrative integration of patterns.

4. Adaptation: The designs are further optimized to meet game engine requirements, including skeletal rigging, silhouette readability, and the integration of visual effects for character skills.

4. Results

4.1. Analysis of Traditional Shadow Puppetry Features

The comparative analysis of six schools reveals distinct visual characteristics, summarized in Table 1. As shown in Table 1, each school possesses unique contour profiles and color systems that reflect regional aesthetics and cultural values. For instance, Shaanxi's bold carving and symbolic colors convey strength and divinity, making it suitable for heroic characters like Sun Wukong, while Sichuan's dynamic joint structure and humorous contours lend themselves to comical or agile figures. Furthermore, the modular construction of Wannan puppets, with separate head and body pieces, offers flexibility for designing transformable game characters that can switch appearances or abilities. The lacquer-dyeing technique of Yunnan provides a visual texture that can be simulated in digital materials to create a distinctive "handcrafted" look. By cataloging these features, we establish a genetic library that not only preserves traditional knowledge but also serves as a toolkit for contemporary designers seeking culturally rooted yet innovative visual languages.

Table 1. Comparative artistic features of six shadow puppetry schools.

School	Contour Features	Color Symbolism	Typical Patterns	Structural Notes
Shaanxi (E)	High forehead, straight nose, "rock skull"	Rich contrasting colors, mineral pigments	Snowflake, swastika, scale	Head-hat integrated, 9-10 inches
Shaanxi (W)	Round faces, deep eyes, larger size	Plain intense colors	Simple elegant patterns	12 inches, rough carving
Jinzhou	"Sky-piercing" nose, small mouth, elegant	Lively colors, five-color face painting	Fine paper-cut inspired lines	Donkey hide, 8 inches
Wannan	Abstract, exaggerated, simple lines	Red (loyal), yellow (cunning), black (brave)	Hollowed lines, local folk motifs	Head-body separate, ox hide
Sichuan	Low forehead, pointed chin, animal symbols	Simple yet rich, influenced by Sichuan brocade	Flame, snake-eye, geometric	14 joints, dynamic expression
Yunnan	Tall figure (2x others), realistic style	Bold harmonious, lacquer dyeing	Opera-like face painting	Bamboo rod joints, cowhide
Lufeng	Realistic, influenced by Chaoshan paper-cut	Strong contrast, bright colors	Magnificent, carved & shaded	Paper/glass paper, modern materials

4.2. Character Design Outcomes

Twelve characters from Journey to the West were designed, each drawing inspiration from one or more traditional schools. Table 2 summarizes the design mapping. For example, Sun Wukong combines the "rock skull" contour of Shaanxi with red-gold colors symbolizing loyalty and divinity, and his phoenix crown echoes traditional imperial regalia. In contrast, the White Bone Spirit uses sharp, cracked patterns from Shaanxi and Hebei, with a ghostly white-blue-purple palette to convey deception and eeriness. These mappings demonstrate how genetic elements are strategically combined to support narrative functions (As shown in Figure 1, Figure 2 and Figure 3).

Table 2. Character design mapping.

Character	Primary School(s)	Key Visual Genes	Color Scheme	Narrative Function
Sun Wukong	Shaanxi (east)	Rock skull, phoenix crown, bold carving	Red-gold	Rebellion, loyalty
Tang Sanzang	Wannan	Square face, closed eyes, simple robe patterns	Vermilion-gold	Compassion, piety
Zhu Bajie	Sichuan	Round belly, comical snout, food-related motifs	Black (robe)	Greed, simplicity
Sha Wujing	Jinzhou + Yunnan	Fierce eyes, thick beard, crescent shovel	Black-red	Strength, wildness
White Dragon Horse	Lufeng	Dragon-horse fusion, cloud patterns	Silver-white	Nobility, agility
Guanyin	Jinzhou	Solemn face, elaborate crown, willow branch	White-pink lotus	Compassion, divinity
White Bone Spirit	Shaanxi + Hebei	Sharp bones, cracked patterns, seductive yet eerie	White-blue-purple	Deception, ghostly
Elder Jinchi	Wannan	Long eyebrows, old appearance, greedy expression	Deep gold-ochre	Hypocrisy, greed
Black Bear Spirit	Sichuan + Jinzhou	Bear-like features, flame patterns on weapon	Black-red	Power, wildness
Spider Spirit	Yunnan	Multiple arms, web patterns, enchanting face	Purple-pink-blue	Seduction, danger
Lingxuzi	Jinzhou	Wolf-headed Taoist, pearl patterns	Grey-brown	Cunning, immortality
Nine-headed Worm	Lufeng	Nine heads, scales, spiral water patterns	Dark green-blue	Aquatic, otherworldly



Figure 1. Pattern deconstruction and reconstruction (partial).



Figure 2. Color extraction and palette development.



Figure 3. Final character designs.

4.3. IOC Evaluation Results

Three experts—one cross-media designer, one game art director, and one shadow puppetry scholar—evaluated the design proposals using IOC assessment forms. The average IOC scores for the key evaluation dimensions are as follows:

Cultural recognizability: 0.92

Visual appeal: 0.88

Game adaptability: 0.85

Narrative coherence: 0.90

All scores exceeded the 0.7 threshold, confirming the validity of the design approach. The high score for cultural recognizability indicates that the genetic translation successfully preserved the essence of traditional puppetry, while the slightly lower game adaptability score suggests room for further technical refinement in collaboration with game developers.

5. Discussion

5.1. Genetic Translation as a Viable Methodology

This study demonstrates that the visual genes of traditional shadow puppetry can be systematically deconstructed and translated into contemporary game character design. Unlike approaches that focus primarily on surface-level imitation, this genetic translation method preserves deeper structural logic—such as the balance between positive and negative space in carving and the symbolic color system—while enabling modern reinterpretation [15].

This approach is consistent with perspectives that emphasize understanding shadow puppetry within its broader cultural ecology, and further extends such insights into an operational design framework [7]. Moreover, the methodology developed in this study has broader applicability and can be adapted to other forms of intangible cultural heritage, such as traditional painting and paper-cutting, thereby offering a replicable model for creative transformation and innovation.

5.2. Bridging Flat Aesthetics and Digital Media

One key innovation lies in adapting traditional flat aesthetics to digital screen environments. Traditional shadow puppets rely on backlit projection, which produces a distinctive luminous effect. In this study, this visual quality is simulated through the use of layered transparencies and gradient color transitions, while preserving the two-dimensional silhouette.

Specifically, alpha channels are applied in character textures to replicate the translucency of leather, and variable line thickness is employed to emulate the hand-carved outlines characteristic of traditional puppetry. A key technical challenge was maintaining the "pierced" visual effect of carved details while ensuring character readability against complex game backgrounds. This issue was addressed by introducing subtle rim lighting, which recreates the visual logic of backlighting while enhancing edge definition.

This approach responds to concerns regarding "media disconnection" in the digital translation of traditional art forms and proposes a new visual grammar that effectively bridges flatness and depth in digital environments [17].

5.3. Industrial Potential and Cultural Sustainability

The twelve characters form a coherent IP system that can be extended to various applications: in-game skins, animated shorts, figurines, and cultural exhibitions. By collaborating with game companies, these designs could reach millions of young players, fostering interest in traditional culture. Moreover, the methodology can be applied to other intangible heritage forms, providing a replicable model for creative transformation. Such initiatives not only revitalize heritage but also generate economic value, creating a virtuous cycle that supports both cultural preservation and creative industries.

5.4. Limitations and Future Work

This study has several limitations. First, the character designs have not yet been tested within an actual game environment; therefore, user acceptance and gameplay integration require further empirical validation. Future work will involve the development of a playable demo featuring three representative characters—Sun Wukong, the White Bone Spirit, and Guanyin—to conduct user testing with both Chinese and international participants. Evaluation metrics will include cultural recognition, aesthetic appeal, and gameplay experience.

Second, the ritual and performative dimensions of shadow puppetry, such as music and manipulation techniques, were not addressed in this study. Future research could incorporate motion capture technologies to record the dynamic rhythms of master performers and translate these into character animation cycles, thereby enhancing

performative authenticity. In addition, acoustic elements-including distinctive vocal styles and instrumental accompaniment-could be integrated as adaptive soundtracks triggered by in-game events.

Third, the digital asset library developed in this study remains at a prototype stage. Further collaboration with game developers is necessary to optimise assets for real-time rendering and production pipelines. Ongoing discussions with an independent game studio aim to implement these designs within a 2.5D side-scrolling game, providing an opportunity to evaluate the scalability of the proposed methodology and identify potential technical bottlenecks.

Finally, cross-cultural adaptation remains an important direction for future exploration. Further research should investigate how these designs can be made accessible to international audiences while preserving their cultural authenticity.

6. Conclusion

This research successfully extracted the core visual genes of traditional Chinese shadow puppetry and translated them into a series of twelve contemporary game characters based on *Journey to the West*. The proposed four-stage design methodology-deconstruction, extraction, reconstruction, adaptation-provides a systematic pathway for the creative transformation of intangible cultural heritage. Expert evaluation confirmed the cultural accuracy and design feasibility of the outcomes. By integrating traditional aesthetics with digital media, this study contributes to the dynamic inheritance of shadow puppetry and opens new possibilities for cultural industries. Future work should focus on empirical testing with players, expansion of the character library, and development of cross-media applications. Ultimately, this work demonstrates that ancient art forms can find new life in the digital age, bridging the past and future through creative design.

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