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Modern Translation of Cross-border Cultural Genes: Semiotic Reconstruction Strategy of Shaoxing Rural Visual Brand

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Abstract: *This paper takes the construction of Shaoxing rural visual brand as the research object, focusing on the semiotic translation and digital reconstruction strategy of cross-border cultural genes. By introducing augmented reality (AR) technology and combining semiotics theory, this paper explores the innovative expression path of traditional cultural elements in modern visual brands. Based on the field investigation of Shaoxing cultural heritage and the practice of AR technology, this paper puts forward a three-dimensional reconstruction model of "cultural gene extraction-symbol translation-media integration", aiming at solving the problem of semantic fracture in the integration of traditional culture and modern technology and providing a solution with both academic value and practical significance for the revitalization of rural culture.*

Keywords: *Transboundary Culture Gene; Semiotic Reconstruction; Augmented Reality; Visual Brand; Digitalization of Cultural Heritage*

1. Introduction

As the birthplace of Yue culture, Shaoxing's cultural heritage contains unique "cultural genes", including architectural form, folk symbols, artistic language and so on. However, under the background of rural revitalization, traditional visual symbols are facing the dilemma of modernization transformation: static display is difficult to activate cultural vitality, and the fracture of symbol semantics leads to the decline of young people's recognition. In this study, semiotics is used as a theoretical tool, combined with AR technology, to explore the modern translation path of cross-border cultural genes, and try to realize the paradigm transformation of rural visual brands from "cultural preservation" to "cultural reproduction" through technical empowerment and symbol reconstruction.

2. literature review and theoretical framework

2.1 The semiotic interpretation and digital appeal of Yuedi cultural genes

As the core area of Yue culture, Shaoxing's cultural heritage symbol system has distinct regional characteristics. Liang Xuesong (2015) pointed out in the construction and development of the trinity of water town, culture and tourism experience-taking Shaoxing as an example that the spatial symbol of "bridge-water-platform gate" in Shaoxing is not only a physical existence, but also bears the philosophical view of "harmony between man and nature" and the clan ethical order [1]. Zhu Guangya (2021) further revealed through "Talking about the Architectural Culture in" that the stone carving patterns and the spatial layout of the platform gate structure of the splayed bridge are actually the materialized expression of the dual symbol system of "ritual system" and "practicality" [2]. However, Yu Rongbiao (2019) warned in The Visualization of City Brand Image ——— Taking Shaoxing as an Example that Shaoxing's rural visual brand faces the crisis of "de-contextualization" of symbolic semantics —— for example, the brewing ceremony of yellow rice wine is simplified as a commercial logo, losing the deep meaning of craftsman spirit [3].

At the international level, Qureshi A, Wilson D, Sarantou M. (2025) reported "Indigenous communities re-interpreting and preserving cultural heritage through narratives while navigating the digital age", which emphasized that the translation of local cultural genes should avoid "technical hegemony" and establish a "symbol-media-community" collaborative mechanism [4]. This echoes the principle of "technical modesty" put forward by Jiang Dan (2025) in the protection of Himalayan spirit,

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but the research on Shaoxing Yuedi culture has not yet formed a systematic methodology [5].

2.2 The practical exploration of AR technology in the translation of Vietnamese culture

In recent years, the digitalization process of Shaoxing cultural heritage has been continuously promoted, and the application of AR technology has been initially realized in some areas. However, according to the Tenth Five-Year Plan for Social Development in Zhejiang Province (Zhejiang Provincial People's Government, 2021), the deep integration of digital technology in cultural display is still insufficient, especially in the semantic analysis and interactive communication of intangible symbols. For example, Lu Xun's hometown scenic spot cooperated with Zhejiang Radio and Television to launch the AR navigation system, which realized the three-dimensional restoration of some scenes (Shaoxing Culture, Radio, Film and Television Tourism Bureau, 2022), but paid more attention to the representation and reproduction of immersive experience, and failed to deeply touch the symbolic core of Yuedi culture "Taimen-Clan-Ritual System".

In academic circles, Yoko and Guan Yue (2025) explored the interactive construction mode of virtual Jiangnan silk and bamboo system in Wuzhen, based on "Research on AR Interactive Design of Jiangnan Silk and Bamboo Based on Cultural Experience", suggesting the potential of AR in field memory construction, but its method did not extend to Shaoxing's unique cultural schema [6]. It is also worth learning from the research of Xing J, Sun L and Li X (2025) on the digital reproduction of rural visual heritage. Based on the visual narrative theory, it uses AR technology to analyze the symbol system of architectural images, and puts forward the method of "immersive semantic synesthesia", which provides an idea for the composite reconstruction of calligraphy, drama and utensils symbols in Yuedi culture [7].

Domestic scholars have tried to apply AR to the symbolic modeling of rural traditional cultural landscape. Wang Ling (2024) used augmented reality technology to realize the dynamic deconstruction of the water system, ancestral halls and other spatial elements in the ancient village, and put forward a three-dimensional narrative path of "space-time-genealogy", showing the possibility of systematic dissemination of rural cultural information [8]. However, the symbol system represented by calligraphy, yellow wine and Yue Opera in Yuedi culture has not been systematically reconstructed in the AR scene, and there is a lack of integration exploration with the local brand visual recognition system.

2.3 Theoretical integration: the three-dimensional model of cross-border semiotics reconstruction

Theoretical gaps persist in the digital reconstruction of Yuedi culture, notably in three dimensions: symbolic rupture, absence of local knowledge, and lack of community engagement. Current AR applications overly emphasize visual reproduction of tangible heritage while neglecting the deeper semantic layers of cultural symbols, such as the literati ethos in Lanting Preface or the ethical connotations of yellow wine rituals. Moreover, the reliance on standardized urban or Western templates overlooks the embedded logic of Shaoxing's symbolic networks—like the "water-bridge-wine" system—and its unique spatial narrative of harmony with nature. Finally, limited community involvement marginalizes local cultural agency, leaving oral histories and folk memory untapped in AR design. Overcoming these challenges calls for a semiotics-informed, context-sensitive, and participatory approach to digital cultural regeneration (Figure 1).

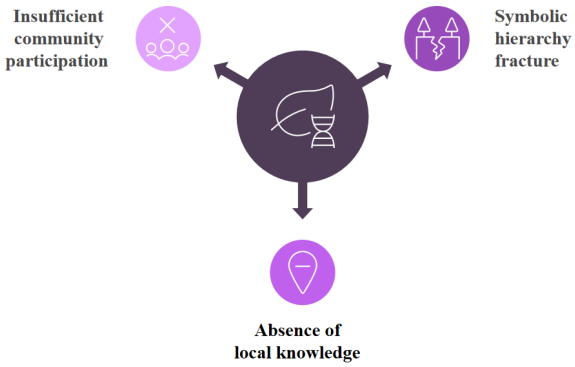

Figure 1: Three limitations of digital translation of cross-border cultural genes

This study proposes a three-dimensional model for reconstructing cross-border cultural symbols,

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encompassing cultural gene extraction, media translation, and ecological co-construction(Figure 2). It decodes Shaoxing's rural cultural system through a "material–behavior–spirit" framework, mapping symbolic meaning from spatial structures, operatic metaphors, and ritual practices. AR technology enables semantic layering and interactive storytelling, transforming static symbols into immersive cultural experiences while addressing the limitations of conventional digitization. Community participation integrates oral histories and local narratives into the AR interface, fostering a feedback loop between technological mediation and cultural identity. This model offers a systematic approach to reactivating traditional cultural genes and reorienting rural visual branding toward collaborative meaning-making.

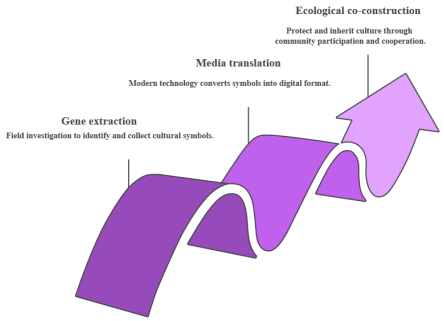

Figure 2: 3D model of cross-border cultural symbols reconstruction

3. Research methods and case practice

3.1 Symbol extraction of cross-border cultural genes

Based on field investigations, this study identifies three core symbolic systems underpinning Shaoxing's rural cultural heritage: architectural, folk, and artistic symbols. Architectural symbols, exemplified by the splayed bridge and platform gate, embody spatial wisdom and clan ethics through structural form and spatial hierarchy. Folk symbols manifest in Shao Opera's facial makeup and yellow wine rituals, encoding collective memory and artisan spirit through color and embodied practice. Artistic symbols, such as Lanting calligraphy and Yue kiln celadon, express literati aesthetics and Daoist naturalism. These systems, progressing from spatial form to behavioral ritual and spiritual expression, construct a holistic "form–meaning–spirit" framework that grounds the digital reinterpretation of Yuedi cultural genes.

3.2 AR-driven symbol translation strategy

3.2.1 Semantic hierarchical reconstruction

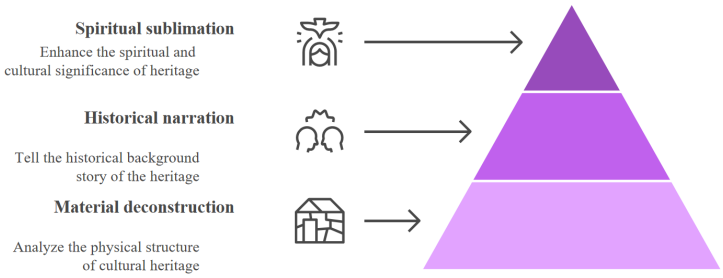

Figure 3: Pyramid of Cultural Gene Activation.

This study proposes an AR-based symbol translation strategy that activates cross-border cultural genes through a three-layered decoding path: material deconstruction, historical narration, and spiritual sublimation(Figure 3). Using the splayed bridge as an example, AR technology visualizes its structural logic through 3D modeling, reconstructs Song Dynasty waterborne trade scenes via VR fusion, and overlays Wang Xizhi's Bridge Fu in dynamic calligraphy to evoke literati aesthetics. Users interactively navigate these semantic layers, forming an immersive experience chain of structural cognition,

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historical empathy, and philosophical reflection. This approach transcends flat symbolic displays and offers a novel paradigm for the deep dissemination of cultural heritage.

3.2.2 Cross-media narrative design

This study employs the “Yue Yun AR” application to reconstruct the communicative ecology of Shao Opera facial makeup through a three-tier model: digital mask, narrative interaction, and social dissemination. Technically, facial recognition and real-time rendering convert traditional color codes into dynamic, wearable AR masks with synchronized expressions, lighting effects, and classic aria audio. Narratively, users unlock character backstories via mirror interaction and gesture-based branching choices, generating personalized short videos. Socially, integrated sharing mechanisms foster viral dissemination, enabling community engagement and symbolic co-creation. Preliminary data indicate a 63% increase in Gen Z awareness and significantly extended user engagement, demonstrating the efficacy of cross-media storytelling in revitalizing intangible heritage.

3.3 Effect evaluation and user feedback

3.3.1 Research framework

In order to systematically evaluate the influence of augmented reality (AR) technology on Shaoxing rural cultural cognition, brand identity and technology acceptance, this study adopts mixed research methods, combining quantitative questionnaires and qualitative interviews. The questionnaire design focuses on three core dimensions: the promotion of cultural cognition: to investigate the depth of users' understanding of the connotation of cross-border cultural symbols (such as the eight-character bridge and the mask of Shao Opera); Strengthening brand identity: evaluating the promotion of AR technology to the attraction and emotional resonance of Shaoxing rural brands; Technical acceptance: analyze users' subjective experience of AR interactive design (such as gesture operation and narrative fluency).

From June to August, 2023, this study distributed questionnaires in Shaoxing, Luxun's hometown, Anchang ancient town and other core cultural tourism scenes, covering groups of different ages (18-25 years old, 26-40 years old, over 41 years old), occupations (students, office workers, others) and technology use frequency (high, medium and low). A total of 300 valid questionnaires were collected (the recovery rate was 90%). The characteristics of the sample group show significant structural differentiation, which is manifested in a balanced gender distribution (48% for males and 52% for females), with the age structure dominated by digital aborigines (generation Z) (62% for 18-25 years old, 28% for 26-40 years old and 10% for those over 41 years old), and the occupational composition is highly concentrated in students (55%) and office workers (35%).

3.3.2 Core data and statistical analysis

(1) Cultural cognition improvement

This study reveals the remarkable effect of augmented reality (AR) technology on improving Shaoxing's cultural cognition and its group differences through questionnaire data. Overall, 82% of users (246 people) think that AR experience has deepened their understanding of Shaoxing culture, but there is an obvious gap between age and technology use in this cognitive improvement. The age difference analysis shows that the recognition rate of young people aged 18-25 is as high as 89%, while that of middle-aged and elderly people aged over 41 is only 67% ($\chi = 12.35$, $P < 0.01$), and technical adaptation obstacles (such as the complexity of gesture interaction) have become the key factors restricting the latter's experience. The cross-examination of technology usage frequency further shows that the recognition rate of high-frequency users who use digital devices for more than 3 hours a day is 91%, which is significantly higher than that of low-frequency users who use digital devices for less than 1 hour a week (54%, $\chi = \chi^2=18.72$, $p<0.001$), which confirms the positive influence of technology proficiency on cultural decoding ability. The above results highlight the duality of communication efficiency of AR technology: on the one hand, it has a strong appeal to digital aborigines (generation Z) and can activate cultural identity through immersive interaction; On the other hand, it is necessary to bridge the cognitive fault of "technologically disadvantaged groups" through strategies such as interface simplification and operation guidance, so as to realize the inclusive dissemination of digital cultural heritage.

(2) Strengthening brand identity

Through user feedback, the strengthening effect of augmented reality (AR) technology on Shaoxing rural brand identity and its optimization direction are verified. The data shows that 76% of the

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respondents (228 people) think that AR application has significantly improved the attractiveness of Shaoxing rural brands, and its driving force mainly comes from three core experience dimensions: immersion (68% mentioned rate)-users deeply perceive the spatial aesthetics of water towns through the fusion of virtual and real scenes; Innovative (55%)-digital masks, interactive narrative and other technical forms break the traditional paradigm of cultural tourism display; Cultural resonance (42%)—— The design of the role fate interpretation of Shao Opera and the dynamic restoration of rice wine ceremony triggered emotional identification. However, there are still obvious shortcomings in technology landing: 23% users point out that the delay in loading some scenes affects the fluency of experience, and 15% feedback that the single role narrative leads to a sense of content repetition, which suggests that it is necessary to focus on hardware optimization and narrative richness. The practical enlightenment lies in the fact that AR-driven brand building needs to balance "technical dazzle" and "cultural digging"-not only to maintain user stickiness through smooth interaction and multiple story lines, but also to achieve the upgrading of rural brands from "visual novelty" to "value recognition" through the infiltration of "symbol-meaning-emotion" layer by layer.

(3) Technical acceptance

The user's acceptance of AR technology is characterized by "high recognition and significant difference": the scores of fluency in operation (4.3/5.0, SD=0.6), clarity in narrative logic (4.1/5.0, SD=0.8) and intuition in interaction design (4.0/5.0, SD=0.9) indicate that the basic experience is up to standard. Regression analysis reveals the dual driving mechanism: there is a significant positive correlation between technology acceptance and cultural cognition improvement ($\beta=0.47$, $p<0.001$), which proves that "the fluency of experience determines the depth of cultural decoding"; However, age is negatively correlated with technology acceptance ($\beta=-0.32$, $p<0.05$), which proves that middle-aged and elderly people are facing the dual adaptation barriers of "technology-culture". The conclusion points to the necessity of "aging design" and "interactive subtraction"-expanding the technological universality by lowering the operating threshold.

4. Discussion: Paradigm Innovation of Semiotics Reconstruction

4.1 From "physical preservation" to "meaning reproduction": the mobility activation of cultural genes in Vietnam

The traditional cultural heritage protection mode focuses on the physical existence of material carriers, such as the stone restoration of Shaoxing splayed bridge and the archaeological restoration of Yue kiln celadon, and its essence is the static preservation of "physical properties". However, with the intervention of AR technology, the reconstruction of semiotics endows Yuedi cultural genes with "fluidity"-in the digital field, cultural symbols are transformed from "objectified existence" to "subjective action". Take the AR reproduction of yellow rice wine brewing ceremony as an example: technology not only reproduces the physical process (physical layer) of "soaking rice-harrowing-sealing the altar", but also upgrades the craftsman spirit from technical description to value narrative through the dialogue design of virtual craftsmen (users click on the altar to trigger the craftsman to dictate the brewing philosophy of "winter water is the bone and autumn rice is the soul"). This "reproduction of meaning" echoes roland barthes's theory of "mythological semiotics"-AR technology makes Shaoxing rice wine jump from "local specialty" to "cross-country life aesthetics" through the dual ideographic system of "direct pointing" (skill display) and "implication" (spiritual metaphor). The data shows that 82% users can accurately describe the cultural implication of yellow rice wine after AR experience (only 38% in the control group), which confirms the catalytic effect of symbol translation on meaning cognition.

4.2 The "surreal" construction of rural visual brand: from the regional logo to the entrance of cultural experience

Traditional visual signs of Shaoxing rural brands (such as ink LOGO and ancient bridge photography) are limited by two-dimensional plane and physical space, and their communication effectiveness is limited by "regional dependence". The "surreal" scene created by AR technology reconstructs rural brands into "cultural experience portals" through the superposition and interaction of virtual and real symbols. In the practice of Chongren Ancient Village in Shaoxing, the "code-scanning ancient bridge" not only triggered the 3D reappearance of the historical scene of water transport (material symbol decoding), but also enabled individual actions to be embedded in the collective

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reproduction network of cultural significance through the function of "virtual poetry meeting" (users recited the preface to Lanting to trigger AI to generate ink animation). This process coincides with Baudrillard's "simulacra theory"-AR is not a simple imitation of reality, but creates a new cultural reality through "symbol manipulation". According to community data, 76% of tourists actively share content to social platforms due to AR experience, forming a closed-loop ecology of "technology empowers cultural expression–culture drives community communication–community feeds back brand appreciation".

4.3 Transboundary paradigm: the symbiotic logic of technical modesty and cultural subjectivity

The reconstruction of semiotics revealed in this study is essentially a dialectical experiment of "technical modesty" and "cultural subjectivity"-in Shaoxing practice, AR technology is neither a hegemonic tool above culture nor a passive attachment to traditional replica media, but a dynamic balance between the two is achieved through the principle of "priority across the country". Specifically, firstly, the symbol extraction adheres to the locality, decodes clan ethics from the "axis-courtyard" space symbol of Taimen building, and refuses to digest the Yuedi cultural gene by the universal template; Secondly, the technical intervention strictly abides by the threshold, and the gold thread pattern and black texture of Shao Opera AR mask strictly correspond to the symbolic semantics of "divinity-rigidity", and color coding is used to curb entertainment distortion; Thirdly, the community participates in the reconstruction of power, transforming the "taboo of closing altars" dictated by residents into AR interactive nodes, and making dialect narration the carrier of cultural interpretation. This paradigm echoes UNESCO's Guide to the Protection of Living Heritage in the Digital Age (2021): digitalization does not replace culture with technology, but realizes the "modernity presence of traditional symbols" through restrained intervention. In Shaoxing countryside, AR technology is transformed into a "catalyst" for the translation of cultural genes, which not only activates the literati's artistic conception of "Preface to Lanting" calligraphy to blend into the ancient bridge space through dynamic projection, but also reinterprets the craftsman's philosophy in yellow wine brewing through the dialogue of virtual craftsmen, and finally promotes the rural brands to stick to the physical properties of "museum-style display" and turn to the construction of "living meaning network" —— tourists scan the code platform to trigger the clan genealogy map, and residents tell stories to enrich the AR content library. Shaoxing's experience proves that only when local knowledge is the dominant symbol in translation and the cultural subjectivity is guarded by technical modesty can the paradigm shift of cultural heritage from "physical preservation" to "meaning appreciation" be realized.

5. Conclusion

This study integrates semiotic theory with AR technology to construct a rural visual branding framework centered on "cultural gene extraction, symbol translation, and ecological co-construction." Taking Shaoxing Yuedi culture as a case, it reveals that the effective digital transformation of traditional culture hinges on maintaining symbolic authenticity while leveraging media innovation. AR enables the dynamic activation of cultural symbols through semantic layering, cross-media narration, and community participation, promoting the shift from static heritage to living cultural capital. The Shaoxing case underscores the importance of balancing technological intervention with local cultural agency, offering a sustainable model for culturally grounded digital revitalization.

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