

Research on Information Visualization Design of Enshi Nuo Masks Based on the Concept of Cultural Genes

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Abstract: Enshi Nuo masks, as a typical representative of the Nuo culture of the Tujia ethnic group, carry unique symbols of regional cultural connotations. This paper takes the Nuo masks in Enshi area of Hubei Province as the design research object, based on the theory of cultural genes, deeply explores the cultural genes of Enshi Nuo masks, and extracts the cultural identification factors contained in the explicit and implicit genes of Enshi Nuo masks. Through methods such as literature analysis and field investigation, the information is structured and analyzed, and the abstract cultural connotations and information are transformed into visual elements that are easy to understand and accept. It presents the charm of Nuo mask culture from a new perspective and in a new way, attracting more people to pay attention to and understand it, and injecting new vitality into the inheritance of Nuo mask culture.

Keywords: Cultural Genes; Enshi Nuo Masks; Information Visualization Design; Map Construction; Intangible Cultural Heritage Protection Introduction.

1. Introduction

With the rapid development of the times and the drastic changes in society, the impact of modern civilization on traditional culture is becoming increasingly intense. The precious cultural heritage of Enshi Nuo masks is facing a severe inheritance predicament. Most people have a low level of understanding of it, and its mostly strange and mysterious appearance has led many young people to reduce their attention. The concept of cultural genes provides a new perspective for the research and inheritance of traditional culture. Based on the theory of genetic genetics, it analyzes the genetic material in Enshi Nuo masks, explores the aesthetic genetic factors in Enshi Nuo masks, and conducts aesthetic application research based on the theory of gene translation [1]. In the digital age, the explosion of information makes people face a vast amount of information. Information visualization design can help people quickly and accurately obtain and understand information. In the field of Nuo mask culture inheritance, it can present the complex information in traditional culture in a vivid and interesting way to the public, stimulate the public's interest and attention in traditional Nuo mask culture, provide the public with a new cultural experience method, break the time and space limitations of cultural dissemination, improve the public's awareness and interest in Enshi Nuo mask culture, and promote the wide spread and exchange of culture. At the same time, through this research, explore the application mode and method of combining the concept of cultural genes and information visualization design in the field of traditional culture inheritance and innovation, and promote the dissemination and inheritance of Nuo mask culture.

2. Theoretical Foundation of Cultural Gene Theory

Genes are the basic units of expression for biological species. The behaviors and characteristics of individuals are designed to maximize the transmission of their genes [2].

Cultural genes are an idea with genetic and evolutionary characteristics, meaning that human genes can to some extent influence the cultural environment in which they exist, and culture can also affect individual behaviors through subsequent learning and inheritance. In 1998, Henrich referred to the phenomenon where a group can influence an individual's behavior as the "conformity transmission" theory. Due to the differentiation of individuals spreading through the group and expanding continuously, cultural diversity is generated [3]. This precisely enables the concept of cultural genes to expand into the field of ethnic cultural evolution [4].

From the perspective of manifestation, cultural genes can be divided into two major categories: explicit and implicit. Explicit cultural genes are presented in an abstract form and can be directly perceived through human sensory systems such as vision, touch, and hearing, covering elements like color combinations and craftsmanship techniques that are intuitive and perceptible. In contrast, implicit cultural genes are the deep driving factors shaping the material cultural form, focusing on the spiritual cultural domain. These genes have the characteristics of strong abstraction and significant dynamic evolution, and their influence is extensive and profound, specifically manifested in religious belief systems, the core of national spirit, and traditional customs and other intangible cultural contents. In terms of transmission paths, cultural genes mainly rely on non-biological genetic mechanisms, and tend to rely on media and carriers with a wide social recognition base for intergenerational transmission and cross-regional diffusion [5]. This study is based on the concept of cultural genes, taking the Huoxian region's Tujia ethnic group's Nuoxian mask culture as the research object. Through extensive field research, literature review, and analysis of the production techniques and expression forms of the Nuoxian masks in Enshi, Hubei Province, a cultural gene map of the Nuoxian masks was constructed. Using the method of information visualization design, visual language was designed and translated to facilitate inheritance and development.

3. Extraction of the Cultural Genes of Enshi Nuo Masks

3.1. Overview of Enshi Nuo Masks

The shadow puppetry originated in the pre-Qin period. They were filled with fear and reverence towards the unpredictable natural environment and frequent epidemics and disasters. They firmly believed in the existence of spirits in all things and thought that there were supernatural gods and ghosts in nature, which controlled people's destinies and could bring blessings or disasters. The inability to explain some phenomena in nature led people to believe that the heavens determined all causes and effects, and this became a spiritual support and belief. The shadow dance of the Tujia people was closely related to the early Ba people's witch-driving performances, both involving activities of worship and making amends. Masks played a very important role in the shadow rituals. During the prosperous period of the Shang and Zhou dynasties, the chief priest Fangxiang Shi wore a "golden four-eyed" mask to achieve the effect of welcoming gods and driving away evil spirits in the shadow rituals. "The Zhou Rites and the Summer Palace" records: "Fangxiang Shi was in charge of wearing a bear skin, golden four-eyes, black and white clothes, holding a spear and a shield, leading a hundred servants to perform the shadow rituals at the right time to seek peace and drive away diseases." In the shadow ritual performances, masks were an important carrier of the shadow puppetry's artistic form and an indispensable part of the shadow puppetry (Figure 1) [6]. The shadow masks of Enshi were mostly made of white poplar wood, camphor wood, etc. The carving process emphasized the use of knife skills and the smoothness of lines, creating the charm of the shadow masks of Enshi[7]. The shadow mask culture is mainly distributed in Jiangxi, Guangxi, Hubei, Gansu, Anhui, Inner Mongolia and other places in China. This article mainly focuses on the study of the shadow masks of Enshi.

The shadow masks of Enshi originated from the Enshi family's ancestral worship culture during the Hongwu period of the Ming Dynasty. The shadow puppetry of the Tujia people in Enshi had a distinct primitive religion in ancient times and was recorded in ancient documents. Many stories about the shadow dance culture and the ancestors of the shadow gods, Grandpa and Grandma, who propagated human beings were passed down orally. This precisely confirmed the Tujia people's logical ancestral relationship. Therefore, they prayed to the ancestors, Grandpa and Grandma of the shadow, to eliminate diseases for the latter and multiply their descendants. Because there was always a response to their requests, it was called "chong shadow and making amends",

and these ritual and sacrificial activities developed into the shadow puppetry of the Tujia people. The Tujia area is currently the region with the richest and most complete preservation of shadow puppetry in China, and it is a representative of the Nuo culture in the southwest region of China.

In modern society, with the advancement of technology and changes in people's lifestyles, the shadow mask culture of Enshi is facing severe challenges. On the one hand, the diversity of modern entertainment methods has led to the shrinking of the survival space for shadow puppetry and other traditional folk activities, and the production and use of shadow masks have gradually decreased; on the other hand, the younger generation has a weak interest in traditional culture, and the inheritance of shadow mask-making skills has no successors, many traditional skills are at risk of being lost. This study improves people's understanding and attention to the shadow mask culture through information visualization design.



Figure 1. Enshi Nuo Masks

(Source: The image is from the internet)







3.2. Extraction of Dominant Genes of Enshi Nuo mask

The cultural genes of Enshi Nu Opera masks can be divided into latent cultural genes and explicit cultural genes. The cultural elements that can be directly perceived by the external society are called explicit cultural genes. The explicit cultural genes of Enshi Nu Opera masks are extracted and designed in a form that can give the public a direct perception (Table 1), and the Nu Opera prototypes and colors are extracted to facilitate their application in design (Table 2). Among the explicit cultural genes, there are also classifications of masks. According to the shape, they can be classified into three types: positive deity type, evil deity type, and secular type.

Table 1. Examination and Refinement of the Original Forms of Enshi Nuo Religion

Performance pictures				
Element extraction				

Table 2. Extraction of modeling elements for Enshi Nuo masks

Nuo Mask Picture					
Element extraction					

3.3. The Extraction of Recessive Genes in Enshi Nuo Masks

The concept of "recessive genes" in cultural genes is a metaphor borrowed from biology, used to describe elements in culture that are not directly manifested but are hidden within the collective consciousness or behavior. Similar to recessive genes in biology, these cultural elements may only become apparent or be activated under specific conditions, or may only come into play after being passed down through generations. Recessive genes are deeply embedded in the core of culture, subtly influencing the inheritance and development of Nuo mask culture. The primitive religious beliefs carried by Enshi Nuo masks contain profound collective unconsciousness. The images of deities in Nuo masks, such as Nuo Gong and Nuo Mu, and the fierce generals who open mountains, although they have undergone changes over time,




the human desire for reproduction and protection they represent has been deeply imprinted in the subconscious of the ancestors of the Ba and Chu people and their descendants. The worship and prayer to natural deities in Nuo performances reflect the people's pursuit of harmony between humans and nature and the most essential human strength. This internalized concept has become an important recessive gene for maintaining the local ecological culture. Converting these abstract connotations into visual design elements can help the audience better understand (Figure 2).

Masks, as a language symbol that has been passed down, different types represent different meanings, carrying deep cultural information (Table 3). In-depth research on recessive genes can provide a more comprehensive and profound understanding of the essence and spirit of Enshi Nuo mask culture, which is of great significance for the protection and inheritance of this precious intangible cultural heritage.



Figure 2. Enshi Nuo mask expresses symbolism
(Source: The author self painted)

Table 3. Semantic Extraction of Enshi Nuo Mask Classification

Nuo Mask Classification	True God	Fierce God	Secular
Nuo Mask Picture			
The semantics of Nuo masks	Kind, amiable	brave, majestic	humorous, witty

4. Exploration of Information Visualization Design for Enshi Nuo Mask

Information visualization is the study of presenting abstract data in an intuitive visual form. Abstract data includes both numerical data (such as financial statements, economic data, stock data, etc.) and non-numerical data (such as text information, map information, trademark information, etc.). Information visualization is a research field that integrates graphic and image processing, human-computer interaction, artificial intelligence, psychology, and social sciences [8].

Information visualization in a broad sense has a long history. The earliest practice of information visualization can be traced back to the Paleolithic era, when people recorded celestial movements, drew navigation maps, and formulated crop planting plans through graphic pictures on rock paintings or clay. Based on cultural genes, the key principles of the information visualization design of Enshi Nuo masks involve the use of graphic, image, color, and other visualization elements to transform the complex cultural information of Enshi Nuo masks into intuitive and understandable visual forms, in order to improve the efficiency and effectiveness of information dissemination.

The implicit cultural genes of Nuo masks (such as

shamanistic beliefs, totem symbols, historical memories) are transformed into explicit visual symbols. Through visualization design, the production process, character classification, social functions, etc. of Nuo masks are popularized. Exploring the innovative application of traditional Nuo masks in contemporary design (such as cultural and creative products, digital art, cultural tourism integration, etc.) the core design dimension in the information layer is to collect information and classify it according to data. Character classification: main deities, evil deities, secular figures; Symbol system: mask design (such as the god of thunder, Nuo god and Nuo mother), colors (black and red as the main colors symbolizing yin and yang). Narrative logic: themes in Nuo plays such as driving away evil and auspiciousness, ancestor worship, and reverence for nature. At the visual level, form is transformed into visual language, and the mask production process is displayed through visual paintings. At the user experience level, visual attraction is used, for example, by using saturated colors to display. The information visualization design of Enshi Nuo masks is essentially the "translation" and "regeneration" of traditional cultural genes. By extracting cultural symbols, reconstructing visual language, and integrating digital technology, ancient Nuo culture can break through regional and cognitive barriers and gain a new life in the contemporary context, allowing viewers to have a more intuitive understanding of the charm of Nuo masks.

5. The Information Visualization Design Practice of the Cultural Genes of Enshi Nuo Masks

As a carrier of Wu Nuo culture, Enshi Nuo masks have gradually been forgotten due to the impact of modernization in terms of their symbol system (shape, color, role) and ritual narrative (exorcism, prayer). The traditional form is static and singular, making it difficult to convey the implicit cultural genes of Nuo masks. Decoding the implicit symbols, cultural connotations, and regional characteristics of Nuo masks through visual design, constructing interactive visual experiences, and promoting young people's deep understanding of Nuo culture. Based on the characteristics of Enshi Nuo mask culture genes, a hierarchical classification design logic is adopted to divide cultural genes into two major categories: dominant genes and recessive genes. Explicit genes are mainly expressed in concrete artistic forms, such as carving techniques, color application, and modeling classification (Figure 4-6), and are presented in visual design using realistic and concrete visual elements; Implicit genes involve abstract concepts such as primitive religious beliefs, values behind folk customs, and collective memory. Through metaphorical and symbolic graphic language, abstract content is transformed into visual expressions (Figure 4-6). At the same time, using the principles of color psychology, select colors blue and green that are in line with cultural gene connotations to enhance visual communication effects. By extracting cultural gene elements and combining them, the development of Enshi Nuo masks is displayed using easy to read logical layout (Figure 4), making it clear to the audience what the author wants to convey. The dissemination of posters through visual design can be achieved through online information publishing and browsing, offline exhibition pasting, element extraction for cultural and creative design, or by using information technology to convert them into AR

postcards. The back pattern of the postcard can be scanned, and the corresponding character's Nuo mask shape can be played on the mobile phone, generating a fun interpretation of "today's fortune". Through the path of "gene extraction digital translation multidimensional interaction", it has been proven that information visualization can not only preserve the implicit cultural genes of Nuo masks, but also activate their contemporary vitality. Through these design methods, the cultural genes of the Enshi Nuo masks have been transformed into a visual language that is easy to understand and disseminate. This not only retains the original flavor of the culture but also attracts more people's attention in an innovative way.



Figure 3. Production tools and color connotations
(Source: The author self painted)

6. Conclusion

This research focuses on the visual design of information for Enshi Nuo masks based on the concept of cultural genes. Through in-depth exploration of the explicit and implicit genes of Enshi Nu Opera masks, it discusses their advantages and feasibility in cultural information dissemination and display, which is conducive to promoting the development of interdisciplinary research, facilitating the deep integration of design studies and the research on Enshi Nuo mask culture, and providing new dissemination methods for the protection and inheritance of intangible cultural heritage. Although user needs and feelings were considered in the design process, the research on differentiated experiences for different user groups is not yet detailed enough. Users of different ages, cultural backgrounds, and interests have different perceptions and demands for Nuo mask culture, and further optimization

will be carried out in the future.



Figure 4. Layout result display
(Source: The author self painted)

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