

Application of Bronze Drum Culture Gene Extraction in Product Design

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Abstract: *The bronze drum stands as a profound testament to the rich historical and cultural tapestry of China's diverse ethnic minorities. Beyond being a mere artifact, it serves as an intricate art form that harmoniously melds manufacturing, craftsmanship, music, and dance. With its exceptional historical significance, the bronze drum is rightfully recognized as an intangible cultural heritage, embodying a legacy that transcends time. This article centers its focus on traditional bronze drums, specifically honing in on samples representing eight distinct types from the Zhuang people in Guangxi. Employing pattern induction and the semantic induction method, the research investigates the psychological perception and cognition of Guangxi Zhuang Bronze Drums. The research methodology employed is comprehensive and structured, involving a meticulous process: initially gathering data from various channels about bronze drums, subsequently delving into the nuanced historical and cultural backdrop, and meticulously exploring the artistic characteristics inherent in these remarkable instruments. Further enhancing the analysis, spectrum analysis is utilized to discern the intricate patterns and semantics of bronze drums, paving the way for a nuanced understanding of their characteristics. Building on this foundation, the article proposes a thoughtful redesign of the characteristic genes, offering a bridge between tradition and contemporary design. The research seamlessly intertwines genetic knowledge of bronze drum culture, systematically extracting the cultural genes embedded within the elaborate patterns. Practical examples are judiciously employed to underscore the feasibility and efficacy of these cultural genes, presenting a wellspring of inspiration for emerging designers. Beyond the realms of mere product development, the cultural gene theory propounded in this research opens new vistas for the inheritance and application of traditional bronze drums in design. This infusion of fresh perspectives not only renders contemporary design more personalized and humane but also significantly enhances the artistic depth and cultural resonance of design in our daily lives.*

Keywords: Traditional bronze drum, Culture Gene, Classification, Product design

1. Introduction

Approximately 2,700 years ago, during the Spring and Autumn Dynasties, the genesis of bronze drums took root, and their enduring legacy continues to this day (Long Fu, 2005). Serving as a poignant testament to the history and culture of Chinese ethnic minorities, the bronze drum is an intricate art form seamlessly interweaving manufacturing, craftsmanship, music, and dance (Chen Hong, 2021). Despite the richness of handicraft resources, there remains an underdevelopment in their exploration (Chen, 2021). Design practices often rely on

prior cultural resources without delving into the study of the image gene inherent in bronze drum relics.

Utilizing the cultural characteristics embedded in relics and artworks as a foundational design source not only elevates the aesthetic appeal of design works but also infuses them with profound emotional and cultural connotations, enhancing the overall aesthetic experience for consumers (Peng Rong et al., 2022). By meticulously extracting the cultural image gene from bronze drum relics as a sample rooted in the audience's perceptual cognition, this approach serves to elevate the designer's proficiency and capabilities, contributing to an enriched design landscape (Wu Yixiang et al., 2021).

Chinese traditional cultural relics boast a wealth of visual elements that serve as a rich source of inspiration for contemporary designers. However, a mere replication of these relics risks hastening their disappearance, as emphasized by Ding Jing (2022). While some Chinese designers have delved into the cultural perception imagery of these relics, as noted by Wu Yixiang et al. (2021), the failure to properly apply or integrate these elements results in a loss of their inherent meaning. The absence of comprehensive research on the evolution process, formal classification, and philosophical connotations of the cultural genes of traditional Chinese relics leaves designers with only the option of simple replication, devoid of creative transformation. This, in turn, culminates in products lacking in cultural connotation, as noted by Fu Qianqian (2014).

The design models rooted in traditional Chinese cultural relics suffer from a lack of innovation, failing to align with contemporary aesthetic preferences and the highly individualized demands of the market (Ding Jing, 2021). Existing pattern designs fall short in meeting the ever-changing, ambiguous, and personalized visual cognition needs of consumers (Chen, 2021). The prevalent practice of modern design often entails a superficial replication of graphics, patterns, and shapes from traditional Chinese cultural relics, as highlighted by Wang Kaina (2020). The evident lack of innovation in these designs contributes to a sense of stagnation, echoing Fu Qianqian's concerns (2014). While traditional cultural relics carry unique spiritual connotations, incorporating elements alone is insufficient; designers must approach their work with a distinctly Chinese perspective (Chen, 2014). Consequently, the challenge facing contemporary designers lies in creatively integrating the cultural image genes of traditional Chinese relics in an international context (Ding Jing, 2022).

Addressing this issue is urgent, as emphasized by Fu Qianqian (2014), and solving the problem of effectively integrating Chinese traditional cultural relics into design remains a pivotal historical challenge. Yu (2021) posits that creatively integrating the cultural image genes of traditional Chinese relics remains a formidable task for Chinese designers. Therefore, a deep understanding of our own traditional culture, coupled with systematic exploration of deeper traditional cultural relics, is essential to effectively integrate tradition with design. Only through this profound engagement can we genuinely inherit and develop the cultural relic genes, giving rise to new artistic value (Wu Yixiang et al., 2021).

Amidst the swift march of technological advancement and the pervasive influence of Western trends, designers find themselves tasked not merely with refining product designs but with crafting designs infused with distinct Chinese characteristics that resonate within the tapestry of a multicultural society. It becomes evident that the cultural image gene inherent in Chinese cultural relics serves not only as a wellspring of design inspiration but also plays a pivotal role in catalyzing user creativity during the nascent stages of design development. This, in turn,

contributes to the evolution of Chinese cultural relic design, serving as a testament to the design philosophies of predecessors for the benefit of future generations.

The overarching objective of this study is to establish dynamic research objectives, define pertinent research questions, and illuminate the significance of the inquiry. The initial thrust of our research centers on categorizing various types of Chinese bronze drum relics and extracting their cultural genes. As our investigation unfolds, we aim to delve into the nuanced impact of diverse cultural genes on the applied research of design, furnishing valuable insights and recommendations for the conceptualization of cultural and creative products.

2. Literature Review

2.1 Cultural genes

The concept of "cultural genes" was originally coined by American anthropologists Alfred L. Kroeber and Clyde Kluckhohn, who pondered the existence of a unified and fundamental "biological gene" in the cultural realm, akin to the microscopic units found in the biological world. Subsequently, British behaviorist Richard Dawkins introduced the term "meme" to convey the idea of a "cultural transmission unit" and the process of "replication." Cultural genes serve as the foundational factors and elements that dictate the inheritance and evolution of cultural systems (Yang, L., & Haiyan, X. (2023)). The trajectories of cultural development, dissemination, and diversification exhibit parallels with biological evolution. In a comparative analogy, cultural products, viewed through patterns, resemble biological individuals; cultural elements, manifesting as cells, mirror biological cells, and cultural genes, expressed through patterns, align with biological genes. The design journey of patterned cultural products unfolds as a dynamic process of growth and development rooted in patterned cultural elements, underpinned by the essence of patterned cultural genes (Li Yanan, 2019). Within this framework, cultural elements encompass cultural genes, with cultural genes representing the enriched essence of cultural elements.

2.2 Research on the design of the bronze drum

Peng Rong (2022) concentrates on the deconstruction of Guangxi bronze drum symbols and delves into branding design. Wei Lanchun (2022) shifts focus to the application of Zhuang bronze drum patterns in cultural and creative products. Wei Jiaying (2021) explores the application of Guangxi visual language in the analysis of bronze drum ornaments using SPSS. Cao Yufen (2021) centers on the development status and optimization strategies of leisure and vacation tourism products in Bronze Drum County, Jiangxi. Mo Qingxiang et al. (2021) emphasizes the design and application research of Zhuang bronze drum elements in cultural and creative products. Huang Le (2021) delves into the research on the design of bronze drum cultural and creative products at the Yunnan Provincial Museum within the context of auspicious culture. Wu Xuehan (2021) focuses on the research regarding the application of bronze drum cultural elements in Chinese cultural and creative products. Liu Xiaozhen (2020) concentrates on the application research of national bronze drum elements in Northwest Guangxi in tea set product design. Xu Yu (2020) directs attention to the innovative application research of Hechi bronze drum cultural elements in product modeling design courses. Zhang Ting and Chen Guangxi (2018) highlights the focus on APP product architecture design with the theme of Guangxi Zhuang bronze drum culture communication. Zhou Wanying and Long Chun (2016) draws attention to the application of national traditional culture in modern design, utilizing the Zhuang bronze drum as an illustrative example. Song Wenjuan and Wang Kunqian (2015) explores the product design value of the cultural symbols of the two bronze drums.

It is evident from this overview that scholars primarily explore aspects such as bronze drum patterns, symbols, cultural elements, and communication, with none having delved into the study of the cultural genes of the bronze drum.

2.3 Combination of cultural genes and design

Wang Jinfeng, Li Zheng (2022) concentrates on the evaluation and design application of Yin Shang cultural genes based on Analytic Hierarchy Process (AHP). Yu Guitao, Ma Chun (2021) directs attention to the research on the conversion path of earthen pottery cultural genes and creative design in southeast Chongqing, with Shijituo in Qianjiang District clay pottery serving as an illustrative example. Zhang Ying (2021) focuses on the integration and construction of Lingnan lion dance cultural genes in product design. (Lan Xingwu, 2021) places emphasis on the extraction of Lingnan brick carving art cultural genes and their design inheritance. Liang Yi (2021) and Wu Yixiang et al. (2021) concentrate on the research into the design transformation of Dongyang bamboo weaving cultural genes, utilizing bamboo weaving lamps as a case study. Yue Yan (2020) directs attention to the extraction and design application of cultural genes of Qinhuai paper-cutting craft. Li Yanan (2019) focuses on the application research of cultural genes in display space design.

It is evident from this review that cultural genes in design are primarily explored within the context of Yin Shang cultural genes, clay pottery cultural genes, lion dance cultural genes, brick carving art cultural genes, urban architectural cultural genes, etc. Notably, none of the researchers have delved into the cultural genes of bronze drums.

To summarize, the research on cultural genes in design is confined to areas such as clay pottery, lion dance, brick carving art, urban architecture, etc. In contrast, the exploration of bronze drum design predominantly revolves around patterns, symbols, cultural elements, and dissemination. Notably, no researchers have undertaken the study of applying the cultural genes of bronze drums in product design. Thus, the primary objective of this study is to extract and apply the cultural genes of bronze drums in product design, aiming to identify their types, meanings or descriptions, and functions.

3. Method

This study uses pattern induction and semantic induction to study the psychological perception and cognition of Guangxi Zhuang bronze drums.

Eight types of bronze drums of the Zhuang nationality in Guangxi were selected as samples for this study. Firstly, collect data on the bronze drum through various means; secondly, study the historical and cultural background and artistic characteristics of the bronze drum; thirdly, use the spectral analysis method to extract the characteristics of the bronze drum pattern; and thirdly, redesign the characteristic genes. (Fig.1The flow chart of research)

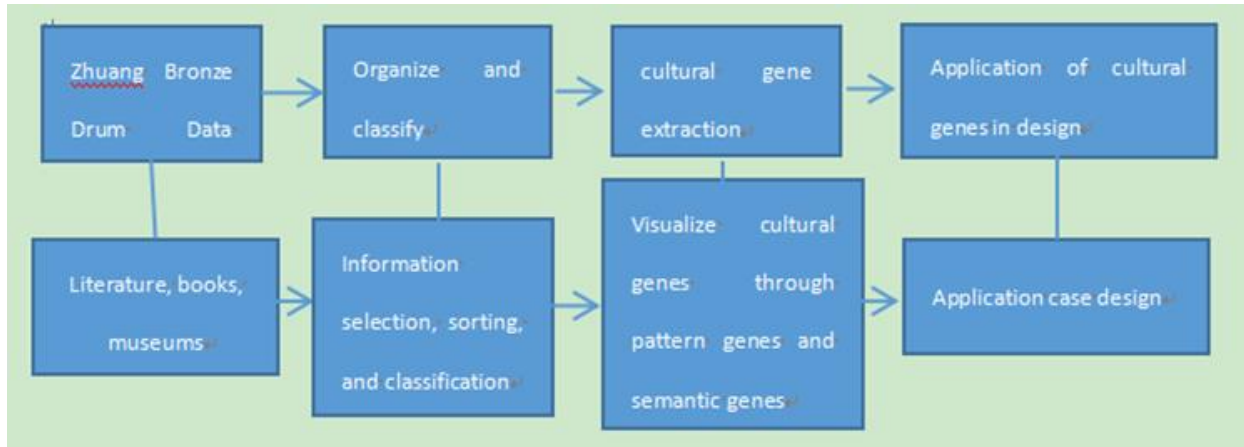





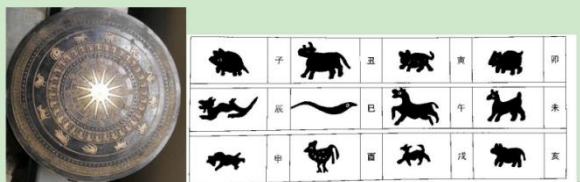
Figure 1: The flow chart of research

3.1 Data collection and organization

Utilizing a combination of methodologies, including interviews, observations, surveys, and literature searches, eight representative Zhuang bronze drums were chosen as the focal points of this research. Through on-site investigations conducted at institutions such as the Guangxi Ethnic Museum, local bronze drum museums, and handicraft workshops, the research team engaged in firsthand exploration. This involved interviewing bronze drum inheritors and local residents, immersing themselves in the cultural milieu surrounding bronze drums, and meticulously documenting cultural background information. The culmination of this effort resulted in the collection of relevant materials related to Zhuang bronze drums, which were subsequently summarized and systematically organized.

3.2 Pattern gene extraction

Bronze drum patterns can be broadly categorized into botanical motifs, fauna depictions, geometric shapes, and portraiture. To facilitate a comprehensive understanding, an analysis table has been created to dissect the various patterns found on bronze drums. The majority of these patterns, as gleaned from literature summaries, draw inspiration from the objects revered by the Zhuang people in Guangxi. Representative patterns have been meticulously extracted for detailed examination and analysis. (Fig.2 Decoration of Bronze Drums (The picture comes from the Internet))

Bronze Drum Decoration Type	Decoration
Geometric ornamentation	 <p>图 2-13 铜鼓太阳纹及白描图 (作者自绘) Figure 2-13 sun pattern and line drawing of copper drum (self drawn by the author)</p>  <p>图 2-14 铜鼓雷纹、云纹及白描图 (作者自绘) Figure 2-14 thunder pattern, cloud pattern and line drawing of copper drum (drawn by the author)</p>  <p>图 2-17 铜鼓三角纹及白描图 (作者自绘) Figure 2-17 triangular pattern and line drawing of copper drum (self drawn by the author)</p>
Animal Decoration	

Plant Decoration	
Portrait Decoration	

Figure 2: Decoration of Bronze Drums (The picture comes from the Internet)

3.3 Semantic Gene Extraction

As a symbol, the ornamentation of bronze drums has evolved in tandem with the passage of time. While the decorative components have remained constant, various types of bronze drum embellishments exhibit distinct characteristics, each conveying profound cultural information. The semantic gene analysis of bronze drums, as illustrated in the table, highlights features related to totem worship, harvest, power, wealth, sacrificial rituals, entertainment, and competition (Jiang Tingyu, 2005). (Fig.3 Types and Semantics of Bronze Drums (The picture comes from the Internet))

Wanjiaba bronze drum	Cold water type bronze drum	Zunyi bronze drum	Majiang type bronze drum
			
Beiliu type bronze drum	Lingshan type bronze drum	Ximeng type bronze drum	Shizhaishan type bronze drum
			
<p>The meaning of the bronze drum: totem worship, harvest, power, wealth, sacrificial etiquette, entertainment and competition.</p>			

Figure 3: Types and Semantics of Bronze Drums (The picture comes from the Internet)

3.4 Application of Bronze Drum Culture Gene in Product Design

Through processes such as extraction, differentiation, synthesis, and reconstruction, the cultural genes inherent in the bronze drum patterns were distilled. Subsequently, creative products were crafted by optimizing the amalgamation of these cultural genes. The application involved incorporating the geometric, plant, and animal patterns of the bronze drum into the design of a purple sand pot tea set. (Fig.4The design effect of the purple sand teapot tea set is shown in the picture.(The picture comes from the Internet))



Figure 4: The design effect of the purple sand teapot tea set is shown in the picture. (The picture comes from the Internet)

4. Result

This study delves into the cultural genes embedded in the bronze drum patterns of the Zhuang people in Guangxi, utilizing eight distinct types of bronze drums as representative samples. Employing pattern induction and the semantic induction method, the research investigates the psychological perception and cognition of Guangxi Zhuang Bronze Drums. The diverse patterns on bronze drums are categorized into plant, animal, geometric, and portrait patterns, each carrying semantic connotations such as totem worship, harvest, power, wealth, sacrificial rituals, entertainment, and competition. The designer has chosen the cultural gene of the bronze drum pattern as a representative sample and fused it with the extracted semantic analysis to inform the creation of product designs.

5. Discussion

The design industry demands creative thinking from designers, emphasizing the ability to lead innovation. Extracting inspiration from traditional culture serves as a fertile ground for creative ideation. Through the aforementioned analysis and case study, the extraction of cultural genes from bronze drum patterns proves highly beneficial for emerging designers. Unlike their predecessors, who often limited their creations to the superficial appearance of patterns without delving into their profound and symbolic meanings, today's young designers are empowered with a deeper understanding. This extraction of cultural genes from traditional Chinese relics serves as a rich wellspring of design inspiration, fostering creativity among designers in a way that was not fully realized in previous years.

6. Conclusion

In the current era of rapid consumerism, young designers are increasingly recognizing the necessity of drawing design inspiration from traditional Chinese cultural elements. They understand the importance of infusing cultural elements with soul and profound cultural connotations to craft products that distinctly embody Chinese characteristics. Building upon this understanding, our research seamlessly integrates the genetic knowledge of bronze drum cultural elements, presenting a method for extracting cultural genes inherent in bronze drum patterns. Through illustrative examples, we substantiate the feasibility and effectiveness of this extraction process, thereby enhancing the wellspring of creative inspiration available to young designers. This approach not only refines the product development process but also elevates the cultural allure of the end product. Furthermore, its relevance extends beyond the realm of bronze drums, offering valuable insights for designing products rooted in diverse cultural styles.

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