

งานวิจัยเกี่ยวกับการนำสัญลักษณ์มาประยุกต์ใช้ในการออกแบบภาพลักษณ์ของ
พิพิธภัณฑ์ประวัติศาสตร์ทางธรรมชาติเป่ย์หลินต้าเหอ เมืองอู่ฮั่น
Research on The Application of Design Semiotics in The Visual Image
Design of the Wuhan Beilin Dahe Natural Museum

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บทคัดย่อ

งานวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาการนำสัญลักษณ์มาประยุกต์ใช้ในการออกแบบภาพลักษณ์ของพิพิธภัณฑ์ประวัติศาสตร์ทางธรรมชาติเป่ย์หลินต้าเหอ เมืองอู่ฮั่น โดยเน้นการวิเคราะห์วิธีการออกแบบภาพลักษณ์ของพิพิธภัณฑ์ประเภทประวัติศาสตร์ทางธรรมชาติที่เฉพาะเจาะจง ซึ่งงานวิจัยนี้ได้ทำการศึกษาวิจัยที่ผสมผสานระหว่างการสำรวจผ่านแบบสอบถามและการสำรวจภาคสนาม โดยศึกษาในมิติทางด้านความหมาย การใช้ภาษา โครงสร้างทางภาษา และบริบทของภาษา เพื่อสรุปห้วงข้อนิทรรศการ เนื้อหาของสะสม วิธีการจัดแสดง และเค้าโครงนิทรรศการของพิพิธภัณฑ์ นอกจากนี้ยังได้สำรวจว่าสัญลักษณ์ ภาพ และองค์ประกอบทางวัฒนธรรมจะสามารถหล่อหลอมและสร้างความเข้าใจรวมถึงสร้างประสบการณ์การเยี่ยมชมให้กับสาธารณชนได้อย่างไร โดยมีกลุ่มเป้าหมายงานวิจัยเป็นผู้เยี่ยมชมพิพิธภัณฑ์ประวัติศาสตร์ทางธรรมชาติเป่ย์หลินต้าเหอ เมืองอู่ฮั่น จำนวน 200 ท่าน และมีเครื่องมือวิจัย ได้แก่ 1. กรอบการวิเคราะห์ทฤษฎีสัญศาสตร์ 2. แบบสอบถามความคิดเห็นของผู้เยี่ยมชม 3. การประเมินแผนการออกแบบภาพลักษณ์โดยผู้เชี่ยวชาญ ซึ่งงานวิจัยนี้ได้ใช้วิธีการวิเคราะห์ข้อมูลเชิงคุณภาพ ควบคู่ไปกับการวิเคราะห์ข้อมูลเชิงปริมาณ เพื่อให้ข้อสรุปมีความเป็นกลางและน่าเชื่อถือ

ผลการวิจัยพบว่า 1. การนำทฤษฎีสัญศาสตร์มาประยุกต์ใช้อย่างมีประสิทธิภาพ จะช่วยส่งเสริมภาพลักษณ์ที่น่าดึงดูดให้กับพิพิธภัณฑ์และเพิ่มประสิทธิภาพด้านการถ่ายทอดข้อมูล โดยการตีความสัญลักษณ์หลายชั้น จะช่วยมอบความหมายทางวัฒนธรรมที่หลากหลายให้แก่ผู้เข้าชมได้ 2. การผสมผสานระหว่างสัญลักษณ์และภาพในการออกแบบเนื้อหาสำหรับนิทรรศการต่าง ๆ มีส่วนช่วยต่อการบอกเล่าเรื่องราวผ่านภาพให้เป็นหนึ่งเดียว และเพิ่มพูนประสบการณ์

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ที่ดำรงให้กับผู้เยี่ยมชม 3. ระดับการรับรู้ของผู้เยี่ยมชมที่มีต่อศาสตร์เพื่อการออกแบบ มีความสัมพันธ์เชิงบวกกับความพึงพอใจในการเยี่ยมชม ซึ่งสอดคล้องกับผลการวิจัยที่คาดว่าจะได้รับการนำมาประยุกต์ใช้ในการออกแบบจากผลการวิจัยตามที่ได้กล่าวมาข้างต้น งานวิจัยนี้จึงได้เสนอแนะข้อคิดเห็นเกี่ยวกับการออกแบบภาพลักษณ์ของพิพิธภัณฑ์ เพื่อส่งเสริมการรับรู้และการประชาสัมพันธ์ทางวัฒนธรรมของพิพิธภัณฑ์ต่อสาธารณชน

คำสำคัญ: การออกแบบภาพลักษณ์, พิพิธภัณฑ์ประวัติศาสตร์ทางธรรมชาติเป้ยหลินต้าเหอ เมืองอู่ฮั่น, ศาสตร์เพื่อการออกแบบ

Abstract

This study aimed to investigate the application of semiotics in the visual identity design of the Wuhan Beilin Dahe Natural History Museum, with a particular focus on methods of visual design specific to natural history museums. A mixed-methods approach was employed, combining questionnaire surveys and field research. The analysis examined exhibition themes, collections, display techniques, and layouts through four semiotic dimensions: meaning, language use, linguistic structure, and context. The study further explored how symbols, images, and cultural elements can shape public understanding and create meaningful visitor experiences. The sample comprised 200 museum visitors. Research instruments included: 1. a semiotic theoretical analysis framework, 2. visitor opinion questionnaires, and 3. expert evaluations of the proposed visual identity design. Both qualitative and quantitative analyses were conducted to enhance the neutrality and reliability of the findings.

The results indicated that: 1. effective application of semiotic theory enhances the museum's visual identity and strengthens its communicative function, with multi-layered interpretations of symbols offering visitors diverse cultural meanings; 2. integration of symbols and images within exhibition content fosters cohesive storytelling and enriches immersive experiences; and 3. visitors' recognition of semiotic design principles showed a positive correlation with satisfaction levels, confirming the expected impact of applying semiotics in museum design. Drawing on these results, the study offers recommendations for optimizing the museum's visual identity to advance cultural awareness and public engagement.

Keywords: Visual Image Design, Wuhan Beilin Dahe Natural Museum, Design Semiotics

Introduction

The function and nature of natural history museums have evolved in response to the growing cultural and intellectual needs of society. These museums are not merely cultural exhibition platforms; they also bear the responsibility of disseminating knowledge about nature and promoting ecological civilization. By the end of 2023, the total number of museums in China reached 6,138, nearly doubling since 2013. This growth reflects the increasing enthusiasm and demand among the public for museum visits. Due to strengthened initiatives in China, visitors have gained deeper insights into ecological culture, playing a crucial role in advancing domestic cultural and educational development (Hou, 2012).

Wang Yue and Chen Lei (2023) suggest that innovative approaches to museum visual image design should be based on four dimensions: semantics, context, pragmatics, and syntax. Design semiotics helps distill the deep cultural characteristics of museums. Xiao Hualiang et al. (2018) argues that design semiotics is the process of sorting out the images, colors, aesthetics, and cultural meanings of the research subject, from which new symbolic design elements can be extracted and applied in creative works. Yu Fang (2016) notes that as important sites for cultural preservation, display, and transmission, natural history museums' visual identity plays a critical role in their development and operation, requiring adherence to principles of thematic unity, aesthetics, and systematic organization. Bai Benli (2020) further points out that visual image design consists of two main systems: the fundamental elements and the applied elements. Excellent visual identity design for museums can establish a deep connection with the audience, enhancing the museum's visibility.

Zhang Ruijie (2021) emphasizes that design should be user-centered, using qualitative and quantitative analyses through field research and surveys to determine design needs and opportunities. Xu Shengfu (2017) notes that although the Wuhan Beilin Dahe Natural Museum boasts quality collections, its visual identity design is still in its early stages due to its recent establishment. To improve the museum's visibility and cultural impact, its visual identity design needs optimization and standardization.

In summary, the visual identity design of natural history museums should be based on design semiotics, using the four dimensions of semantics, context, pragmatics, and syntax to analyze the cultural characteristics of themes, collections, display techniques, and layout. Ensuring the organic unity of these visual elements, while adhering to the principles of thematic coherence, aesthetics, and systematic organization, effectively communicates the core values and cultural essence of the museum.

The objective(s) of The Study

This study is divided into the following three objectives:

1. To utilize design semiotics to study the cultural characteristics of the Wuhan Beilin Dahe Natural Museum.
2. To analyze the existing problems in the museum's visual identity design and seek appropriate solutions.
3. To create visual identity design rich in cultural features.

Literature Review

1. Overview of The Wuhan Beilin Dahe Natural Museum

The Wuhan Beilin Dahe Natural Museum is located within the Wuhan Garden Expo Park, Hubei Province, taking advantage of its ecological, cultural, and transportation resources, and nestled in a scenic environment. The museum covers a total area of 29,000 square meters, with 18,000 square meters dedicated to exhibitions. The exhibition theme, "Journey of the Great River, Song of Life," aims to raise public awareness and love for, and protection of, the Yangtze River.

Wu Hongtang (2018) points out that as an important cultural venue in Wuhan, the Beilin Dahe Natural Museum not only showcases rich cultural content but also integrates diverse scientific knowledge. Through a variety of collections, scientific themes, multi-modal displays, and guided experiential layouts, the museum successfully creates a platform that combines science, education, and culture, serving as a vital space for the public to learn about nature and culture.

2. Design Semiotics Theory

Symbols are defined as marks or signs that represent objects or concepts. Design semiotics, building upon this foundation, has evolved into a theoretical system that integrates multiple values and meanings, widely applied in information transmission and visual communication. Design semiotics not only focuses on the meaning of symbols themselves but also emphasizes their application and representation in different contexts.

According to Xiao Hualiang et al. (2018), design semiotics is analyzed through four dimensions: semantics, syntax, pragmatics, and context. Through these four layers of interpretation, the images, colors, aesthetics, and cultural backgrounds of the research subject can be sorted out, allowing designers to extract the necessary symbolic elements and theoretical basis for design. This analysis helps designers understand the deep meanings behind the symbols, providing actionable guidance for design practice. The author uses these four dimensions of design semiotics to gain a deep

understanding of the collections, themes, display techniques, and layouts of the Wuhan Beilin Dahe Natural Museum, extracting representative symbolic elements and applying them in the visual image design process.

3. Visual image design

Bai Xue (2018) noted that the term "visual identity design" originates from the "CI" (Corporate Identity) theory proposed by the famous American advertising master David Ogilvy, which comprises three elements: Mind Identity, Behavior Identity, and View Identity.

Zhou Wenjuan (2021) argues that visual identity design is a systematic set of symbols composed of logos, colors, graphics, and typography, which can be divided into fundamental element systems and applied element systems. The fundamental element system includes logos, standard fonts, auxiliary colors, auxiliary graphics, and mascot designs. The applied element system covers signage design, posters, tickets, and derivative products. Visual identity design is not only a tool for internal management but also a guideline for external activities and promotions. Therefore, to enhance the visibility of the Wuhan Beilin Dahe Natural Museum, the author suggests focusing on both fundamental and applied elements to create a complete visual identity system that ensures the museum's image is more consistent and effective in communication.

Theoretical Framework

Based on the four dimensions of design semiotics—semantics, syntax, pragmatics, and context—the collections, display techniques, themes, and layout of the Wuhan Beilin Dahe Natural Museum are analyzed from multiple perspectives. The conceptual framework presented in this study demonstrates how these four dimensions are interconnected to form an integrated design system, as shown in Figure 1

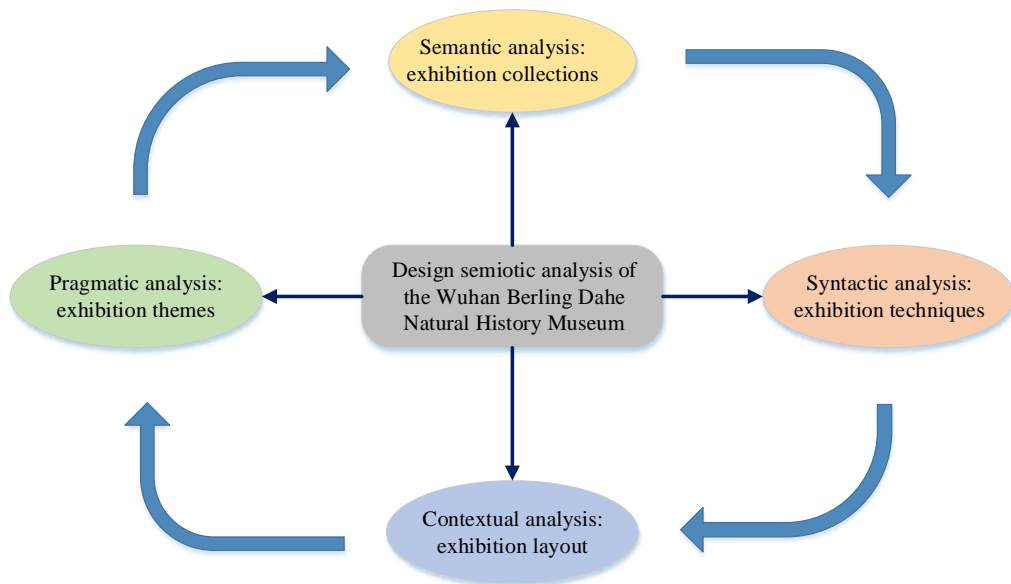


Figure 1: The Theoretical Framework of This Study (Source: Constructed by The Researcher)

Methodology

1. Population and Sample

The sample for this study consists of 200 visitors from the Wuhan Beilin Dahe Natural Museum, representing a diverse group. These visitors include children, students, families, tourists, senior groups, educators, and researchers, among others. This diversity provides the study with a broad perspective and a rich data foundation.

2. Research instruments

The author designed a questionnaire comprising 21 multiple-choice questions and 3 open-ended questions, categorized into three main sections. The first section focuses on gathering basic information about the museum visitors, such as age, occupation, and educational background, to facilitate the classification and analysis of different visitor behaviors. The second section investigates visitors' perceptions of the museum's exhibits, exploring which exhibition elements left the deepest impression and which forms of display were most engaging, aiming to identify the exhibit elements that resonate most with visitors. The third section collects feedback on visitors' expectations and opinions regarding the museum's visual identity design, in order to further assess the current visual identity's recognition and impact in the minds of visitors.

The purpose of the questionnaire design is to gain an in-depth understanding of users' expectations and preferences for the museum's visual image, collect their feedback during the visit,

evaluate the effectiveness of the existing visual image design, and provide a basis for the optimization of the museum's future image. Before the questionnaire was officially distributed, we specially invited three Thai art design experts to conduct a professional evaluation of the questionnaire content. According to the feedback from the experts, the IOC index of the questionnaire was between 0.88 and 1.00, as shown in Table 1. It's shows that the question design was reasonable and effective, and suitable for further research.

Table 1 The Professional Evaluation of The Questionnaire Content

Evaluator	IOC index (Mean)	Result
Expert 1	0.96	pass
Expert 2	0.88	pass
Expert 3	1.00	pass

3. Data collection process

The data collection for this questionnaire combined both online and offline methods. Offline distribution was conducted by setting up survey stations at the museum entrance and in exhibition halls, where paper questionnaires were provided. Visitors were encouraged to fill out the questionnaires and submit them in designated collection boxes. For online distribution, digital forms were made available, and visitors could access these by scanning QR codes displayed at the museum’s service desk or on the museum’s official social media platforms. This combination of methods ensured both broad reach and convenience in data collection.

4. Data analysis

Analysis of the collected data revealed that 39.13% of respondents were students, with ages ranging from 7 to 22. This group showed a clear preference for design styles that are lively, modern, and approachable. Furthermore, many users expressed a desire for the museum’s visual identity to center around its iconic exhibits, such as petrified wood and Mamenchisaurus fossils. By extracting and incorporating symbols from these notable collections into the visual design, the museum can not only deepen emotional resonance with visitors but also effectively enhance its brand image and visibility. This strategy would help expand the museum’s influence, attract a younger audience, and achieve the research goal of strengthening public recognition and perception through optimized visual identity design.

Result

1. Cultural Characteristics of The Wuhan Beilin Dahe Natural Museum Exhibitions

Culture is the comprehensive reflection of the material and spiritual aspects created by humanity over time, playing a key role in human production and life. The cultural characteristics of natural history museums are reflected primarily in their collections, exhibition themes, display techniques, and layout.

From the semantic dimension of design semiotics, the Wuhan Beilin Dahe Natural Museum holds a diverse collection of natural cultural artifacts, including animal, plant, fossil, and mineral specimens. Analyzing the shape, color, and material of these collections allows for the extraction of representative visual symbols that inspire design.

From the pragmatic perspective, the museum exhibition revolves around the scientific theme of “Journey of the Great River, Song of Life”. The exhibition is divided into five sections: the prologue hall, the vicissitudes of the great river, the treasures of the great river, the meditation of the great river, and the exploration of the great river. These sections create an exhibition environment that centers on nature and life.

In the syntactic dimension, the museum features a multi-faceted display culture, employing various methods such as biological specimens, graphic boards, ecosystem models, interactive displays, as well as audio and video presentations. These approaches not only enhance audience participation and immersion but also improve the effectiveness of information delivery.

From the contextual perspective, the museum emphasizes an experiential layout design, including linear layouts, interactive layouts, narrative-based layouts, and special thematic areas. These designs enable visitors to better engage with the exhibition content, using interaction and learning to deepen their understanding.

In conclusion, based on the theory of design semiotics, the Wuhan Beilin Dahe Natural Museum showcases multi-dimensional cultural characteristics: diverse collections, a scientific exhibition theme, multi-modal displays, and an interactive, experiential layout. These cultural features not only enhance the museum's appeal but also establish it as a knowledge platform that integrates education and interactive experiences, offering visitors a deeper exploration of nature's beauty.

2. Analysis of issues and solutions in the museum's visual identity design

Through the questionnaire survey, feedback and existing issues related to the museum's visual identity design were collected, providing valuable research tools and data for design practice. Based on the opinions of surveyed visitors, four main issues were identified. Firstly, visitors considered

the current visual identity design to be average. If a new design is implemented, they recommended a green, nature-inspired style as the top choice. Secondly, if designing a logo or mascot, it should be based on the museum’s representative collections to add uniqueness. Thirdly, in terms of derivative cultural products, respondents showed higher interest in stationery and toy products. Future product designs should prioritize these categories to enhance interaction and practicality between the museum and its visitors. Finally, survey results revealed that the primary visitor demographic consists of individuals aged 7 to 22, indicating that schoolchildren and university students are the core user groups. Therefore, the visual identity design should take into account the preferences and needs of this demographic, creating more appealing and educational content.

3. Design of A Culturally Rich Visual Image

The visual identity design of the Wuhan Beilin Dahe Natural Museum consists of two main parts. One is the fundamental element system, and the other one is applied element system. By designing both systems, a culturally rich visual identity that conveys the core values of the museum can be created.

The design process of the fundamental element system is shown in Table 2.

Table 2 Visual Image Fundamental Elements System Design of The Museum

Logo Design	
Logo Font Design	

Auxiliary
Graphics
Design



Auxiliary
Colors
Design



Mascot
Design



Source: Constructed by The Researcher

As shown in Table 2, the fundamental element system includes logos, standard fonts, auxiliary graphics, auxiliary colors, and mascot design. During the logo design process, the initial concept was based on the results of the visitor survey, selecting the museum's most representative collections as the inspiration. Four representative exhibits were chosen from four categories: biological fossils, extant animals, rock and mineral specimens, and extant plants. These are Mamenchisaurus, African elephants, nautilus fossils, and ginkgo specimens. These items evoke feelings of mystery, strength, antiquity, and nature, enhancing the museum's identity and appeal to visitors. The auxiliary graphics and colors were inspired by the museum's eight iconic treasures, using their appearance and colors to form a modern visual language. The mascot design was developed to meet the needs of the 7 -

22 age group, incorporating local features of Wuhan and symbolic elements from the museum’s collections.

The applied element system includes the design of tickets, maps, posters, and various derivative cultural and creative products. It is an extension of the fundamental elements. Through the visual image design for the Wuhan Beilin Dahe Natural Museum, it is evident that the museum’s strategies for internal management and external promotion have become more defined. The systematic design elements and consistent visual style not only enhance the brand’s recognition and reputation but also improve visitors’ experience and interaction. Every design detail—whether it be the logo, standard fonts, tickets, maps, or cultural products—has been meticulously considered to ensure optimal performance in various application scenarios, fully reflecting the museum’s core values and cultural essence. The design of visual image application elements system of the Wuhan Beilin Dahe Natural Museum is shown in Table 3.

Table 3 Visual Image Application Element System Design of The Museum

Tickets, Promotional Maps, and Poster Design	
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<p>Stationery Product Design</p>	
<p>Cultural and Creative Gift Design</p>	

Source: Constructed by The Researcher

4. Expert Review Results of The Design Work

After completing the visual image design for the Wuhan Beilin Dahe Natural Museum, we invited three senior experts in the field of art and design to conduct a comprehensive evaluation of the design results. The purpose of this evaluation was not only to verify the rationality and innovation of the design but also to assess the effectiveness of the design semiotics framework in practical application. The evaluation results are shown in Table 4. The results indicate that the design received an average score of 4.46. Whether in terms of creativity or thematic coherence, it met expectations. This provides strong support for the brand development and public recognition of the Wuhan Beilin Dahe Natural Museum.

Table 4 Evaluation Results of Satisfaction With Museum Visual Image Design

Evaluation project	Opinion level		
	Mean	SD	Level
1. The Visual Image Design is Thematic	4.50	0.60	Suitable
2. The Visual Image Design is Aesthetic	4.40	0.55	Suitable
3. The Visual Image Design is Systematic	4.35	0.65	Suitable
4. The Design Can Promote The Wuhan Beilin Dahe Natural Museum	4.60	0.50	Very suitable
5. Have A Certain Degree of Creativity and Uniqueness	4.45	0.70	Suitable
In total	4.46	0.60	Suitable

Discussion

In this study, based on the framework of design semiotics, comprehensively summarizes the cultural characteristics of the Wuhan Beilin Dahe Natural Museum and thoroughly analyzes its practical application in visual image design. The results show that design semiotics not only provides strong guidance for museum identity design but also successfully extracts core cultural visual symbols, thereby enhancing public recognition and approval of the museum.

1. Application of Design Semiotics in Museum Visual Identity Design

Through the four dimensions of semiotics (semantics, pragmatics, syntax, and context), this study offers a multi-dimensional interpretation of the museum's collections, display methods, exhibition themes, and layout. It extracts representative cultural symbols, providing solid theoretical support for the museum's visual identity design. Each design element is deeply rooted in cultural heritage, achieving a stronger emotional connection between the design and the audience.

2. Cultural Communication in The Visual Identity Design of The Wuhan Beilin Dahe Natural Museum

The museum's visual identity is not only an external expression that attracts the public but also a concrete representation of its cultural essence and philosophy. Visitors have high expectations for the museum's cultural symbols and iconic elements, particularly for the visual extraction and use of its representative collections. This symbolic expression helps enhance visitors' cultural identification and participation, further promoting the museum's cultural dissemination and influence.

3. Analysis of expert evaluation results

According to the feedback from three design experts, the visual identity design of the Wuhan Beilin Dahe Natural Museum has been highly recognized in several aspects. The experts unanimously agree that the application of design semiotics provides an organic combination of theory and practice for the museum's identity design, validating its feasibility and effectiveness in design. This approach not only showcases the cultural depth of the museum but also, through the clever use of visual symbols, attracts visitors of various age groups, achieving the expected goal of enhancing the museum's brand image.

Through the exploration and analysis in this study, it can be concluded that the application of design semiotics in natural history museum visual identity design has broad potential and practical effectiveness, offering valuable reference for future projects of a similar nature.

Suggestions

Suggestions for Research Applications

This study successfully applied design semiotics to create a design system that integrates culture and visual identity for the Wuhan Beilin Dahe Natural Museum. This not only improves the museum's cultural communication but also provides valuable references and guidance for future visual identity design work.

Suggestions for Future Research

While this study highlights the important role of design semiotics in museum visual identity design, there remains room for further exploration. First, more user research and field testing can be conducted to validate the design's impact on different visitor groups. Second, future design practices could place more emphasis on integrating semiotics with technological methods, such as augmented reality (AR) and virtual reality (VR), to enrich the museum's digital exhibition experience. Additionally, considering the museum's diverse cultural background, further exploration of cross-cultural symbols could enhance its appeal to international audiences.

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