Double pier cultural symbol under augmented reality technology display design research

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Abstract: *In order to solve the practical dilemma of "limited understanding, no experience, and difficult promotion" of Shuangdun culture, from the perspective of the integration of the content of Shuangdun's symbolic culture and the media carrier, the theory of symbol interaction is used to conduct a field survey of Shuangdun ruins, analyze their symbol types, artistic representations, communication channels and other characteristics, integrate the symbol system of Shuangdun culture, and extract the key symbols of cultural identity. At the same time, the method of combining digital technology with visual design is adopted to build a double pier culture display and communication system under augmented reality technology, forming a "digital field" of multi sensory interactive experience, with a view to providing feasible suggestions for the cross regional and cross space-time communication of double pier culture.*

Keywords: *New media, Cultural heritage protection, Folk symbols, Visualization*

1. Preface

The academic research on Double pier cultural started late. One of the reasons is that although the Huaihe River Basin is one of the main cradles of Chinese civilization, it has been a flood prone area since ancient times. The academic community has doubts about whether there are traces of human activities in its geographical space as a whole. Until the 1980s, the Anhui Provincial Institute of Cultural Relics and Archaeology and the Bengbu Museum successively carried out three rescue archaeological excavations on Double pier cultural Relics, unearthed a large number of valuable cultural relics such as stone tools, pottery, and mussels, and found a large number of portrayal symbols in them. The Bengbu Shuangdun Excavation Report laid the foundation for the research on Double pier cultural Archaeology [1], At the same time, it also preliminarily confirmed that the Huaihe River also has a bright civilization history. The "Project of Exploring the Origin of Chinese Civilization", launched in 2000, successfully verified the theoretical guess of the origin of ancient civilization of China's "integration of multiple sources", and also confirmed that the ancient civilization of the Huaihe River basin was the result of the collision and integration of the Yellow River basin and the Yangtze River basin, through the research of the legendary era of the Five Emperors before the Shang Dynasty, through the method of multi-disciplinary and multidisciplinary summary.

2. The Research Status of Double pier cultural Symbols

Therefore, as the cultural treasure of the Huaihe River basin, Shuangdun culture has both individual cultural characteristics and the common characteristics of Longshan culture and Liangzhu culture [2]. In particular, the excavation of more than 600 double dun symbols provides a lot of information for exploring the social, economic and cultural life of ancestors 7300 years ago. Xu Dali studied the characteristics and properties of double pier symbols and the origin of early characters from the perspective of semiotics [3]; Xu Dali and Yan Xuhang studied the meaning of the double pier symbol [4] from the perspective of philology, and believed that it played an important role in the birth and development history of Chinese characters [5]; Rao Zongyi analyzed the aesthetic characteristics of the double pier symbol under the totem worship [6], and believed that the double pier symbol carries the cultural function of symbol and memory. The above research points out the direction for the nature, characteristics and symbols of Shuangdun's symbols. However, the author also finds that the current research on Shuangdun culture tends to be unitary, mostly focusing on the Shuangdun culture itself. There is less overall research involving multi-disciplinary and multi-disciplinary combination, and it is urgent to conduct comprehensive and systematic research.

To sum up, the Huaihe River Basin is the birthplace of Chinese civilization. It connects the two

cultural traditions of the Yellow River and the Yangtze River with the role of ties and bridges. The research on the display design of Shuangdun cultural symbols will help to study the origin, development and expansion of Chinese culture as a whole, and take this opportunity to enhance the popularity of Shuangdun culture, and expand new case studies for building cultural confidence and cultural roots in the new era.

3. Research status of augmented reality technology in the field of cultural heritage

In 1978, American sociology professors Marcos Felson and Joan Spence proposed a shared economy in a published paper. The sharing economy refers to the main purpose of obtaining certain compensation. based ona stranger and a new type of temporary transfer of the right to use the itemEconomic modelIt contains the demand side, supply side and shared economic platform[7] of the three main products or services. The distinguishing features of the sharing economy are the integration of social resources, the reduction of the cost of both parties, the temporary transfer of use rights, the improvement of allocation efficiency, the diversification of profit models, and the flexible form of employment. With the emergence of prominent companies such as Uber and Airbnb, the sharing economy has shown a rapid development, bringing new opportunities and challenges to traditional enterprises and shared economic enterprises. Under the shared economy, with the popularization of sharing ideas and the intensification of competitive pressures, innovation has become a fundamental factor in the sustainable development of enterprises, and it is decided whether enterprises can gain competitive advantage and corporate performance in market competition. Enterprise innovation strategy orientation is the degree to which enterprises are open to new things. The tendency to innovate and change through the adoption of new technologies, resources, techniques and management systems, mainly market innovation orientation and technology innovation orientation[8].Innovation strategy orientation reflects the company's business philosophy through a set of innovative values and beliefs deeply rooted in the company, which determines the company's innovation strategy direction and development focus[9].Enterprise innovation in the sharing economy is confused with how to meet the fierce market competition demand and the orderly and healthy development of the shared economy[10].

4. A Study on the Semiotics of Double pier cultural

Symbols are the aggregation of information and the abstract expression of culture. The German culturologist Jan Asman believes that people provide a kind of overall consciousness and historical consciousness for the cultural identity of ethnic groups through the symbols passed down from generation to generation [11] to confirm the continuity of culture. Double pier cultural is also a cultural system developed and formed in a specific history and region, and its symbolic form expresses the ancient people's thinking and creative power of "looking up to the sky, looking down to the earth, observing birds and animals' writings and the suitability of the earth, taking all bodies near, and taking all things far away". However, due to the rupture of the historical context of Double pier cultural and the replacement of media, the cultural significance of "coding" in different periods has been difficult to understand in the transmission and preservation of symbols. Therefore, it is necessary to translate symbols through the replacement of media in order to find the "trace" and "road" of the "real past", so as to realize the sharing of culture at the synchronic and diachronic levels. Professor Li Yanzu proposed: "The core task of contemporary design is to create symbols. From a sociological perspective, design becomes a tool for social stratification by creating different things, including different symbols, different values of things, and symbolic values. These things, symbols, and values enable social stratification to emerge and generate, and in this process, they show a 'power' of things, symbols, and values, which is a 'cultural power' [12]"。 American anthropologist Clifford Goltz also believed that "the so-called culture is a web of meaning woven by groups. If human beings want to retain culture for a long time, they must have the ability to invent and create cultural symbols that can be circulated [13]".

From the perspective of semiotics and design, this paper explores how the double pier culture formed a stable and firm relationship between "signifier" and "signified" through symbols in the historical process; How to realize the translation of symbols and the revival of cultural identity through design renewal; And how to bridge the gap between the past and the present through media replacement to form an immersive cultural atmosphere.

4.1. A Semiotic Analysis of Double pier cultural

As the basic unit of cultural carrier and communication, symbol is the process and behavior of mapping the written experience, written experience, personal experience and related speculative activities acquired by human beings into the ideographic process and behavior of symbols. Ferdinand de Saussure, a Swiss linguist, proposed that symbol is a whole produced by the connection of "signifier" and "signified" [14]. Based on the thinking mechanism of the division of labor between the left and right hemispheres of the human brain, Yuri Lotman, a Soviet cultural semiologist, proposed two types of human thinking symbols - discrete symbols represented by natural language and muddy shaped symbols represented by pictures [15]. The double pier inscriptions are also a set of mature ideographic symbols. The author systematically reorganizes and classifies the double pier cultural symbols, divides the double pier symbols into pictographic, geometric and other categories, and finely divides them according to each category, through the field investigation of the Double pier site in Shuangdun Village, Huaishang District, Bengbu City, the research and analysis of the double pier cultural materials, and the communication with relevant experts, Twenty one subcategories are summarized. These twenty-one subcategories are the reflection of the economic and cultural development of China's primitive civilization society. They have obvious chronicles and strong graphic functions. The chronicles are mainly embodied in the types of functional symbols such as stamping and counting (mostly geometric), involving the clothing, food, shelter, transportation, astronomical calendar, religious beliefs, etc. of the Shuangdun people. The symbols of this type have simple structure, smooth lines and high repetition rate. For example, in the pottery fragments, the box shape and grid shape appear hundreds of times, indicating that the contents recorded and expressed by the symbols are events of the same nature. The ideographic nature is reflected in the diversified expression of the same type of symbols and the multi type combination of symbol modes (mainly pictographic and other types). For example, for the transmission of the sun symbol, the double pier cultural symbols have a variety of forms, such as single circle, triangle, concentric circle, semi concentric circle, etc. and some symbols have two or more forms of expression, such as "main pattern" and "ground pattern", This shows that the double pier carving symbol has evolved from an independent symbol to a continuous symbol with rich expressive ability and complex implication ability. Through the symbol, it shows a lot of information about the production, life and spiritual activities of ancestors. However, during the investigation, the author also found that these symbols were all unearthed in the cultural layer. The trial excavation area was a concave ditch formed by people dumping domestic wastes at that time, which was inclined from north to south and from west to east. Many carriers of symbols are incomplete and difficult to identify. In particular, the double pier symbols are mostly engraved on the outer bottom and inner bottom of the objects, which increases the possibility of damage and brings great difficulty to the collection and research work. For example, the pig shaped symbol of 91T0620 specimen takes pictographic and geometric types as combined symbols, and uses indentation and engraving methods to present the image of a running pig. However, due to the damage of the utensils, the geometric lines on the inside of the pottery pot are seriously worn and difficult to identify. Therefore, digital transformation and storage of Double pier cultural symbols based on symbol types has become an urgent matter to be solved. Fan Jinshi, president of the Dunhuang Cultural Relics Research Institute, once said, "Cultural relics are not renewable, nor can they live forever. Making cultural relics' live forever 'in digital protection is an effective way to rescue those cultural heritages that are on the verge of destruction, depletion or disappearance. [16]" Build a Shuangdun cultural information database to form visual digital cultural content, It is the first step for the protection and development of Shuangdun cultural symbols(As shown in Figure 1).
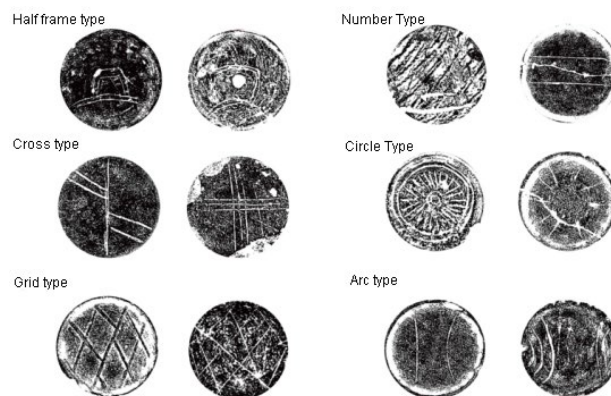

Figure 1: Visual information database of double pier marking symbols

The double pier carved symbol is a pictorial symbol that can be understood and interpreted. However, due to the rupture of its historical and cultural context and the replacement of the media, the encoding method does not match the multi-dimensional decoding method in the modern context, resulting in its inability to connect with the modern context. Therefore, in the process of digital transformation, it is necessary to recode, reconstruct and interpret Huizhou folk songs in the way of digital technology and design intervention. Through the analysis of double pier symbols with typical artistic characteristics, it is necessary to determine the appropriate type of visual design and the form generated under digital technology. For example, in the design process of double pier carved symbols of object shapes, the author uses innovative thinking to refine the memory points of symbols, uses simple lines and double pier carved symbols to combine, transforms abstract spiritual and cultural connotation into realistic visual symbols, injects them into the scene, adds modern design aesthetic features to the double pier symbols, and retains the unique cultural aesthetic features of the double pier culture, forming understandable Design drawings of modern visual symbols that are easy to spread are shown in Figure 2.
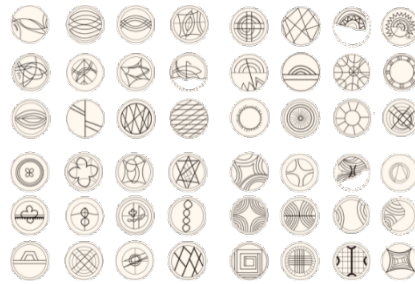

Figure 2: Visual Symbol of Modern Double Pier Culture

4.2. Narrative Expression of the Key Symbols of Double pier cultural

Key symbols refer to the most typical and core elements with the most national cultural representation extracted from the cultural symbol system. American scholar Sherry Altner believes that the powerful cultural factors in key symbols will have a huge cohesive role in the construction of nation and country, and become the cultural schema for the generation of individual or group significance and social experience [17]. Double pier symbols are a special cultural relic among the artifacts unearthed at Shuangdun Site. More than 600 pieces of Double pier symbols show a unique connotation of the early and middle northern and southern primitive culture. Their symbols are very rich in content, including realistic inscriptions of mountains, rivers, houses, animals, plants, etc; There are also depictions of production and life such as pig hunting, fishing, net bird, deer capture, planting, silkworm rearing, knitting, raising livestock, etc. There are also geometric symbols such as recording events and counting, which almost cover all aspects of ancient people's production, life and spirit. At the same time, the double pier symbols also appeared in different sites such as the Houjiazhai site, which shows that the same symbol has formed a conventional value orientation and cultural identity within a certain range. For example, the most representative of the double pier symbols is the double pier pottery sculpture carved with human heads decorated with concentric circles on the forehead and pricked points on the cheeks, which is famous for the "Huaihe River Girl". This symbol carries the worship of ancestors for the sun and light, contains a huge national thinking paradigm and cultural factors, and is a key symbol to identify with the "self" and distinguish the "other". Therefore, in the symbol display, select such key symbols that contain a large number of excellent traditional cultures and have a high sense of public cultural identity, and adopt narrative design for the symbols. Through situational and situational expression, reconstruct the cultural semantics in line with modern society and the vanished era atmosphere. For example, in the narrative design of the figures with double mound pottery sculpture inscriptions, the author uses visual metaphor to reproduce information, reproduce the scene of portraying the sun decoration on the forehead of the figures, and increase the public's understanding of the cultural connotation and implication of the symbol.

5. Research on the Display of AR Technology in Double pier Cultural Symbols

G.H Mead, the representative of the Chicago School, put forward the theory of symbolic interaction in Mind: Self and Society. He believed that "human self-consciousness is formed through symbolic interaction in society [18]". Later, American sociologist Bloomer summarized three propositions of the theory of symbolic interaction. The first is significance, that is, the activity of individuals to things is

based on the meaning of things to them; The second is interactivity, meaning comes from the interaction between individuals and groups or other individuals; The third is interpretability, that is, individual experience amends the meaning of things through interpretation [19]; American sociologist Cooley also put forward the concept of "I in the mirror" on this basis, and he believed that situation, as a field of constructing symbolic environment, is important to interaction [20]. So far, as a product of culture, symbols have the function of communication and enlightenment, and display is a cultural performance of interaction and construction of symbolic meanings. Members of the same cultural community confirm themselves or interact with others through symbols, to a certain extent, promote mutual understanding among ethnic groups, and enhance national cultural identity and cohesion.

5.1. Research on the Framework of AR Technology in the Display and Communication of Double pier Cultural Symbols

This paper takes Double pier culture as the guide, and puts forward display and communication strategies that conform to their own laws. Its core idea is the practical application research conducted under the guidance of the theoretical framework research. The research process is to use the visual design of double pier cultural symbols, AR technology as a means, and Mobile application as a carrier, to work together on the real display space, in order to open up new ideas for the display and dissemination of cultural heritage difficulties, and provide feasible case references. At the same time, it tests on the mobile intelligent terminal platform, and gives relevant experimental test results, Finally, constantly summarize, optimize and apply in the real market.

5.2. Research on the Application of AR Technology in the Exhibition and Communication of Double pier Cultural Symbols

Symbolic interaction theory proposes that people respond to things according to their own understanding of the meaning of things in the process of social interaction [21]. In the process of exhibition, the audience also gains the cognition of the social and cultural world through the understanding of the content presented by the exhibition media. At the same time, the understanding is also different from introspection. The embodied cognition theory believes that the audience will further explain knowledge, concepts, art, etc. and form an unforgettable and profound memory or impression by participating in the experiential learning or experiencing a cultural process. Therefore, as a specific form of experience, understanding how to attract and catch the audience's attention through the corresponding exhibition scene and information design, and how to link their current experience situation with the acquired knowledge reserves to form a multi-dimensional exhibition experience is the core issue of exhibition design. The use of multi media is also the key to make the form of understanding become more multidimensional and increasing. For example, the integration of virtual and real time interaction under AR technology display, the transformation from static exhibition mode to two-way interactive participation mode, and the formation of a "phenomenon field" of virtual and real combination, bringing new features such as interactivity, multi sensory experience, and sense of place to the interaction of cultural symbols. In practice, the author's team used such technologies as graphic identification and tracking, 3D modeling, Unity3D script development to track and identify locations through cameras and use Unity technology to superimpose virtual information on the real environment of the exhibition area. The steps are as follows: first, obtain the real scene. In this process, the system needs to carry out a series of work to complete: (1) real-time collection of target object labels in the real environment; (2) According to the label, obtain the coordinate axis of the target object in the real scene, and determine the position and direction of the camera in the real scene through the external parameters of the camera. Secondly, obtain the registration information of virtual objects, complete the three-dimensional tracking registration module, and integrate the digital content into the real environment of the target object in real time to achieve the enhancement effect of the real scene information. Third, real-time rendering of 3D animation, video, sound and other digital content in the virtual object database. Finally, the intelligent terminal displays the output for interactive processing, and the interactive interface operates and controls the virtual objects superimposed in the real scene to awaken the perception and emotional level in a multisensory and multi-level way, realizing the perfect integration of "virtual" and "real". The subsequent development will also be tested and optimized in combination with the real scene. APP identification marks will be printed on the tickets or cultural and creative products in the exhibition area. The audience can use the mobile device camera to scan the identification marks for interactive viewing. In the communication context, the content and information presented through the exhibition media will realize the interaction between the audience and the exhibition theme and content. Even after the visitors leave the exhibition area, they can still scan the identification marks for repeated viewing, and can share on the

social platform to widely spread the characteristic culture of Double pier.

6. Conclusion

This paper focuses on the problems of Double pier Cultural in the display and communication, explores the solutions under the digital technology, through the process of refining, designing, displaying and communicating the representative cultural symbols of Double pier, and uses the advantages of AR technology to bring new features such as interactivity, multi sensory experience, and sense of place to the display and communication, sublimates the public's sense of regional identity and sense of belonging, so as to drive the development of local cultural and creative industries. And through communication, people will be aroused to pay attention to and spread the cultural heritage exemplified by Double pier Cultural, promote the spread of Chinese civilization worldwide, and promote the joint development of cultural and creative industries, tourism industries and other industries. It can also provide new development ideas and technical means for the upgrading and industrial development of historical and cultural products, and produce good social value and economic benefits.

Acknowledgement

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