Exploration and Practice of Digital Technology and Virtual Reality Technology in the Creation of Public Art with Chinese Characters:Take Qingshan Hongfang as an Example

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Abstract: In the modern context of rapid development of artificial intelligence, it provides a new direction for the development of public art in the new situation. The digital reconstruction of modern and contemporary public art has provided new experiences in terms of interaction and emotion. The popularization of interactive devices and virtual reality technologies has made the forms of public art more diverse and the audience's experience more personalized. As the carrier of Chinese civilization, Chinese characters have their special cultural significance and resonance. Translating Chinese characters through public art is a good form of expression. Currently, there is a lack of public art works with cultural identity in urban public spaces in China. This article will use a combination of quantitative and qualitative methods to analyze the public art and Chinese character design cases of the Red Steel City Red House architectural complex in Qingshan District by sorting out relevant concepts and combining case study methods. Ultimately exploring the combination of digital technology and virtual reality, incorporating Chinese characters as a creative element in contemporary art and design. Intended to provide reference and inspiration for art creators and related practitioners.

Keywords: public art, virtual, Chinese characters, AI, Qingshanhongfang.

1. Introduction

With the rapid development of AI technology in recent years, digital technology has gradually deepened from the original electronic semiotics, and gradually affected the creation and exhibition space of public art. The contemporary human society is gradually moving from the private field to the public field with the development of society and culture. With the increasingly open and open of social, political and service institutions, individuals have more opportunities to participate in social and public activities. The increasing demand for publicity leads to the increasing demand of the whole society for social space and public space. The contemporary public art has changed the requirements, and there are more profound requirements of the times for public participation and the diversity of expression.

In the digital era, the development of AI technology provides new possibilities for the performance and display of traditional public art. The popularity of smart phones, interactive devices, virtual reality and other technologies has made art forms more diversified and audience experiences more

personalized. However, this transformation is not without challenges. The original meaning and emotional transmission of traditional art may be diluted or misread in the process of digital transformation. Words are not only the media that breaks the boundaries of time and space, but also the symbol that conveys information. The production of words is the process of transforming the language originally expressed by sound into graphical symbols. Even with the continuous progress of science and technology, people began to gradually reduce the text transmission using paper as the media, but the text continues to become an important medium for human communication and information transmission through electronic media. As one of the oldest and most widely used characters in the world, Chinese characters carry the history and culture of China for thousands of years. The cultural connotation of Chinese characters has distinctive historical and national characteristics. Chinese characters are the product of the combination of characters and graphics. The graphitization of Chinese characters is the expression mode that converts the shape and structure of Chinese characters into visual graphics, so that the ideographic nature of characters can be transformed into vivid graphical image expression. As a design element that appears frequently in public daily life, the familiarity with Chinese characters gives people a sense of aesthetic fatigue. With the help of digital technology and virtual reality, the Chinese character elements are treated by deconstruction, reorganization, isomorphism, deformation and other composition methods, and then combined with graphics to make artistic design, so as to achieve visual and spiritual resonance.

2.   Literature review

This paper takes the external forms of expression and internal creation techniques of Chinese character art works as the main line, and selectively analyzes the artistic creation process of the works, such as the subject concept, material selection, writing methods, etc. From this, we can understand the essential concept of artistic creation and the ideas and means of creation behind the works, start with the specific form of Chinese character elements in contemporary art works, and analyze how the planarization, three-dimensional space and dynamic Chinese character works are created. Specifically, we can analyze and discuss them from three aspects: the use of materials, the creation of new Chinese characters, and the expression of ideas, so as to compare their corresponding particularity and advantages. Both Chinese characters and sculpture belong to plastic arts, so the aesthetic thought and theoretical system of Chinese character art can be used as the creation basis of Chinese line drawing sculpture art[1]. Among the Chinese character fonts, pictographs and seal script are the most unique in font form, because pictographs are drawn from the natural world with reference to the appearance of things. The seal script is based on hieroglyphics, and gradually divorced from reality, but it has not been completely eliminated. Therefore, the writing method and font structure of seal script reflect a blend of characters and paintings, with the dual attributes of reality and abstraction. Since the Qin Dynasty unified the characters and established Xiaozhuan as a national font, the shape of Xiaozhuan has tended to be stable and has a unique style of writing. The font shape and structure show a purely abstract form. Therefore, the shape of Xiaozhuan is taken as the research direction of abstract sculpture modeling, and combined with the modeling language, design methods and materials of contemporary sculpture art, the purpose is to transform Xiaozhuan font into an abstract three-dimensional sculpture. In the design of constructing abstract sculpture in calligraphy, this paper not only considers the aesthetics of calligraphy, but also integrates the modeling language of Chinese ceramics and the performance skills of lacquerware. In the creation of works, it is no longer dependent on the writing form of calligraphy, but pays more attention to the association between the existing ceramic form and the seal script in calligraphy. The shape fully revolves around the morphological characteristics of seal script and integrates with another three-dimensional modeling artistic language, which has brought unique artistic effects to the shape design performance. Explore the creation of modern abstract sculpture art works with both the

morphological characteristics of Chinese characters and the ceramic body language. The integration of Chinese character art elements into urban public art can further promote the development of regional culture, enrich the forms of expression of urban public art, endow it with higher humanistic value, and also help to improve the cultural value of urban public art[2].Taking the characteristics of Chinese characters as the breakthrough point, this paper analyzes the application advantages and significance of Chinese character art elements in urban public art, and expounds on the specific application of Chinese character art elements in urban public art[3]. In the era of digital technology represented by the Internet, the "public art space" for the creation of public art can be expanded to a space that is beyond the real geographical location. This enables the creation methods of public art to be expanded, including digital technology and algorithm art. Aigc's creative method is a blind box experiment that attempts to gradually approach the target through constant trial and error. And in this mode of creation, a collaborative relationship will be formed - the collaboration between individual artists and the public's aesthetic preferences, and the final form of interaction of artistic works will move towards an open script with movement and change, exclusive to the audience, and multi-dimensional interaction[4].

3.　Research methods

This study adopts the methods of literature research and field research

Literature research method: research and summarize the relevant materials of public art research, learn the relevant concepts of relevant digital technology and AI algorithm technology, and understand the relevant development trend and current situation by analyzing the relevant data of the Internet and social media platforms. Clarify the research thread of the subject, understand and master the problems related to the public art studied, investigate and summarize the relevant data of digital public art, and deeply analyze the means and methods of creation and dissemination of public art.

Field research method:

The present situation of Hongfang building complex in Qingshan District of Wuhan was investigated on the spot.

4.　The significance of the combination of Chinese characters and public art

Chinese characters are graphic symbols that integrate form, pronunciation and meaning. They are visual, readable and audible, and can convey information through various media and forms. Saussure, a Western linguist, classified Chinese characters as an ideographic system in his book,which is a course in general linguistics. He believed that there was no correlation between language symbols and language pronunciation in the ideographic language system. Some scholars also classify characters as a category of semiotics, and have clearly pointed out the existence and significance of the materiality of characters according to the research on characters in the disciplines of human, language and archaeology. The features of Chinese characters include graphical features, symbolic features, ideographic features, material features, etc. Chinese characters evolved from graphics. They have pictographic features since ancient times. They have graphical meaning and are also the carriers of information dissemination. Public art is an art placed in public space, focusing on the spatial characteristics and functionality of art works[5]. With the emergence of urban space, urban public works of art show not only the artist's own ideas, but also bring sensory art experience to the audience. It is also a channel to show the unique humanistic spirit of the city. Modern urban public art can be summarized in five "emphases": emphasis on community, environment, place, materials and history[5]. Many modern and contemporary artists usually absorb and learn from the historical context, natural landscape, folklore or craft tradition of the community to create works with local

characteristics. These works not only show the unique charm of the community, but also become a part of residents' memories[6].

The artistry and culture of Chinese characters just provide a new idea for the creation of public art.

4.1. Advantages of digital technology and virtual reality

For a long time in the past, limited by the development level of science and technology, people's cognition of public art still remained at a simple two-dimensional and three-dimensional level, while the art dimension under the background of cross-border, integration and interaction under the background of digital technology has extended to multiple dimensions such as time and space[7]. Therefore, the traditional way of public art cognition has been unable to meet this requirement. The reconstruction under the integration of art and digital can further enrich people's cognition of architectural art.

With the development of AI technology, public art can use algorithmic art to break the tradition, and use digital technology and virtual reality to make Chinese characters and public art creation develop in multiple ways[8]. Using algorithmic art to disassemble Chinese characters, the advantage of AI art is that it can dynamically generate visual effects without repetition, including 2D and 3D, and continuously learn and generate creative works of different styles and contents according to the data from the audience[9]. Draw with light and data, and invite the audience to enter the three-dimensional dynamic combination of experience and visualization.

To a large extent, digital public art needs digital technology support. On the one hand, it is the dynamic interactive intelligent hardware realized by automatic control circuits, and on the other hand, it is the creative visual works realized by 3D animation and game engines[10]. The application of visual illusions has brought shocking effects to public art, and caused the communication effect by digital media. Since visual illusions need certain conditions to produce, the adjusted dynamic effects may even achieve more visual effects than the scene in the transmission of digital media. In the process of transforming to a virtual form, sound art also participates in digital form. The technology and equipment involved in sound collection, processing, editing and dissemination help artists create more abstract virtual time and space. Similarly, VR helmets, wearable computers, odor generators, electronic skin and other equipment can enhance the relevant feelings of virtual time and space for "virtual reality".

Any public art in the design stage needs to fully investigate the positive impact on the public[11]. The public art of virtual space is in line with contemporary needs. First of all, its advantages can be reflected in the investigation of public participation and positive influence[12]. A sufficient user base is conducive to the implementation of the publicity of the project. Virtual art is public in terms of, vision and experience[13]. The characteristics of public art are the particularity of its location. The public art in virtual space can be customized for the groups it faces[14]. The content and forms of expression are more diverse, and it can be more closely linked with the public and communicate more efficiently[15]. It should be noted that even if public art is transformed into a virtual form, it cannot change its nature for commercial or personal interests. It must reflect its sociality and universality[16].

4.2. Take the red house as an example of conceptual creation

The "Red House" specifically refers to the worker's housing built by state-owned enterprises such as Wuhan Iron and Steel in the 1950s and 1970s, and is called the "Red House" due to its red bricks and tiles. The origin of the 'Red House' can be traced back to the period of the 'Fifth Five Year Plan'. At that time, New China allied with the Soviet Union and implemented an economic strategy of prioritizing the development of heavy industry. In 1954, the Central Committee of the Communist

Party of China approved the establishment of Wuhan Iron and Steel Corporation, with its location in Qingshan. More than 100000 construction troops gathered from all over the country on the green mountains. Soviet experts used the design drawings of Soviet steel plants and designed the first batch of Wuhan Iron and Steel Works residential buildings.

The Hongfang building complex in Qingshan District is a red brick and tile structure with a three-story spire and a red house in with Soviet style. Seen from the air, a large number of red houses are connected together, which seems to form an auspicious character with Chinese traditional cultural characteristics: "囍",(as shown in Figure 1) .The red houses are concentrated in the areas of Honggang city and Hongwei Road, with 16 blocks. It reflects the historical style of Wuhan in the early days of the founding of the people's Republic of China and is a "Living Industrial Heritage".

As the economic dividends brought by the steel age gradually disappear, large-scale layoffs have led to the loss of indigenous people. The Red House building has also started new planning and renovation with the new developer. Nowadays, it is also impossible to appreciate this architectural design from a horizontal perspective. Those who originally knew about the history of this city are on the brink of disappearing with the changes or passing of their residences.

As an important historical relic in the industrialization history of China after the founding of the People's Republic of China, residential areas in industrial zones have shown great historical and protective value in terms of their layout, architectural form, and living atmosphere. As one of the ten historical sites in Wuhan, the "Red House" in Qingshan has become a key construction area of concern for the city and district governments, serving as the core of commercial and trade services in the central and western regions of Qingshan, as well as the characteristic center of the Steel City.   As one of the few well preserved historical districts within the "Red House" area, eight and nine Jie Fang is facing a good opportunity for public art renewal. Restoring its vitality and reproducing the history and culture of Wuhan Iron and Steel Group is of great practical significance.

For the inheritance of this practical significance, public art can leverage its uniqueness and become a carrier for cultural inheritance and dissemination. Based on the current geographical location, there is a blank area between the renovation of the new buildings in the Hongfang Building Complex and the Qingshan River Beach, with new residential areas on both sides. In this open space, digital technology can be used for conceptual design of public art in Figure 2. The design is named "Xi" and uses abstract structure as a technique to express the Chinese character "Xi". In Chinese characters, "double happiness" means people's yearning for a better life. In Chinese, it means "double happiness". Horizontal and vertical are childhood memories of Chinese people learning to write when they were young. The intersection of strokes reflects the rhythmic sense of architectural structure in symmetry. In terms of appearance design, new environmentally friendly materials are used to create a red brick and tile effect. During the day, it can serve as a shelter for daily rest and morning exercises. At night, participants can see the projection of the Chinese character "xi" floating in the air through touch, VR devices, and other means. Based on AI technology, the shape and size of Chinese characters can be changed through virtual touch, and the font that matches one's preferences can be calculated based on algorithm technology, even for interactive recombination of Chinese characters. This design adopts a user centered and visual centered digital interactive device. Through the process of conveying the concept of the work, interactive intervention, real-time feedback, etc., combined with real-time interaction technology, it completes the emotional transmission between the receiver and the work. The combination of Chinese characters and red room art design breaks the spatial limitations by using digital technology and virtual reality technology, and also helps the inheritance of red room culture.
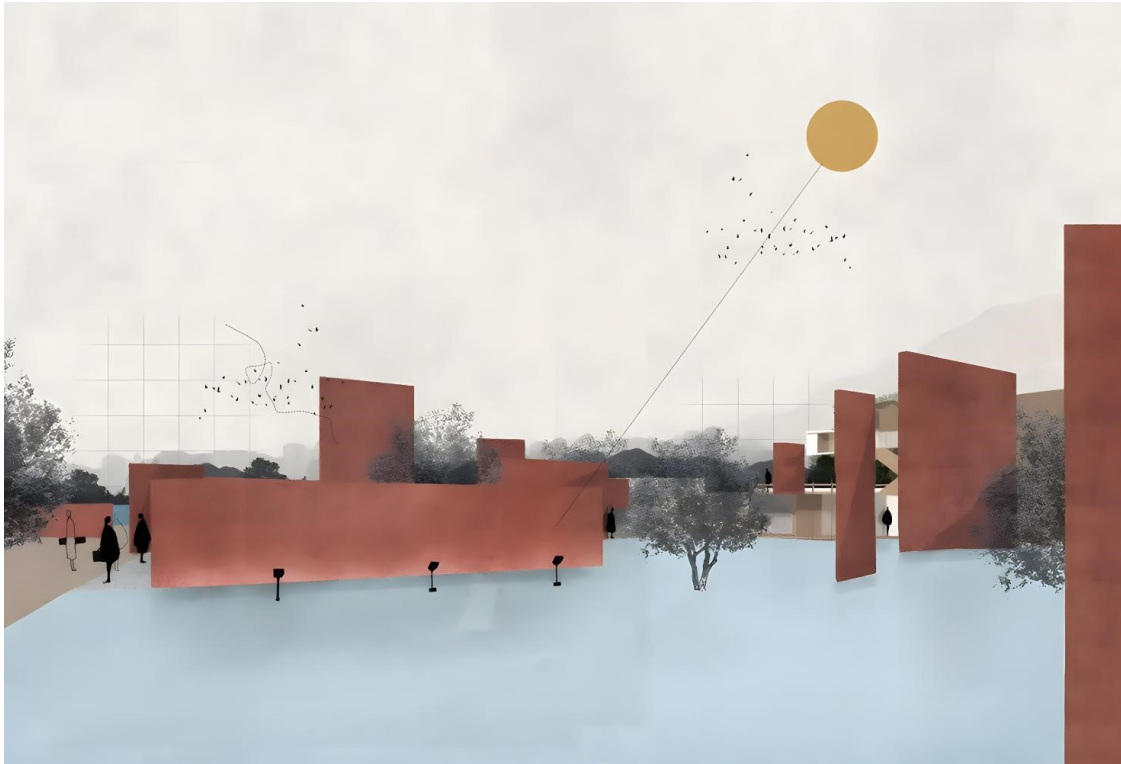
Figure 1: Short Description

Figure 2: Short Description

5. Conclusion

Public art is a business card of urban development, which embodies the spiritual style and cultural heritage of a city and plays a crucial role in shaping urban environment construction. The success of urban development or not, the economic level is only one of the factors, not all. The cultural heritage of a city is a strong driving force for the city to survive and develop for a long time. Many cities also have the same special history as Qingshan red houses. But with the change of the times, more and more people have no chance to see these historical sites. The human factors of a city's development are in its history.

Therefore, the design of public art and space environment is particularly important. The rapid development of AI technology has penetrated into all walks of life of social development. It is not only the requirement of the development of the times, but also to meet the needs of the people's ever-changing quality of life by using AI to help Chinese character elements to apply   the design of public art space environment. In this way, public art design can enrich people's lives, inherit the city's culture, drive the development of related industries, and promote the sustainable development of the city.

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