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**RESEARCH ARTICLE**

## Re-Empowerment of Intangible Cultural Heritage under the Meta-Cosmos: The Case of Dunhuang Cave Art

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**ABSTRACT**

Intangible cultural heritage in Dunhuang cave art is now suffering from a lack of interest feedback, insufficient social awareness, and insufficient media utilization leading to difficulties in transmission and non-transmission; this article argues whether the concept of metaverse can be combined with new media forms to re-empower Dunhuang cave art, exploring its possibilities and expecting methods of implementation. The article is based on a desktop research methodological argument to explore the empowerment of Dunhuang cave art in the context of the metaverse, which explores and builds a worldview of NFT heritage in the metaverse world and obtains offline experiences such as cultural and creative products, offline cave experiences, and NFT cultural exchanges by combining the virtual world of NFT collections, virtual tours, and virtual learning of NFT techniques in exchange for tokens. We are willing to break the barrier between reality and virtual, link the stagnation and empowerment of NFT culture. The article concludes that it is feasible and reasonable to realize the empowerment of intangible cultural heritage under the Meta-Cosmos.

**KEYWORDS**

Metaverse; Dunhuang cave art; intangible cultural heritage; industrial empowerment; painted sculpture

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**1. Introduction**

At a time when the 19th National Congress proposes to promote the innovative development of Chinese civilization and the state attaches great importance to the transmission and dissemination of intangible cultural heritage, Dunhuang cave art, as one of the brightest pieces of non-heritage, such as cave excavation techniques, stone powder painting, and color sculpture production techniques, is experiencing natural and man-made disasters and various problems due to external factors, and is in urgent need of industrial transformation to better disseminate and transmit the non-heritage art of the caves. As a virtual world that maps and interacts with the real world, the virtual world will gradually become an essential part of people's lives. This paper is forward-looking to propose and envision the application of the dissemination of non-heritage under the metaverse, combining the Non-Fungible Token digital collection to explore a new context to solve the non-heritage of Dunhuang Cave Art.

**2. Background of Intangible Cultural Heritage Protection**

According to the definition of the Convention for the Safeguarding of Intangible Cultural Heritage stipulated by UNESCO (2003), intangible cultural heritage refers to all kinds of practices, performances, expressions, knowledge systems, and skills, as well as their related tools, objects, artifacts and cultural places, which are considered by groups, communities and sometimes individuals as their cultural heritage. Intangible cultural heritage protection is a kind of cultural protection activity that is usually led by the government and widely participated by people from all walks of life and has been moving forward along with the development of human civilization.

The report of the 19th National Congress proposes to promote the creative transformation and innovative development of Chinese civilization, and the vitality of intangible cultural heritage must be activated, which shows that the inheritance and dissemination of intangible cultural heritage must keep pace with the times. Data from (National Bureau of Statistics of China, 2022) show that National enterprises of cultural and related industries above the scale in the first quarter of 2022 saw their business revenue grow by 5.0%, and in recent years, the state's emphasis on the inheritance of intangible cultural heritage and the promotion of policies have led to the rapid expansion of China's cultural consumption market, which shows that the market of non-heritage is a very promising market.

### 3. Dunhuang Cave Art

Dunhuang is located at the western end of the Hexi Corridor in Gansu Province, China. Dunhuang cave art relies on the Mogao Caves in Dunhuang, a sacred site of Buddhist culture and a shining piece of intangible cultural heritage. Dunhuang's Cave of the Scriptures is home to an endless collection of treasures. The Mogao Caves, also known as the Caves of the Thousand Buddhas, were built during the Xuanzao Emperor's reign in the former Qin Dynasty and then through the Northern and Sui Dynasties, with 735 caves, 45,000 square meters of murals, and 2,415 clay sculptures, making them the world's largest and richest surviving Buddhist art shrine. However, more than 100 years ago, a Taoist priest named "Wang Yuanluo" discovered the world-shattering Mogao Caves, but the caves were "born at a bad time" when the government was corrupt and incompetent during the late Qing dynasty, and the brilliant treasures of Dunhuang continued to be scattered overseas, becoming an unprecedented catastrophe in Chinese history and culture. (Liu et al., 2015)

As intangible cultural heritage, traditional cave art, such as cave excavation, fresco-making techniques, and sculpture-making techniques, is highly specialized and is a precious national and global historical and cultural heritage that is awaiting development.

#### 3.1 Cave Excavation Techniques

One of the Dunhuang documents, "The Cave Manuscript," describes the processes required to build a cave from inception to completion, including repairing the cliff face, excavating the cave, painting the murals, shaping the statues, and decorating the eaves. As a specific operation of the cave construction, the craftsmen are divided into different types: masons, masons, painters, sculptors, carpenters, etc., such as Figure 1 for the basic steps of cave building.

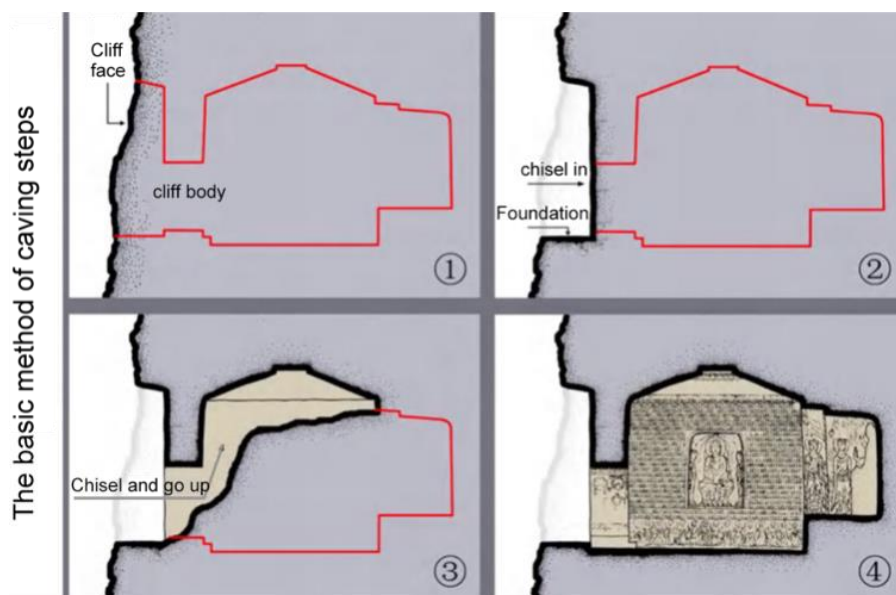
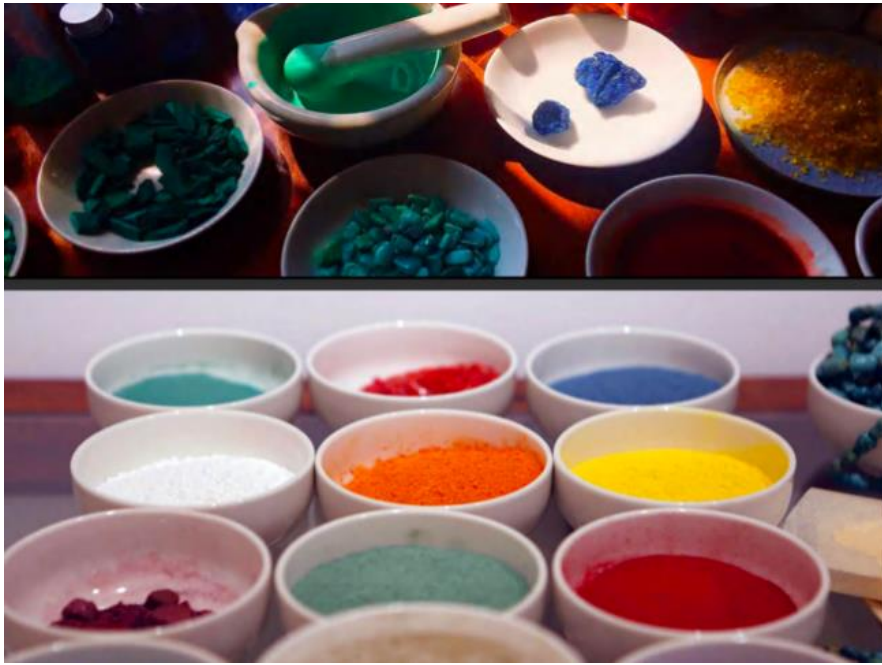


Figure 1 The basic steps of cave building

#### 3.2 Dunhuang Stone Powder Painting

Dunhuang stone powder painting is a painting technique with varying colors of stone powder as the pigment, with clay walls, rice paper, silk, white cloth, etc., for the picture. The stone powder is made from a variety of rocks, minerals, and plants as the main raw materials, as shown in Figure 2, ores such as gold, silver, pearls, agate, coral, malachite, and cinnabar, minerals such as estrogen, andrographite, and china clay ore, and plants such as saffron, rhubarb, rouge, and yellow lotus. This painting technique, which incorporates painting forms and techniques from around the world, is based on the long-term painting accumulation and practice of a large number of Dunhuang painters, resulting in a complete painting system, an ancient technique that continues to this day.



**Figure 2 Pigments of stone powder painting**

### **3.3 Color Sculpture Production Process**

Sculpture can be divided into carving and sculpture. Carving is divided into stone and wood carving, and sculpture is divided into clay sculpture, color sculpture, ceramics, and bronze. Clay sculpture can be divided into direct clay sculpture and indirect clay sculpture. Direct clay sculpture is the oldest sculpting technique, and indirect clay sculpture is the necessary way to learn sculpture, which is the modeling basis of all sculptures.

Usually, colored sculptures (shown in Figure 3) are made of clay mixed with fiber, sand, glue, alum, and water, and then shaped on a wooden skeleton, dried, caulked, polished and primed, and then colored. The Dunhuang sculpture-making technique was announced by the Gansu Provincial People's Government in 2008 as a list of intangible cultural heritage in Gansu Province, which shows its importance in cultural heritage.



**Figure 3 Colored sculpture production**

## **4. Current Status in the Development of the Dunhuang Caves**

### **4.1 Mogao Caves' Own Development**

#### *4.1.1 Natural Disasters*

The Mogao Caves were built over a thousand years ago, and damage to the caves and cliff walls caused by natural factors has gradually had a serious impact on Mogao's heritage. The special geographical environment of the desert has also led to serious weathering of the relics, many of which have lost their former elegance.

#### *4.1.2 Man-made Disasters*

The Mogao Caves were severely damaged and destroyed in the early days of their discovery and have not been professionally and properly protected and rescued for a long time. The proliferation of visitors and the lack of control measures over the past few decades have resulted in the dissolution of fresco pigment particles due to a large amount of carbon dioxide gas produced and the increased humidity and temperature in the caves, leading to a gradual dimming of the colors and even peeling of the artifacts.

### **4.2 External Factors in the Development of the Mogao Caves**

#### *4.2.1 Lack of Benefit Feedback*

The inheritance of intangible cultural heritage in Dunhuang, like other intangible heritage internationally, is in crisis, with skills losing their practical space and a lack of positive benefit feedback. The learning costs of intangible heritage do not match the feedback, and intangible heritages choose to give up halfway through the process because their hard-earned knowledge is not rewarded with equal pay. The color sculpture techniques of the Dunhuang Mogao Caves are a very important part of the non-genetic heritage, but because their audience is relatively homogeneous, it is increasingly difficult to promote them in the new era, resulting in a serious compression of the living space of non-genetic inheritors and making it difficult to bring satisfactory economic benefits to their groups.

#### *4.2.2 Insufficient Social Awareness of Cultural Relics and Non-genetic Heritage*

There are many old men and women, and there are few young talents. It is difficult for craftsmen to give full play to their skills in the new era, and it is difficult to pass on the essence of intangible heritage from generation to generation without the support of the general environmental policy. The people's awareness of heritage protection needs to be improved, and the attitude toward intangible cultural heritage needs to be changed, which is not only the icing on the cake in life but also a fundamental source of identity and national pride for national culture.

#### *4.2.3 Inadequate Use of Communication Media*

The policy is top-down, while the power of the media is point-to-point. The rapid rise of the Internet has brought new opportunities and challenges to all industries. For the preservation and transmission of intangible cultural heritage, the advent of the new media era has undoubtedly provided a suitable environment for its growth. Visitors no longer need to travel thousands of miles to enjoy the exquisite frescoes in the grottoes and the ingenuity of the artisans' works, and more people can learn that cultural relics and intangible heritage will also breathe new life into them.

## **5. Modern Media Empowers Intangible Cultural Heritage Communication**

Modern media often have the characteristics of a high dissemination rate and wide audience, which can solve the problem of "lack of successors" in the transmission of intangible cultural heritage to a certain extent. For example, some culture-based games, interactive videos of ICH, and creative products can continue to empower the economy of ICH.

In the era of "Internet+", the times are moving forward with great speed, whether or not one wants to ride the fast moving train. In today's world, the Internet is a modern medium that must be utilized for non-heritage. (Zhu & Jian, 2022)

### **5.1 Huawei AR Map Dunhuang**

This "Huawei AR Map Dunhuang" by the Dunhuang Research Institute, in cooperation with Huawei, creates digital Mogao Grottoes through 3D modeling technology, Huawei Cyberspace technology, and high-precision spatial computing and mapping technology. It creates a new world of fusion between reality and reality, with a superior visual and interactive experience.

### **5.2 The "Dunhuang in the Cloud" App**

The Dunhuang Research Institute, in cooperation with Tencent, has launched "Yunyou Dunhuang", an app that offers a rich cultural experience and a strong sense of art about the Dunhuang caves. The company's main goal is to provide a platform for people to learn more about the culture of Dunhuang without having to leave home, creating a deeper and broader "cultural surplus" effect. (Lu et al., 2022)

### 5.3 "Woodworking" Game

This is a small game that combines video games with traditional carpentry techniques to bring a magical world of woodworking to players. The makers say that the best way to preserve traditional culture is to pass it on, and young people are undoubtedly the most suitable candidates to pass it on, and video games are a popular form of entertainment for young people around the world. The game has a sense of fun and education, allowing players to learn about the culture of mortise and tenon construction and unknowingly experience the charm of the "tight fit" of mortise and tenon culture.

## 6. Development Trend of Metaverse

### 6.1 One Rare - Gourmet Meta-Verse

The metaverse is the future trend of the Internet, and non-genetic heritage must keep up with the development of the Internet era in order to have successors and stable economic security to pass on. I take One Rare, a very hot food meta-universe world, as an example to learn how this product is built to let "food" run through the virtual world and the real world and to think about whether this operation mode can run in the meta-universe context of grotto art. brings the global food industry to WEB3 for the first time, (as shown in Figure 4). Players can request NFTs from favorite chefs, brands, and restaurants, access culinary and social food experiences and earn revenue to exchange NFTs for regular meals through simple gameplay. This is a revolutionary shift in the metaverse industry, combining the online NFTS experience with the actual offline experience, a process in which the virtual and real worlds gain from each other. The culinary abilities learned in the game can be translated into actual offline culinary experiences through tokens. The company is committed to the cause of ending world hunger by partnering with the restaurant industry and the WEB3 program to raise funds and awareness, a company with ambition and a humanistic vision at the same time. Could this be how our cave art bridges the virtual and real worlds, transforming the online learning process into actual offline practice to excavate caves and appreciate the beauty of cave art?



Figure 4 One Rare home page

## 6.2 How to Drive Grotto Art Industry Empowerment Through the Metaverse

### 6.2.1 Building a New World View of the Metaverse

For the Dunhuang Caves' non-heritage art, can we also learn from the "artisanal wood" concept and integrate education into the game, teaching users the art of cave art, such as the process of making painted sculptures and cave excavation techniques through virtual games in the metaverse, exploring virtual cave building, carving experiences, stone painting experiences, etc. (Jing et al., 2022) Money flow can be learned through "One Rare". Users can earn tokens in exchange for real-world Mogao Grottoes products, NFT (Non-Fungible Token) collections of Mogao Grottoes artifacts, or offline visits to the Mogao Grottoes and lessons from NFT masters. Giving each player a meta-universe image and access to the grottoes for tours through virtual reality will not only reduce the pressure of tours and the current state of damage in the grottoes today but also spread the culture of the grottoes in a more comprehensive and detailed way. Through the form of entertainment to stimulate consumption, inherit the non-heritage skills while empowering industrial innovation. (Lu et al., 2022)

### 6.2.2 Building the Artistic Identity of the Metaverse

The colors, lines, and composition of the Mogao Caves murals are a reflection of their artistic beauty. The Northern Wei frescoes combine the "bony and clear" styles of the Central and Southern Dynasties. The lines are smooth and subtle, soft and rigid, bold

and free, and uniform in color, emphasizing the aesthetic laws of balance, symmetry, repetition, variety, and unity. In building the Yuan universe, the aesthetic characteristics of the Dunhuang caves should be adhered to. (Liu et al., 2015)

### 6.2.3 Design Reflections on Building the Metaverse

There is a need to understand consumer needs and to control the aesthetic distance between Dunhuang art and the general public. In metaverse construction, it is important to match the beauty of cave art with the aesthetics of the user. Costs also need to be considered. The huge amount of information in the Mogao Caves requires a very high level of product backend system design and operation and maintenance. It is important to keep things simple and to communicate our worldview of the caves in the most concise design language.

## 7. Conclusion

The article provides a new perspective on intangible cultural heritage and exhaustively envisions the grotto art as an example, proposing solutions to today's development challenges such as the difficulty of passing on the intangible heritage skills of the Dunhuang Grottoes, the lack of people to pass them on, and the lack of media utilization. By building a meta-universe platform to teach and entertain, the traditional non-heritage art will be disseminated to players with games in the virtual world while bridging the online and offline experiences, with the results of the online games going to feedback to the actual offline experience of visiting Dunhuang Mogao Caves and practicing grotto art. We need to make good use of modern science and technology and choose a new medium to pass on the cave art. The shortcoming of this study is that it uses a single research method, only desktop research, and will continue to expand other research methods to support the argument.

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