

# The Global Dissemination and Living Heritage of Dunhuang Culture from the Perspective of Musical Notation

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**Abstract:** As a cultural crossroads on the Silk Road, Dunhuang's rich heritage includes a remarkable musical notation system that serves as a vital link between history and the present. From vivid depictions of music and dance in murals to ancient musical scores preserved in the Mogao Caves, these musical symbols document the flourishing cultural exchanges of the medieval period and showcase the inclusiveness of Chinese civilization through their artistic language. In today's era of globalization, exploring the dissemination routes and transmission mechanisms of Dunhuang musical symbols is a crucial practice for the innovative transformation and creative development of China's outstanding traditional culture. Such research not only deepens the understanding of Dunhuang's cultural significance but also offers new perspectives for civilizational dialogue within a global context. Based on this, the article conducts relevant research on the global dissemination and living heritage of Dunhuang culture from the perspective of musical notation, for reference.

**Keywords:** Dunhuang culture; musical symbols; global dissemination; living heritage

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## 1. Introduction

In order to deeply implement the spirit of General Secretary Xi's important speech and deepen cultural exchanges and cooperation with countries and regions along the Belt and Road, the Ministry of Culture launched the "Belt and Road" Cultural Development Action Plan in 2016, which clearly stated the need to increase the protection of cultural heritage along the Belt and Road and plan a blueprint for the development of cultural and museum industries. Dunhuang, a brilliant pearl located on the ancient Silk Road, contains rich regional cultural treasures. It has widely absorbed the cultural essence of various countries in the Western Regions in the long river of history, perfectly demonstrating the integration and coexistence of diverse cultures. Therefore, Dunhuang, as a rare artistic treasure in the history of human civilization, naturally shoulders the sacred mission of showcasing Chinese cultural confidence, inheriting Chinese civilization, and promoting the spirit of the Silk Road.

Interpreting the dissemination and inheritance of Dunhuang culture from the perspective of musical symbols breaks through the limitations of traditional cultural relic research. As an art form that transcends language barriers,

musical symbols have become an effective carrier for Dunhuang culture to go global with their intuitive infectivity and rich expressive power. By analyzing the transmission paths of symbolic elements such as instrument images, musical score documents, and music and dance scenes, the activation mechanism and innovative mode of Dunhuang culture in contemporary context can be revealed.

## 2. The construction of Dunhuang music symbols and analysis of their cultural connotation

### 2.1. Concept and composition of Dunhuang music symbols

Dunhuang music symbols are a diverse and three-dimensional composite cultural system, which is a synthesis of material, image, text, and behavioral etiquette, deeply rooted in the open and integrated cultural soil unique to Dunhuang as the throat of the Silk Road. The composition of Dunhuang musical symbols can be divided into three levels: the most mysterious and abstract ones are the Dunhuang scores in documents, mainly including the “Dunhuang Score” (P.3808) stored in the National Library of France. This set of 25 music pieces recorded with Pipa fingering symbols is a highly condensed cultural code, waiting for scholars to awaken those dormant melodies<sup>[1]</sup>.

The silent symphony is formed by the dazzling array of musical instrument images in the Mogao Grottoes murals, from the graceful flying Pipa played by the heavens, to the grand orchestra held in the solemn sutra paintings, such as gongs, gongs, clappers, and drums. These instruments are endowed with visual symbols of timbre, technique, and cultural identity, and they speak of flowing sound in a frozen posture. The highest level of symbolic expression lies in the narrative space created by the entire music scene and dance movements. Whether it is the “heavenly music singing in the sky” in the paradise world or the “banquet singing and dancing” in the mundane world, the atmosphere rendering places music in a specific religious, social, and emotional context, making it a comprehensive narrative behavior<sup>[2]</sup>.

### 2.2. Analysis of typical musical instrument symbols

Among the thousands of musical instruments in Dunhuang murals, Pipa and chopsticks are undoubtedly the most representative cultural symbols. The Pipa, especially the Quxiang Pipa from the Western Regions, appears more than 600 times in Dunhuang murals, and its frequent appearance itself is the most vivid visual evidence of the “Hu music entering China” on the Silk Road. The pear shaped resonance box and melody of the Pipa are all imprinted with exotic aesthetic genes. However, under the painter’s pen, they are lightly held in the hands of the flying sky<sup>[3]</sup>. The graceful ribbon and graceful posture inject the poetry of Central Plains culture into it, completing the magnificent translation from Western musical instruments to Chinese cultural imagery, becoming a model of artistic integration between China and foreign countries.

In contrast, the phoenix head spear carries a more sacred meaning. This horn shaped harp, which originated in Mesopotamia and was later introduced to India, was often accompanied by Buddhist heavenly palace music in early Dunhuang caves. Its elegant and slender neck and exquisite phoenix head decoration naturally have a rising and transcendent temperament visually. The sound played by the chopsticks seems not to be ordinary sounds, but rather the sound of the other shore that guides the soul to ascend and communicates with humans and gods. Its symbolic meaning is more focused on the sacredness of religion. This combination of “secular”, “sacred”, “dynamic”, and “static” together outlines the dual charm of Dunhuang music culture, which combines secular vitality and religious transcendence<sup>[4]</sup>.

### 2.3. The expression of musical context in murals

The music in Dunhuang murals is carefully organized into specific contexts, creating dramatic scenes full of tension, greatly enriching the semantic dimension of musical symbols<sup>[5]</sup>. In the magnificent “The Transformation of the Pure Land in the West”, a huge array of bands is arranged between the pavilions and water pavilions, and instruments that sing without drums are suspended in the void. All these visual symbols collectively point to an ultimate ideal country where

“there is no suffering, but all music is received”. Music here becomes a proof of the solemnity of Buddhism and the excellence of the Pure Land, and is an auditory symbol of eternal joy.

When the perspective shifts to secular themes such as “Zhang Yichao’s Travel Picture” or “Song Dynasty Lady’s Travel Picture”, the context and function of music change accordingly. In **Figure 1**, the military band beats drums and sounds horns to enhance military power, while the honor guard sings and dances lightly to show off their glory. Music is transformed into a symbol of power, status, and human entertainment, vividly recording the real life scene of the aristocratic society in the Tang Dynasty. The transition from “heaven” to “earth” allows the same musical instrument symbols to freely wander between the sacred and secular in different narrative frameworks, showcasing the astonishing expressive power of Dunhuang music culture. It also fills the cold stone walls with the sound of life and the quiet sound of Sanskrit.



**Figure 1.** Zhang Yichao’s travel map.

#### 2.4. The cultural significance of Dunhuang music images from the perspective of semiotics

If viewed from a deep perspective of semiotics, Dunhuang music images are actually a vast and precise “cluster of symbols”, with rich levels of meaning between their signifiers (lines, colors, forms on murals) and their referents (cultural concepts, religious beliefs, social structures behind them)<sup>[6]</sup>. In a picture of a band ensemble, it may contain the sheng of the Han ethnic group, the Pipa of the Western Regions, the bamboo flute of India, and the suona of Persia, vividly recording the historical process of different civilizations meeting and conversing here, and ultimately creating brilliance together.

The artistic expression form of the “no drum, no sound” instrument symbolizes the world of Buddha’s desire for non-action and the natural flow of Dharma sounds, and is a visual expression of the Buddhist philosophy of “dependent origination emptiness”<sup>[7]</sup>. When textual records were lacking, these precise depictions of instrument shapes, playing postures, and even band arrangements provided us with physical evidence that no text can replace for understanding the practice of music performance, the craftsmanship of instrument manufacturing, and the evolution of music systems in the Middle Ages. Therefore, the musical symbols of Dunhuang are cultural containers, crystallization of ideas, and witnesses of history. In the silent murals, they sound the voice of the entire era for us<sup>[8]</sup>.

### 3. The global transmission path of Dunhuang culture from the perspective of music symbols

#### 3.1. Digital dissemination of cultural relic images

The global dissemination of Dunhuang music symbols is relying on digital technology to achieve revolutionary

breakthroughs, transforming music relics that have been dormant for thousands of years into globally shared digital resources through systematic digital engineering. According to official data from Gansu, 350 million Chinese Yuan has been invested in the past five years to implement 98 projects for the protection, utilization, and digitization of Dunhuang grottoes. 300 caves have been digitized and collected, and over 100000 high-definition images have been obtained through the digital restoration project of Dunhuang cultural relics lost overseas. More than 500000 high-definition digital resources have been shared globally.

These resources have been integrated into the “Digital Scripture Cave” database platform, which has recorded 74651 unearthed cultural relics from the Dunhuang Scripture Cave, released over 9900 volumes of Dunhuang documents and scriptures, and over 60700 images. The content recognition of the scriptures has reached more than 8.4 million words, building a Dunhuang millennium digital library that connects ancient and modern times. Dunhuang Academy has also innovatively created the “Digital Dunhuang Open Material Library”, which opens more than 6500 high-definition digital resource archives to the world through blockchain technology, providing scholars and artists with one-stop official authorized resources.

At the level of dissemination, more than 10 short videos and mini programs such as “Cloud Appreciation of Dunhuang” and “Cloud Tour of Dunhuang” created by Gansu have attracted visitors from 120 countries and regions, reaching over 800 million people in total, making music symbols and dance images such as Pipa and chopsticks accessible cultural resources to global audiences at any time (Figure 2).

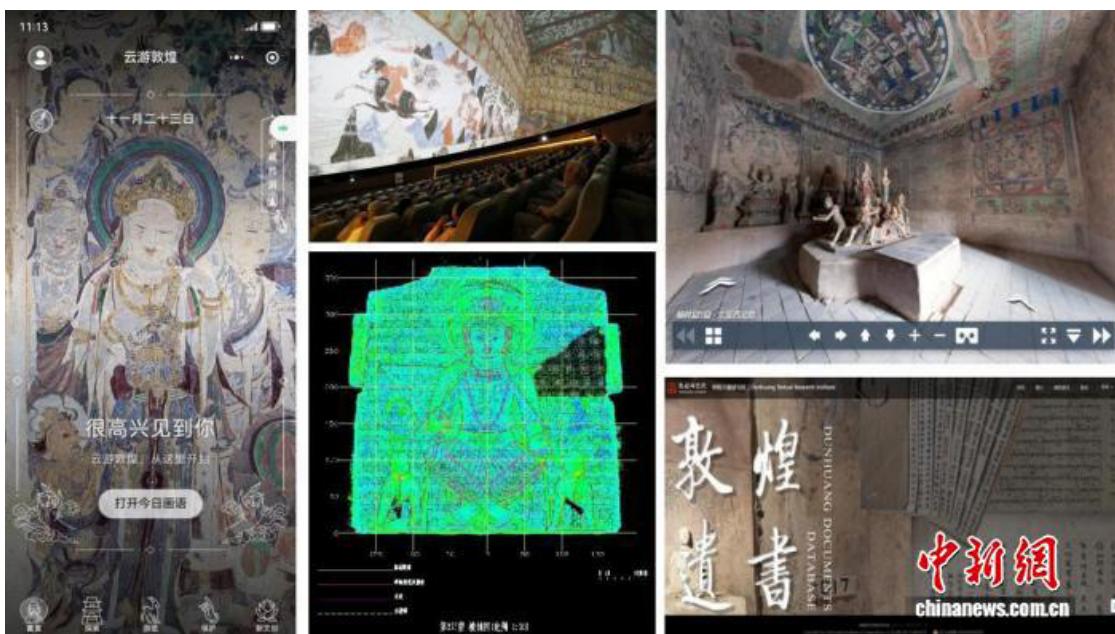


Figure 2. Digital resources of Dunhuang Grottoes cultural relics [Adapted from Dunhuang Academy].

### 3.2. Music restoration and stage art performance

Through academic restoration and artistic translation, Dunhuang music symbols have transformed from static images into dynamic stage language, achieving emotional resonance across cultural boundaries<sup>[9]</sup>. In terms of instrument restoration, the “Dunhuang Mural Music Reconstruction Project” launched by Dunhuang Culture and Tourism Group has successfully restored 105 Dunhuang mural imitations of ancient musical instruments, covering four categories: playing, striking, plucking, and string pulling.

In terms of innovative performance, the Dunhuang Grottoes Interactive Music Exhibition, jointly organized by Zhejiang Conservatory of Music and Dunhuang Culture and Tourism Group, selects 34 groups of 13 ancient musical instruments as the main elements. Using immersive sound technology, AI image activation and other digital means, the audience can

virtually perform four string straight neck slender waist Pipa and other instruments through camera gestures, truly “hearing” Dunhuang. The successful experience of the Huaxia Ancient Orchestra of Henan Museum is even more exemplary.

Based on cultural relics, the orchestra has restored more than 1000 ancient musical instruments from over 30 categories from ancient times to the Tang and Song dynasties, excavated and performed nearly 200 ancient songs, performed nearly 20000 times, and attracted more than 2 million audiences. Its adapted version of the ancient music “Let’s Do Good Together” has a daily playback volume of 120 million, proving that the combination of Dunhuang music elements and modern aesthetics can generate strong dissemination power (Figure 3).



Figure 3. Performance of the Huaxia Ancient Orchestra of Henan Museum.

### 3.3. The spread of music symbols in international cultural exchange

Dunhuang music symbols, as an important carrier of Chinese civilization, are reaching the world through high-end international platforms and joint projects, becoming a link to promote cultural dialogue<sup>[10]</sup>. The scientific research achievements of Gansu cultural relics protection have been extended to Myanmar, Kyrgyzstan and other countries jointly building the “the Belt and Road”. In addition to completing the digital protection project of Baganta Bingyu Temple in Myanmar, the Ministry of Science and Technology of China has approved the establishment of a joint laboratory of China Kyrgyzstan cultural heritage protection “the Belt and Road”.

The Digital Dunhuang Exhibition organized by Dunhuang Academy has been held more than 50 times in Beijing, Shanghai, Chongqing, Austria, Germany, Uzbekistan and other countries and regions, promoting Dunhuang music and dance art to the international stage. At the same time, the case of Chinese original music festival brands going global to Singapore demonstrates a new path for contemporary performing arts platforms to spread traditional culture. When the Bubble Island Music Festival was held on Sentosa Island in Singapore, multinational fans accounted for over 90% of the audience, and “post-95s” audiences exceeded 85%.

The social media topic views on all platforms exceeded 200 million. The Music Festival, together with the “China-Chic” cultural experience booth set up by Xiamen Satellite TV, enables international audiences to feel the charm of Chinese traditional music in interaction through the Han costume experience, Gezi Opera performance and other projects, and provides an innovative paradigm for the overseas dissemination of Dunhuang music symbols.

### 3.4. Integration of Dunhuang symbols into the music education system

Dunhuang City, with the theme of “Inheriting Dunhuang Culture, Promoting Mogao Spirit, and Cultivating New People

of the Times", will comprehensively integrate Dunhuang culture into various educational stages <sup>[11]</sup>. In terms of teaching material construction, the University has jointly published the "Students' World-Dunhuang Culture Special Issue", compiled and printed more than 20 school-based teaching materials such as My Home is in Dunhuang, and Dunhuang Paper Cuttings <sup>[11]</sup>. At the level of practical activities, the city has steadily carried out intangible cultural heritage inheritance activities such as Dunhuang Quzi Opera, Dunhuang Paper Cuttings, and Dunhuang Dance, created 12 sets of novel and unique Dunhuang dance exercises between classes, established 352 art associations, and created 42 art featured projects such as "Man Dance Flying Sky" and "Drum Dance Dunhuang".

The "Dunhuang Dance Intermission Exercise" choreographed by Dunhuang Middle School, a national civilized campus, won the special prize in the Gansu Province primary and secondary school big break competition and appeared on CCTV's "Golden 100 Seconds". In terms of educational research, Dunhuang City has organized over 30000 primary and secondary school students from all over the city to participate in branded research activities such as "Dunhuang Grottoes Art Enters Campus" and "Dunhuang History and Culture Zero Distance". Every year, more than 40 primary and secondary school students are selected to become "little tour guides" for the Mogao Grottoes. This educational model has been promoted nationwide through the "Dunhuang Culture Research Season" and has entered universities such as Central South University, Wuhan University, and Nanjing University, forming a complete communication chain from basic education to higher education.

## 4. Exploration into the practice of living inheritance under the symbol of Dunhuang music

### 4.1. Music technology empowers inheritance

The "Digital Dunhuang" project launched by the Dunhuang Academy uses high-precision 3D scanning and VR virtual reality technology to transform the murals in the Mogao Caves that carry millennium old music into an immersive music space. When the VR device is worn and reaches out to "touch" the Pipa in the murals, the ear will hear the "tilted cup music" restored from Dunhuang ancient music. Artificial intelligence has shone in the field of music score decoding. Faced with the difficult to interpret Pipa finger symbols in the Dunhuang Music Score, researchers have used deep learning algorithms to perform pattern recognition and cross validation on existing Tang Dynasty music scores. They have successfully digitally reconstructed the rhythm framework of ancient songs such as "Shui Gu Zi" and "Yi Zhou". Although they cannot fully restore ancient sounds, they provide valuable melodic blueprints for contemporary creation <sup>[12]</sup>.

### 4.2. Translation of Dunhuang phonology in contemporary music creation

Famous composer Tan Dun transformed the philosophical imagery of "singing without drums" in the murals of his symphonic theater "Ode to Compassion in Dunhuang" into a stunning stage reality. He specially made a batch of antique instruments to hang on the dome of the concert hall, resonating with the performance of the orchestra below through special vibration devices, and constructed a flowing "pure land of sound" using a sound system that combines reality and virtuality. Young electronic musicians interpret Dunhuang with completely different vocabulary, such as the experimental album "Dunhuang Illusion Sound" which superimposes the sampled sound of chopsticks with synthesizer sound effects layer by layer.

Through the unique spatial reverberation and delay effects of electronic music, it simulates the mysterious sound field in the Mogao Caves, creating a wonderful chemical reaction between ancient phonetics and cyberpunk aesthetics <sup>[13]</sup>. The dance theater "Silk Road Flower Rain" has pioneered the revival of mural paintings. For decades, the creators have continuously extracted the "S" shape and typical gestures from Dunhuang dance movements, and innovatively integrated them with the movement elements of Persian and Indian dances, completing the perfect translation from visual symbols to body symbols <sup>[14]</sup>.

### 4.3. The utilization of Dunhuang materials in ethnic music education

The Central Conservatory of Music and other higher music institutions have taken the lead in offering the course system of “Dunhuang Music and Dance Theory and Practice”, which not only teaches the research results of predecessors such as Ye Dong and Chen Yingshi in translating music scores, but also guides students to use imitation Dunhuang Pipa and chopsticks for practical performance, rebuilding the blood connection with ancient music in both technical and artistic dimensions<sup>[14]</sup>. Educational innovation aimed at teenagers is more interactive and fun, such as the interactive picture book “Dunhuang Music Fantasy Journey” launched by Shanghai Conservatory of Music Press.

Children use a mobile app to scan the flying images in the book, and the screen will present the construction principle of the chopsticks in three dimensions accompanied by classic music clips. On a broader level of social education, the online course “Decoding Dunhuang Ancient Music” has attracted over 100000 students on the MOOC platform. The instructor demonstrates the evolution of Dunhuang music scores through animation and invites students to try playing simplified ancient music melodies with modern instruments. This dissemination method that breaks the limitations of time and space is transforming specialized Dunhuang music knowledge into a shared cultural resource for society.

## 5. Conclusion

In summary, from the perspective of musical symbols, the global dissemination and dynamic inheritance of Dunhuang culture have shown unprecedented vitality. Through the digitization of cultural relics, the translation of stage art, international dialogue, and educational integration, Dunhuang musical symbols have broken through the boundaries of time and space, and have integrated into modern life in a perceptible and resonant way. Looking ahead to the future, we still need to work hard to make the millennium sound rhythm of Dunhuang echo in the symphony of world civilization, injecting eternal vitality into the mutual learning of human civilization.

## Disclosure statement

The author declares no conflict of interest.

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