



Performance practice of the Xu Gongning bianzhong

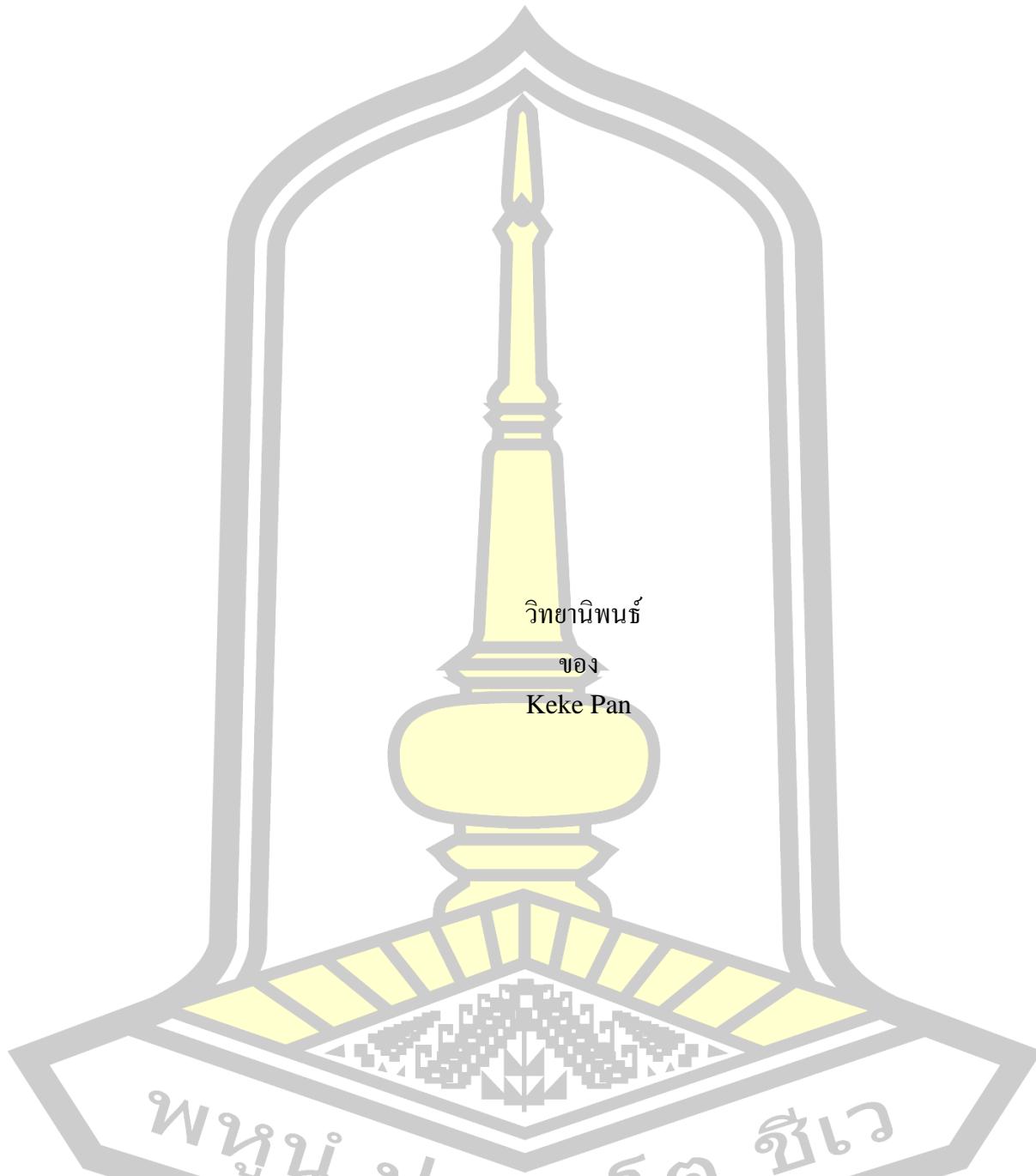
Keke Pan

A Thesis Submitted in Partial Fulfillment of Requirements for  
degree of Doctor of Philosophy in Music

September 2024

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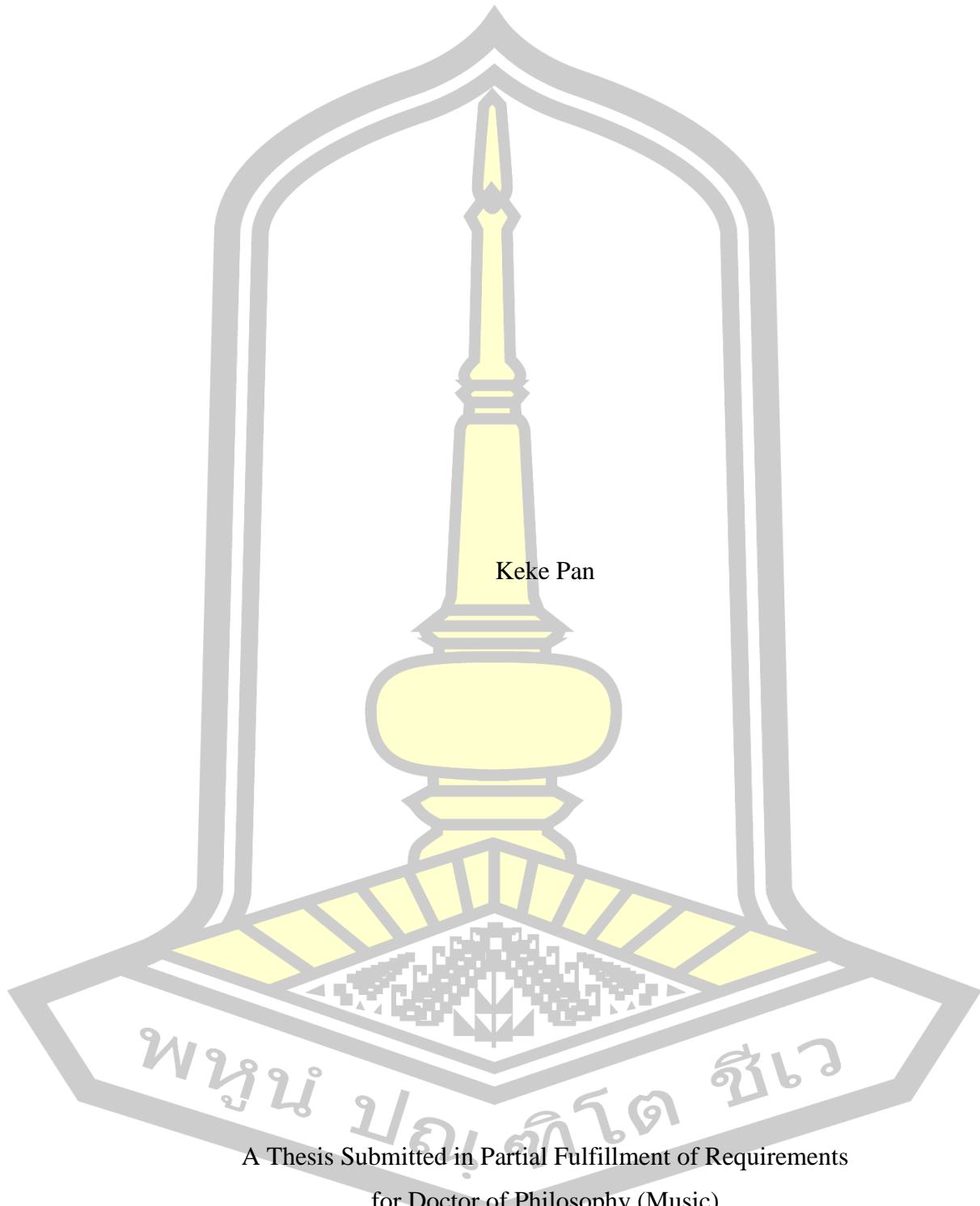
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### ABSTRACT

The title of this research is “performance practice of the Xu Gongning bianzhong”. The objectives are 1) To investigate the physical structure and tonal system of the Xu Gongning Bianzhong. 2) To analyze the repertoire performance techniques of the Xu Gongning Bianzhong. 3) To develop the transmission guidelines of the Xu Gongning Bianzhong. The paper systematically collects and analyzes relevant documents about chimes. The research data mainly comes from historical documents and field data obtained from field visits. The research methods used in the study include: Ethnomusicological, Qualitative research, Musicology, Musical Anthropology, Validation and analysis of data against set objectives. The research results are as follows:

- 1) Sorted out the physical structure and tonal system of the Xu Gongning Bianzhong. The physical structure includes the shape, decoration, arrangement, etc. of the Yong Zhong, Niu Zhong, and Bo Zhong; the tonal system includes the Pitch, Cent, HZ, etc. of each bell.
- 2) Analyze four musical works from the aspects of mode characteristics, musical form, harmony, etc., and summarize the playing methods of Xu Gongning's bells: split click, double click, counterattack, strike the bell stand, etc.
- 3) Taking Pingdingshan University as the object of investigation, through interviews with administrators, teachers, performers, and students, we sorted out the teaching system, teaching process, assessment method, and various performance practice activities of the chime course, and collected feedback from different groups.

Keyword : Bian zhong, Physical structures, Tonal system, Performance practice, Transmition and development

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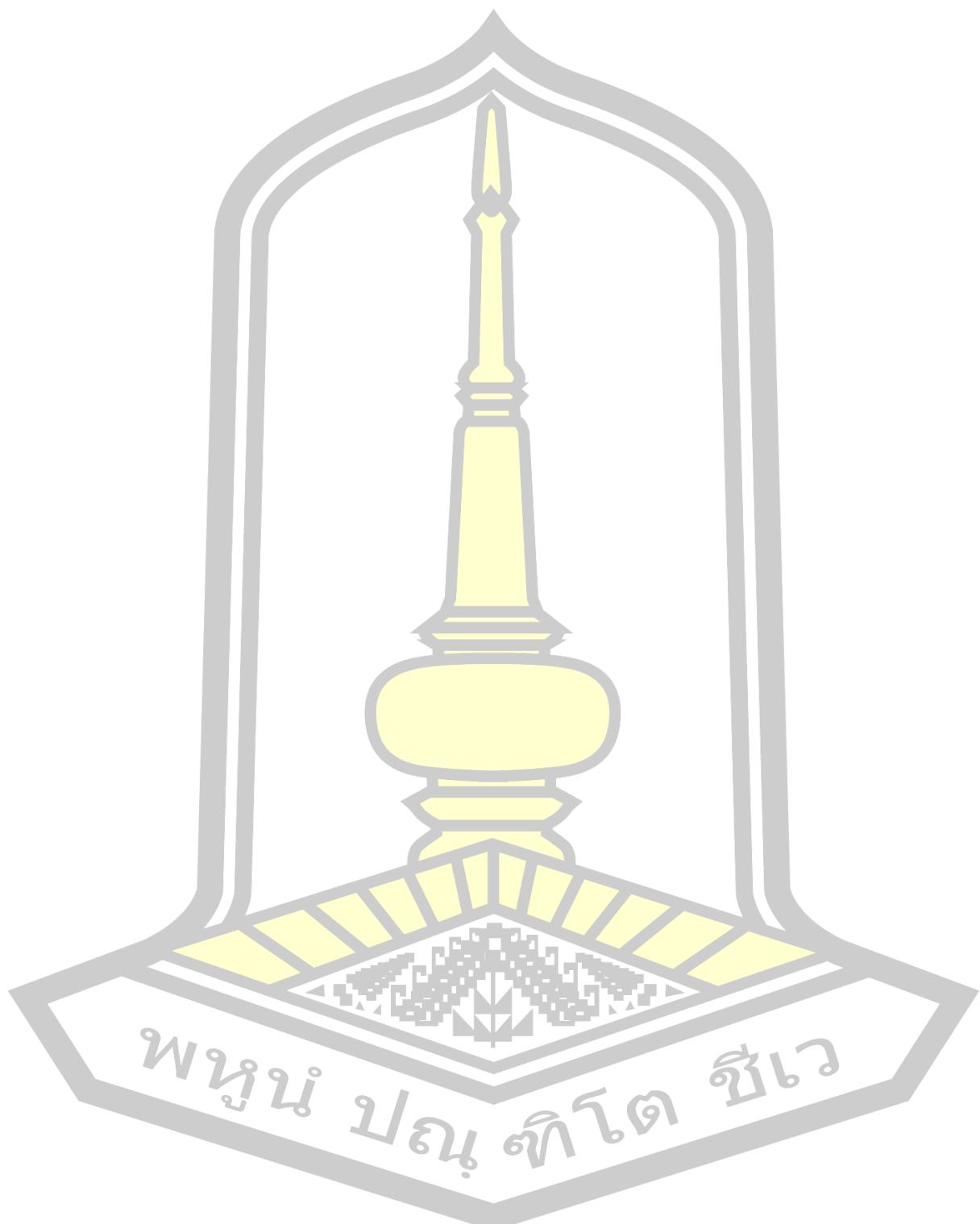
Thanks to all the teachers who imparted knowledge and inspired thinking - Dean Karin Khomkrich, Dr. Arsenio Nicolas, Dr. Sayam Chuangprakhon, Dr. Awirut Thotham, etc. It is your selfless help that allowed me to successfully complete my studies; thank you to the defense committee for your defense Experts - Dr. Chalermsak Pikulsri, Dr. Arsenio Nicolas, Dr. Kritsakorn Onlamul, Dr. Narongruch Woramitmaitree, etc. Thank you for your criticism and guidance, and for urging me to continue to improve in the future; thank you to everyone who helped me during the fieldwork. We would like to thank all authors cited and referenced in this article.

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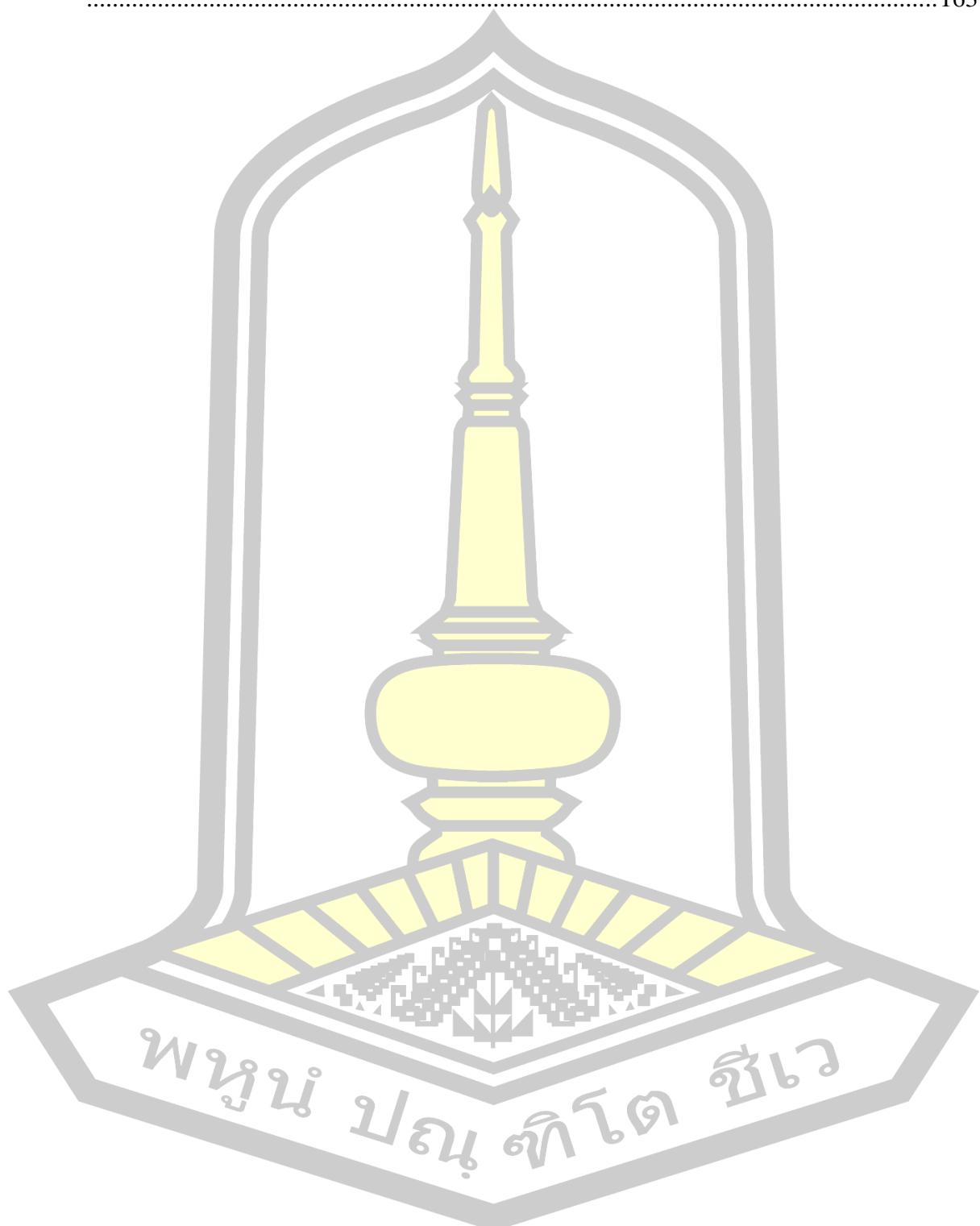
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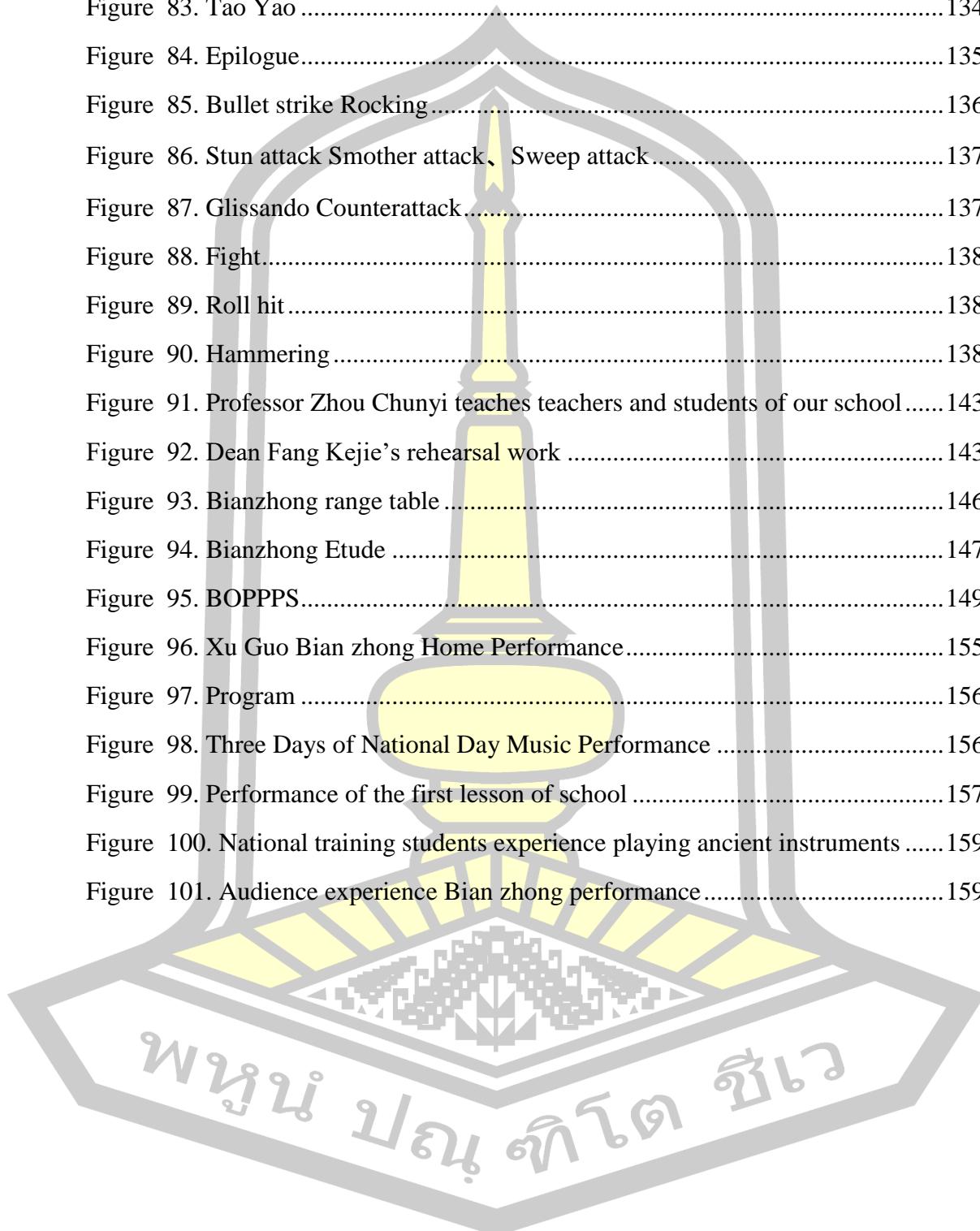
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# CHAPTER I

## INTRODUCTION

### 1.1 Background and problem of the research

Bianzhong are traditional Chinese bronze percussion instruments. Bianzhong originated in the Zhou Dynasty(1046BC-256BC) and flourished in the Qin Dynasty(221-207BC) and Han Dynasty(202BC-220AD) during the Spring and Autumn Period (770BC-476BC) and the Warring States Period. Bianzhong are composed of several bells of different sizes arranged high and low order, hung on a wooden frame to form a group of bells, Use a T-shaped wooden hammer or a long wooden stick to hit the bell body to produce different sounds. Xu Gongning Bianzhong are a set of Bianzhong unearthed in Xu Cemetery in 2002. Its owner was the fifteenth king of the Xu Kingdom during the Spring and Autumn Period. Xu Gongning Bianzhong are currently the largest combined Bian zhong with the largest scale, the most complete shape, the largest number of pieces and the most unique combination form in the same period. The complete set of Bian zhong consists of 37 pieces, which are divided into 5 groups: The NewZhong have 9 pieces in one group; the Yongzhong has two groups of 20 pieces, 10 pieces in each group; the BoZhong have two groups of 8 pieces, 4 pieces in each group. (Pingdingshan Municipal Cultural Relics Administration Bureau,2007)

This set of Bianzhong are rare in history in terms of shape, type, and combination, especially two sets of BoZhong of different shapes and styles (one set is a ridgeless chime and the other is a ridged chime), and the two types of Bianzhong came out of the same tomb. This is unique among the large-scale Bian zhong in the pre-Qin period, and its value is self-evident. The scale of this set of Bianzhong is second only to the Bianzhong of Marquis Yi of Zeng; in terms of age, it is more than two hundred years earlier than the Bian zhong of Marquis Yi of Zeng; the combination of bells is unique in historical materials. Regardless of the historical or cultural significance, this set of Bianzhong has a value and function that cannot be replaced by any other Bian zhong. (Youhua Wang,2009)

With the continuous development of archeology, more and more scholars have begun to pay attention to the excavation, inheritance and protection of ancient musical

instruments. As "the most important musical instrument in the country", Bianzhong are the focus of extensive research. In particular, Zeng Houyi's Bianzhong are favored by experts and scholars at home and abroad. The Xu Gongning Bianzhong has a history of 2,600 years, which is more than 200 years earlier than the world-famous Zeng Houyi Bianzhong. It has a value and function that cannot be replaced by any other Bian zhong in terms of history, music, culture, etc.

However, because Xu Gongning Bianzhong were discovered late (April 2002), public awareness is still low. A few scholars have paid attention to the shape and sequence characteristics of Xu Gongning Bianzhong, and have also carried out some Bian zhong music practice activities. However, they lacked research on the ontology of music and lacked in-depth thinking on the inheritance and innovation of Xu Gongning Bianzhong, which seriously restricted the development of Bian zhong art. How to resurrect ancient music that has been dormant for more than 2,600 years and make "silent" cultural relics "alive" and pass them on has become a topic of historical significance.

In 2009, Pingdingshan University prepared to establish Ya Orchestra, which was the first Ya Orchestra established in a mainland university under the inspiration and guidance of Professor Chunyi Zhou from Nanhua University in Taiwan. During the establishment of the Ya Orchestra, relevant personnel researchernt to Pingdingshan City Cultural Relics Bureau, Ye County Cultural Relics Bureau, Ye County Government and other places to investigate related musical instruments in the Central Plains, especially Xu Gongning Bianzhong in Ye County. From June 2010 to March 2011, Inspection group researchernt to Hubei Suizhou, Jingzhou, Shandong and other places to investigate the reproduction of Bianzhong and other musical instruments. Since then, in terms of music composition, program creation and performance practice, he has been supported by Chunyi Zhou, head of the Ya Orchestra of Nanhua University; Vice President of Wuhan Conservatory of Music Youping Li, Professor Chengyun Ding of Wuhan Conservatory of Music, Professor Yan Chen of Zhengzhou University Conservatory of Music and many other experts and scholars. With the unremitting efforts of all staff, on May 10, 2013, a press conference of the Ya Orchestra of Pingdingshan University was successfully held in the Pingdingshan Art Center, and an excellent performance of " Ying long Feng yun", which is based on the historical

background of “Yingguo”, was successfully held. A feast of elegant music; in October 2013, at the invitation of the China Conservatory of Music, I researchernt to Beijing to participate in the Fifth Traditional Music Festival, which gained a good reputation; in December 2019, the "Book of Songs" elegant music special session was successfully held in the Pingdingshan Art Center. (Wei Liu,2014)

Xu Gongning Bianzhong are currently the largest combined chime bells with the largest scale, the most complete shape, the largest number of pieces and the most unique combination form in the same period. Due to its late discovery, many scholars have not covered the research field of Xu Gongning Bianzhong. Currently, making "silent" cultural relics "come alive" and pass them on has become a topic of historical significance. Based on this, I developed three "research objectives".

## 1.2 Research objectives

- 1.2.1 To investigate the physical structure and tonal system of the Xu Gongning Bianzhong.
- 1.2.2 To analyze the repertoire and performance techniques of the Xu Gongning Bianzhong.
- 1.2.3 To develop the transmission guidelines of the Xu Gongning Bianzhong.

## 1.3 Research question

- 1.3.1 What is the physical structure of the Xu Gongning Bianzhong? What specific tonal system do Bian zhong exhibit? How do they contribute to the overall musical performance of the Xu Gongning Bianzhong?
- 1.3.2 How do the performance techniques employed in the repertoire of the Xu Gongning Bianzhong contribute to the interpretation and execution of the selected pieces?
- 1.3.3 What are the ways and methods for the transmission and development of Xu Gongning's chime culture in academia?

## 1.4 Research benefit

- 1.4.1 By studying the physical structure and tonal system of the Xu Gongning Bianzhong, researcher can understand the range and scale of Bian zhong, deepen their

understanding of the unique sound quality of these ancient instruments, lay the foundation for track creation, and contribute to a broader understanding of Chinese tradition music.

1.4.2 Analyzing the repertoire performance techniques of the Xu Gongning Bianzhong will provide insights into the nuanced approaches musicians use to interpret and perform these historical pieces, enriching the artistic landscape of traditional music practices.

1.4.3 Developing transmission guidelines for the Xu Gongning Bianzhong ensures the preservation and continuation of this cultural heritage within academic institutions, fostering its legacy for future generations of musicians and scholars to explore and appreciate.

## 1.5 Definition of terms

1.5.1 Xu Gongning Bianzhong refers to a complete set of 37 chime bells unearthed from the Xugong Tomb;

1.5.2 The physical structure refers to the shape, the decoration, the arrange of the Bianzhong;

1.5.3 Tonal system refers to arranging musical tones of different levels in order to form a sequence, which includes tonal system structure of Bian zhong and specific sound measurement data;

1.5.4 Analysis repertoire refers to the mode, musical form, harmony of the Xu Gongning Bianzhong selection;

1.5.5 Performance technique refers to the specific methods and approaches used by performers when playing chime music, including single click, double click, counterattack, sweep strike, bell strike, etc;

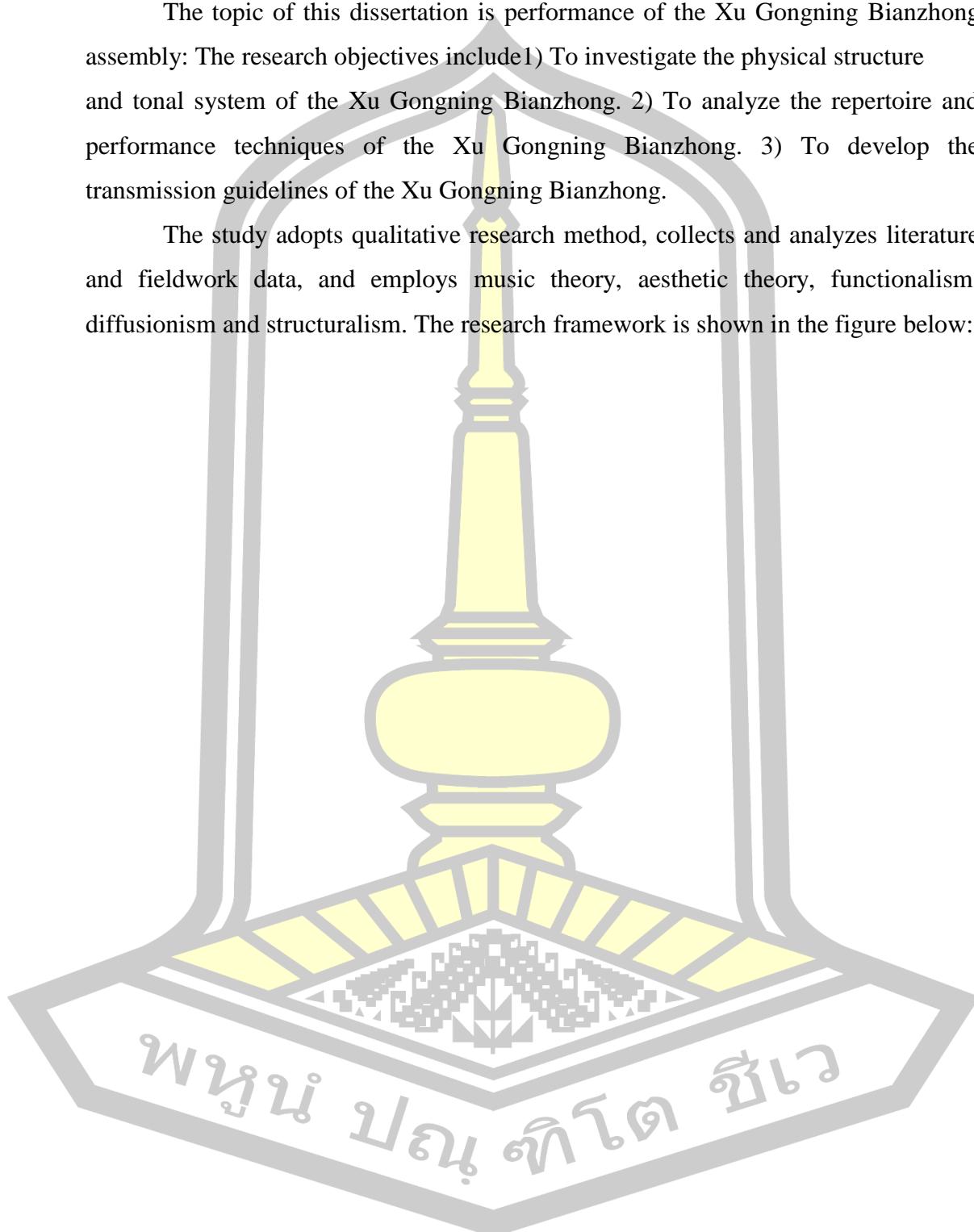
1.5.6 Transmission guidelines refers to methodologies, and best practices devised for effectively transmitting the cultural heritage and musical tradition of the Xu Gongning Bianzhong within academic contexts, facilitating its preservation, dissemination, and continued practice;

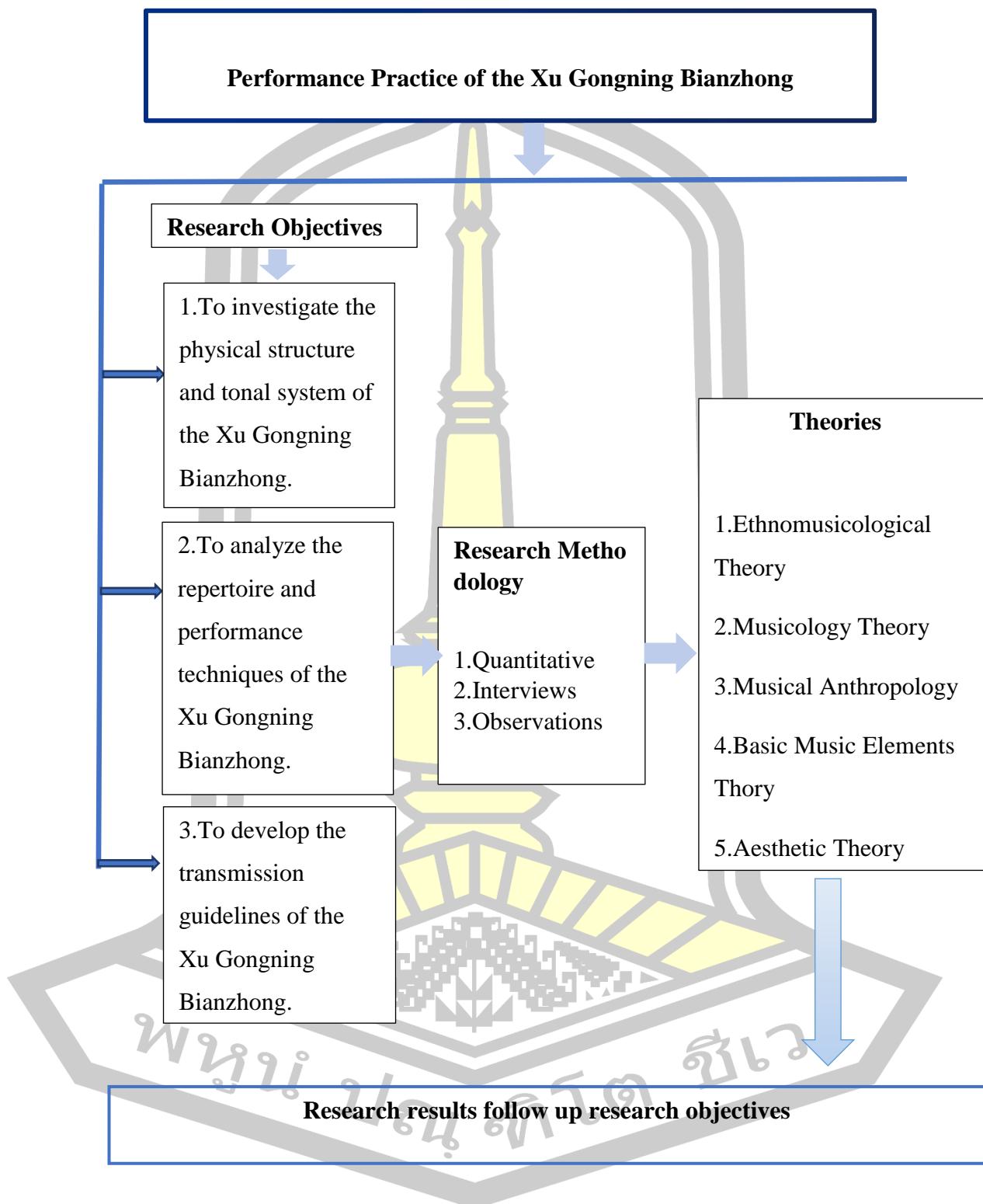
1.5.7 Pingdingshan University refers to a university located in Pingdingshan City, Henan Province, China. In 2010, The school copied a set of Xu Gongning Bianzhong and established the first Ya Orchestra in mainland China.

## 1.6 Conceptual framework

The topic of this dissertation is performance of the Xu Gongning Bianzhong assembly: The research objectives include 1) To investigate the physical structure and tonal system of the Xu Gongning Bianzhong. 2) To analyze the repertoire and performance techniques of the Xu Gongning Bianzhong. 3) To develop the transmission guidelines of the Xu Gongning Bianzhong.

The study adopts qualitative research method, collects and analyzes literature and fieldwork data, and employs music theory, aesthetic theory, functionalism, diffusionism and structuralism. The research framework is shown in the figure below:





## CHAPTER II

### LITERATURE REVIEW

The topic of this research is "To analyze performance practice of the Xu Gongning Bianzhong". In order to achieve the goal, the researcher reviewed the relevant documents to obtain the most comprehensive information available to be used in this research. This chapter consists of six sections, as shown below.

- 2.1 General Knowledge abou Bianzhong
- 2.2 General Knowledge abou the history of Xu Gongning Bianzhong
- 2.3 General Knowledge of the physical structure and tonal system characteristic of Xu Gongning Bianzhong
- 2.4 General Knowledge of Bianzhong performance practice and performance techniques
- 2.5 General Knowledge about the transmition and development of Xu Gongning Bianzhong
- 2.6 Related foreign research
- 2.7 Theories Used in this Research
- 2.8 Documents and Research Relate

#### 2.1 General Knowledge about Bianzhong

##### 2.1.1 Research on the origin of Bianzhong

Bronze music bells began in the pre-Qin Dynasty(1636-1911), and records are scattered in several ancient documents. These classics contain relevant records on the origin, functions, casting techniques, etc. of the bell. These mythological records show the thinking of the ancestors. "The Classic of Mountains and Seas - Hai Nei Jing" records: "Drums and extensions cast bells to create music", "Lu's Spring and Autumn Period (770 BC - 476 BC)- Ancient Music Chapter" records: "The Emperor ordered the musician Ling Lun to cast twelve bells", "Shiben" records: "Put down (or stick) as a bell". These legendary records show that the origin of music bells is very early and should be traced back to a certain period of prehistoric civilization. Musical bells already existed in the late primitive society. This clock is probably not a copper bell,

but a bell in its original state - a "pottery bell". However, the cross-section of its cavity is not a perfect circle, which is close to the main characteristics of later music bells. (Ke Yuan,1980)

Dingsui Jiang (1995) believes that China's bronze bell-like musical instruments should have begun in the Xia Dynasty. At that time, oblate copper bells already existed, which were the prototype of bells and did not have the true meaning of musical bells. The earliest bronze bell ever seen in the archaeological community was unearthed in the second phase of the Erlitou Culture (1900 BC to 1500 BC) in Yanshi. It has been standardized in shape and has the shape of a tile, and has the basic characteristics of a bronze bell. It is an undoubted fact that during the Yin and Shang Dynasties in China, a large number of grouped bronze music bells - cymbals - were popular.

Renjun Wen (1982) believed in the mathematical interpretation of acoustic knowledge in "Kao Gong Ji" that "Zhou Li Kao Gong Ji" was an extremely important scientific and technological monograph in the pre-Qin period, and "Kao Gong Ji Fu Shi" said "Fu the clan is the bell". "Fu's" made a qualitative analysis of the sound of the bell. In addition, "Kaogongji" also recorded the names of the various parts of the Yongzhong in detail, and systematically described the Bian zhong-making bell regulations and sound conditions. It has almost the same content as European bells. Discussions date back to about 1500. "Kaogongji" is a precious historical material that people can use for reference in the study of pre-Qin clock-making technology and acoustics level.

People in the Song Dynasty realized that the proportion of copper-tin alloy used to make Bian zhong had a great influence on the timbre. It was recorded in "Song History" and "Song Dynasty Facts Class Garden" that "copper and tin are not refined, and the rhyme is not beautiful." Clear" and so on.

#### 2.1.2 Research on the cultural attributes of Bianzhong rituals and music

Jianjun Fang (2006)'s book "Research on the Cultural Structure and Social Function of Shang and Zhou Musical Instruments" mainly uses unearthed musical instruments and related archaeological materials to conduct a comprehensive study on the multiple structures and social functions of Shang and Zhou musical culture.

Di Luo (1998) raised doubts about the cultural attributes of Zeng Houyi Bianzhongin "Questions on the cultural attributes of Zeng Hou Yi'sBianzhong- "Zeng

music culture" may be related to "Shang-Song culture"". He believed that, Zeng State was a country of rituals and music where people with the surname "Zi" from Shang to Song Dynasty made sacrifices. Zeng culture may belong to Shang-Song culture.

Dong Haihong (2022) in "Looking at the Ritual and Music System of the Zhou Dynasty(1046 BC-256 BC) and the Noble Excess System of the Spring and Autumn Period (770 BC - 476 BC)and the Warring States Period from the Perspective of Bian zhong", Dong Haihong (2022) focused on Bian zhong, combined with relevant historical materials and reports of unearthed cultural relics, to study the Zhou Dynasty(1046 BC-256 BC) and the Spring and Autumn Period (770 BC - 476 BC)The ritual and music system of the Warring States Period. The problem of aristocratic overextension during this period.

Wenjing Qu (2020) in "Looking at the trajectory of the transformation of two-week rituals and music from the decoration of Bian zhong at the Zhengguo sacrificial site", studied and compared the decoration of the bells and Niuzhong unearthed from the Zhengguo sacrificial site, and gradually deepened into the "Xinzheng style" This paper explores the trajectory of the transformation of rituals and music in the two weeks from the aspects of its origin, the influence between the cultures of Zheng and Chu, and the Zheng people's concept of rituals and music.

Shunfang Hu (2014) in "A Brief Analysis of the Cultural Attributes and Musical technique of Zenghou Yi's Bian zhong", discussed the cultural attributes and musical technique of Zenghou Yi's Bian zhong, and explored the role of Zenghou Yi's Bianzhong in culture, art, and the significance and achievements represented by many aspects of science and technology.

### 2.1.3 Research on the physical structure and tuning system of Bian zhong

Chunyi Li (1996) applied the methods of archaeological stratigraphy and typology in the book "A Review of Musical Instruments Unearthed in Ancient China" to analyze the quantity and variety of most of the musical instruments discovered before the Han Dynasty(202BC-220AD).

Yu Sui (2023) in "Analysis of the Form and Dual-tonal State of Pre-Qin Bian zhong Unearthed in Henan", used statistical standard deviation as the core analysis method to summarize the regional form characteristics of the Pre-Qin Bian zhong in

Henan Province and clarify the music The development of bell shape and dual tonal state in this aspect.

Xiangpeng Huang (1978) in "Neolithic and Bronze Age Known Acoustic Data and the History of Scale Development in my country" made a series of questions on the pre-Qin scale, the relationship between scale and temperament system, the emergence of temperament system, and the spin palace. Bold and reasonable inferences and the discovery of the double-tonal phenomenon of pre-Qin Bian zhong have certain significance for the study of Bian zhong.

Xiangpeng Huang (1981) in "A Preliminary Study on the Musicology System of Zeng Hou Yi Zhongpan Inscription", explained the names of the laws, scales, and changes in the inscriptions; It is a model work on the study of the Bian zhong sound sequence of Marquis Yi of Zeng.

Guangsheng Feng (2002) believed in "Double-tonal Technology of Bian zhong in the Zhou Dynasty (1046 BC-256 BC) and Double Application of Bells" that the technology of double-tonal bells had matured in the middle and late Western Zhou Dynasty(1046 BC-256 BC), and he focused on the definition of double-tonal bells, the formation and application of double-tonal technology range and many other issues. These studies contribute to scientific research evaluating and using the acoustic data of ancient Bian zhong.

Zichu Wang is a major scholar of Chinese music archeology research since the end of the 20th century. He is responsible for compiling the "Chinese Music Relics Series", which includes music relics unearthed and handed down from all over the country.

Zichu Wang (2003) in "Niu zhong" believed that Niuzhong were first seen in the late Western Zhou Dynasty (1046 BC-256 BC) and early Spring and Autumn Period. At that time, the use of Bian zhong was gradually becoming popular among the middle and small aristocrats, and the playing melody showed a trend of diversification, and Bian zhong came into being.

Yilong Kong (2005) believed in his doctoral dissertation "Yongzhong sound sequence and Its Mathematical Characteristics in the Early and Mid-Western Zhou Dynasty(1046 BC-256 BC)" that the Yongzhong Zhengdrum sound sequence in the Western Zhou Dynasty(1046 BC-256 BC) presented three situations, and their pitches

had a common characteristic, that is, sound The higher the pitch, the larger the interval between the two adjacent drums, and the lower the pitch, the smaller the interval between the two adjacent drums, showing the development trend of upper big bottom and small bottom.

Datong Huang (2021) "The Derivation of the Structure Style and Formation of the Twelve Bian zhong of Zeng Houyi Also on the Evidence and Reasoning Method", taking the evidence on Zeng Zhongzhong's inscription and the mutual evidence between the evidence as the only bridge for fact determination, Discuss the structural style of the pure twelve names on the Zeng Zhong and how they were generated, and verify whether the relevant mainstream cognition of the unearthed Zeng Zhong in the past 40 years belongs to the issue of revealing the truth about the pre-Qin period.

Yaxiong Du (2021) pointed out in "The Concept of Temperance in the Structure of Zenghouyi's Bian zhong and Its Current Application", the structural practice of the "Four Bases", "Four Corners" and "Four Zengs" of Zenghouyi's Bian zhong has already used the concept of "regulation". According to Hou Zhong's structure, he named the three tonal s that do not yet have a rank name, and proposed a structure that can be used to express Zeng Shou and use it in the teaching of Chinese music history and Chinese music theory.

Rongda Zheng (1998) in "Research on the Rhythm Positioning of Zenghou Yi's Bian zhong Copy", through the analysis and study of the rhythmic connotation contained in the inscription of Yinhou Yi's Bian zhong, he proposed the theoretical data of the twelve temperament positions of Zeng Hou Yi's Bian zhong. Civilization Some issues regarding how the replica of Zeng Houyi's Bianzhong can maintain the performance of the original music were discussed.

Xian Cui (1988) pointed out in "A Brief Analysis of the Relationship between Zeng Hou Yi's Bianzhong and Palace Tunes" that the twelve palace tunes of Zeng Hou Yi's Bianzhong have certain practicality, and the relationship between the palace tunes is arranged in order. The order of far and near reflects a certain organization. Logically, he proposed concepts such as "Three Cardinal Guidelines", "Four Palaces of Practice", "Five Equalities of Right Speech", and "Basic Six Equalities".

## 2.2 General Knowledge about the history of Xu Gongning Bianzhong

### 2.2.1 Xu Gongning Bianzhong unearthed from Xu Cemetery in Ye County

The old site of Yecheng in the Spring and Autumn Period (770 BC - 476 BC) is the ancient county seat of Yexian County, which is about 15 kilometers southwest of Yexian County, Henan Province, and is now called Jiuxian County. The circumference of the city is nearly 10 kilometers, and it is called the Northern Four Kingdoms of Chu State together with Chen, Cai and Butang. The strategic location of Yedi is very important. To the south is the Fangcheng Ancient City of Chu State, which is the only way for Chu State to enter the Central Plains; to the east are Juancheng, Wuyang, Chen, and Cai; to the north is Kunyang, Xiangcheng, Shuangyi, and Butang are important military sites that Chu State has carefully managed for a long time. According to "Historical Records" and other records, Yedi should be one of the local administrative regions of Chu State, that is, "outside Fangcheng". (Briefing on Spring and Autumn Tomb No. 4 in Jiuxian County, Yexian County, Henan Province, 2007)

Xu State was a bullied and weak vassal state in the Spring and Autumn Period. There are few ancient documents, but its unusual political status in the Spring and Autumn Period (770 BC - 476 BC) is evident because of its aristocratic identity and geographical location. The history and frequent migration of Xu State have aroused the attention and research of many experts and scholars, such as Chen Changyuan's "Xu State's First Confidentiality and the Historical Geographical Issues of its Migration", He Guangyue's "The Formation and Migration of Xu State", Xu Tongxin's "Research on the History and Geography of Xu State", etc., have conducted detailed research on many issues such as Xu State's first fiefdom, migration process, bronze wares, history and geography. According to historical records, the initial fiefdom of the ancient Xu Kingdom in the early Zhou Dynasty (1046 BC-256 BC) should be located in Gucheng Village, Zhangpan Township, 20 kilometers east of today's Xuchang City, that is, Xu County in the Han Dynasty(202BC-220AD). In the fifteenth year of Lu Chenggong (576 BC), "Xu Linggong was afraid of being forced by Zheng, so please move to Chu. Xin Chou, the son of Chu moved Xu Yuye." From then on, Xu State was forced to move the whole country to Yeyi in Chu State. Ye Di became the common governance of Xu Guo and Ye Yi. Since then, Xu Guo has placed himself in the state of Chu, relying on the people of Chu to survive. (Zuo Zhuan. Fifteen Years of Cheng Gong, 1979)

In the spring of 2002, an unsealed ancient tomb was discovered in the north of Changzhuang Village, Jiuxian Township, Ye County, Pingdingshan City, Henan Province, on the south bank of the Li River on the west side of the Xunan Highway. The archaeological survey found that the ancient tomb was seriously stolen. Dozens of bronze fragments that were not stolen were found in a large robbery cave. Approved to carry out rescue and excavation work on ancient tombs. Later, Mr. Li Xueqin, an archeology expert of the Chinese Academy of Social Sciences, determined that the tomb was the tomb of Xu Linggongning, the fifteenth king of Xu State in the Spring and Autumn Period. The tomb is called the No. 4 Spring and Autumn Tomb in Jiuxian County, Yexian County, and its geographical location is Yecheng, the first migration place of the ancient Xu Kingdom in the Spring and Autumn Period. (Briefing on Spring and Autumn Tomb No. 4 in Jiuxian County, Yexian County, Henan Province, 2007)

Due to the robbery of the ancient tomb, most of the funerary objects were lost. Fortunately, the relatively complete bronze ritual instruments were not damaged. There are 73 musical instruments and decorations including copper Bian zhong, Bianzhong and frame decorations, bell stick heads, and drum bases. In particular, there is a set of 37 multiple combination bronze Bian zhong, consisting of 20 Yongzhong, 9 Ox bells and 8 Bozhong. The combination of shape and structure is unique and of great value. This set of bronze bells is second only to Zeng Hou Yi's Bianzhongin scale, but its age is about 100 years earlier than Zeng Hou Yi's. The unearthing of this batch of musical instruments can be called another major discovery in Chinese music archeology. It is of extremely high academic value for studying the evolution history of the diversified combination of bronzeBianzhongin the Spring and Autumn Period (770 BC - 476 BC) of my country.(Impression of the chimes of Tomb No. 4 in Jiuxian County, Yexian County, Henan Province, 2009)

### 2.2.2 Making process of Xu Gongning Bianzhong

In order to form the first Ya Orchestra in a mainland university, since 2009, the leaders of Pingdingshan University and the members of the Ya Orchestra preparatory team have visited various places to conduct investigations in terms of musical instruments, composition, music and dance creation, etc. Among them, the imitation of Xu Gongning Bianzhong unearthed in Ye County, Pingdingshan City, as an important symbolic instrument in the formation of the band, is particularly important.

From June 11th to 14th, 2010, the Pingdingshan University Bian zhong inspection team went to Suizhou and Jingzhou, Hubei Province to investigate the reproduction of Bian zhong and the culture of Bian zhong.

After several on-the-spot investigations and expert recommendations, it was finally decided to cooperate with Suizhou Bian zhong Culture Media in Hubei Province to jointly imitate Xu Gongning Bianzhong in Ye County. side work. Suizhou Bian zhong Culture Media is responsible for the selection of materials, casting, grinding, molding and other work in the specific production.

Xu Gongning Bianzhong have great historical value, humanistic value and artistic value. For this reason, the number, type, and size of the imitation bells are strictly copied according to Xu Gongning 1:1 ratio, and the required material is bronze. The ingredients are reasonable and the production adopts the lost wax method, which requires accuracy, beauty and generosity, reflecting the basic style of the Central Plains palace celebration bells in the Spring and Autumn Period. It needs to be developed in strict accordance with the requirements of its physical characteristics and technical indicators to reflect the style and characteristics of the original Bian zhong. Through academic exchanges and discussions, the temperament, pitch, and phoneme arrangement of the imitation Bianzhong were determined, and detailed technical parameters were calculated to ensure reference for temperament, frequency, tuning and other issues during the production process. The temperament system adopts the three-point profit and loss rhythm recorded in "Lushi Chunqiu" and is appropriately adjusted in combination with the pure temperament. (Wei Liu, Reconstruction of traditional elegant music and innovation in subject construction in Universities and universities, 2014)

### 2.3 General Knowledge of the physical structure and tonal system characteristic of Xu Gongning Bianzhong

In 2022, with the unearthing of Xu Gongning Bianzhong, some experts and scholars turned their research perspectives to this ancient musical instrument 2,600 years ago. Wang Zichu, Chen Yan, Kong Yilong, Feng Zhuohui, Wang Youhua, Shao Xiaojie, Wang Renya, etc. paid tribute to Xu Gongning Bianzhong. Conduct research on the form, arrangement, sound sequence, combination, cultural value, artistic value, scientific value, etc. These studies can not only supplement and demonstrate the

deficiencies or errors recorded in the pre-Qin documents, but also play a role in revealing the two weeks The development of ritual and music culture during the period, the evolution of the ritual and music system, and people's cognitive ability of music during the two-week period, especially the historical aspect of the collision and integration of the Shang and Zhou music culture in the Central Plains and the Jianghan, Jingchu music culture, All have important historical significance.

Despite this, because Xu Gongning's Bianzhong were unearthed relatively late (April 2002) and are not as popular as Zeng Hou Yi's Bian zhong, there are not many research results so far. Searching the National Knowledge Infrastructure, there are only 12 articles.

Pingdingshan Municipal Administration of Cultural Relics and Ye County Chen Changyuan (1993) jointly wrote the "Brief Report on the Excavation of the No. 4 Spring and Autumn Tomb in Jiuxian County, Henan Province". This paper involves an overview of the unearthed situation of Bian zhong among musical instruments.

Zichu Wang (2007) believed in "Two Groups of Spring and Autumn Tombs Unearthed from No. 4 Spring and Autumn Tomb in Jiuxian County, Yexian County, Henan Province" that large-scale music bell formations had been produced as early as the middle and late Spring and Autumn Period, more than a hundred years before Zeng Houyi's Bian zhong, that is, It is reflected in the two sets of compilations unearthed from the No. 4 Spring and Autumn Tomb in Yexian County.

Zichu Wang&Xiaojie Shao (2008) co-authored the article "Analysis of the Rhythm of the Bian zhong of Tomb No. 4 in Jiuxian County, Yexian County", based on the characteristics of tonal system and grouping of the Bian zhong of Tomb No. 4 in Jiuxian County, Ye County, to demonstrate the main cultural attributes of the Bian zhong , highlighting the social reality of the fusion of Central Plains culture and Chu culture that had influenced the course of Chinese history in that period.

Zichu Wang (2009) made a systematic analysis of Ye County Bian zhong in his paper "Impressions of Bian zhong from Tomb No. Unprecedented, the form of the four-piece group was an important norm in the Central Plains in the middle of the Spring and Autumn Period, especially in the area of Zheng Guo."

Yan Chen (2011) in the paper "Analysis of Music Cultural Factors of Bian zhong Unearthed from Xuling Cemetery", discussed the music culture phenomenon of

the music culture of Xuling Cemetery Bian zhong, which was deeply influenced by the music culture of the Central Plains and Chu music culture, and had the characteristics of compatibility between the two, pointing out that This set of bronzeBianzhongis a concrete manifestation of the integration and accumulation of northern and southern cultures.

In Yan Chen's (2015) paper "Discussion on the Biography of Xu Cemetery", the special shape, decorative features, sound beam structure, sound sequence phenomenon, and the cultural attributes of the times carried by the two groups of platters unearthed from the Xu Cemetery were used. On the one hand, it discusses the evolution of Bo clocks in the Spring and Autumn Period (770 BC - 476 BC) and the unique cultural phenomena presented by the Bo clocks compiled in Xugong Cemetery.

Yan Chen's (2015) Peek into the Changes of Ritual and Music Culture in the Spring and Autumn Period (770 BC - 476 BC) from the Bian zhong of Xu Cemetery, taking the unearthed Bian zhong from Xu Cemetery as a case, sorted out a clear evolution of the ritual and music system in the Spring and Autumn Period (770 BC - 476 BC)from prosperity to decline.

Renya Wang (2016) sorted out the imitation process and modern inheritance of Xu Gongning Bianzhong in the paper "Research on the Artistic Practice and Modern Inheritance of Xu Gongning Bianzhong"; combined with the specific performance of the Pingdingshan University Ya Orchestra, a brief analysis of Xu Gongning Bianzhong'modern repertoire, showing the performance application value and cultural inheritance value of Xu Gongning Bianzhongin the practice of modern gala music.

Yan Chen (2019)'s "Research on the Bronze Bian zhong of Xu Cemetery in Spring and Autumn", from the perspective of musicology and music archaeology, conducts an all-round study on the shape, arrangement, sound sequence and cultural, artistic and scientific value of the Bian zhong of Xu Cemetery Research.

Kong Yilong (2007) "Inspection Notes on the Bian zhong of Tomb No. 4 in Jiuxian County, Ye County, Henan Province", Feng Zhuohui (2008) "Research on Shang and Zhou Dynasties", and Wang Youhua's doctoral thesis "Research on the Bian zhong of the Pre-Qin Large Combination" about the Bian zhong combination in the Xu cemetery The chapters all discuss the combination phenomenon of Xu's cemetery bells, the bell form system, and chronological research.

## 2.4 General Knowledge of Bianzhong performance practice and performance techniques

### 2.4.1 Performance practice of Xu Gongning Bianzhong

In recent years, Pingdingshan University has been committed to the creative transformation and innovative development of Xu Gongning Bianzhong. The Pingdingshan University Yale Orchestra has taken a big step forward in the practice of the creation of the Central Plains Yale in many times of creation and text arrangement and creation, and held a Yale press conference in Pingdingshan University on May 10, 2013. And the special performance of Yingguo Gagaku culture in the Western Zhou Dynasty(1046 BC-256 BC) in the Central Plains, allowing the ancient art of Bian zhong to pass through the millennium and lively inherited in the practice of stage performances in the Western Zhou Dynasty(1046 BC-256 BC). On October 11, 2013, he was invited to participate in the Fifth Beijing Traditional Music Festival hosted by the China Conservatory of Music. ", "Yinghou Worshiping Ancestors" and "Yingshi Yongyong" cover the major events in the history of ancient Yingguo, such as the migration of ancient Ying ancestors, the establishment of Yingguo, and Yinghou worshiping ancestors. The customs of Ying people recorded in literary works have been newly shaped, artistically showing the real-life pictures and rich inner world of the native Ying country ancestors, performing the honest and honest folk customs of Ying country in the prosperous age, and completing the creationblank of the Central Plainsgala. (<https://www.pdsu.edu.cn/info/1014/1138.htm>)

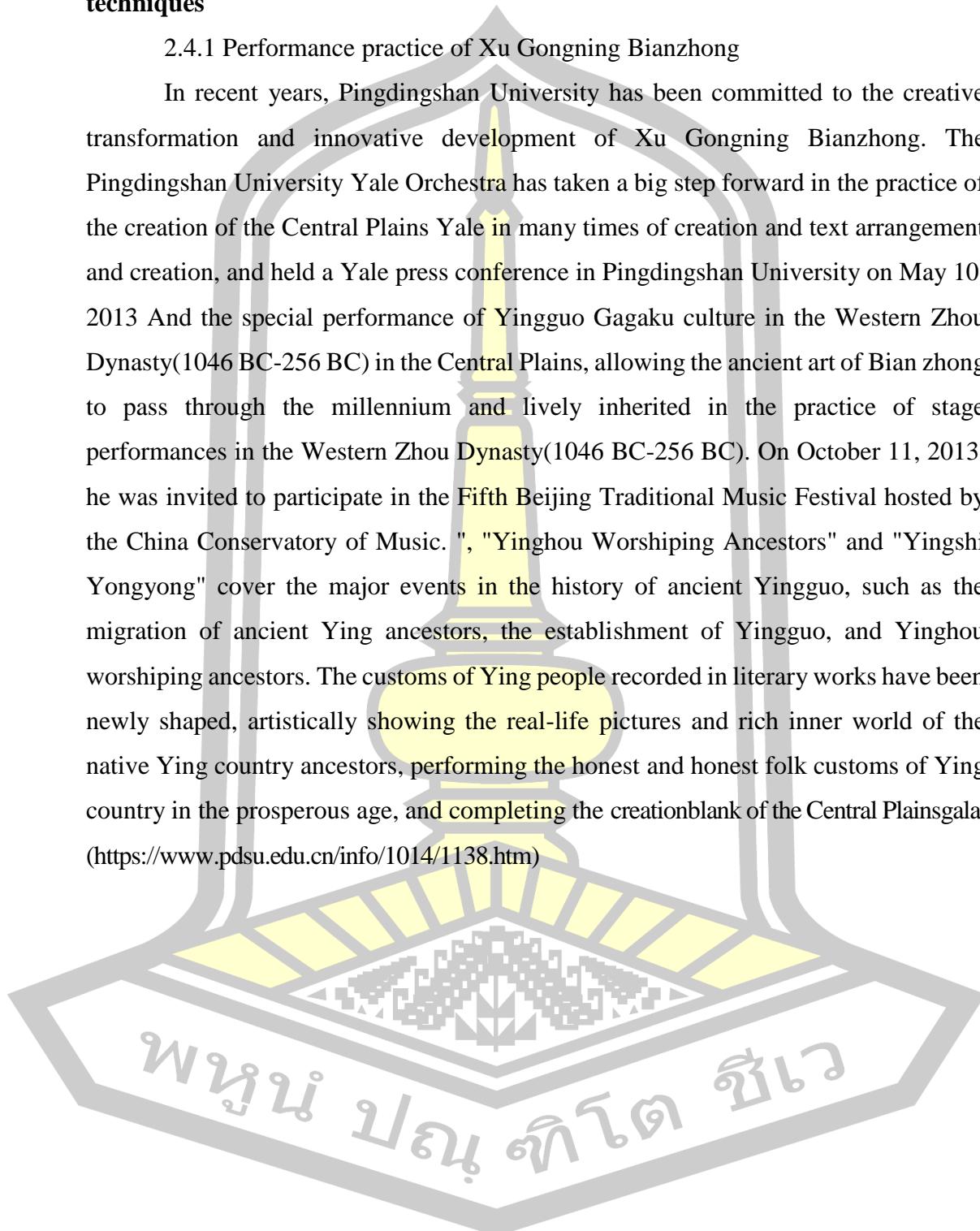




Figure 1. Ying long feng yun performance Image

Source : Keke Pan,2013

#### 2.4.2 Research on Xu Gongning Bianzhong performance practice and performance techniques

With the continuous development of Bian zhong music practice, some new achievements have been made in the study of Bian zhong art practice and performance techniques. Jun Tan, Lili Xie, Mengjie Zhang, Xingzi Wan, Pingge He, Hongxiang Gao, etc. copied Zeng Hou Yi's bell Bian zhong. , drumstick production, music arrangement, phoneme structure, timbre characteristics, performance techniques and the adaptability of performance, etc. are analyzed and discussed. It has strong reference significance for the summary and sorting out of Xu Gongning Bianzhong performance practice and performance techniques.

Hongxiang Gao (1988) analyzed and discussed the music arrangement, phoneme structure, timbre characteristics, performance techniques and performance adaptability of Zenghouyi Zhongqing in "Research on the Arrangement Technology of Zenghouyi Zhongqing".

Lili Xie (1997)'s "Bian zhong Performance Technique and Timbre Combination", Through comprehensive research on Bian zhong performance tools, performance techniques, and combination of timbres combined with performance experience, the

performance techniques of Bian zhong such as "stippling", "quick hit and roll" and various timbre classification and combination forms are summarized. The author believes that the excellent sound performance of Zenghouyi Bian zhong provides great possibilities for exploring its performance techniques; the research on performance techniques is promising.

Mengjie Zhang (2016) in "The Use of Bells in National Orchestras and Several Issues in Band Rehearsal" described the performance characteristics of Zeng Hou Yi's Bian zhong and the characteristics of instruments in each part, trying to solve the problems caused by modern instruments and ancient instruments. The intonation problem caused by the conflict in the temperament system.

Xingzi Wan (2017) "A Brief Discussion on the General Situation, Characteristics, Performance and Influence of Zenghouyi Bian zhong in Today's Society", taking the Zenghouyi Bian zhong unearthed in 1978 as the main research object, from four Chapters analyze and study its shape, range, structure of sound sequence and playing technique.

Pingge He (2022) in "The 'fusion' phenomenon in Gong Huahua's Bianzhong and the national orchestral work "Harmony""", Taking Professor Gong Huahua's Bianzhong and national orchestral work "Harmony" as the research object, this paper analyzes the fusion of different styles of Jingchu folk pitch materials and the fusion of different instrument timbres and sound configurations in the musical works.

Jun Tan (1999) in "Research on the Development and Research of Bian zhong and Bian zhong Series Strike Hammers" aimed at improving the sound quality of Bianzhong and Bianzhong in the second phase, and studied another important factor that affects the sound quality of Bianzhong and Bianzhong - Bian zhong, the complementing and serialization of Bian zhong hammers have been studied and discussed.

Jie Gu (2000), in "Review of the Research on Ancient Instruments from Zeng Houyi's Tomb and the Compilation and Performance Practice of Zhongqing Music Works at Wuhan Conservatory of Music", reviewed the research on ancient musical instruments from Zenghou Yi's Tomb and the compilation and creation of bell and Qing music works at Wuhan Conservatory of Music in the past 20 years. , performance practices were classified and sorted out. It mainly includes the study of musical temperament, reproduction of ancient musical instruments, creation of works and research on performance techniques.

Li Zhang (2022) in "The 'Rebirth' of Bian zhong: The Production and Use of Contemporary Bian zhong" starts from the production and use of contemporary Bian zhong, focusing on the study of Zeng Houyi's Bian zhong, and compares scholars' views on "copying" and "Different understandings of words such as 'restoration'" analyze the academic orientation of contemporary Bian zhong production; focusing on the 24-piece set of Bianzhong customized by the Ya Orchestra of the China Conservatory of Music in 2013. Through these three questions: "When did the Bianzhong start to be copied?" "Why did the China Conservatory of Music Ya Orchestra customize such a set of Bian zhong?" "How to use this set of Bianzhong after it is made?", we analyze the role of the Bianzhong in this case. way of "rebirth".

In addition, there is a "copper pot with fishing and hunting patterns for feasting" (hidden in the Palace Museum), a copper pot with patterns of mulberry picking and hunting during the Warring States Period (unearthed from the Warring States Tomb No. 10 of Baihuatan Middle School in Chengdu, Sichuan Province), and a bronze pot with patterns for feasting and hunting. Mirror (unearthed from M1, Zhaogu Village, Hui County, Henan Province), Zhangqiu Nvshan Music and Dance Figurines (unearthed from the Warring States Tomb of Nvshan, Zhangqiu City, Shandong Province), Jinan Wuyingshan Musical and Dance Acrobatic Maid (unearthed from the southern slope of Wuyingshan, Jinan City, Shandong Province), T-shaped silk painting from Mawangdui Tomb No. 1 (unearthed from Mawangdui Tomb No. 1), portrait bricks of Yinan Beizhai Music and Dance Hundreds of Operas (unearthed from the Han Tomb in Beizhai Village, Jiehu Town, Yinan County, Shandong Province), Dangyang Half Moon Hundreds of Music and Dance Bricks with opera portraits (unearthed from the Han Tomb No. 1 of Banyue Middle School, Dangyang City, Hubei Province) without inscriptions. Images of Bian zhong performance can be found in Qi Wenshao (hidden in Qufu Museum), etc., which provides insights into the performance of Bian zhong in today's era. Strong theoretical support and practical compliance.

However, it is a pity that there is only one study on the performance practice of Xu Gongning Bianzhong. Renya Wang (2016) sorted out the imitation process and modern inheritance of Xu Gongning Bianzhong in the paper "Research on the Artistic Practice and Modern Inheritance of Xu Gongning Bianzhong"; combined with the specific performance of the Pingdingshan University Ya Orchestra, a brief analysis of Xu

Gongning Bianzhong' modern repertoire, showing the performance application value and cultural inheritance value of Xu Gongning Bianzhong in the practice of modern gala music.

There are 0 studies on Xu Gongning Bianzhong repertoire and performance techniques.

## 2.5 General Knowledge about the transmission and development of Xu Gongning Bianzhong

Shao Shuai (2017), in "Research on the Protection and Inheritance of Bianzhong Culture in Hubei Province - Taking the Yellow Crane Tower Art Troupe as an Example", investigated the current status of Bian zhong in Chu culture and the protection and inheritance of Bian zhong culture and Chu culture, and also This paper analyzes the current problems in the protection and inheritance of Bianzhong, and considers the cultural inheritance of Bianzhong based on the artistic practice of Bian zhong by the Yellow Crane Tower Art Troupe.

In "Analysis of the Current Situation and Protection Discussion of the Copper Bianzhong Unearthed in Chengyang City", Wu Ji (2020) used scientific and technical means to research and analyze the copper Bianzhong, trying to clarify the reasons for the deterioration of the cultural relics themselves, and explore how to effectively protect the cultural relics themselves and maximize their protection. Preserve its historical, scientific and artistic value,

Guan Bei (2016) in "Inheriting Bianzhong Music and Promoting Traditional Culture" strengthened the inheritance and development of Bianzhong culture through the performance practice of variant bands, the construction of school-based Bianzhong music courses, and the holding of cultural exchange activities, and provided a basis for the inheritance and promotion of Bianzhong music. China's excellent traditional culture and art have made contributions.

Li Hongliang (2022), in "Design and Implementation of Virtual Simulation Experiment of Zeng Houyi's Bian zhong Performance and Composition", introduced a virtual simulation experiment of Zeng Houyi's Bianzhong Performance and Music Creation that can theoretically study "note name recognition" music performance and music creation, opening up It has created new ideas for the development of traditional

music culture and broadened the breadth and depth of the inheritance of China's excellent traditional music culture.

Bianzhong are not only a ritual instrument, but also a musical instrument. Only through the performance of musical instruments can the living inheritance of cultural relics be realized. Governments, schools, orchestras, etc. can inherit the ancient art of Bianzhong through the cultivation of Bian zhong talents and artistic practice. This paper A comprehensive survey on the inheritance and development of Xu Gongning Bianzhong in classroom teaching and extracurricular practice. However, because it is based on Pingdingshan University as a case study and is unique, it is rarely mentioned in the research results of other scholars. However, regarding the integration of Bianzhong and technology the research provides new ideas and reference for this paper.

## 2.6 Related foreign research

The famous American international sinologist Lothar von Alexander Falkenhausen's (1988), "Ritual Music in the Bronze Age of China: An Archaeological Observation" explores the music production of the Bronze Age from the perspective of archaeological production. intellectual, artistic and technical characteristics.

Lothar von Alexander Falkenhausen (1994) "Hanging Music: Bian zhong in Chinese Bronze Age Culture" is a comprehensive study of bronze bells from the Yin, Shang and Western Zhou dynasties, involving bronze The types, shape evolution, sound structure of musical bells, and the relationship between bronze musical bells and pre-Qin ritual music and pre-Qin social politics, etc. Rotay von Folkenhausen pointed out: The bronze music bell was the core symbol of social hierarchy and authority in the pre-Qin period. It actually demonstrated a close connection between the ideological superstructure and the ritual performances that expressed this structure. , that is, the theory that gradually developed through the long evolution process of bronze music bells in the pre-Qin period, and promoted the interconnection between ancient Chinese cosmology and music theory. This kind of data collection and outstanding textual exegesis based on bronze Bian zhong has triggered an interpretation of the political structure of China's Bronze Age and a unique thinking about the history of Chinese music thought, which is worthy of our reference.

Hornbostel & Sachs (1914) In "History of Musical Instruments", divided musical instruments into categories based on intuitive vibration characteristics. The hierarchical classification basically followed Ma Yilong's four categories, that is, based on the physical characteristics of the sounding body, musical instruments were divided into musical instruments, membrane telephones, Four categories: stringed instruments and aviation telephones. The second level of classification criteria under body-sounding instruments is the playing method (percussion, plucking, friction and blowing). Level 3 classification standard knocking. Is the knocking action direct or in the form of level 4 classification standard knocking (hitting, being hit)?

William P. Malm (1968) in "Britannica Encyclopedia 4-3-24", discussed the twelve-tonal system related to blowing the bamboo pipe (lü), and analyzed the tonal system of Chinese music and its theory. He noted that the first tube produces an interesting fundamental pitch called a yellow bell (Huang bell). This concept is special because it is the oldest information in the world about a tonal system involving very specific pitches and the intervals between them.

William P. Malm (1968) analyzed the pitches of the lü in "Britannica Encyclopedia 4-3-24", he pointed out, twelve pitches of Chinese music as produced by overblowing the lü, bamboo tuning pipes. The bamboo lü pipe is closed at the bottom by a node in the bamboo, with the result that another pitches a fifth (melodic distance between the first and fifth pitches of the Western major scale) and one octave higher could be produced on it by blowing more strongly (overblowing). This new pitch could be produced an octave lower by constructing a separate pipe two-thirds the size of the first one. If one then continued to construct pipes alternately four-thirds and two-thirds the length of the previous ones, an entire system of 12 notes could be generated.

William P. Malm (1968) pointed out in "Encyclopedia Britannica 4-3-24" that the Twelve pitches of Chinese music as derived from ancient bells (starting for ease of comparison from Western C). A new interpretation of Chinese theory occurred in the late 20th century with the discovery of sets of 4th- and 5th-century tuned bells. Some of the bells produce two pitches and have the pitch names written at the two striking places. This information led to the development of a 12-pitch theory in which 5 pitches are generated in a cycle of fifths, and the 7 remaining pitches are located a major third

(the melodic distance between the first and third pitches of the Western major scale) above or below the first 4.

William P. Malm (1968) analyzed the seven-tonal Chinese scale of Chinese music in "Britannica Encyclopedia 4-3-24". He pointed out that, In the Western traditional systems most scales use seven tonal s that can be transposed and that contain modes. The Chinese system concentrates in a similar way on a seven-tonal scale but with a five-tonal core (wu sheng) plus two changing (bian) tonal s to accommodate transpositions of a single mode to different pitch levels as well as modulations from one mode to another. As in the Western system, modes can be constructed in Chinese music, and the scale can be transposed.

William P. Malm (1968) analyzed the extra-musical correlation of pitches within the Chinese musical tonal system in "Encyclopedia Britannica 4-3-24". he pointed out, the five-core tonal s of Chinese scales are sometimes connected with the five elements, or wuxing (earth, wood, metal, fire, and water), while the 12 pitches of the tonal system are connected by some writers with the months of the year, hours of the day, or phases of the moon.

## 2.7 Theories used in this research

### 2.7.1 Ethnomusicological theory

Ethnomusicology includes investigating and studying the music characteristics of different ethnic groups, countries, and regions; exploring the relationship between these music and geography, history, and other cultures; compiling ethnomusicology or regional music, and drawing some conclusions related to music from it. It belongs to a category of musicology and is closely related to ethnology and folklore. It is a science that investigates and studies the national music of different countries and regions with different social systems and different levels of development, and finds out various laws related to music. Fieldwork is the basic way to obtain research materials. The predecessor was European Comparative Musicology. In addition, things like comparative instrument ology and comparative music history are all research topics in this discipline. (Bruno, 2017)

Ethnomusicology is: "a theoretical discipline under musicology that studies the traditional music of the peoples of the world and its types of development, with

fieldwork being the basic way of obtaining sources of research material. Its main characteristic is that it regards the musical object under study as a musical phenomenon and places it into the specific natural and socio-cultural environments of the ethnic group, so as to expound the basic morphological characteristics, survival and mutation patterns of the musical genres concerned through the study of how members of the ethnic group construct, utilize, disseminate and develop these musical genres in accordance with their own cultural traditions. By examining and studying how members of the ethnic group construct, use, disseminate and develop these musical genres in accordance with their own cultural traditions, we will expound on the basic morphological features, survival and variation patterns and national cultural characteristics of the genres concerned. (Wu Guodong, 2016)

Originally formed by the convergence of the disciplines of musicology and anthropology, the study of music using the theories of anthropology is a cross-disciplinary discipline that can enter more deeply into the cultural field of vision. It is a cross-disciplinary field that can enter into the cultural field of view more deeply. The study of music in the cultural field of view is defined by the American ethnomusicologist Merriam as "the study of music in culture" or "the study of music as culture". (Guan Jianhua, 2013)

Japanese musicologist Osamu Yamaguchi defines the discipline of ethnomusicology in this way: The discipline of ethnomusicology deals with musical expression and even musical culture and its surrounding matters that exist at various levels of culture from individual human beings, small collectives, communities, regions, tribes, nations, countries, and races up to the whole of humanity. It seeks to elucidate not only the internal structure (Musical Structure) of its central object, but also its external structure (Chakra Structure), which is constrained by the respective society and culture, and to grasp the interrelationship between the two structures, internal and external. In this way, it clarifies the nature of human musicality while positioning it between the poles of cultural individuality and universality. (Shan Kouxiu, 1999)

In the research, I will use the theoretical method of ethnomusicology to explore the true appearance of the ritual and music system, politics, culture, technology, art and other aspects of Xu Gongning Bianzhong in the historical period.

### 2.7.2 Qualitative research

A qualitative research uses depth interviews and observations for data collecting. Qualitative research is concerned with qualitative phenomenon involving quality. Some of the characteristics of qualitative research\method are:

- 1) It is non-numerical, descriptive, applies reasoning and uses words.
- 2) Its aim is to get the meaning, feeling and describe the situation.
- 3) Qualitative data cannot be graphed.
- 4) It is exploratory.
- 5) It investigates the why and how of decision making

The process of qualitative research:

- 1) Selection of a site and definition of problems, concepts and indicators.
- 2) The researcher chooses a strategy to move into the researcher.
- 3) Selecting people and events to observe.
- 4) Develop relationships with the participants.
- 5) Analyze and observations.
- 6) Final analysis and interpretation. (Sielk& M. B. S. & Wilm& S, 2004)

In my research, I will use the theory of qualitative research, observe and interview key informants. Through participating in observation and exploration, we can gain an in-depth understanding of Xu Gongning Bianzhong' shape, combination, rhythm, the tuning system and the cultural value of ritual and music contained therein.

### 2.7.3 Musicology

"Musicology" has many meanings and concepts, each with a similar viewpoint and perspective. The principles and methods of musicology have been systematized. The concept of learning is to work from research. Many scholars have elaborated their own meanings of "musicology":

Mention that musicology is the study of certain musical styles deeply, including all of the musical contents, including music performance, composition, and music resources. The contents are about the theory of music, such as music elements, harmony, and melody. (Christine Ammer, 1987)

Musicology is the general term for all theoretical subjects that study music. The general task of musicology is to elucidate the nature and laws of various phenomena relating to music. For example, studying the relationship between music and ideology includes music aesthetics, music history, music ethnology, music psychology, and music pedagogy. (Yandi Yang, 1995)

Musicology is the general term for the academic study of music and related matters. Music disciplines include music performing arts, composition and composition techniques theory, and musicology. Not only that, in musicology, the subject branch should include music creation and music performing arts. (Yaohua Wang and Jianzhong Qiao, 2005)

Musicology is the study of the material properties of music, including musical acoustics, Law, musical instruments, etc. The study of musical form and its composition includes melody, harmony, acoustics, counterpoint, and compositional process. There are also performance issues to consider, such as performance theory and How to play. (Yu Renhao, 1997)

In my research, I will use music analysis methods to analyze the collected Bian zhong music. Through a comprehensive analysis of the music, I will understand its background, musical patterns, melody characteristics, rhythm characteristics, harmony, and performance Form etc. Interpret it from multiple angles, explore the deep connotation of music culture, and better apply it to Xu Gongning Bianzhong performance practice.

#### 2.7.4 Musical Anthropology

Musical Anthropology is a humanities discipline that uses anthropological theories and methods to study music and relate cultures. It directly faces the living human music culture (including both material and nonmaterial forms), and strives to conduct a comprehensive study of the research objects. , a discipline of multi-level and multi-angle observation, experience, understanding and corresponding recording, organization, description and interpretation(Fanyu Meng,2009)

In my research, I will use the music anthropology to Study teaching content, teaching models, teaching venues, and practical activities.

### 2.7.5 Basic Music Elements Theory

Basic Music Elements includes: Sound (overtonal, timbre, pitch, amplitude, duration) Melody、 Harmony 、 Rhythm 、 Texture 、 Structure/form 、 Expression (dynamics, tempo, articulation). 1. Sound Overtonal: A fundamental pitch with resultant pitches sounding above it according to the overtonal series. Overtonal are what give each note its unique sound, such as “nasally,” “resonant,” “vibrant,” “strident,” “high,” “low,” “breathy,” “piercing,” “ringing,” “rounded,” “warm,” “mellow,” “dark,” “bright,” “heavy,” “light,” “vibrato.” Pitch: The frequency of the note’s vibration (note names C, D, E, etc.). Amplitude: How loud or soft a sound is. Duration: How long or short the sound is. 2. Melody A succession of musical notes; a series of pitches often organized into phrases. 3. Harmony The simultaneous, vertical combination of notes, usually forming chords. 4. Rhythm The organization of music in time. Also, closely related to meter. 5. Texture The density (thickness or thinness) of layers of sounds, melodies, and rhythms in a piece. Most common types of texture: Monophony: A single layer of sound; Polyphony: Two or more independent voices. 6. Structure or Form The sections or movements of a piece; i.e. verse and refrain, sonata form, ABA, Rondo (ABACADA), theme, and variations. 7. Expression Dynamics: Volume (amplitude)—how loud, soft, medium, gradually getting louder or softer (crescendo, decrescendo). Tempo: Beats per minute; how fast, medium, or slow a piece of music is played or sung. Articulation: The manner in which notes are played or words pronounced: e.g, long or short, stressed or unstressed such as short (staccato), smooth (legato), stressed (marcato), sudden emphasis (sforzando), slurred, etc. (William P. Malm ,1968)

This theory is very important for my research topic, I will use this theory to reveal the sound (overtonal, timbre, pitch, amplitude, duration), melody, harmony, rhythm, structural form, etc. of Xu Gongning Bianzhong.

### 2.7.6 Aesthetic Theory

Aesthetics, the philosophical study of beauty and taste. It is closely related to the philosophy of art, which deals with the nature of art and the concepts of interpreting and evaluating individual works of art. This article aims to elucidate the nature of modern aesthetics and describe its basic principles and concerns. Although this article focuses on Western aesthetic thought and its development, it also explores some

important features of Marxism and Eastern aesthetics. The Nature and Scope of Aesthetics The scope of aesthetics is broader than that of philosophy of art, one of its branches. It deals not only with the nature and value of art, but also with reactions to natural objects expressed in the language of beauty and ugliness. (William P. Malm ,1968)

This paper uses Aesthetic Theory to further explore the aesthetic characteristics of Chinese music and reveal the cultural ideas of ritual and music contained in Bian zhong. Music can create a social atmosphere and can also influence the formation of a social atmosphere. For example, "Appreciating music is to understand politics" and "Music is what the saints enjoy, and it can improve the people's hearts", etc., which illustrates the role of music in improving social atmosphere, educating people, changing customs, and promoting social harmony.

## 2.8 Documents and Research Relate

To sum up, the academic community has achieved significant results in the research on bronze Bianzhong in my country. Through CNKI, 1,738 relevant academic journal articles and 261 dissertations were retrieved. The research perspectives mostly stay at the theoretical level, and the research content is mostly focused on Research on rhythms, inscriptions, unearthed musical instruments, music history, comparative research on Bianzhong in different regions, and research on cultural attributes, and most of the research objects are Zeng Hou Yi's Bianzhong. In recent years, with the accumulation of many years of practical experience, Bianzhong New results were also introduced in terms of music arrangement, performance techniques and music creation, with a total of 8 papers retrieved.

There are a total of 37 Bianzhong in Xu Gongning Cemetery, second only to the Bianzhong of Marquis Zeng Yi, but they are dated more than a hundred years earlier than the Bianzhong of Marquis Yi of Zeng. Its shape combination is unique. It is the only diversified combination Bianzhong with the largest scale, the largest number, and the most complete form among the large-scale combination Bianzhong of the Spring and Autumn Period (770 BC - 476 BC) in my country. It has a milestone value that cannot be ignored in the history of Chinese bronze bells and plays an important role in outlining the pre-Qin Dynasty (1636-1911) in my country. The evolution and

development of the diversified combination of bronze Bianzhong has important academic value and historical significance. However, because Xu Gongning Bianzhong were unearthed relatively late (April 2002), the research results of many scholars have not included the research field of Xu Gongning Bianzhong. Currently, there are 12 studies on Xu Gongning Bianzhong, including 9 special studies and 3 related to the research on Xu Gongning Bianzhong. Practical transformation is less involved, with only one article. For the creative transformation and innovative development of Xu Gongning Bianzhong music, Research has not covered this. This leaves a broad space for the follow-up research of this article.

Table 1. Creating an outline of the findings

Search keywords	Research content	Number of articles
"Bianzhong"	Including the shape, combination, sound sequence, and cultural attributes of Bian zhong in different periods.	1,738 academic journal papers and 261 dissertations.
“Zenghouyi Bianzhong”	Including the shape, inscription, phoneme, melody, cultural value, etc. In recent years, some scholars have analyzed the music arrangement, phoneme structure, timbre characteristics, performance techniques and performance adaptability of Zenghouyi Bian zhong.	542 academic journal papers and 48 dissertations

Table 1 (Continued)

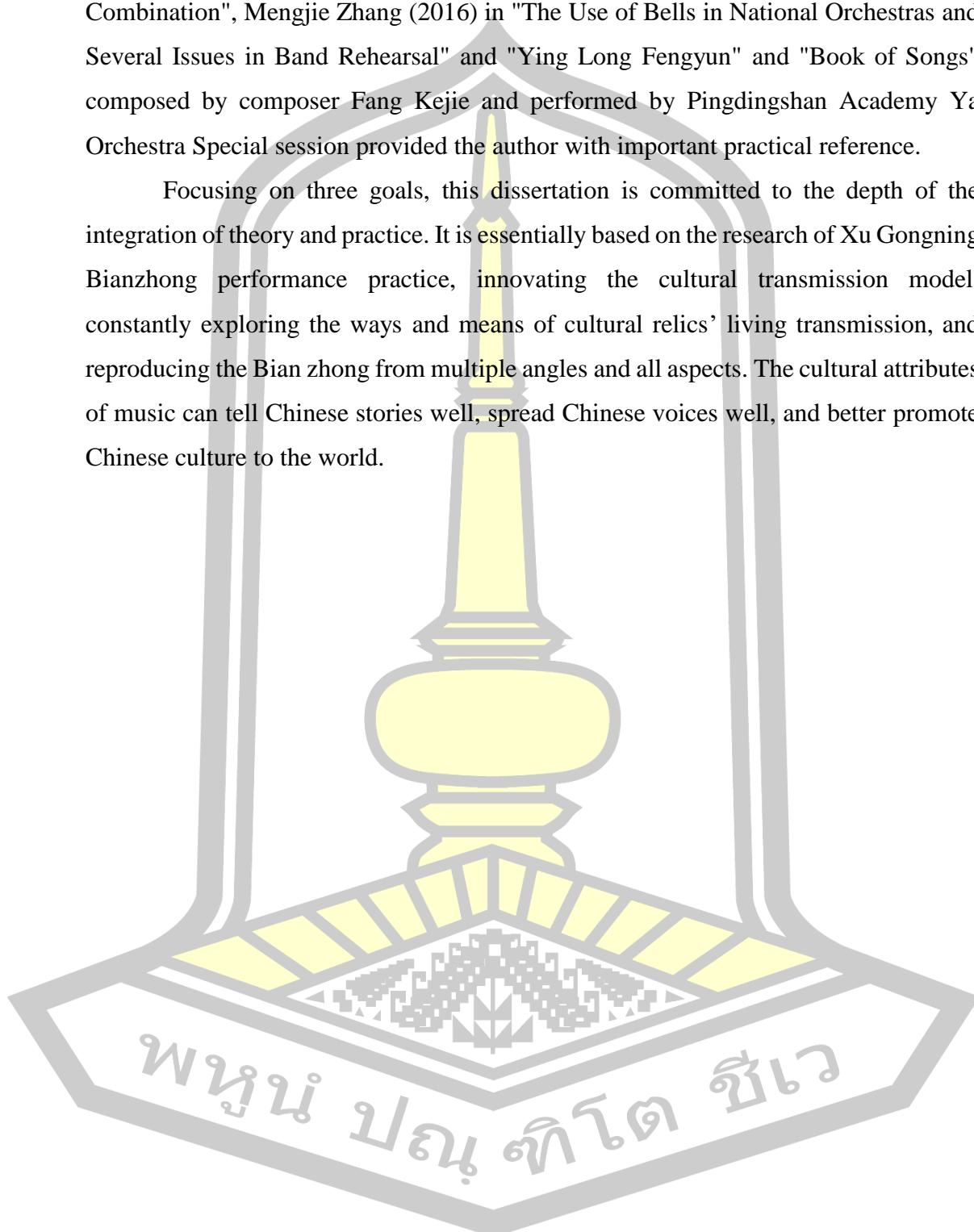
Search keywords	Research content	Number of articles
“Xu Gongning Bianzhong”	Including the shape, arrangement, sequence, combination, ritual and music cultural value, artistic value, scientific value of Xu Gongning Bianzhong, etc.	A total of 12 academic journal papers, including 9 special research papers and 3 papers related to Xu Gongning Bianzhong. There is only 1 research on the practical transformation of Xu Gongning Bianzhong, and 0 articles analyzing Xu Gongning Bianzhong performance technique.

Source:Keke Pan,2023

Previous research results have provided strong theoretical support for this paper and an inexhaustible source of ideas for the author. Huang Xiangpeng (1978) "Known acoustic data of the Neolithic and Bronze Age and issues on the development history of musical scales in China", Zichu Wang "Analysis of Rhythm of Bian zhong in Tomb No. 4 of Jiuxian County, Yexian" by Chu Chu (2008), "A Drama of Chinese Musical Cultural Relics" by Wang Zichu (2009) and Du Yaxiong's (2021) paper "The Concept of Rhythm Position in the Structure of Bian zhong of Marquis Yi of Zeng and Its Today" Use", Tong Zhongliang's (1994) paper "The third tonal system of Zeng Hou Yi's Bian zhong", Wang Youhua's (2021) "sound sequence combination of pre-Qin combination Bian zhong", Chen Yan's "Research on the bronzeBianzhongof Xu Cemetery in the Spring and Autumn Period" (2019), Li Chunyi's "A Comprehensive Review of Musical Instruments Unearthed in Ancient China", (USA) Lothar von Alexander Falkenhausen's Suspended Music: Bian zhong-bells in the Culture of

Bronze Age China, Lili Xie (1997)'s "Bian zhong Performance Technique and Timbre Combination", Mengjie Zhang (2016) in "The Use of Bells in National Orchestras and Several Issues in Band Rehearsal" and "Ying Long Fengyun" and "Book of Songs" composed by composer Fang Kejie and performed by Pingdingshan Academy Ya Orchestra Special session provided the author with important practical reference.

Focusing on three goals, this dissertation is committed to the depth of the integration of theory and practice. It is essentially based on the research of Xu Gongning Bianzhong performance practice, innovating the cultural transmission model, constantly exploring the ways and means of cultural relics' living transmission, and reproducing the Bian zhong from multiple angles and all aspects. The cultural attributes of music can tell Chinese stories well, spread Chinese voices well, and better promote Chinese culture to the world.



## CHAPTER III

### Research Methodology

This article takes Xu Gongning Bianzhong as the research object. On the basis of literature research and field investigation methods, the physical structure and tuning system of Xu Gongning Bianzhong are studied, and the composition of Xu Gongning's Bianzhong repertoire is analyzed. Xu Gongning Bianzhong-playing techniques and the transmission in the university are sorted out and summarized. This part includes the following basic points:

#### 3.1 Research scope

- 3.1.1 Scope of content
- 3.1.2 Scope of time

#### 3.2 Research Process

- 3.2.1 Selection of the research site
- 3.2.2 Selection of the key informants
- 3.2.3 Selection of the musics
- 3.2.4 Research Tools
- 3.2.5 Data Collection
- 3.2.6 Data Management
- 3.2.7 Data Analysis
- 3.2.8 Data Presentation

#### 3.1 Research scope

The research scope is the basis of research and an important basis for determining research plans and decisions. Only by accurately grasping the research scope can we determine the focus and research methods, so as to effectively achieve the research goals. Therefore, in this section, the content, location, etc. of the study will be scoped.

##### 3.1.1 Scope of content

The content includes the history of Xu Gongning Bianzhong, the shape and scale of Xu Gongning Bianzhong, the rhythm and mode of Xu Gongning Bianzhong,

the music creation of Xu Gongning Bianzhong, and the playing methods of Xu Gongning Bianzhong.

### 3.1.2 Scope of time

January 2023-February 2024.

## 3.2 Research Process

### 3.2.1 Scope of research site

The delineation of the research site in this article is shown in Figures 2 and 3 below. Figure 2 is the administrative region map of the People's Republic of China. The area outlined with a red circle in the picture is Henan Province. You can know from the picture; Henan Province is located in the central region of China. Figure 3 is a map of the administrative regions of Henan Province. The red circle in the picture is Pingdingshan City, Henan Province. Pingdingshan University is located in this city. Here is the first elegant orchestra in mainland China. In 2010, a 1:1 set was successfully copied. Xu Gongning Bianzhong, I am also a teacher at Pingdingshan University. I have participated in the inspection and copying of Xu Gongning's Bianzhong, and have done service work for many performances of the Ya Orchestra. I have closely observed the rehearsal and performance of the Bian zhong. Here, the Bian zhong are not just static. Instead of being a cultural relic, it has been transformed into an important musical instrument. In many performances, the ancient music that has traveled through thousands of years resonates with the pace of the new era, achieving a contemporary and gorgeous presentation of ancient Chinese music.

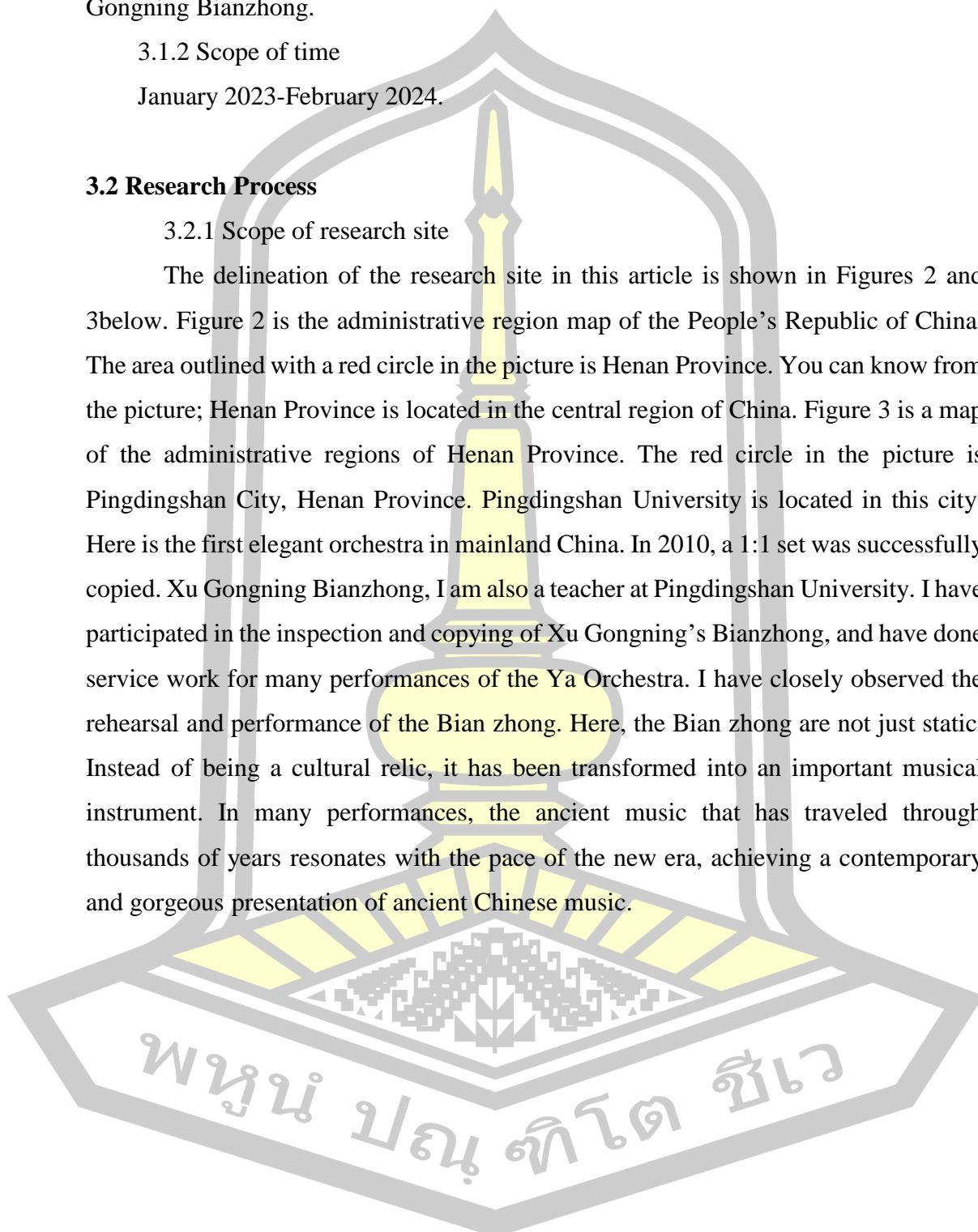




Figure 2. Map of Administrative Regions of China

Source: Google Maps



Figure 3. Administrative Region Map of He Nan Province

Source: Google Maps

### 3.2.2 Selection of the key informants

Based on the research objectives, the researcher selected three groups of people as the interviewees in the field research. They are: key informants, casual informants and general informants. The following selected criteria and selected personnel will be presented.

#### 1) Key informant

The criteria for selecting key informants are:

- 1.1) Members involved in the reproduction of Xu Gongning Bianzhong .
- 1.2) Bian zhong music creators.
- 1.3) Bian zhong performers.

1.4) People who have long been committed to the study of ritual and music culture. They (she) are all witnesses/performers and researcher of Xu Gongning Bianzhong in the Pingdingshan University Elegant Orchestra, and have a comprehensive/in-depth understanding of Xu Gongning Bianzhong.

According to the above criteria, the key information providers are Kejie Fang, Wei Liu、Yanhui Li、Renya Wang、Yang Zhang、Kun He.

#### 2) General informant

General informants also refer to students and individual teachers who participated in Bian zhong performances, and are listed here due to the limited number of persons listed in this study. The fourth chapter of this paper is an analysis of Bian zhong works and Bian zhong performance techniques, so the performers' evaluation of Bian zhong is also particularly important. They will provide researcher with real and detailed data. The following are general information providers: Wenliang Li、Wenzong Liu、Jiahui Liu、Rui Huang、Rui Liu、Yilin Fan、Zewen Zhang.

#### 3) Casual informant

Temporary informants mainly target Bianzhong enthusiasts and audiences of Bianzhong performances in daily life. These groups will also provide researcher with some reference information during the research process. These groups mainly appear in daily Moments, WeChat, Facebook, etc. Note: Casual informant may also be professionals, so the information they provide is also important. The following are general information providers: Hao Jiang、Qi Kou、Kai Cui、Zhen Ren、Yun Xiao.

### 3.2.3 Selection of the music

Since the establishment of the Ya Orchestra, Pingdingshan University has hired national first-class composer Fang Kejie to create two concerts tailored for Xu Gongning Bian zhong based on regional music and cultural characteristics, namely "Gu Ying Fengyun" and "Ya Le" Book of Songs. , opened the prelude to the ritual and music culture. In recent years, He Kun, a young teacher at the Conservatory of Music, has adapted two Bian zhong works based on classic folk song melodies, laying a solid foundation for the inheritance and innovation of Bian zhong art. This paper selects three categories and four works, namely: "Lu Ming", "Wan Qiu", "Jasmine", "Dong Fang Hong". The paper starts from the introduction of the works, tonal characteristics, musical structure, harmony, etc. A comprehensive and in-depth analysis was carried out in order to use a rich theoretical basis to guide the performance practice of Bian zhong. During the field survey, it was learned that the four works were performed most frequently, were easy to understand, and were deeply loved by the audience. At the same time, these works All can embody the peaceful, majestic, smart and melodious characteristics of Bian zhong music.

### 3.2.4 Research tools

I mainly used interviews and observations.

Process of making the questionnaire, Observation's form, and Interview form:

- 1) Make questions based on research objective.
- 2) Bring it to the advisor to examine.
- 3) Be modified according to advisor editing before being used in the field work.

Table 2. interviews and observations

Interview content	Observations content	Others
1.What is the history of Xu Gongning Bianzhong? How did you copy it?	1.Observe the shape of Xu Gongning Bianzhong bells.	a video recorder, a tape recorder, a sound meter, a computer, a ruler, a pen and a notebook.
2.What is the shape, decoration and combination of Xu Gongning's Bianzhong bells?	2.Observe tonal system of Xu Gongning Bianzhong and the rhythm of each Bian zhong.	

Table 2 (Continued)

Interview content	Observations content	Others
3.What are tonal system, rhythm and pitch of Xu Gongning Bianzhong?	3.Observing the historical data kept by the informant.	
4.What are the representative repertoires? What are the forms of performance? What are the characteristics of music	4.Observe the Bian zhong score. Analyze the mode, melody, harmony, texture, and rhythm of the play.	
5.What are the techniques and teaching methods of Bian zhong playing?	5.Observe the Bian zhong playing techniques of the performers.	

Source: Keke Pan,2023

### 3.2.5 Data Collection

This study used a combination of literature research method, field research method and musicological analysis method to collect data. In the specific literature research, the researcher will make full use of online + offline resources to collect and organize information related to the research topic. In terms of field research, the researcher will mainly adopt methods such as interviews and observations of relevant people and things. , the specific details are as follows:

#### 1) Document Study

First of all, the researcher made full use of the rich resources of the Internet and used literature retrieval methods such as direct method, sequential search method, backward search method, spot check method, retrospective method, and circular method to search in China National Knowledge Infrastructure (CNKI), SCI, and the National Journal Database. (NSSD), Wanfang Data Digital Journal, Super Star Journal, Chinese Social Sciences Citation Index (CSSCI), Xinhua Digest, National Newspaper and Periodical Index and other academic platforms search keywords to conduct a comprehensive and multi-angle retrieval of literature related to this topic.

Secondly, the researcher contacted the management staff of the Pingdingshan University Elegant Orchestra to search for rich cultural and historical materials.

## 2) Field Study

The researcher went to Pingdingshan University, where the 1:1 replica of Xu Gongning Bianzhong currently exists, to conduct on-the-spot investigations to obtain first-hand information. Based on the relevant theoretical knowledge of musical cultural anthropology, through the investigation and analysis of the historical situation of Xu Gongning Bianzhong and the transformation of modern performance practices, the unearthed situation, physical structure, modulation system, performance practices, compositions and performance techniques of Xu Gongning Bianzhong were analyzed. Conduct on-site interviews, interviews, and investigations. The field investigation work is divided into three stages, and the specific arrangements are as follows:

Table 3. Field survey work flow chart

	Stage	Detailed arrangement
1	Preparation Phase	Select a survey location → familiarize yourself with the location conditions → survey outline → familiarize yourself with relevant theoretical knowledge
2	Initial stage	Get support from relevant departments → Arrive at the location to learn more about the situation
3	investigation stage	Engage in Observation & In-depth Interviewing

Source :Keke Pan,2023

## 3) Interviewing

The researcher conducted in-depth interviews with Xu Gongning Bianzhong music creators, Xu Gongning Bianzhong performers, and leaders of the Ya Orchestra. Before the interview, first design the outline of the interview, and after obtaining the interview permission, make an appointment with the interviewer before having a formal conversation. Get permission to video or record the conversation before the formal conversation, which will help better organize the data. Through face-to-face interviews, the

data obtained are specific and accurate, which also fully illustrates the reliability of the sources of this research.

My criteria for selecting informants are: (1) Members involved in the reproduction of Xu Gongning Bianzhong. (2) Bian zhong music creators.(3) Bian zhong performers. (4) People who have long been committed to the study of ritual and music culture. They are all witnesses/performers and researcher of Xu Gongning Bianzhong in the Pingdingshan University Elegant Orchestra, and have a comprehensive/in-depth understanding of Xu Gongning Bianzhong.

So, I can select three groups of informants to interview:

Group 1: Management staff of Pingdingshan University Elegant Orchestra

Group 2: Xu Gongning, the composer of Bian zhong music

Group 3: Xu Gongning Bianzhong performers

Table 4. Details of interviewees

Area name	The person's name	Age
Pingdingshan City, Henan Province, China	Kejie Fang	69
Pingdingshan City, Henan Province, China	Wei Liu	54
Pingdingshan City, Henan Province, China	Yanhui Li	46
Pingdingshan City, Henan Province, China	Renya Wang	40
Pingdingshan City, Henan Province, China	Yang Zhang	35
Pingdingshan City, Henan Province, China	Kun He	45

Source: Keke Pan,2023

Kejie Fang, Composer, he has created two Bian zhong concerts. The paper's "Lu Ming", "Wan Qiu" and "Ying Shi Yong Yong" were all composed by Kejie Fang.



Figure 4. Composer: Kejie Fang

Soure: Kejie Fang,2022

Wei Liu, He once served as the dean of the Music School of Pingdingshan University and participated in the reproduction of Xu Gongning Bianzhong and the preparation of the Bian zhong orchestra.



Figure 5. Manager: Wei Liu

Soure: Wei Liu,2023

Yanhui Li, The managers of the Bian zhong Orchestra have long been committed to the inheritance and development of ritual and music culture.



Figure 6. Manager: Yanhui Li

Soure: Yanhui Li,2023

Renya Wang, He once served as the leader of the elegant orchestra of the Conservatory of Music of Pingdingshan University and was responsible for organizing Bian zhong performance practice activities.



Figure 7. Leader of the Ya Orchestra: Renya Wang

Soure: Renya Wang,2023

Yang Zhang, Bian zhong rehearsal class teacher, responsible for teaching Bian zhong performance techniques and rehearsing Bian zhong repertoire on a daily basis.



Figure 8. Percussion teacher: Yang Zhang

Soure: Yang Zhang,2023

Kun He, A composition teacher, the two modern pieces in the thesis were both adapted by Kun He.

#### 4) Observation

During the field investigation, the researcher conducted comprehensive and multi-angle observations and reflections on Xu Gongning's training, performance, management and other activities. And make a good observation outline and make detailed records, and finally organize, analyze, summarize the observation results, and draw conclusions.

##### 3.2.6 Data Management

Data management is the process of effectively collecting, storing, processing and applying data. Its purpose is to fully and effectively play the role of data. It is the central issue of data processing. The basic purpose of data management is to extract and derive data that is valuable and meaningful to certain people from a large amount of data that may be messy and difficult to understand.

From the data I collected on historical documents, Bian zhong parameters, rhythmic pitch, music content, performance techniques, and repertoire, I have classified

these data according to time division, music content classification, music source channels, and relevant information of different representatives. Management to provide help for subsequent data analysis.

### 3.2.7 Data Analysis

In the first research object, first of all, I adopt the method of literature research, investigate the literature and obtain information, aiming to fully and correctly understand and master the research questions. Second, I used qualitative research, using in-depth interviews and observations to collect data. So, I chose 3 groups informants. Finally, use the research and analysis methods of ethnomusicology, organize and summarize the collected literature and interviews, to study the structure, junior system and tonal syster of Xu Gongning Bianzhong.

In the second research object, I use the method of summarization and classification to classify the collected scores and music content, so as to understand the characteristics of different styles of Bian zhong music. I use the method of music analysis to analyze the selected Xu Gongning Bianzhong music. It mainly includes: 1) Analyzing the creative background and source of creation. 2) Analyze the structure of music. 3) Analyze the Bian zhong playing form. 4) Analyze the mode Musical 、 form harmony characteristics of music. 5) Analyze the style of music.

In the third research object, I use the Musical anthropology to study teaching content, teaching models, teaching venues, and practical activities.

### 3.2.8 Data Presentation

I presented on 7 chapter

Chapter 1 Introduction

Chapter 2 Review literature

Chapter 3 Methods of Research

Chapter 4 The physical structures and tonal system of Xu Gongning  
Bianzhong

Chapter 5 Analyze the repertoire and performance techniques of the Xu  
Gongning Bianzhong

Chapter 6 The transmition and development of Xu Gongning Bianzhong  
in the university

Chapter 7 Conclusion Discussion and Suggestions

## CHAPTER IV

### The physical structures and tonal system of Xu Gongning Bianzhong

This chapter closely focuses on the first goal, based on the method of literature research combined with field investigation, to conduct in-depth research on the shape, decoration, arrangement, tonal system, combination form and cultural attributes of Yong zhong, Niu zhong and Bo zhong.

#### 4.1 The physical structure of Xu Gongning bian zhong

##### 4.1.1 The overall structure of Xu Gongning bian zhong

##### 4.1.2 The physical structure of the Yong zhong

##### 4.1.3 The physical structure of the Niu zhong

##### 4.1.4 The physical structure of the Bo zhong

##### 4.1.5 Bian zhong playing tools

##### 4.1.6 Hanging Methods of Xu Gongning bian zhong

#### 4.2 The tonal system of Xu Gongning bian zhong

##### 4.2.1 The tonal system of the Yong zhong

##### 4.2.2 The tonal system of the Niu zhong

##### 4.2.3 The tonal system of the Bo zhong

#### 4.3 Application of Bianzhong in music

#### 4.4 Summary

### 4.1 Physical Structure of Xu Gongning Bian zhong

#### 4.1.1 The overall structure of Xu Gongning bian zhong

##### 1) Shape

The total height the frame of Xu Gongning Bianzhong is 2.36 meters, the bottom plate is 0.81 meters wide, and the length is 6.71 meters. The overall appearance is solemn and grand. The bell frame of the Bian zhong is a copper-wood structure, supported by four bronze warriors and several columns. The beams are wooden. The painting is decorated with lacquer, and both ends of the beam are covered with bronze sets engraved with dragon patterns. There are two bronze figures with swords on each of the middle and lower beams, supporting the beam frame with their heads and hands,

and there are copper pillars in the middle for reinforcement. The complete set of Bian zhong has a total of 37 pieces, which can be divided into three types: Yongzhong, Niuzhong, and Bozhong. There are five groups in total. It is a multi-component Bian zhong set, including two groups of Bozhong, with 4 pieces in each group; and two groups of Yongzhong, with 10 pieces in each group ; A set of button clocks, 9 pieces in total.



Figure 9. Xu Gongning bian zhong used by the Pingdingshan University Elegant Orchestra

Source: Keke Pan,2023

## 2) Diagram

The structural shapes of Bian zhong have their own characteristics, including yong, xuan, wu, zheng, mei, zhuan, zheng jian, gu bu, xian, yu, sui, heng, etc. "Zhou Li· Kaogong Ji" is the earliest document in the world that discusses bell casting technology. The article not only introduces the names of various parts of the bell, the proportions of the bell body, but also details important issues such as the relationship between its shape and sound, as well as tuning and filing techniques. The "Fushi" section of "Kaogong Ji" says: "The two luan on both sides of the bell are called "xian" , and the xian jian is called "yu" . The top of yu is gu, the top of gu is zheng, the top of zheng is wu, the top of wu is yong, and the top of yong is "Zheng", the circular bell hanging at the lower part of the cave is called "xuan" , the bell belt is called " zhuan" , and the protruding stalactite is called "mei" (Wen Renjun,1982)

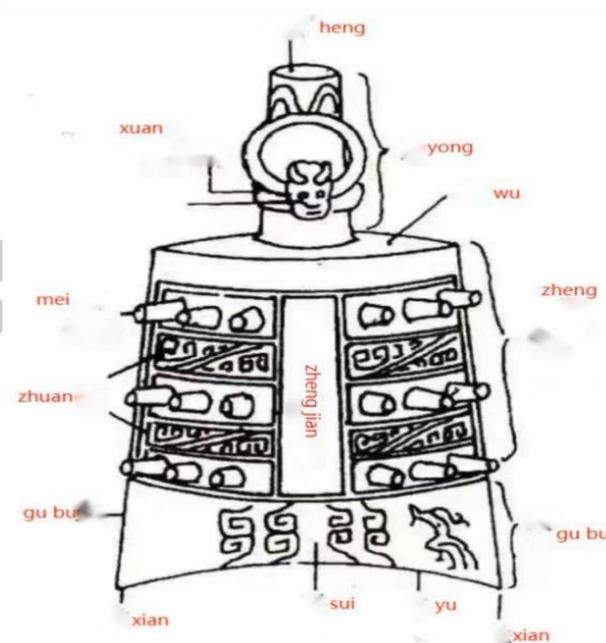


Figure 10. Bianzhong structure diagram

Source: [https://tz.zjol.com.cn/tzxw/202109/t20210923\\_23132601.shtml](https://tz.zjol.com.cn/tzxw/202109/t20210923_23132601.shtml)

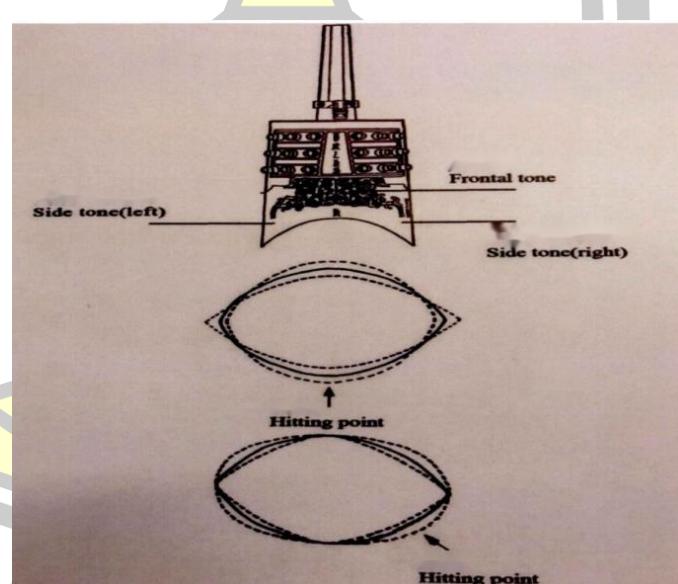


Figure 11. The front and side drum sound of Bian zhong

Source: <https://www.google.com/search>

### 3) Types

According to the type of bell, it is divided into three levels: upper, middle and lower, separated by the bell frame (including the bronze figure and pillars supporting the bell beam), and divided into two sound groups, left and right, which can be played at the same time or separately. When the performer strikes the upper and middle bells, he can strike two tonal s simultaneously or successively by holding a T-shaped wooden hammer in each hand; when striking the lower bell, he can only strike one tonal with a large wooden stick held in both hands.

According to the appearance characteristics of Bian zhong, they can be divided into five types, namely: “He wa” type, trapezoidal, with mei type, with fanniu type, with yong type and Rigde type.

Table 5. Bianzhong types

Types	Shape	Number	Name
Type A	“He wa” type	29	Yong zhong、 Niuzhong
Type B	Trapezoid type	8	Bo zhong
Type C	With “mei” type	33	Yong zhong、 Niuzhong、 Ridgeless Bo zhong

Table 5 (Continued)

Types	Shape	Number	Name
Type D		8	Bo zhong
Type E		20	Yong zhong
Type F		4	Bo zhong

Source: Keke Pan, 2023

#### 4.1.2 The physical structure of the Yong zhong

The Yong zhong is one of the most important ritual instruments in the Zhou Dynasty(1046 BC-256 BC) and the earliest bell in the bronze bell family. The Yong zhong was finalized and used in the early Western Zhou Dynasty(1046 BC-256 BC).

Since then, it has played an extremely important role in the establishment and implementation of the ritual and music system of the Zhou Dynasty(1046 BC-256 BC). Yongzhong flourished from the Shang and Zhou Dynasties to the end of the Warring States Period, which lasted for more than 1,400 years, spanning from the 17th century BC to the 3rd century BC.

According to data, when discussing the shape and other issues of music bells in ancient documents, Yong zhong was used as a model. The Yong zhong were recorded in the section "The Fu family is a bell" in "Zhou Li Kao Gong Ji".

Among the bronze bells, the Yong zhong has the most complex shape and the most sophisticated casting technology. From the middle of the Western Zhou Dynasty(1046 BC-256 BC) to the middle of the Spring and Autumn Period, the shape of the bell was gradually improved, and the decoration and casting techniques were gradually improved. The "Fushi" section also made a qualitative analysis of the problem of the sound of the bell, saying: "The vibration caused by the thickness of the bell, the origin of the clear and turbidity, and the origin of the extravagant calculation are explained. If the bell is thick, it will become a stonal, and if it is thin, it will become a stonal. If you sow extravagance, the trees will grow; if you calculate, the gloom will grow and the Yong will tremble." (Renjun Wen ,1982). Regarding the scientific issue of the acoustics of bronze music bells, Wen Renjun once In his article "Mathematical Interpretation of Acoustic Knowledge in "Kao Gong Ji""", he used mathematical acoustics research methods to prove that the "Fushi" section's analysis of the characteristics of Bian zhong is in line with modern acoustic principles. Therefore, "The Fu family is a bell" in "Zhou Li Kao Gong Ji" not only records the casting technology and acoustic principles of Yongzhong, but is still a document of important scientific value in the field of bronze bell casting as of today. As for the origin of Yong zhong, academic circles have been discussing it for nearly half a century. Looking at the research results of the academic circles, there are basically three views, namely: the northern version of Yong zhong and the southern version of Yong zhong (Zhixi Gao ,1999), Yongzhong originated from the theory of exchange between the north and the south. Among these views, whether they are from the South, the North, or the North-South exchange theory, there is ultimately a consensus that the formation of the Yong zhong is based on multiple and composite factors. It inherits the grand shape of the

southern cymbals, develops the excellent performance of the northern cymbals, and integrates the multiple functions of the northern and southern bronze cymbals into one body. It has become an important symbolic instrument for Zhou people to make rituals and music. The Yong zhong highlighted its extraordinary role in the ritual and music system of the Zhou Dynasty(1046 BC-256 BC). First of all, its status as a ritual instrument in the minds of Zhou people, but more importantly, its function as an instrument in communicating between people and gods and educating people. Demonstrated significant value.

There are a total of 20 pieces of Xu Gongning Yongzhong, with roughly the same external shape and basically the same structure. According to the shape, it is divided into two groups, A and B, with 10 pieces in each group.

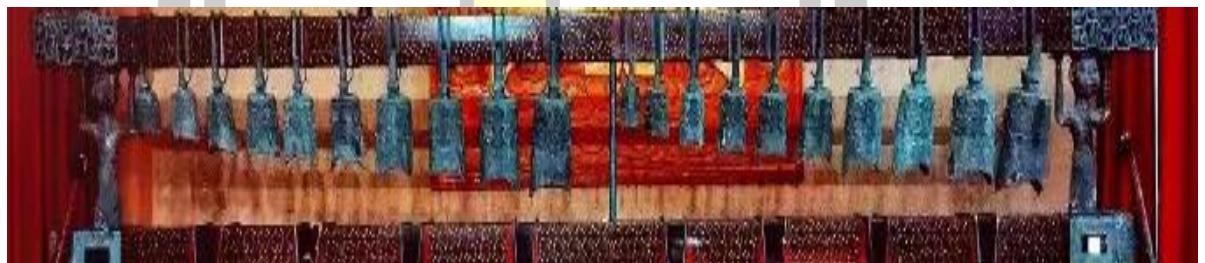


Figure 12. Xu Gongning Yongzhong

Source: Keke Pan,2023

### 1) The shape Characteristics of Yong zhong

Shape is one of the important factors in the study of bronze Bian zhong. Xu Gongning Yongzhong have the same shape, with successive sizes. The bell cavity is in the shape of a tile, with the front becoming wider downwards, and the upper part arching like an arc. The yong is cylindrical, with a xuan on the top and a shank attached to it. The wu is relatively flat. The yu has a raised triangular inner lip and a flat inner cavity. The front and back sides are decorated with 4 groups of 36 spiral-shaped medallions in the middle. The periphery of the medallion and the center are decorated with convex lines. The central part is relatively plain. The decoration on both sides of the bell body is the same.



Figure 13. Xu Gongning Yongzhong Detail image

Source: Keke Pan, 2023

## 1.1) The shape Characteristics of Yong zhong in Group A

Group A bells, 10 pieces in total. The shapes are similar, the shapes are elegant, the patterns are beautiful, and the castings are excellent. In descending order they are: A1, A2, A3, A4, A5, A6, A7, A8, A9, A10.

Table 6. Shape data table of Xu Gongning Yongzhong (Group A) (unit: kilogram, centimeter)

Number	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
Overall height	55.7	52.5	48.4	46.1	42.0	39.3	35.4	32.0	30.1	26.4
Long of yong	18.8	17.6	16.7	15.5	14.1	14.4	13.0	11.3	11.2	9.1
Upper diameter Of yong	4.9	5.0	4.6	4.5	4.0	4.1	3.4	3.3	3.4	2.7
lower diameter Of yong	6.7	6.8	6.5	5.9	5.7	5.7	4.9	4.2	4.2	3.5
Long of wu(part of chime)	17.7	16.8	15.1	13.7	12.8	11.8	10.55	9.3	9.1	8.5
Wide of wu(part of chime)	23.6	23.1	21.8	20.0	18.8	16.9	15.0	13.2	12.5	11.4
Xian(part of chime)	37.2	34.7	31.7	30.3	27.9	25.1	22.6	20.9	18.7	17.3
upper circumference	67	61	57	52.5	49	44	40	35.5	36	31.5

Table 6 (Continued)

Number	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
Lower circumference	81	78	68	62.5	57.5	52	46	41	40	35
Gu(part of chime)	22.9	21.4	19.0	16.5	15.3	13.8	12.1	11.0	10.1	9.1
Xian(part of chime)	29.6	28.6	26.0	24.5	23.1	20.0	18.1	15.8	14.4	13.8
Thickness of drum area	0.8	0.85	0.7	1.35	2.1	1.25	1.3	0.9	1.3	1.7
Thickness of lateral drum area	2.5	1.9	2.0	1.85	2.3	1.65	1.9	1.0	1.9	2.0
Kilogram	22.3	19.1	16.8	15.2	12.35	11.35	7.9	6.35	5.9	4.9
Mei(part of chime)	Spiral									

Source: Keke Pan,2023

### 1.2) The shape Characteristics of Yong zhong in Group B

Group B bells, 10 pieces in total. The Yongzhong in Group B are similar in shape, elegant in shape, beautiful in decoration, and well-cast. The Yongzhong in Group B are, in ascending order of unearthed numbers, as follows: B1, B2, B3, B4, B5, B6, B7, B8, B9, B10.

Table 7. Shape data table of Xu Gongning Yongzhong (Group B) (unit: kilogram, centimeter)

Number	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
Overall height	55.6	52.5	48.1	42.0	46.2	39.2	35.6	32.0	30.3	26.0
Long of yong	18.9	17.9	6.5	14.4	15.7	13.9	13.0	11.2	11.4	9.1
Upper diameter of yong	5.0	4.9	4.7	4.0	4.5	4.2	3.8	3.3	3.3	2.7
Lower diameter of yong	6.8	6.9	6.5	5.55	6.0	5.1	4.6	4.3	4.2	3.5
Long of wu(part of chime)	17.5	16.2	15.1	12.9	13.9	11.8	10.8	9.2	9.1	8.6
Wide of wu(part of chime)	24.0	23.0	21.6	18.6	20.2	17.0	14.9	13.2	12.4	11.4

Upper circumference	67	63	59	55	51	47	42	37	36	33.5
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Table 7 (Continued)

Number	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
Lower circumference	82	77	70.5	64.5	60	54	48	43	40	37.5
Xian(part of chime)	37.1	35.1	31.7	27.8	30.7	25.2	22.7	20.9	18.6	17.2
Gu(part of chime)	22.8	21.1	18.7	15.2	16.2	14.0	12.0	11.0	10.1	9.2
Thickness of drum area	1.1	0.9	0.9	0.7	1.55	0.85	1.5	1.4	1.5	2.1
Thickness of lateral drum area	1.5	2.1	1.4	1.15	1.5	1.2	1.5	2.1	1.8	2.0
Kilogram	20.9	19.6	16.7	12.7	14.7	11.55	9.05	7.15	6.0	4.75
Mei(part of chime)	Spiral									

Source: Keke Pan,2023

Observing from the basic shape and external shape of Yongzhong in groups A and B, whether it is a tile-shaped bell body or a shorter cylindrical bell, as well as the cicada pattern on the bell, the heavy ring pattern on the xuan, the wu position, and the zhuan. The decoration of the parts and the two sets of symmetrical Gu Shoulong patterns on the drums on both sides of the cavity highlight the typical characteristics and unique style of the Yong zhong decoration in the middle and late Western Zhou Dynasty(1046 BC-256 BC).

## 2) The decorations characteristics of Yongzhong

Decoration, known as the "language" of bronze ware, has always been an important part of the study of bronze ware. As Mr. Li Xue qin said: "The decoration of bronze ware is one of the best standards for the classification and division of bronze ware. Because decoration is much more common than inscriptions, plain surfaces are also a common practice. A variety of patterns. Patterns are like language. As long as you can understand them, you can tell what period and region it is from." Gao Ming also believes: "The pattern changes much more slowly than the shape of the vessel, and the time range is very wide, According to the interlacing and combination of patterns in different periods, it is of certain reference

significance to analyze the characteristics of patterns in a certain period." The theme content and style of decorations vary greatly in different eras and regions. The characteristics of the decoration can be used to infer the era and regional characteristics of a certain bronze vessel. Therefore, the decoration of Xu Gongning Yongzhong not only embodies a kind of decorative art, but also has the unique function of explaining its era to a large extent, and it contains rich cultural phenomena.

The decorative use of Xu Gongning Bianzhong are unique. The cicada pattern decorated on the yong part of the Yong zhong is mostly seen on bronzes of the Shang and Zhou dynasties; the heavy ring pattern on the yong part and the hanging scale pattern on the gan are also common decorations in the middle and late Western Zhou Dynasty(1046 BC-256 BC); the two groups on the drum part of the Yong zhong The symmetrical C-shaped Kui dragon pattern with opposite sides is more common on Yongzhong from the late Western Zhou Dynasty(1046 BC-256 BC) to the early Spring and Autumn Period; the oblique moiré pattern on the center of the Yong zhong mostly appears on similar objects from the late Western Zhou Dynasty(1046 BC-256 BC) or the early Spring and Autumn Period. Observed from the ornamentation, the ornamentation of Xu Gongning's Yongzhong has the characteristics of the middle and late Western Zhou Dynasty(1046 BC-256 BC).



Figure 14. Cicada pattern and double ring pattern

Source: Keke Pan,2023



Figure 15. C-shaped Kui dragon pattern

Source: Keke Pan,2023

The central parts of the three bell types of Xu Gongning Bianzhong all adopt a unified spiral design. This is the earliest and only example of the use of spiral bells on Yongzhong, which highlights the cultural attributes of these bells. and value. The spiral shell first appeared on the southern cymbals of the Shang Dynasty, which to some extent reflects certain conditions of the ancient southern ecological environment. The use of spiral bells on bells also shows, to a large extent, the gradual reflection of regional cultural factors on bells.



Figure 16. Spiral piece

Source: Keke Pan,2023

In addition to the Gu Shoukui dragon pattern on the main drum part, the Yong zhong in Xu Cemetery has the characteristics of late Western Zhou Dynasty(1046

BC-256 BC) decorations. The decorations on the following parts also have the characteristics of Western Zhou Dynasty(1046 BC-256 BC) decorations:

(1) The Gu Shou Kui dragon pattern on the wu part is similar to the Zhongyi bell unearthed from the Western Zhou bronze ware hoard in Qijia Village, Fufeng in 1960, and the Qin Gong bell unearthed from the Taigong Temple hoard in Yangjiagou, Baoji in early 1978.



Figure 17. Gu Shoukui dragon pattern on Wu part of Yong zhong

Source: Keke Pan,2023

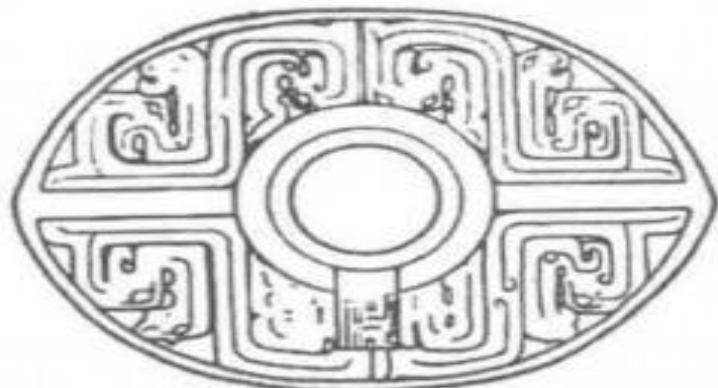


Figure 18. Rubbing of the Wu part of Zhongyi Zhong (183)

Source: Yan Chen,2023

(2) The heavy ring pattern decorated on the Xuan part is similar to the decoration on the Xuan part of Qin Gong. The double ring pattern was a popular decoration in the middle and late Western Zhou Dynasty(1046 BC-256 BC).

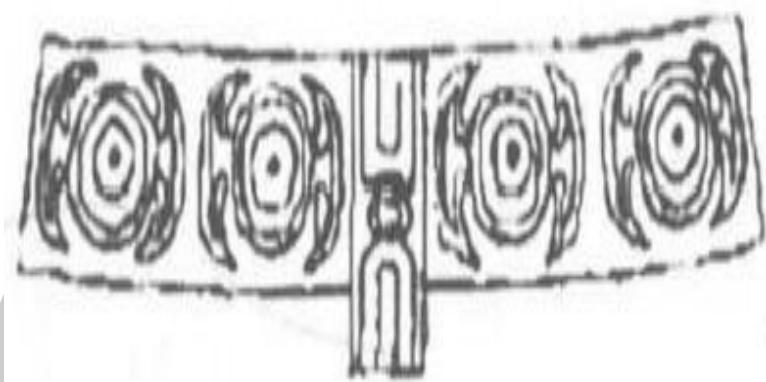


Figure 19. Decorations on Qin Gong Zhong xuan parts

Source: Yan Chen, 2023

(3) The triangular cicada pattern decorated on the Yong zhong are similar to the Western Zhou bronze bell unearthed in Qicun, Fufeng County, Shaanxi in 1998. Cicada pattern was a popular decoration in the earlier Shang and Zhou dynasties in China.



Figure 20. The bell unearthed in Fufeng Qicun (left), and the picture of Xu Gongning Bianzhong (right)

Source: Chengyuan Ma, 2023

Data show that around the early Western Zhou Dynasty (1046 BC-256 BC), when my country began to use the bronze Yong zhong as the main melody instrument, it attached great importance to the pattern decoration of its drum, zhuan and wu parts. At first, the main decorations were cloud patterns. In the middle of the Western Zhou

Dynasty (1046 BC-256 BC), Kui dragon patterns appeared in large numbers. For a long time, cloud patterns and Kui dragon patterns have been the main decorations on the bell, drum, wu and zhuan parts. The two patterns either appear individually on several main parts of a set of Bian zhong, or appear simultaneously in different areas of a Bian zhong. After entering the Spring and Autumn Period, the decorations on Bian zhong began to show a hundred flowers blooming, and the complicated decorations were dizzying. Regarding these changing factors, they are important factors that cannot be ignored when studying the age of Bian zhong.

### 3) Xu Gongning Yongzhong arrangement

There are a total of 20 pieces of Xu Gongning Yongzhong. The currently seen combination method is that during the sound testing, Wang Zichu divided it into two groups of basically the same arrangement based on the unearthed conditions and shape and size, with each group consisting of 10 pieces.

The phenomenon of the arrangement of 10 pieces of music bells appeared in the mid-Spring and Autumn Period, but it was mainly seen in the arrangement form of Niu zhong. From the analysis of the data on the arrangement of Yongzhong in the entire Spring and Autumn Period, the arrangement of 10 pieces of Yongzhong was only seen in Xinzheng. There are two sets of bells with Chifeng pattern and Xu Gongning.

The arrangement of Xu Gongning Yong zhong is different from the regular arrangement of 8-piece sets of Yongzhong in the late Western Zhou Dynasty (1046 BC-256 BC), and also different from the irregular arrangement in the process of changes in the arrangement of Yongzhong in the mid-Spring and Autumn Period. Instead, it appears in two neat groups of 10 pieces. Has a strong specificity. Judging from the current data, Xu Gongning's 10-piece arrangement of Yongzhong has the possibility of development and changes in the arrangement of early Yongzhong. This phenomenon appears concentratedly in specific areas on the bells of the Zheng Dynasty in the middle and late Spring and Autumn Period. Hundreds of 10-piece bells were unearthed in Xinzheng, Henan today. Judging from the analysis of Xu Gongning Bianzhong-shaped decoration and the development process of Yongzhong, Xu Gongning's Yongzhong should be earlier than the Niu zhong of Zheng State, so there is no situation of inheriting or imitating the Niu zhong arrangement, not to mention that

the Zheng State's set of 10 Niuzhong only. It is limited to the jurisdiction of Zheng State and is not found in other areas, so it has no influence. In this way, there is only one explanation. The superiority of Yong zhong was challenged by the rising star Niu zhong. In order to seek its own development and maintain its superior status, it had to seek changes. During this process, the number of Yongzhong was increased in order to expand the sound range, and the system was expanded from 8 pieces to 10 pieces to ensure its main status. Xu Gongning's 10-piece Yong zhong set is a representative example. On the other hand, from the analysis of the scale of Xu Gongning's complete set of Bian zhong. This set of Bian zhong is currently the largest and most complete set of Bian zhong in the Spring and Autumn Period. It has a strong advanced ideology and form. The two sets of 10 bells came from the same tomb, and tonal systems do not completely overlap. This phenomenon shows that although Xu State was small and weak at that time, it had the authentic identity of the Zhou clan. Coupled with the aesthetic concept of "taking beauty as giant" during the Spring and Autumn Period, Xu State showed its own strength by using the Yong zhong, an important ritual and musical instrument, to show its own strength and not to be outdone. At the same time, it cannot be ruled out that it reflects an attempt in the process of initial changes in the Yong zhong List. Under the dual effects of "ritual" and "music", it moves from the strict constraints of "ritual system" to the activeness of "music" Fission. Therefore, the phenomenon of Xu Gongning's arrangement of Yongzhong should be the initial phenomenon in the evolution of the arrangement of Yongzhong, and it is evidence of the initial changes and reforms in the arrangement. Its age is speculated to be in the early mid-Spring and Autumn Period.

In short, in the mid-Spring and Autumn Period, the eight-piece arrangement of the Yong zhong was broken through in the mid- Spring and Autumn Period (770 BC - 476 BC) after having lasted for more than 300 years. The breakthrough of Yong zhong have important historical significance in the development history of bronze bells.

#### 4.1.3 The physical structure of the Niu zhong

Niu zhong, also known as bronze Niu zhong, refers to a new type of bronze bell-like instrument derived from the combination of the bell body of the Western Zhou Dynasty(1046 BC-256 BC) Yong zhong and the niu of the copper bell. It was produced approximately in the Western Zhou Dynasty(1046 BC-256 BC) and the early Spring

and Autumn Period. Xu Gongning Niu zhong, a total of 9 pieces, are similar in shape, pattern style, and size in descending order. They are divided into groups according to the shape.



Figure 21. Xu Gongning Niu zhong

Source: Keke Pan,2023

### 1) The shape and decorative characteristics of Niu zhong

Xu Gongning Niu zhong are composed of 9 bells. The bell cavity is in the shape of a tile, with a straight front and a wide bottom. The upper part of the main drum is arched. The Wu part is relatively flat, with a small square ring in the center. The front edges are straight and slightly convex in the middle. The five parts of the Niu zhong and the main drum part are decorated with the dragon pattern, the center part is decorated with the beveled Kui dragon pattern, and the round stem is decorated with the colorful rope pattern, which reflects the profound influence of Chu and Yue culture. Wu, zhuan, and gu have the same decorative style. There are 4 groups of 36 raised spiral bells on the front and back of the clock. The perimeter of the bell is decorated with a convex linear border with colorful cord patterns. The center is relatively plain. The front and back of the clock button are decorated with fine thunder patterns. Mainly, the decorations on the small square ring buttons are slightly different. There are two kinds of decorations: Kuilong pattern or triangular thunder pattern. The whole Bian zhong is very beautifully decorated, with the same decoration on both sides of the bell body.

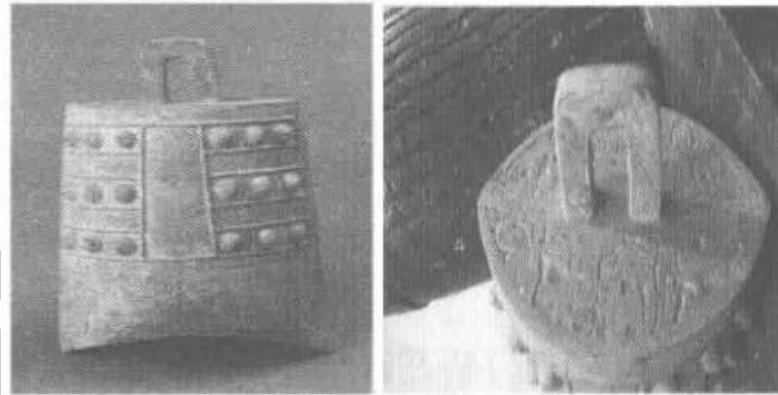


Figure 22. Partial view of Niu zhong

Source: Yan Chen, 2023

From the shape and appearance of Xu Gongning Niu zhong, as well as the arrangement of the bracing inside the bell cavity and the traces of tuning files, the shapes from large to small are: n1, n2, n3, n4, n5, n6, n7, n8, n9 .

Table 8. Xu Gongning Niu zhong data table (unit: centimeters, kilograms)

Number	n1	n2	n3	n4	n5	n6	n7	n8	n9
Overall height	26.9	25.0	24.1	22.0	20.7	20.1	18.9	17.5	16.3
height of niu	4.4	4.2	4.0	3.9	3.7	3.6	3.4	3.2	3.2
Gu(part of chime)	13.0	11.3	11.3	10.4	10.1	9.5	8.6	8.2	7.5
Xian(part of chime)	17.9	17.3	15.8	15.4	13.8	12.8	12.1	11.3	10.3
Long of wu(part of chime)	14.7	14.0	13.2	12.4	11.4	10.5	10.2	9.5	8.5
Wide of wu(part of chime)	10.8	10.2	9.6	9.0	8.5	7.7	7.4	7.1	6.4
upper circumference	40	38	37.5	36	33	31	30	28.5	24
Lower circumference	46	43	40.3	38.5	36	33	31	30	27
Thickness of drum area	0.9	0.8	0.8	0.6	0.6	0.7	1.0	1.1	0.9
Thickness of lateral drum area	0.9	0.9	0.9	0.9	0.9	0.8	1.4	1.1	1.2~1.4
Kilogram	3.3	2.95	2.75	2.25	2.05	2.4	2.0	1.9	1.8
Mei(part of chime)	Spiral								

Source:Keke Pan,2023

## 2) Xu Gongning Niu zhong arrangement

Arrangement has dual meanings for bronze musical bells. First, as an external expression of the form and scale of a ritual vessel, and secondly, as a musical instrument, arrangement is the basis for the actual musical performance and application of the bell.

The arrangement of Niuzhong has reflected breakthroughs and developments since its birth. Xu Gongning pioneered the nine-piece arrangement of Niuzhong, breaking the institutionalization of the eight-piece arrangement of Yongzhong in the Western Zhou Dynasty(1046 BC-256 BC) that had been maintained for nearly 300 years. It became the first bell arrangement in the late Spring and Autumn Period (770 BC - 476 BC) of the Western Zhou Dynasty(1046 BC-256 BC). A thriving new force. "After the middle of the Western Zhou Dynasty(1046 BC-256 BC), from the king of the Zhou Dynasty(1046 BC-256 BC) to the high-ranking nobles, the combination of Bian zhong generally consisted of eight pieces. This situation shows that the arrangement of Bian zhong in the entire Western Zhou Dynasty(1046 BC-256 BC) was institutionalized. The music system of the Western Zhou Dynasty(1046 BC-256 BC) embodied by the Bian zhong was relatively unified, and the music system was Reach a high degree of consistency with etiquette." The development of Bian zhong needs to conform to the development laws of music in order to adapt to and meet the entertainment needs of society and dignitaries. The bold expansion of the Niu zhong arrangement form injects new blood and life into "Lexuan", enriches the content of "Lexuan" and gives it a brand-new appearance.

### 4.1.4 The physical structure of Bo zhong

Xu Shen of the Han Dynasty(202BC-220AD) explained "Pu" in "Shuowen Jiezi" as: "Pu, the big bell belongs to it." The porcelain is one of the early bronze bells in China and the oldest musical instrument among the Chinese bronze bells.

#### 1) Shape characteristics of Bo zhong

Xu Gongning compiled 8 pieces in total, divided into two groups, 4 pieces into a compilation. One group is a ridged bell (i.e., an ellipsoid with a rib and a central ridge, a ridged and non-edged bell), and the other group is a ridgeless bell (i.e., an elliptical body without a rib and a central ridge, without a ridge). (pieces). The two sets of bells are of different shapes and sizes, with completely different styles and characteristics. Xu Gongning's two groups of bronze bells provide new information and

material evidence for the study of the development of bronze bells in my country during the Shang and Zhou dynasties, and their value is self-evident. as the picture shows.



Figure 23. Xu Gongning's ridged bell

Source: Keke Pan,2023



Figure 24. Xu Gongning's ridgeless Bian zhong

Source: Keke Pan,2023

### 1.1) The shape and decorative characteristics of the ridged bell

Xu Gongning's ridged Bian zhong are "four-winged" Bian zhong with a rib and a central ridge. The four ridged "four-winged" Bian zhong are basically the same in shape and are of similar size. The front is slightly bulging and the vagina is slightly convergent. The cavity is nearly elongated and oval, slightly trapezoidal when viewed from the front, and flush with the mouth. The "four-wing" bell has a door ridge at the upper end of the xian parts on both sides of the cavity, which is connected to the symmetrical buttons on the wu part. The wu part is flat and slightly concave. A central ridge is set in the center of the body cavity, forming a "four-wing" shape with the two side ridges. The length of the door rib and the middle ridge account for about two-thirds of the bell cavity, and the lower half of the cavity is plain.



Figure 25. Partial view of the ridged bell

Source: Keke Pan, 2023

The decoration on the bell body is a relief dragon pattern. The decoration on the wu part is consistent with the decoration on the cavity surface. The relief dragon pattern is concave in the body and ridged on the edges. The upper and lower edges of the cavity are decorated with belt-like grooves, and are surrounded by 8 quadrangular

pyramid-shaped emulsions. The door ribs on both sides of the body and the door ribs on the middle spine are all open-carved Kui-phoenix patterns. The open-carved Kui-phoenix pattern is based on delicate triangular thunder patterns. There is a dragon-shaped flat body with complex buttons on the wu part, and the wu part is decorated with two sets of opposite coiled dragon patterns. The front and back of the cavity are decorated with relief-style dragon patterns. The upper and lower edges of the dragon pattern are each surrounded by a pattern of diamond-shaped cones spaced apart from each other. Among these patterns, the dragon body decorations are all in the shape of grooves, and the modeling styles are unified. The casting reflects an abstract aesthetic idea of switching from complexity to simplicity.



Figure 26. Panlong-shaped flat body with fanniu

Source: Keke Pan, 2023

The four ridged "four-wing" plaited pieces are beautifully decorated and well-made. The bell has a thick cavity and a well-proportioned shape, which can perfectly demonstrate the solemnity, majesty and luxury of the "four-wing" bell. From large to small, they are: b1, b2, b3, b4.

Table 9. Statistical table of Xu Gongning's ridged braided steamed buns (unit: centimeters and kilograms)

Number	b1	b2	b3	b4
Overall height	58.2	54.3	52.9	48.8
Long of fanniu	18.2	17.0	17.1	15.2
The width of the door	6.5	6.0	6.0	5.3
The edge of the door is thick	1.0	1.1	1.1	1.1
Long spine	29.8	27.0	26.7	25.0
Ridge width	6.5	6.0	6.0	6.0
Long of wu(part of chime)	24.4	23.1	22.0	20.7
Wide of wu(part of chime)	20.4	19.5	18.5	17.5
Xian(part of chime)	40.0	37.3	35.8	33.6
Upper circumference	72	68	66	58
Lower circumference	102	93	91	88
Gu(part of chime)	29.5	26.1	26.3	25.8
Kilogram	28.7	24.7	26.6	23.7

Source:Keke Pan,2023

The shape of Xu Gongning's ridged bell is a kind of ridged bell with a "four-wing" shape. There are door ribs on both sides of the upper part of the bell's cavity, and the buttons on the dance are connected to the door ribs on both sides. A central ridge is set in the center of the body cavity, forming a "four-wing" shape with the two sides of the ribs. The open-carved patterns are abstract and beautiful. According to data analysis: one of the important features of early bells is the placement of door ribs on both sides of the body, and the important features of the early door rib openwork are bird patterns and bifurcated feather tail-shaped decorations. For example, the Jiangxi Xinganbao has an open-carved squatting bird cast on both sides of the body, and is connected to the open-carved door edges with bird feathers and tail patterns on both sides, forming a ridged carcass shape. At first glance, it seems that the edges and

buttons of Xu Gongning's ridged china clock are not similar to those of the new china china. However, if you look closely, you will find that there is a trace of inheritance between the two. Although Xu Gongning's ridged buttons and intricate open-carved patterns have been completely abstracted and become a decorative framework that combines the deformed Kui dragon pattern and the exaggerated phoenix tail pattern, the existence of the small square ring buttons of the same shape is still retained. However, the appearance of the central ridge on Xu Gongning's ridged poultice and the highly abstract shape of its decoration fully reflect the obvious distance between the two.

### 1.2) The shape and decorative characteristics of the ridgeless bell

From the perspective of music archeology, the ridgeless bells should be later produced than the ridged bells. Because of its shape, the ridged bell has great limitations in its musical performance, while the musical performance of the ridged bell far exceeds that of the ridgeless bell. After the early Spring and Autumn Period, the ridged bell accounted for leading position.

Xu Gongning's ridgeless bells, 4 pieces in a series. The ridgeless bell body has a typical tile shape, slightly trapezoidal in front view, and elliptical in cross-section. The upper part is equipped with a leaf edge, which is symmetrical on both sides. The fan niu is connected to the door ribs on both sides, and the length of the door rib and the middle ridge accounts for about 2/3 of the cavity. The plane of the Wu part is slightly concave, with a complex button and a small square ring at the top. The arc-shaped xian, the xian part gradually widens downwards, and the yu part is flush.



Figure 27. Xu Gongning's ridgeless Bian zhong

Source: Keke Pan,2023

The front and back of the ridgeless bell have the same decoration. The main drum is decorated with two pairs of four opposite Kui dragon decorations, with clear grooves and lines. The wu part is vertically set with a complex button, which is an openwork carving. It is made of 8 dragons intertwined in a coil. The dragon body of the complex button is engraved with detailed thunder patterns. The round stems in the Wu and zhuan areas are decorated with colorful cord patterns. There are 4 groups of 36 spiral-shaped mei on the front and back of the body. The zhuan is decorated with panchi patterns. There is a Yang line border between the periphery of the mei and the zhuan. The center part is somen. The four ridgeless bell-shaped ornaments are basically the same, and are of similar size.



Figure 28. Kui dragon decoration

Source: Keke Pan,2023



Figure 29. Detailed view of wu part

Source: Keke Pan,2023



Figure 30. Spiral shape

Source: Keke Pan, 2023

The four pieces of ridgeless Bian zhongneys are beautiful in shape and have excellent casting technology. However, the Bian zhong are relatively thin and light, which can perfectly display the unique style of the ridgeless Bian zhong. From large to small they are: b5, b6, b7, b8.

Table 10. Statistical table of ridgeless braided buns made in Xu Cemetery

Number	b5	b6	b7	b8
Overall height	42.3	40.0	37.8	34.8
Height of niu	10.9	10.7	10.2	9.8
Button top width	4.4	3.4	3.3	3.0
Button bottom width	21.8	21.1	19.7	19.0
Long of wu(part of chime)	23.7	22.2	21.0	19.5
Wide of wu(part of chime)	17.9	17.0	14.6	14.5
Upper circumference	68	61	56	53
Lower circumference	79	72	69	60
Xian(part of chime)	27.8	26.5	24.5	22.1
Thickness of drum area	0.5	0.4	0.7	0.7
Thickness of lateral drum area	1.1	1.0	1.2	1.0
Kilogram	8.0	6.8	5.8	4.6
Mei(part of chime)	Spiral	Spiral	Spiral	Spiral

Source: Keke Pan, 2023

To sum up, judging from the cultural attributes reflected in the shape of Xu Gongning's ridgeless urn bell, whether it is from the curved outer convex cavity of the urn body showing a typical composite tile type; confusion; as well as the same decoration and shape of panchi as wu, zhuan, gu, etc., comparing the similar artifacts unearthed in the Central Plains area in the past, it is not difficult to find a large number of the same type of artifacts. But if you compare it with the style of Bian zhong you see, you can see a clear gap. In terms of the characteristics of cultural attributes, the shape of the ridgeless wove made by Xu Gongning has obvious characteristics of the Central Plains culture. However, the 36 bell-shaped beauties set on the ridgeless trowel are mainly of an exotic style. Some scholars believe that "snails are a common aquatic animal in the south, and the snail-shaped shells are likely to come from the customs of the Yue and Chu cultures in the south." At the same time, some scholars believe that the exquisite patterns on the snail-shaped shells are earlier than in the past. The specimens of snail-shaped plum blossoms that have appeared are less likely to be related to the Wu culture. The 36 snail-shaped plum blossoms on Xu Gongning's ridgeless bells, Yongzhong and Niuzhong should be the earliest snail-shaped plum blossoms that appeared. Although the setting of the shaped plum blossoms reflects a certain Chu cultural trend, further discussion is needed on the evolution of the spiral plum blossoms and the positioning of their cultural attributes.

### 1.3) Xu Gongning's Bo zhong arrangement

The scrolls compiled by Xu Gongning are divided into two forms, with a total of 8 pieces, appearing in the form of "4+4". Xu Gongning's two sets of Bian zhong of different shapes form a "4+4" arrangement and are arranged in the bass part of a large-scale diversified combination of Bian zhong. Although it was unearthed in the Chu region (now Yexian County, Henan Province, which belonged to the territory of the Chu State in the Spring and Autumn Period), it has obvious typical characteristics of the Central Plains in the mid-Spring and Autumn Period. There is a considerable gap compared to the early compilation. It is speculated from this that Xu Gongning's two sets of clocks were produced in the early to mid- Spring and Autumn Period (770 BC - 476 BC) when the arrangement of the bells shifted from the three-piece system to the four-piece system.

#### 4.1.5 Bian zhong playing tools

The traditional Bian zhong playing tools mainly include wooden T-shaped hammers and long sticks. The mallets are used to strike the middle Yong zhong and the upper button bell, and the long sticks are used to hit the lower bells. Traditional performance tools have many advantages, such as being good at expressing solemn and solemn scene music, especially for playing music passages with brilliant effects. In recent years, Professor Tan Jun's team at Wuhan Conservatory of Music has improved Bian zhong performance tools. We have developed soft hammers (large, medium and small), neutral hammers (large, medium and small), hard hammers (large, medium and small), brushes (soft and hard) and skewers (thick and fine), etc. the performance performance is greatly enhanced.



Figure 31. T-shaped mallet

Source: Keke Pan,2023



Figure 32. Beating the hammer with a long stick

Source: Keke Pan,2023

#### 4.1.6 Hanging Methods of Xu Gongning bian zhong

There are three types of hanging methods for the Xu Gongning Bian zhong, the latch type for the Niu zhong, and two types for the Yong zhong and Bo zhong, including the collar type and the hook type.

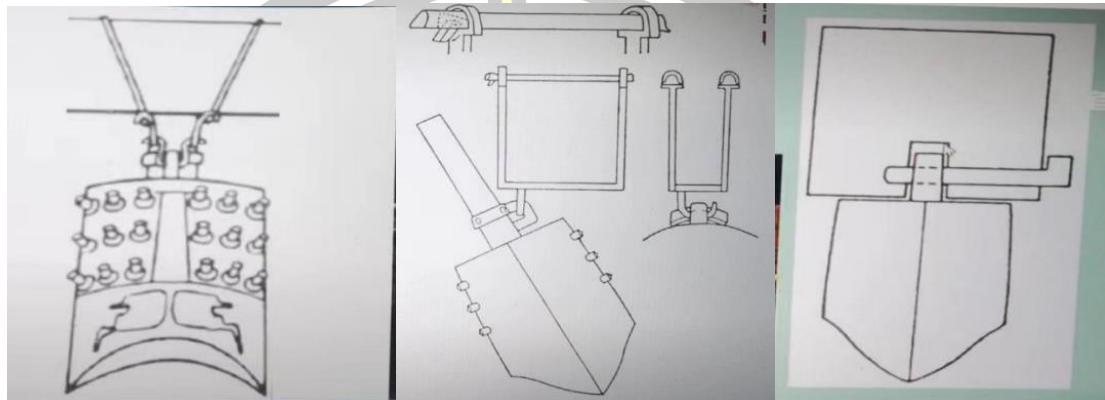


Figure 33. collar type, hook-type, latch-type

Source: Yihan Zhao, 2023

#### 4.2 The tonal system of Xu Gongning bian zhong

From a musicological perspective, the tonal system are a sequence of musical tones of different pitches arranged in order. The change and evolution of tonal system is complementary to the evolution of the musical bell arrangement. The arrangement is the external form of the musical bell. As an instrument, the change of the musical bell is the core content in the evolution process of the musical bell.

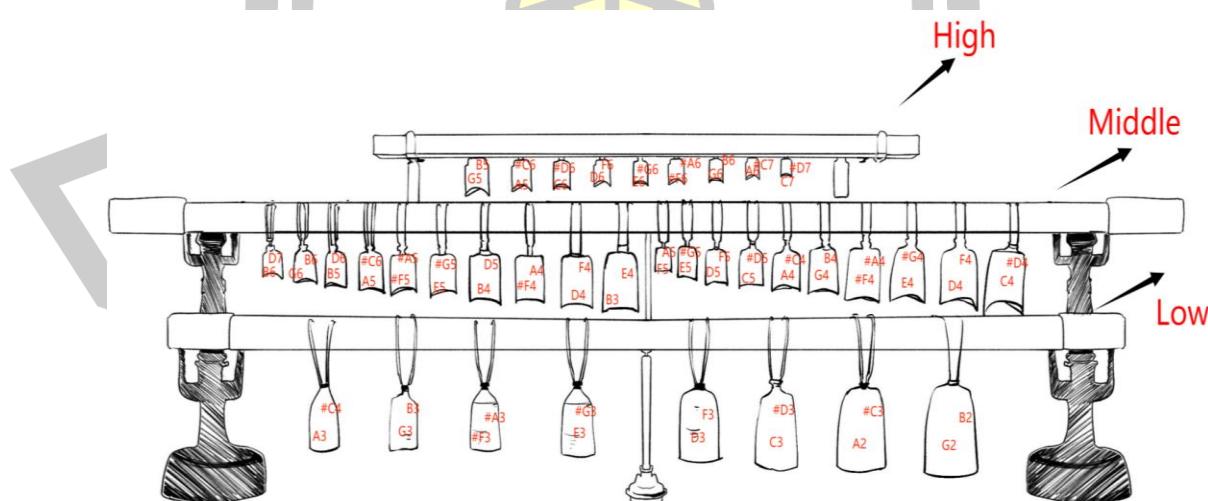


Figure 34. Xu Gongning's hand-drawing of Bian zhong phonemes

Source: Keke Pan, 2023

Note: The phonemes in the table are engineering notations. G2 - B2 represents the large character group G-B, C3 - B3 represents the small character group c-b, C4 - B represents the small character group c1-b1, and C5 - B5 represents the second small character group c2-b2, C6-B6 means three groups of small characters c3-b3, C7-#D7 means four groups of small characters c4-f4.

Traditional Chinese music theory is the same as Western music theory. The pitch distance between an octave is divided into twelve semitonal s, which are called twelve laws. The odd numbers are called "Liu Lu" and the even numbers are called "Liu Lv", so it is also called "Twelve Laws". The twelve rhymes represent absolute pitch, and its properties are the same as the note names (e, d, e, f, g, a, b) in Western music theory. In the history of our country, Lu Lu has always been associated with the calendar and measures, quantities, and measures. The measures, measures, and measures of each dynasty and each generation are different, and the standard pitch is also different. For example, in the Western Zhou Dynasty(1046 BC-256 BC), the rhythm height of Huang Zhong was 350 Hz to 370 Hz, which is approximately equivalent to the f in a group of small characters in Western phonetic names. In the Tang Dynasty, the rhythm height of Huang Zhong was similar to the e in a group of small characters in Western phonetic names. In the Yuan and Ming dynasties, it was 295z to 299Hz, approximately equivalent to the small letter d in Western phonetic names.

Because the actual rhythm system of the Bian zhong unearthed from Xu Gongning's cemetery cannot be inferred, and the relationship between the various rhythms is relatively confusing, it is mainly determined by hearing. Therefore, the set of Bian zhong copied by Pingdingshan University is based on the three-part gain and loss rhythm recorded in "lv shi chun qiu·jixia ji·yin lv pian" and infers the pitch relationship of the twelve-temperature.

First, determine the pitch, phoneme, tonal sequence and pitch of two sets of Yong zhong A and B. According to the "tonal Analysis of the Bian zhong of Tomb No. 4 in Jiuxian County, Ye County" (Wang Zichu, 2008), it is confirmed that this set of bells is based on D It is the pentatonic series of the palace. There are a total of 9 palace sounds in the two sets of bells, and the average value is calculated to be d-7 (193 cents). The pitch closest to this pitch is the side drum sound d3 of the 8th bell in Group A,

which is lowered by two. The first octave is d1 (191 cents), which is the pitch of Huang Zhonglu, which is 292.147hz.

The temperament of this set of clocks adopts the three-point gain and loss temperament recorded in "Lu Shi Chun Qiu", and is appropriately adjusted in combination with the pure temperament of natural semitonal s (112 cents) and modified semitonal s (92 cents). After research, it was determined that the yellow bell rhythm is D (the Zheng gu yin sound of A2 in the Yongzhong group), and the D in the small group is 292.147hz.

Table 11. Xu Gongning Bianzhong Each pitch

	Hua ng zhong g	Da lv	Tai cu	Jia zhon g	Gu xian	Zho ng lv	Rui bin	Lin zhong g	Yi ze	Nan lv	Wu yi	Ying zhong g
Ptic h	d	d#	e	f	f#	g	g#	a	a#	b	c1	c1#
Cent	95	152	197	254	299	356	401	446	503	548	605	650
Hz	146. 0735	156. 016	164. 3415	175. 527	180. 3935	197. 4785	208. 016	219. 116	234. 030	246. 5185	263. 298	277.3 47
Ptic h	d1	d1#	e 1	f 1	f1#	g 1	g1#	a 1	a1#	b 1	c 2	c2#
Cent	191	305	395	509	599	713	803	893	1007	1097	1211	1301
Hz	292. 147	312. 032	328. 683	351. 054	360. 787	394. 957	416. 032	438. 232	468. 060	493. 037	526. 596	554.6 94
Ptic h	d 2	d2#	e 2	f 2	f2#	g 2	g2#	a 2	a2#	b 2	c3	c3#
Cent	382	610	790	1018	1198	1426	1606	1786	2014	2194	2422	2602
Hz	584. 294	624. 064	657. 366	702. 108	721. 574	789. 914	832. 064	876. 464	936. 120	986. 074	1053. .192	1109. 388
Ptic h	d 3	d3#	e 3	f 3	f3#	g 3	g3#	a 3	a3#	b 3	c4	c 4#

Table 11 (Continued)

	Hua ng	Da lv	Tai cu	Jia zho	Gu xian	Zho ng	Rui bin	Lin zho	Yi ze	Nan lv	Wu yi	Ying Zho ng
Cen	764	122	158	203	239	285	321	357	402	438	484	5204
t		0	0	6	6	2	2	2	8	8	4	
Hz	116 8.58 8	124 8.12 8	131 4.73 2	140 4.21 6	144 3.14 8	157 9.82 8	166 4.12 8	175 2.92 8	187 2.24 0	197 2.14 8	210 6.38 4	2218 .776
Ptic h	d 4	d4 #	e 4	f 4	f4#	g 4	g4 #	a 4	a4 #	b 4	c 5	c 5#
Cen	152	244	316	407	479	570	642	714	805	877	968	1040
t	8	0	0	2	2	4	4	4	6	6	8	8
Hz	233 7.17 6	249 6.25 6	262 9.46 4	288 6.29 6	296 1.71 2	315 9.65 6	332	350	374	394	421	4437 .552

Note: Sound measurement data were provided by key informants

Source:Keke Pan,2023

#### 4.2.1 The tonal system of Yong zhong

From a musicological perspective, the tonal system is a sequence of musical tonals of different pitches arranged in order. The change and evolution of tonal system is complementary to the evolution of the musical bell arrangement. The arrangement is the external form of the musical bell. As an instrument, the change of the musical bell is the core content in the evolution process of the musical bell.

There are 20 pieces of Xu Gongning Yongzhong, arranged in the form of "10+10". The pitch of the 20 Yongzhong is clear, and the third-degree relationship between the front and side drum sounds of the Yong zhong is clear and relatively balanced.

Xu Gongning's two sets of Yong zhong have a wide range of sounds, ranging from small character group to small character 4 groups, spanning 5 octaves, with five,

six and seven tonals. The structure and specific sound measurement data of two groups of Yong zhong, Xu Gongning A and B, Each chime has Zheng gu yin and Ce gu yin, which can produce two tones,as shown in the picture.

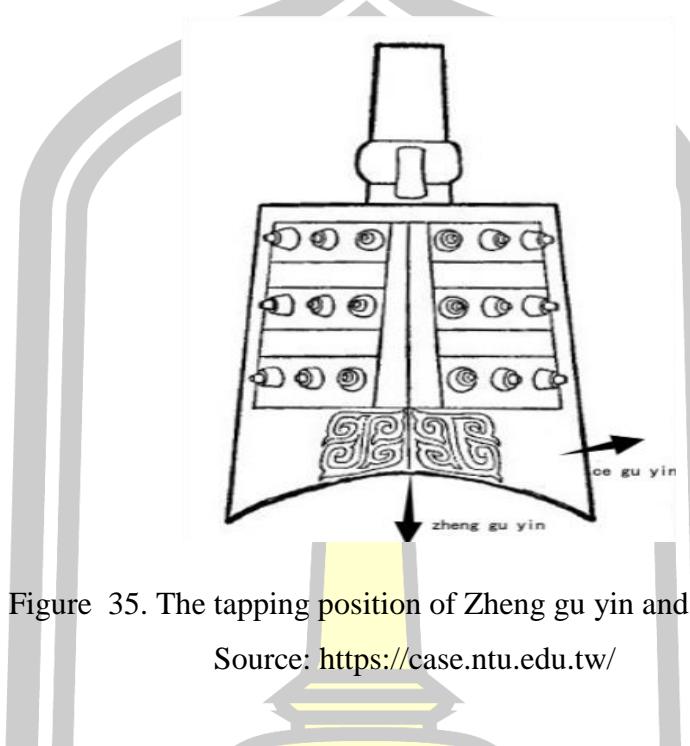


Figure 35. The tapping position of Zheng gu yin and Ce gu yin

Source: <https://case.ntu.edu.tw/>

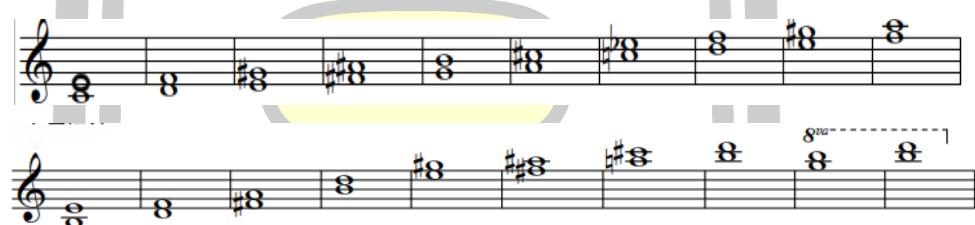


Figure 36. Yong zhong sound range

Source: Keke Pan,2023

Note:The sound below is Zheng gu yin, the sound above is Ce gu yin



Table 12. Xu Gongning Group A ( 10 pieces) Yongzhong sound measurement data table

Number		A 1	A2	A3	A4	A5	A6	A7	A8	A9	A10
Zheng gu yin	pitch	c1	d1	e1	f1 #	g1	a1	c2	d2	e2	f2
	pho	bian	gong	shang	jue	qing	zhi	bian	gong	shang	jue
	nem	gong				jue		gong			
	e										
Ce gu yin	pitch	d # 1	f1	g1 #	a1 #	b1	c2 #	e	f2	g2 #	a2
	pho	gong	jue	bian zhi	zhi	yu	bian	shang	jue	yu	zhi
	nem						gong				
	e										

Source:Keke Pan,2023

Table 13. Group B (10 pieces) Yongzhong sound measurement data table

Number		B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
Zheng gu yin	pitch	b	d1	f1 #	b1	e2	f2 #	a2	b2	g3	b3
	pho										
	nem	yu	gong	jue	yu	shang	jue	zhi	yu	qing	yu
	e									jue	
Ce gu yin	pitch	e1	f1	a1	d2	g2 #	a2 #	c3 #	d3	b3	d4
	pho										
	nem	shang	jue	zhi	gong	bian	zhi	bian	gong	yu	gong
	e					zhi		gong			

Source:Keke Pan,2023

It can be seen from the table that tonal systems of Xu Gongning's two sets of Yongzhong are arranged as follows:

- 1) Group A Yongzhong Zheng gu yin are listed as:bian gong - gong - shang - jue - qing jue - zhi - bian gong - gong - shang jue.
- 2) Ce gu yin of Group A Yong zhong are listed as follows:gong—jue — bian zhi — zhi — yu — bian gong—shang — jue—yu — zhi.
- 3) Group B Yong zhongzheng Zhenggu yin are listed as : yu—gong—jue—yu—shang—jue—zhi — yu—qing jue — yu
- 4) Ce gu yin of Group B Yong zhong are listed as follows:shang — jue — zhi—gong—bian zhi — zhi — bian gong — gong—yu — gong.

The analysis of the sound measurement data of Xu Gongning's Yong zhong shows that the sound series of two groups of Yong zhong, A and B, have the following characteristics:

1) xia zhi scale is more typical. By breaking up the two octave groups A and B, the scale can be composed as follows: Gong, Shang, Jue, Qing jue, Zhi - Yu - Bian Gong. This scale form is a typical lower Zhi scale form. The "Xiazhizhi scale" is composed of five "zheng sheng" plus "qing jue" and "bian gong". Some people call it "qing yue scale" or "new scale"...

2 )The embodiment of the concept of "Zhong Shang yu". The sound "Yu" appears frequently in the main and drum tonal s of Xu Gongning's Yongzhong, and the first and last two bells of the Yongzhong in Group B are both "Yu". The concept of "Zhong Shangyu" recorded in the literature is vividly reflected in Xu Gongning's Yongzhong.

3 ) Breakthrough in the "Shang" sound. In the sound series of Xu Gongning's two sets of Yongzhong, the appearance of the "Shang" sound is an iconic message: first, the "Shang" sound precepts used by Zhou Lejie have been broken in the sound series of Xu Gongning's Yongzhong; secondly, Xu Gongning's Yong zhong must have been produced in the period after the Yong zhong sound sequence changed. However, from the analysis of the sound series, it can be seen that although the "Shang" sound appears in the two groups of Yongzhong A and B, the position of the "Shang" sound has not become the main sound of the two groups of Yong zhong sound series, and still reflects

a kind of sound. The early tentative use demonstrates the early evolution of tonal system.

4) The "Yu- Gong" structure is a typical sound sequence structure of the Bian zhong of the Western Zhou Dynasty(1046 BC-256 BC) in the Central Plains. tonal system of the Yongzhong in Group B of Xu Gongning inherits the typical characteristics of the Bian zhong of the Western Zhou Dynasty(1046 BC-256 BC) in the Central Plains. In Group B, B1 and B2 are Zheng gu yin sounds, and B9 The drum sounds on the 10th and 10th sides all adopt the structure from "Yu" to "Gong". This sound sequence structure fully reflects the core role of the "Yu-Gong" structure.

#### 4.2.2 The tonal system of Niu zhong

As a musical instrument, the evolution of the tonal system is the core content in its evolution. In the article "Musicological Dating of Chinese Bronze Bells", Wang Zichu proposed several dating standards for bronze bells, one of which is the tonal system. Tonal systems of bronze bells have different characteristics in different periods. Compared with the external forms such as shape and decoration, which are relatively easy to change, tonal systems themselves have relatively strong stability. Each chime has Zheng gu yin and Ce gu yin, which can produce two tones, as shown in the figure.

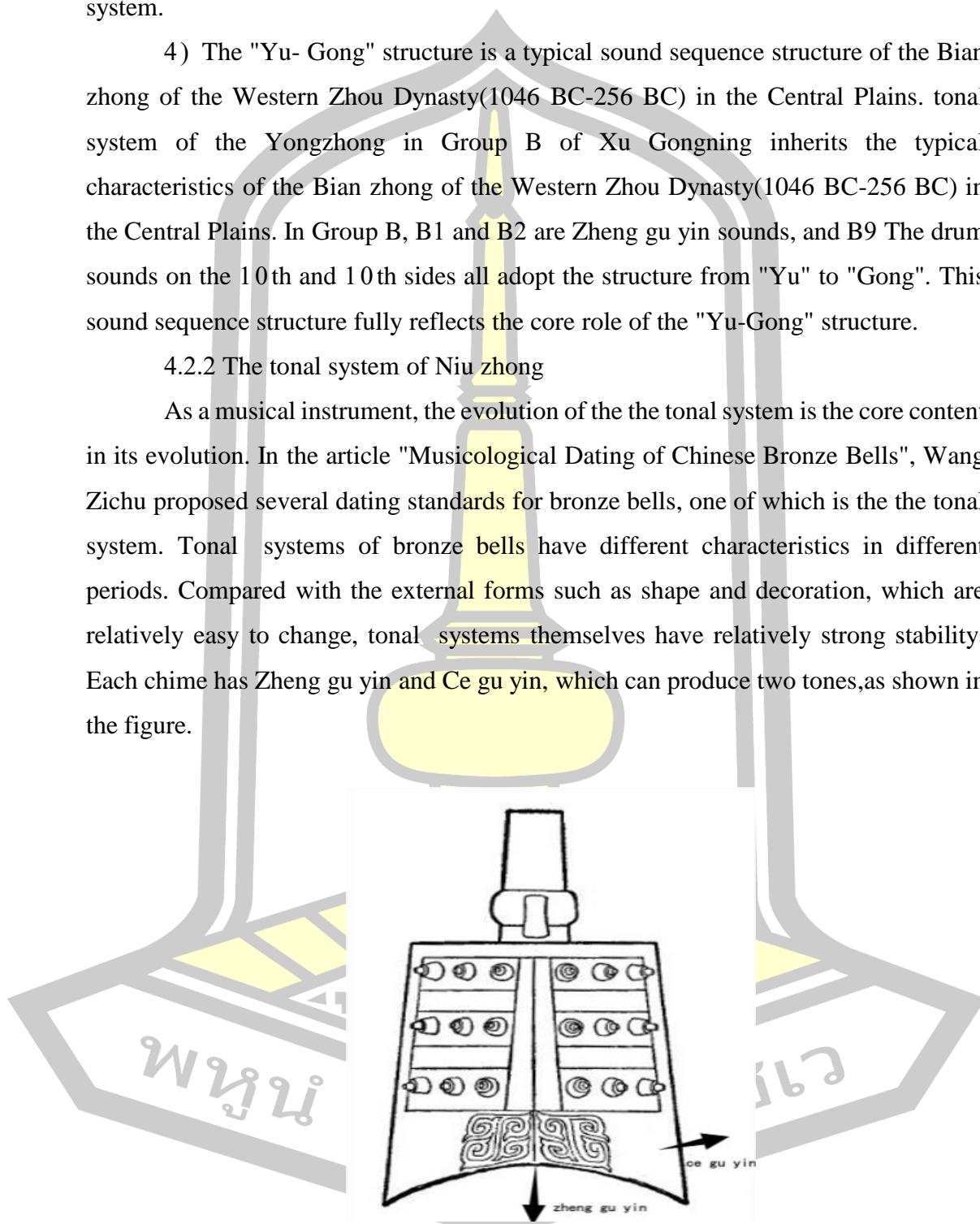


Figure 37. The tapping position of Zheng gu yin and Ce gu yin

Source: <https://case.ntu.edu.tw/>

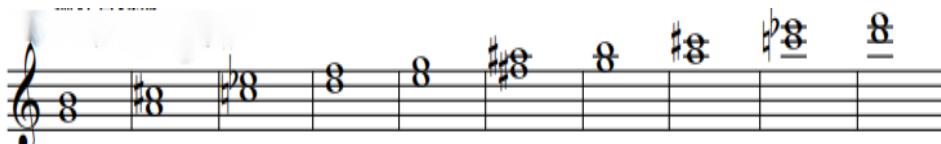


Figure 38. Niu zhong sound range

Source: Keke Pan, 2023

Table 14. Niu zhong Sound Measurement Data Sheet

Number	1	2	3	4	5	6	7	8	9
Zheng gu yin	g2	a2	c3	d3	e3	f3 #	g3	a3	c4
scale name	zhi	(yu)	gong	shang	(jue)	yu zeng	zhi	yu	gong
Ce gu yin	b2	c3 #	d3 #	f3	g3 #	a3 #	b3	c4	d4
scale name	shang zeng	gong	shang	qing jue	zhi	yu	bian gong	gong	shang

Source: Keke Pan, 2023

From the sound measurement data, it is shown that the phoneme arrangement of the Zheng gu yin sounds of this set of bells should be: "zhi — (yu)-gong — shang — (jue)—yu zeng—zhi — (yu)— gong". In this way, the main drum sound series of Xu Gongning's nine Niuzhong are completely consistent with the regular system of Niu zhong sound series.

Xu Gongning's 9 pieces set of Niu zhong sound row settings is to set the "Zheng" sound of the side drums of the 8-piece Yong zhong sound row and the "Shang" sound in the Zhou music precepts to the main drum sound of the Niu zhong, making the phonetic position of the Niu zhong The arrangement changes. In this way, the setting of the sound series of Niu zhong not only follows the inheritance factors of the Zhou system, but also reflects the breakthrough and innovation of change. tonal system of Xu Gongning's nine Niuzhong reflects the structure of this pattern.

#### 4.2.3 The tonal system of Bo zhong

Since the introduction of Lexuan by the Zhou Dynasty(1046 BC-256 BC), the bell has changed its original single-piece structure and been arranged in an array as the bass part in the "yue xuan" combination. This change greatly expanded the practical value of the clock and gave it a greater living space. On the one hand, it provides greater room for expansion in the organization and scale of the music system. More importantly, it provides a solid foundation for the expansion of the musical performance and tonal array of large-scale combination Bian zhong.

The tonal system is the core connotation of the musical performance of the bell, and the development of tonal system marks the continuous improvement of the musical performance of the bell. Since the sound series of musical bells broke away from the shackles of Zhou rites at the beginning of the Spring and Autumn Period (770 BC - 476 BC) in the Western Zhou Dynasty(1046 BC-256 BC), especially the birth of Niu zhong and the breakthrough of the sound series, it has provided extremely important conditions for the transformation of the musical performance of bronze bells. Compared with the shape and decoration Generally speaking, the evolution of sound sequences is more characteristic of the times.

Xu Gongning Bo zhong are divided into two groups, each group has 4 pieces, marked using B1,B2,B3,B4,B5,B6,B7,B8. The specific sound measurement data are shown in the figure.



Figure 39. Bo zhong sound range

Source: Keke Pan,2023

Table 15. Sound measurement data sheet of Xu Gongning ridged Bo zhong

Number	B1	B2	B3	B4
Zheng gu yin	G	A	C	D
Ce gu yin	B	c#	d#	f

Source:Keke Pan,2023

Table 16. Sound test data sheet for 4 pieces of ridgeless Bo zhong

Number	B5	B6	B7	B8
Zheng gu yin	E	F#	G	A
Ce gu yin	g#	a#	b	c1#

Source:Keke Pan,2023

#### 4.3 Application of Bianzhong in music

Judging from historical records, the use of Bian zhong for musical performances began at least in the Shang Dynasty. Bian zhong are special musical instruments for the palace. With the fall of the Qing Dynasty, Bian zhong were also relegated to the "invisible palace". After 1949, people heard the sound of Bian zhong again, probably the music "The East Is Red" played on the Bian zhong unearthed from the Guanchu Tomb in Changtai, Xinyang, Henan Province. In 2010, Pingdingshan University copied a set of Xu Gongning Bian zhong. The complete set of Xu Gongning Bian zhong has a total of 37 bells. The range spans 5 octaves and the semitonal s are basically complete. More than two thousand years ago, our ancestors had already created such a complete musical instrument. Naturally, Much to the excitement of those in the contemporary music industry.

Although Bian zhong are expensive, their role in music is a percussion instrument that can emit a certain pitch. Its tonal sequence and acoustic characteristics are unique. How to make good use of this instrument in music creation practice and promote its It is a question that researcher should study carefully to avoid their shortcomings. Only by understanding the sound performance characteristics of Bian zhong can we master the instrument technique of Bian zhong and apply them skillfully to music.

First, the range of Bian zhong is different. Since ancient times, the number of Bian zhong in a set has not been fixed, ranging from three in the early days to 108 in contemporary times (Zhong hua bells). The range of Bian zhong is as narrow as one

octave and as wide as six octaves. The range of Xu Gongning Bianzhong is five octaves. Therefore, the composer must know the range and scale of the band's Bian zhong before orchestrating them, otherwise there will be a situation of "noted music but no tonal".

Second, the lingering sound of the chimes cannot be controlled. Since the chimes do not have a sound-stopping device, they can only disappear naturally once they are excited. According to the average statistics of the measurement results, the natural delay of the high-pitched Bian zhong is generally about 2 seconds, the alto bell is generally about 5 seconds, and the bass bell is generally 10 seconds. Suppose we use a Bian zhong to play a medium-tempo piece of music with 96 beats per minute, and 1.6 beats will be played in one second. This means that if a high-pitched Bian zhong is struck, it will take 3.2 beats for its sound to disappear; and If you strike the bass bell, it will take 16 beats to make the sound disappear. From this point of view, even in the high-pitched area, Bian zhong are not suitable for playing passages with rapid pitch changes, and you must be more careful with mid-range and low-pitched bells. Otherwise, the music will be "a mess."

Third, the frequency spectrum of Bian zhong is relatively complex. The overtones of Bian zhong mostly form a disharmonious relationship with the fundamental tonal. When struck alone, because the high-frequency overtones disappear quickly, this disharmonious sound effect will not affect our hearing. We will still hear a clear fundamental tonal. If you use Bian zhong to play multi-part music, such as striking a chord, even a major triad, many dissonant intervals above the fundamental tonal of the Bian zhong will collide together at the same time, resulting in an extremely dissonant sound. Chords that are inherently disharmonious make the sound even noisier. Therefore, when orchestrating Bian zhong music, you should choose harmonious and simpler chords.

#### 4.4 Summary

Table 17. The physical structures and tonal system of Xu Gongning Bianzhong

	<b>About Yong zhong</b>	<b>About Niu zhong</b>	<b>About Bo zhong</b>
<b>The physical structures of Xu Gongning Bianzhong</b>	<p>1) Shape: A total of 20 pieces, are similar in shape, with successive sizes. The bell cavity is in the shape of a tile, The yong is cylindrical, with xuan on it, shank attached to it, and wu relatively flat.</p> <p>2) Decorations: 4 groups of 36 spiral-shaped Mei, cicada patterns, C-shaped Kui dragon patterns, and S-shaped diagonal dragon.</p> <p>3) Arrangement: Divided into two groups, A and B, with 10 pieces in each group.</p>	<p>1) Shape: A total of 9 pieces, are similar in shape, decoration. The bell cavity is in the shape of a tile, with a straight front and a wide bottom, and the upper part of the main drum is arched. The Wu part is relatively flat, with a small square ring in the center.</p> <p>2) Decorations: There are 4 groups of 36 convex spirals on the front and back.</p> <p>3) Arrangement: Set of 8 pieces.</p>	<p>1) Shape: A total of 8 pieces, divided into 2 groups, 4 pieces ridged bells and 4 pieces ridgeless bells. The ridged bells have central ridge in the middle of the cavity.</p> <p>2) Decorations: Ridge Bozhong are decorated with relief dragon patterns, two sets of opposite coiled dragon patterns. Ridgeless Bozhong are decorated with two pairs of four opposing Kui dragon patterns, spiral-shaped Mei.</p> <p>3) Arrangement: 8 pieces, divided into two groups, and 4 pieces are made into a series.</p>

Table 17 (Continued)

	<b>About Yong zhong</b>	<b>About Niu zhong</b>	<b>About Bo zhong</b>
<b>The tonal system of Xu Gong ning Bian zhong</b>	<p>1) Group A Yongzhong Zheng gu yin are listed as:bian gong - gong - shan g - jue - qing jue - zhi - bian gong - gong -shang jue;Ce gu yin are listed as:gong- jue- bian zhi- zhi- yu- bian gong-shang - jue- yu- zhi.</p> <p>2) Group B Yong zhong Zheng gu yin are listed as:yu-gong-jue-yu-shang -jue-zhi-yu-qing jue-yu; Ce gu yin are listed as: shang-jue-zhi-gong-bian zhi-zhi-biangong-gong- yu-gong.</p>	<p>1) Zheng gu yin are listed as:“zhi-(yu)-gong-shang- (jue)-yu zeng-zhi-(yu)-gong”.</p> <p>2) Ce gu yin are listed as:Shang zeng-gong-shang-Qing jue-zhi-yu-Bian gong-gong-shang.</p>	<p>1) Ridged Bozhong Zheng gu yin are listed as:qing jue- zhi-run- gong;Ce gu yin are listed as:yu- bian gong- gong- jue.</p> <p>2) Ridgeless Bozhong Zheng gu yin are listed as:shang- jue-qing jue- zhi;Ce gu yin are listed as:bian zhi- zhi- yu- bian gong.</p>

Source:Keke Pan,2023

ພអុនំ បណ្តុះពុំ

## CHAPTER V

### Analyze the repertoire and performance techniques of the Xu Gongning Bianzhong

Xu Gongning Bianzhong have a unique shape and solemn sound quality. The lower bell is a rare bass instrument among Chinese national musical instruments. It is more suitable for expressing strong, powerful, solemn and steady music; the middle bell usually plays melody, plus the lower bell. The bass padding of the bell and the rhythmic filling of the chime enrich the elegant style of the music; the upper button bell is used to play certain sound pattern backgrounds or for rhythm embellishment.

The Pingdingshan University Elegant Ensemble successfully copied a set and used it to perform in elegant music works, reproducing the sound of ancient Chinese musical instruments today, opening up a new path for the development and reappearance of chime culture, and effectively promoting the creativity of China's excellent traditional culture Transformation and innovative development. This chapter focuses on analyzing and sorting out the tonality, use of chords and performance techniques of Bianzhong's repertoire. It has important practical significance for the living inheritance of Bianzhong culture and the promotion of traditional Chinese elegant music art.

#### 5.1 Xu Gongning Bianzhong repertoire analysis

##### 5.1.1 Banquet category repertoire

##### 5.1.2 Folk music

##### 5.1.3 Modern repertoire

#### 5.2 The performance of Bianzhong

##### 5.2.1 Bianzhong performance in ancient documents

##### 5.2.2 Bianzhong performance technique

#### 5.3 Summary

## 5.1 Xu Gongning Bianzhong repertoire analysis

### 5.1.1 Banquet category repertoire——" Lu Ming "



QR code1: Lu Ming

#### 1) Introduction

"Xiaoya Lu Ming" is a poem written by Anonymous in the Western Zhou Dynasty (1046 BC-256 BC). It is a poem in the "Book of Songs", the first collection of poetry in ancient China, and the first chapter of "Xiaoya". It comes from Zhu Xi's "Collected Poems". This poem was originally sung by the king when he entertained his ministers. Later, it was gradually popularized among the people and was used to hold banquets such as country drinking ceremonies and Yan ceremonies. The whole poem is divided into three chapters, each chapter has eight lines, singing about the host's respect for guests. The content is upright, the style is elegant, and it has a peaceful atmosphere. Especially the opening line, with the deer rising, is fresh and simple.

From QR code1, "Deer Ming" is a representative piece tailor-made for Xu Gongning by the famous composer Fang Kejie based on "Xiaoya Lu Ming" from the Book of Songs.

#### 2) Mode characteristics

A mode is a group of tonal s organized according to a certain relationship with a certain "sound" as the main one. In each mode, the dominant sound is called a "Tuotou". As the head of a palace, the "music master" leads many different tunes and many modes organized around them. Each mode in the same palace constitutes a "gong system" (Du Yaxiong, 2004). In an official system, the position of Gong Sheng is determined, and the main tonal s of Shang, Jiao, Zheng, and Yu, as well as some other changed tonal s, are determined accordingly. The "Gong System" is the arrangement of all modes led by Gong Sheng. collectively.

A tune can be formed on each of the five tonal s of Gong, Shang, Jue, Zhi, and Yu in the middle. The name of the tune comes from the name of the class where the tune is located, such as "tonal " formed on "Shang". In ancient times, It is called "Shang Tiao", now it is called "Shang Tiao style", and the "tonal " formed on "Gong" was called "Gong Tiao" in ancient times, and now it is called "Gong Tiao style". ((Du Yaxiong, 2004))

The piece "Deer Ming" uses the "re, mi, #fa, (sol), la, si, (do)" scale. According to the structural characteristics of the pentatonic scale, the pentatonic mode has only one major third, which was formed in between Gong and Jue, so it is inferred that the work is in D Gong mode, adding two partial tonal s of "5" and "1", namely QingJue and QingYu, forming a seven-tonal "QingShang scale", also known as "Yan music" "Scale", which is composed of five "zhengsheng" plus "QingJue" and "QingYu". The characteristic of the QingYu scale is that there are semitonal s between the third and fourth levels and the sixth and seventh levels, and whole steps between other levels. Therefore, this work is in the seven-tonal Yanyue mode of the DGong system. The picture below shows the D major scale.



Figure 40. D palace mode Yanyue scale

Source : Keke Pan,2024

### 3) Musical form

The whole song is divided into four parts, the first part (A) measures 1-11, Largoq quarter note = 46, the second part (B) measures 12-55, Andante quarter note = 64 solemn, the third part (C) Measures 56-107, Allegro quarter notes = 148 solemn, part 4 (D) 108-148 measures, Audantino quarter notes = 78, 82, 84, gradually faster. The whole song is in the key of D, in 4/4 time.

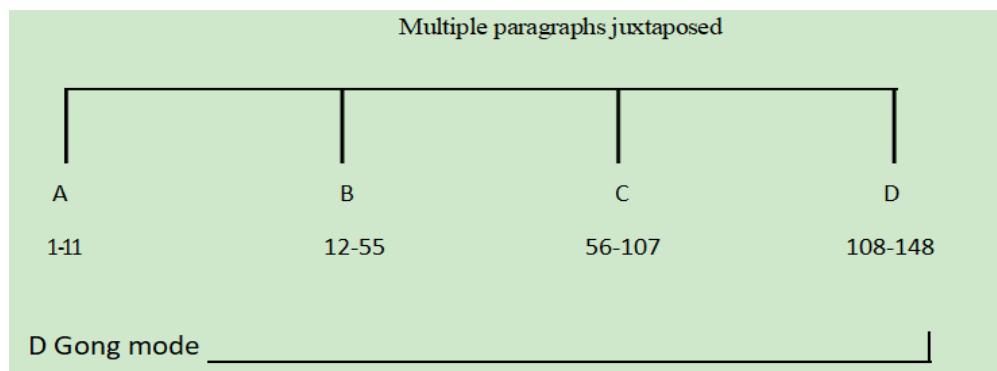


Figure 41. Musical form

Source : Keke Pan,2023

From Figure 42, Part I (A) Sections 1-11. In section 7 of the first part, in the vast wilderness, a group of deer were eating weeds and making yo-yo calls from time to time, one after another, harmonious and melodious. Yo-yo refers to the cheerful invitation given by the deer when they eat delicious wormwood. The sound calls for companions to share delicious food together, embodying the Confucian idea of "benevolence". The Bian zhong parts are used very cleverly. The Niu zhong and Yong zhong I parts use the ascending quarter notes of palace, clear horn, zheng and leap, accompanied by a crescendo from p to f. The Yong zhong II part uses Instead of the half-note Gong and Shang going up, the bell uses the half-note Gong and Yu going down, forming a reverse progression with the previous three parts, making it more stable in hearing. In particular, the palace tonal s and feather tonal s used in the descending direction of the bell have the same effect as the tonic and dominant tonal s in Western modes. In addition to the stability of the auditory effect, it also highlights the Eastern respect and admiration for rituals, reflecting the importance of rituals and music to social stability. "Yo yo deer roar, eating wild apples" creates a cheerful and harmonious atmosphere for the banquet. The technique of raising spirits commonly used in the Yong Book of Songs leads to the following scene of drums, harps and sheng.



Figure 42. Sections 1-11

Source: Kejie Fang, 2012

Note: “+” refers Ce gu yin

Part II (B) Sections 12-55. It depicts someone presenting a gift in a bamboo basket to the sound of warm and cheerful music, and then the host replies to the guests with polite words such as "Thank you for coming, show me the way." If the master is a king, then these two sentences mean that he is willing to listen to the advice of his ministers and hopes to create greater glory together with his ministers.

Section III (C) 56-107 expresses the host's praise for the guests and asks the minister to be a good and upright official to correct the folk custom of stealing. Among them, in measures 88-91, the three parts of Niu zhong and Yong zhong I and II use vibrato for 4 consecutive measures and beat the bell frame to form a bright and crisp sound effect that is different from Bianzhong. At the same time, From Figure 43, the bell part uses a whole-note leap sound in measures 88 and 90 respectively, which is in sharp contrast to the previous three parts. The auditory effect is as follows: the vibrato performance of the above three parts represents the feeling and thought of "music" in ritual music, while the two quarter notes of the bell part represent the vigilance of "ritual" in ritual music. And reminder - "Le" must be attached to "Li" and cannot exceed the scope of "Li". The work also reflects the thoughts of that era, with a certain degree of opposition. In measure 92, all the Bianzhong voices play in unison on the first beat. Since the first three voices use eighth notes to hit the bell frame (that is, whole notes are used), the sound is only short and half a beat, and will not continue). The bell plays the bell body, and the whole whole note can be completely presented. This also means

that "music" must be attached to "ritual". "Music" disappears and "ritual" "It must also be in line with the social system and philosophical ideas of the time.



Figure 43. Sections 86-92

Source: Kejie Fang, 2012

Part IV (D) Sections 108-148. From Figure 44, Starting from Section 114, the music is full of joy. The last few lines push the joyful atmosphere to a climax and further deepen the theme of the music. The implication is that this banquet will not be just for ordinary eating and drinking to satisfy the needs of the appetite, but to "ease one's mind", so that the ministers participating in the banquet will be sincerely convinced and consciously serve the king's Rule.



Figure 44. Sections 110—118

Source: Kejie Fang, 2012

From Figure 45, Starting from bar 142, the backbone of the melody played by the Niu zhong is "d-g-a", which constitutes the progression of I-IV-V. As the main tonal settles, it heralds the perfect ending of the banquet. The music is not only emotional but also joyful, more rituals, music, and education. This is the true realm of Chinese beauty.

Figure 45. Sections 140-148

Source: Kejie Fang, 2012

#### 4) Harmony

This piece is in Yanyue mode of the DGong system. The picture below shows D palace mode Yanyue scale harmony.

Figure 46. D palace mode Yanyue scale harmony

Source: Keke Pan, 2023

##### 4.1) Harmony progression

Part I (A) Sections 1-11. In the first section, the bell plays the piano "D", declaring the hegemony of the tonic. In the third section, the voices are full and clear. The four parts adopt the method of maintaining the same tonal, showing a stable main chord. The appearance of clarifies the tonal. In Sections 7-10, the melody parts of the Niu zhong and Yong zhong are highlighted. Using the technique of ascending and maintaining the same tonal, the porridge bell continues to play the main tonal "D", which complements the Niu zhong and Yong zhong, declaring that the ritual and music norms cannot be exceeded.

Part II (B) measures 12-55. The harmonic texture of this part has become richer. In addition to the commonly used I, IV, and V chords, the VII chord is also used in measures 14, and the chords are used in measures 12 and 16. The IV chord with three notes omitted, and the VII chord with three notes omitted are used in bar 14. The bell

is still the melody part, 15, 19, 32, 33, 34, 35, 40, 41, 42, 43, 47, 51 The rhythm pattern of the melody is very distinctive. It adopts the technique of modular progression, repeatedly ascending or descending on the chord tonal s. Sections 40-43 completely repeat the melody of Sections 32-35, and Sections 47-52 repeat the melody of Sections 15-20, which is constantly strengthened. The impression of this melody is that the bell has been maintaining the same tonal or intervals of thirds, and the bell still steadily repeats the smooth progression of I-IV-V, but there is a jump of six degrees in measures 18-20, and then a progression Descending, returning to the main tonal.

Part III (C), Sections 56-107, the melody part is not clear enough, the harmonic texture is relatively simple, mostly using unison maintenance, progression and smooth progression of thirds, the rhythm pattern is relatively simple, all whole notes, harmonies It is highly functional and repeated between "V-I". The "strike" playing method is used in Sections 88-91, which adds color to the smooth and single harmony progression. In addition, the ending chord of this part is not the main chord, but the VII chord, which adds potential power to the presentation of the next part.

The fourth part (D) measures 108-148. The melody line of this part is more obvious. The rhythm patterns of "x-xx" and "x-x-" appear many times. In measures 108-110, the Niu zhong part continues in the form of broken chords. Repeating the pitch of "c g a g", the crisp bell ringing echoes the swaying movements of the dancers, 114 to 115. Niu zhong and Yong zhong I play the same melody, highlighting the sense of melody. Sections 128 to 135 are 116 to 123 The changes are repeated and a similar rhythm pattern is used. Yong zhong I constructs a third or fourth interval above the original sound, the harmonic texture is fuller, and the harmony progression is mostly a VII-V-I connection. Bar 134 "fa The appearance of the sound makes the music more colorful and creates the feeling of being temporarily out of tune. In Sections 134-147, the melody moves up or down in the second, third, and fourth degrees, and the lower three parts maintain the same tonal , solemnly and solemnly. It declares the solid foundation of sovereignty, especially in Sections 145-146, where the melody repeats its fourth descending progression and finally enters a stable main chord.

#### 4.2) Part progression

There are three types of simultaneous progression of two voices, namely: simultaneous progression, reverse progression and oblique progression. The

progress of two voices in the same direction is called co-directional progression. Parallel progression is a type of co-direction progression, which is the result of the two voices maintaining the same direction for a long time. When two voices progress in opposite directions, it is called reverse progression. One voice remains stationary and the other voice moves up or down, which is called diagonal progress. In music with more than two parts, various combinations of the above three situations are possible. It is worth noting that "Gong, Shang, Jue, Zhi, Yu" are the "step names" of the pentatonic scale (which are different from "note names" and "note class names"), which represent fixed sound relationships. Among them, "Jue, Zhi" and "Yu, Gong" are separated by three rhythms (that is, three semitonal s), and the other adjacent tonal s are separated by two rhythms (that is, two semitonal s). In the pentatonic mode, the interval relationship between "Jue-Zhi" and "Yu-Gong" is generally called "minor third", and the relationship between other adjacent tonal s separated by an equal measure is called "major second". It should be noted that What is interesting is that the minor third in the pentatonic scale is an adjacent progressive relationship, rather than a jump.

In the piece "Deer Ming", the harmonic progressions of the four parts are mostly of the following types:

1. Proceed in the same direction

In measures 7-8 of "V-I", the four voices move upward in the same direction.

Sections 12-14 IV-VII, the four voices are moving upward in the same direction.

Measures 50-51 IV-I, four voices ascending in the same direction

In measures 68-70 of "V-I", the four voices move in the same direction.

Measures 140-142 VII-I, the four voices are rising in the same direction.

2. Proceed in the same direction + proceed in the opposite direction:

In section 7 I-V, the upper three voices progress in the same direction, and the lower voice progresses in the opposite direction;

Measures 14-16, VII-IV, the lower three voices progress in parallel, forming a reverse progression with the higher voice;

3. Progress in the same direction + proceed diagonally:

In measures 28-32 I-V, the high voice is maintained in unison, and the next three voices proceed in the same direction, forming an oblique progression with the high voice.

In measures 72-74 "V-I", the upper two voices move in the same direction, the lower two voices maintain the same tonal, and form an oblique progression with the upper two voices.

In measures 74-76 I-V7, the Yong zhong II is maintained in unison, and the other three parts progress in the same direction. The four parts constitute the same direction + diagonal progression.

In measures 83-85 I-V, the high voice and the low voice progress in the same direction, and the two middle voices maintain the same tonal. The four voices constitute the same direction + diagonal progression.

Sections 116-118 VII-V, the high voice goes downwards, and the three lower voices go downwards at the same time. The four voices form the same direction + diagonal progression.

4. Progress in the same direction + proceed in the opposite direction + proceed diagonally:

In measures 81-83 V7-I, Yong zhong I and Bo zhong proceed upward, Yong zhong II maintains the same tonal, and Niu zhong proceeds downward. The four voices form the same direction + reverse progression + oblique progression.

In sections 102-104, V-VII, the Niu zhong goes up and the Yong zhong I goes down. The two upper parts form a reverse progression. The Yong zhong II and the Bo zhong maintain the same tonal. The two parts form the same progression, and the four voices the part forms the same direction + reverse direction + diagonal progress.

In measures 142-143 I-IV, the high and low voices progress together in the same direction. Yong zhong, I maintain the same tonal, and Yong zhong II progresses upward. The four parts form the same direction + reverse progress + oblique progress.

#### 4.3) Cadence

A stated harmonic progression that ends a musical structure and ends an idea (or an independent part of it) is called a cadence. It is divided into two basic

functional types: (1) Terminations ending with the stable chord T; (2) Terminations ending with the unstable chords D or S. There are three types of stable cadences: (1) cadence; (2) declension; (3) complete cessation. The D-T progression at the end of a phrase or section is called cadence. A cadence ending with an unstable functional chord (D or S) is called a half-cadence (Sposobin, 2008).

The ending of the piece "Deer Ming" is:

In the first part (A), Sections 7-10 form the harmonic progression of "I-V-I", ending in a stable positive pattern. (Insert musical example)

In the second part (B), Sections 48-55 form the harmonic progression of "IV-I", ending with a stable change.

In the third part (C), Sections 102-107 form the harmonic progression of "V-VII", ending with the unstable functional chord D, which is called the regular half-cadence.

In the fourth part (D), Sections 142-147 form the harmonic progression of "I-IV-V-I", the return of the main chord is delayed, and the unstable state is prolonged. A conflict between two opposite unstable functions, S and D, is formed. This conflict is only resolved when returning to the main chord. This harmonic progression is called a complete cessation.

#### 5.1.2 Folk music — “Wan Qiu”



QR code 2: Wan Qiu

##### 1) Introduce

Wanqiu, an ancient place name, is located in Huaiyang District, Zhoukou City, Henan Province today. Legend has it that it is the place where Fuxi, the "ancestor of mankind", established his capital and rested. It has always been known as "the most sacred place for the ancestors of the imperial dynasty in the world". "Wanqiu" comes

from "The Book of Songs· Chen Feng". The poem has three chapters and four lines in each chapter. It is a folk song from the pre-Qin era. The ancient and modern interpretations of the poem "The Book of Songs· Chen Feng· Wanqiu" can be roughly divided into three schools of thought. One group, represented by "Preface to Mao's Poems", believes that this poem is a mockery of Chen Yougong's "licentiousness, confusion, and excessive wandering." One group, represented by Hao Yixing's "Shi Wen", believed that this poem reflected the bad custom of Chen State's "good at worshiping witches, singing and dancing". One group, represented by modern scholars, believes that this poem expresses the poet's love for a female dancer.

## 2) Moda characteristics

The piece "Wanqiu" uses the "re, mi, #fa, (sol), la, si, (do)" scale. According to the structural characteristics of the pentatonic scale, the pentatonic mode has only one major third, which was formed in Between Gong and Jue, it was inferred that the work formed the mode of the D palace system, adding two partial tonal s of "5" and "1", which were Qingjue and Qingyu respectively, and the seven-tonal "Qingshang scale" was produced, also known as It is the "Yan music scale", and the ending tonal of the music is Zhi, so the mode of this piece is the D palace system A Zhi seven-tonal Yanyue mode. The picture below shows the A Zhi scale.



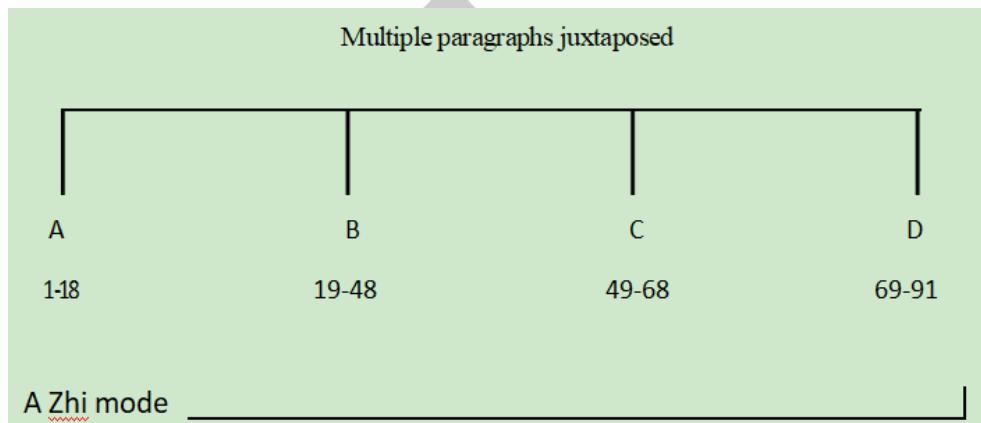
Figure 47. A Zhi mode Yanyue scale

Source: Keke Pan, 2024

## 3) Musical form

The work "Wanqiu" is based on "The Book of Songs· Chen Feng". It is also a representative piece customized by composer Kejie Fang for Bianzhong. The whole song is divided into four parts, the first part is Sections 1-18, Adagio quarter note = 56, the fourth part In the second part, Sections 19-48, Allegro quarter notes = 134, in the third part, Sections 49-68, Adagio quarter notes = 56, in the fourth part, Sections 69-

91, Rubato starts slowly and slightly freely. The whole song is in the key of AZ and in 4/4 time.



Part I (A) Sections 1-18. From Figure 49, In measures 3-13 of the first part, the Bian zhong parts are used in a very layered manner. The button bell I part uses decomposed chords of quarter notes, with alternating progressions of zheng, shang, angle, clear angle, and leap, and is composed of p, The two parts of Yong zhong I and II use the same direction of half notes. The two parts always maintain the relationship between pure fourths and pure octaves, highlighting the basic sound effect of elegant music. The whole-note Zheng and Gong appear alternately every one measure, echoing the previous three parts. While making the sound more stable, it also highlights the melody of the button bell part. At the same time, the Zhengyin and Gongyin used in the bell have the same effect as the tonic and dominant tonal s in Western modes. In addition to the stability of the auditory effect, it also highlights the Eastern respect and admiration for rituals, reflecting the importance of rituals and music to social stability.



Figure 49. Sections 1-13  
Source: Kejie Fang, 2012

Part II (B) Sections 19-48. Sections 19-22 adopt a special performance method of using drumsticks to quickly hit the stand, which creates a rapid and enthusiastic music atmosphere. From Figure 50, Sections 23-32 highlight the melody characteristics of the Niu zhong. The backbone sounds are "a-d", forming the harmonic progression of I-IV, depicting the dancer's swaying and charming dance steps. Sections 33-36 also use a special playing method of rapidly hitting the stand with drumsticks, which exaggerates a more unrestrained musical emotion.



23

Niu zhong

Yong zhong1

Yong zhong2

Bo zhong

*f*

*f*

28

Niu zhong

Yong zhong1

Yong zhong2

Bo zhong

滚击架子

*pp* 滚击架子

*pp*

*f*

Figure 50. Sections 23-32

Source: Kejie Fang, 2012

From Figure 51, Sections 37-40 repeat the melody of Sections 33-36, with Niu zhong as the main melody, which progresses smoothly in the pure fourth, and the co-authored solo vividly presents the moving image of a graceful dancer.

34

Niu zhong

Yong zhong1

Yong zhong2

Bo zhong

Figure 51. Sections 34-40

Source: Kejie Fang, 2012

Part III (C) Sections 49-68. From Figure 52 and Figure 53, This part of the music material has changed. The four Sections 53-56 keep repeating "6", declaring the stable A Zhi mode. Sections 58-65 are similar to the theme melody of the first part, and the

music is performed around the three musical elements of "a-c-e". The unfolding of thoughts continues to outline the swaying dance steps.

54

Niuzhong

Yong zhong 1

Yong zhong 2

Bo zhong

*p*

Figure 52. Sections 54-61

Source:Kejie Fang,2012

62

Niu zhong

Yong zhong1

Yong zhong2

Bo zhong

Figure 53. Sections 62-69

Source: Kejie Fang, 2012

Part IV (D). Sections 69-91, from bar 73 to the end, the rhythm pattern of "X X X climax until the end of the song. Qing Jue and Bian Gong are added to the melody tonal to form a complete seven-note scale.

# ພ້ອນ ປນໍາ ດີຕະ ຂຶ່ເວ

70

Niu zhong

Yong zhong1

Yong zhong2

Bo zhong

f

p

76

Niu zhong

Yong zhong1

Yong zhong2

Bo zhong

p

p

84

Niu zhong

Yong zhong1

Yong zhong2

Bo zhong

pp

Figure 54. Sections 70-91

Source: Kejie Fang, 2012

## 4) Harmony

This piece is in the D palace system A Zhi seven-tonal Yanyue mode. The picture below shows A ZHi mode Yanyue scale harmony.

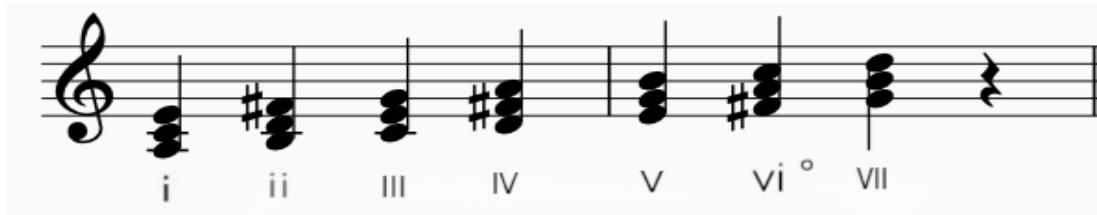


Figure 55. A ZHi mode Yanyue scale harmony

Source: Keke Pan, 2024

#### 4.1) Harmony progression

Part I (A) Sections 1-18. In the first section, the bell plays the Bian zhong "a" to declare the hegemony of the tonic. In the third section, a stable main chord is presented. In sections 3-6, the melody part is presented in the form of broken chords, and the direction of the part is It proceeds in a wave-like manner, with the main note "a" appearing many times and maintaining the same sound in the I part of the Yong zhong. The low part goes up four degrees, clarifying the mode and tonality. The melody parts of Sections 7-10 are completely repeated 3-6. In measures 11-14, the melody part repeats in measures 3-6, and the rhythm of the two parts of the bell changes slightly. The harmony repeats between I-IV until the V6 chord without the seventh note appears in measure 15, and ends on the main chord in measure 18. The bass part of the entire section has been in I-IV-I-IV-I-IV-V-I, mostly in fourths, with obvious harmonic lines, highlighting the norms of etiquette and music.

Part II (B) measures 19-48. Measures 19 and 21 use the "fighting frame" playing method. The bass still maintains the main tonal . The unique solemnity and solemnity of the bell and the enthusiastic and unrestrained "fighting frame" sound complement each other. , opened the chapter of the second section. The melody and rhythm of this part are simple and clear. The high part uses the "X-X-" rhythm pattern many times. The other three parts are mostly whole notes. The melody part in Sections 23-26 has an ascending progression of fourths and fifths. , outlining the dancer's swaying dance steps, Sections 29-32 completely repeat the melody of Sections 23-26, Sections 37-40 are exactly the same rhythm pattern as Sections 23-26, but the melody sound is slightly different, Sections 33-36 use The "rolling rack" playing method adds

color to the smooth and single harmonic progression. The harmony progression of this part is I-IV-I-IV-I-IV-I-IV-V-I-IV-I.

Part III (C) measures 49-68. The first 49 measures are the main chord. The Niu zhong part and the Yong zhong I part use the double-click percussion technique to enrich the sound effect of the harmony. The high voice of Sections 53-56 is always the tonic "la", always declaring the hegemony of the tonic, and the mode and tonality are obvious. Sections 58-59 are a typical melody model, Sections 59-60, Sections 61-62, Measures 63-64 and 65-66 all adopt the method of modulation, repeating the melody of measures 58-59. The bell part of measures 58-66 adopts a progressive descending part, and the low part still maintains a stable tonic tonal. Ongoing. The harmony progression in this part is relatively simple, continuing the main chord.

Part IV (D) Measures 69-91, this part is a repetition of the changes in the first part. The starting chord is the V6 chord, and this chord is repeated in measure 71. Measures 73-83 are completely repeated in both melody and harmony. In measure 71, the melody part is presented in the form of decomposed chords, and the part moves in a wave-like manner. The main note "a" appears many times and maintains the same tonal in the Yong zhong I part. The low part progresses upward in fourths. Starting from bar 85, it comes to the end. The melody part makes a smooth progression of third and fourth degrees. Yong zhong I makes a second upward movement, Yong zhong II performs unison maintenance, and the low part ascends to the main tonal for the second time. The whole section is The harmonic progression is V6-I-IV-I-IV-I-IV-V6-I.

#### 4.2) Part progression

In the piece "Wanqiu", the harmonic progressions of the four parts are mostly of the following types:

##### 1. Progress in the same direction + proceed in the opposite direction:

In sections 13-15 IV-V6, the Niu zhong and Yong zhong II move in the same direction, and the Bo zhong and Yong zhong I move in the same direction. The four voices form the same direction + reverse direction.

In measures 71-73, V6-I, the Niu zhong and Yong zhong II move downward in the same direction, and the Bo zhong and Yong zhong I move in the same direction. The four voices form the same direction + reverse direction.

In sections 79-81 IV-I, the high voice goes up, the lower three voices go down together, and the four voices form the same direction + reverse direction.

2. Progress in the same direction + proceed diagonally:

In sections 9-11 IV-I, the high voice maintains the same tonal, the lower three voices move downward in the same direction, and the four voices constitute the same direction + diagonal progression.

In section 43-45 I-IV, Yong zhong I maintains the same tonal, and the other three parts go up in the same direction. The four parts constitute the same direction + diagonal progression.

In section 45-47 IV-I, Yong zhong I maintains the same tonal, and the other three parts move downward in the same direction. The four parts constitute the same direction + diagonal progression.

3. Progress in the same direction + proceed in the opposite direction + proceed diagonally:

In sections 3-5, I-IV, the high voice and the low voice go up in the same direction, Yong zhong I maintains the same tonal, and Yong zhong II goes down. The four parts form the same direction + reverse + diagonal progression.

In section 5-7 IV-I, the high voice is maintained in unison, the two voices of the Yong zhong go up at the same time, and the low voice goes down. The four voices form the same direction + reverse progression + diagonal progression.

In section 11-13, the upper two voices maintain the same tonal, the Yong zhong II progresses downwards, and the lower voice progresses upwards. The four voices form the same direction + reverse progression + oblique progression.

In section 73-75 I-IV, the upper two voices maintain the same tonal, the Yong zhong II progresses downwards, and the lower voice progresses upwards. The four voices form the same direction + reverse progression + oblique progression.

In section 77-79 I-IV, the low and high voices move up in the same direction, Yong zhong I move down, and Yong zhong II maintains the same tonal. The four parts form the same direction + reverse progression + diagonal progression.

In sections 81-83 I-IV, the upper two voices maintain the same tonal, the Yong zhong II progresses downwards, and the lower voice progresses upwards. The four voices form the same direction + reverse progression + oblique progression.

In section 85-88, V6-I, the Bo zhong and the Yong zhong I go up in the same direction, the Yong zhong II maintains the same tonal, and the Niu zhong goes down. The four voices form the same direction + reverse progression + oblique progression.

#### 4.3) Cadence

In the first part, Sections 15-18 form the harmonic progression of "V-I", ending in a stable positive pattern. (Insert musical example)

In the second part, Sections 45-47 form the harmonic progression of "IV-I", ending with a stable change.

In the third part, Sections 63-65 form the harmonic progression of "DVII--I", ending in a stable positive pattern.

In the fourth part, Sections 77-90 form the harmonic progression of "I-IV-V-I". The return of the main chord is delayed and the unstable state is prolonged. A conflict between two opposite unstable functions, S and D, is formed. This conflict is only resolved when returning to the main chord. This harmonic progression is called a complete cessation.

#### 5.1.3 Modern repertoire— "Jasmine"、 "Dong fang hong"

##### 1) "Jasmine"



QR code 3:Jasmine

##### 1.1) Introduce

"Jasmine" is a classic Jiangsu folk song, derived from the Chinese folk song "Flower Tune". It was first released as a single in 1957. "Jasmine" has been performed many times at major events such as the handover ceremony of Hong Kong's return to the motherland and the closing ceremony of the Athens Olympics. In 1982, "Jasmine" became one of the outstanding songs recommended by UNESCO to people

all over the world. It has a high reputation at home and abroad. It is also one of the representative elements of Chinese culture and has many versions abroad. John Barrow, the author of "Travel to China", served as secretary to Earl Macartney, the first British ambassador to China from 1792 to 1794. On his way back to the UK after leaving office, Barrow heard the song "Jasmine" and sang Admire. In order to make it easier for the song to be sung in Europe, he recorded the score in five-line notation. Sitner, the official of the mission, added an introduction, ending, accompaniment, etc. to the tune and published it; Italian composer Giacomo Puccini In the opera "Turandot", Barrow's version of "Jasmine" was re-arranged, and combined with the opera created in the Yuan Dynasty of China, the oriental charm touched the heartstrings of Western audiences; the United States launched a rocket into outer space Satellites carry beautiful music from many countries, and the music selected by China is this "Jasmine"; the opera "Turandot" made this folk song from China famous.

The Bianzhong work "Jasmine" was arranged by He Kun, a teacher from the Conservatory of Music of Pingdingshan University. The melodious and delicate melody is integrated into the "sound of gold and jade", complementing the ancient Bianzhong and embodying the traditional Chinese concepts of harmony, integration, coexistence and resonance, both ancient and modern. The collision of cultures makes people excited.

### 1.2) Mode characteristics

The work is divided into four parts. The scale arrangement of the introduction part is "sol la si re mi". According to the structural characteristics of the pentatonic scale, the pentatonic mode has only one major third, which is formed between Gong and Jue, so it is inferred that the fifth The second part (A) is the G Gong pentatonic mode, and the third part (A') scale arrangement is "do re mi sol la". According to the structural characteristics of the pentatonic scale, the pentatonic mode has only one major third, which is formed in Gong and Jue, so it is inferred that the second part is C Gong pentatonic mode, and the scale arrangement of the fourth part (B) is "sol la si re mi fa#". According to the structure characteristics of the pentatonic scale, it is inferred that the third part is Add the modified G mode. In terms of mode and tonality, it can fully reflect the characteristics of Jiangnan minor tune and has

typical southern color characteristics. The melody is mainly in thirds. The melody is euphemistic and soft, and the delicacy of Jiangnan minor is fully demonstrated here.

The picture below shows the scales of G Gong mode, C Gong mode, and G Zhi mode.

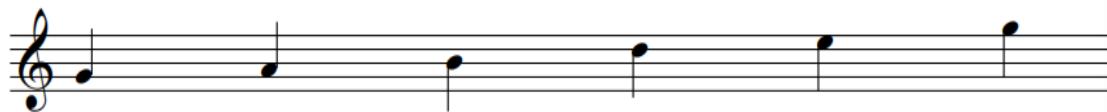


Figure 56. G Gong modal scale

Source: Keke Pan, 2024

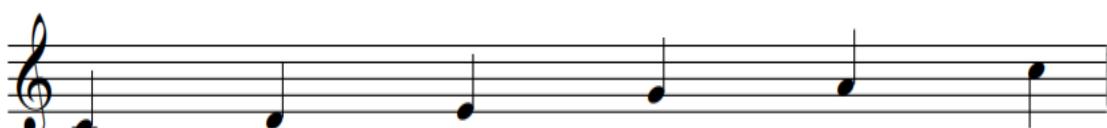


Figure 57. C Gong modal scale

Source: Keke Pan, 2024

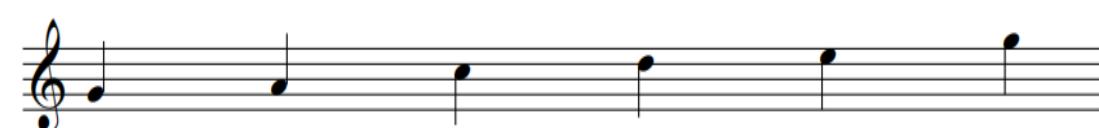


Figure 58. G Zhi modal scale

Source: Keke Pan, 2024

### 1.3) Musical form

"Jasmine" has a total of 41 sections, divided into four major parts, namely the introduction, section A, section A', and section B. Section A consists of two square-shaped phrases. Section A' is a variation and repetition of Section A. The two sections have the same melody but slightly different modes and harmony. Section B adds new musical materials and adopts Chinese folk music. The development technique of changing music from beginning to end. Section A is in the G key mode, Section A' is in the C key mode, and Section B is in the G key mode. The A and A' sections are the main theme, and the B section is the secondary theme.

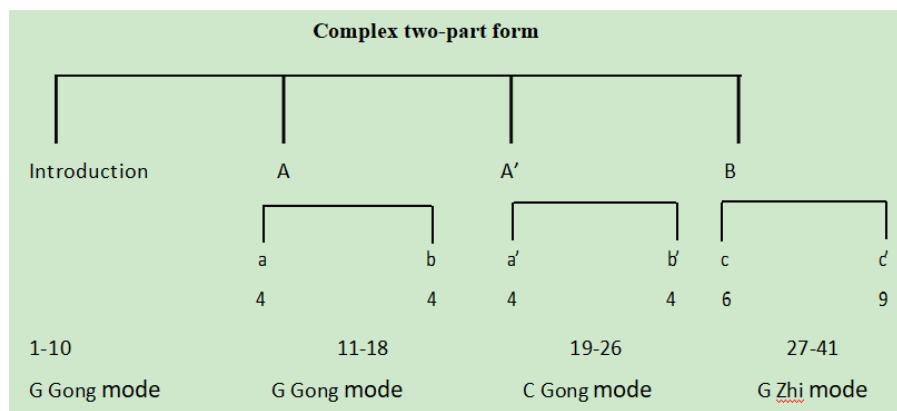


Figure 59. Complex two-part form

Source: Keke Pan, 2023

Introduction part (sections 1-10). From Figure 60, The Niu zhong plays "b g e d a f", which is exactly the scale of G Gong mode. This is the chord tonal of the main chord, subordinate chord and dominant chord, which pave the way for the establishment of the mode and lay the foundation.

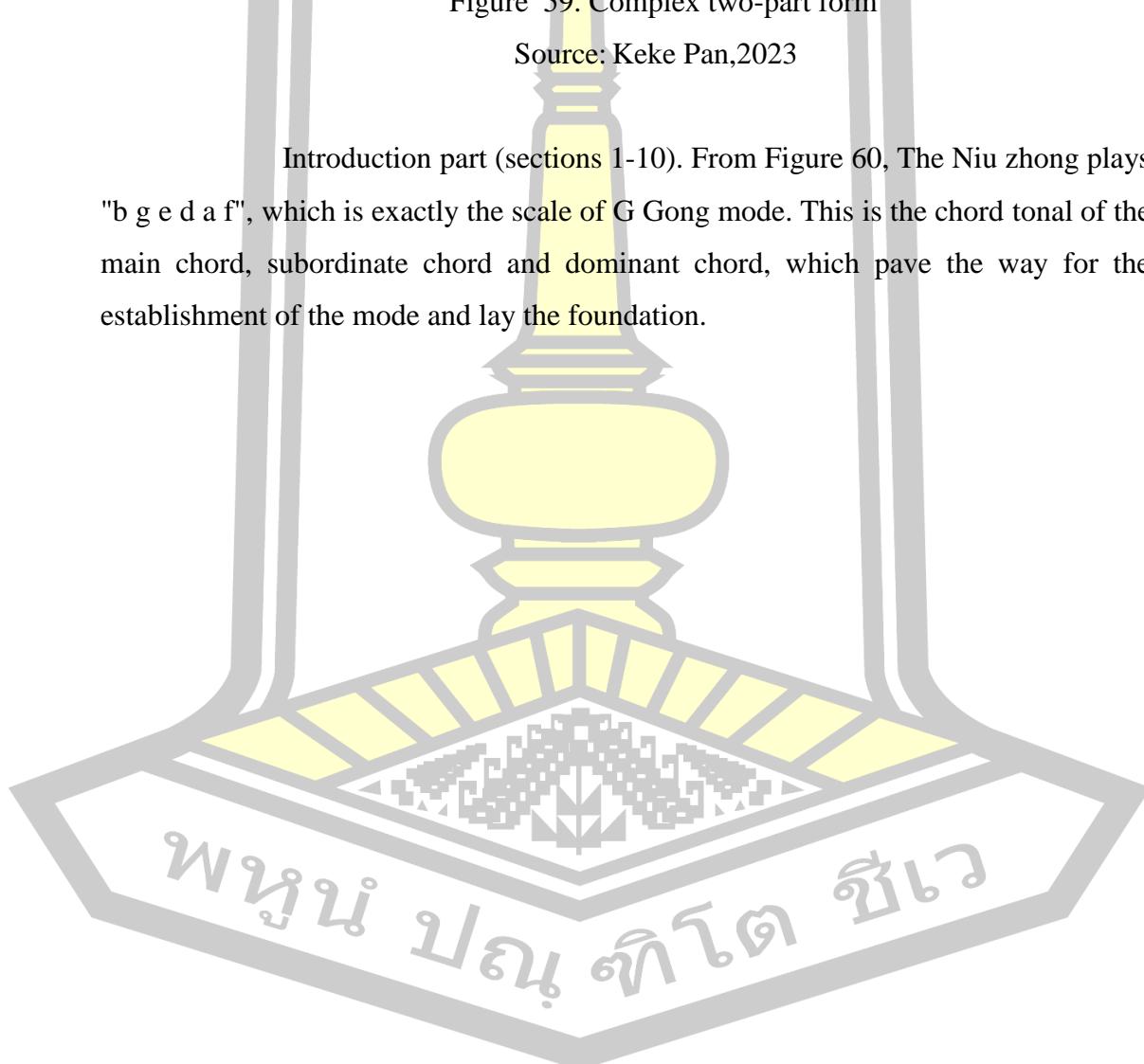


Figure 60. Sections 1-10

Source: Kun He, 2021

Part A (sections 11-18). From Figure 61, Sections 11-12 are the melody motive, with repeated changes around the core sound of "b d e g". This part contains two phrases a and b, which is a "4+4" square structure, in which the falling tonal of a is at the end of the G Gong mode. The sound, b falls in the G key mode.

Figure 61. Sections 11-18

Source: Kun He, 2021

Part A' (sections 19-26). From Figure 62, Part A' changes from the G key mode to the C key mode, and the melody and structure are completely repeated in Part A. This part contains two phrases, a' and b', which is a “4+4” square structure, in which a' falls on the key tonal of C major, and b' falls on the key tonal of C major.

Figure 62. Sections 20-27

Source: Kun He, 2021

Part B (sections 27-41). From Figure 63, The melody, rhythm, and texture of Part B have all changed, and the mode has changed from C to G. This part contains two phrases c c', which is a non-square integer structure. Among them, the ending sound of the melody of c and c' is the zhi tonal. Bar 36 stretches the rhythm of the melody, prolongs the termination process, makes the conflict more intense, and finally returns to the main tonal in bar 40.

28

Niu zhong { G clef, 4/4 time, 2 staves

Yong zhong { G clef, 4/4 time, 2 staves

Bo zhong { F clef, 4/4 time, 1 staff

32

Niu zhong { G clef, 4/4 time, 2 staves

Yong zhong { G clef, 4/4 time, 2 staves

Bo zhong { F clef, 4/4 time, 1 staff

36

Niu zhong { G clef, 4/4 time, 2 staves

Yong zhong { G clef, 4/4 time, 2 staves

Bo zhong { F clef, 4/4 time, 1 staff



Figure 63. Sections 28-41

Source: Kun He, 2021

In terms of melody, this work is mainly based on progression and third intervals. The melody lines are smooth, gentle, graceful and delicate, and it sounds novel and friendly. In terms of rhythm, most of the rhythms use quarter notes and eighth notes. In terms of expression of musical ideas, the a phrase consists of two measures, and the melodies of the two measures are relatively symmetrical. The a' phrase inherits the melody of the previous sentence and introduces new musical ideas with a third jump. The c and c' phrases are lyrical and graceful., plays the role of "turning" and "joining", and several phrases show the structural characteristics of "turning, turning and joining".

#### 1.4) Harmony

This piece contains the G Gong mode, the C Gong mode, and the G Zhi mode. The figure below shows the harmonic connections of each mode scale.

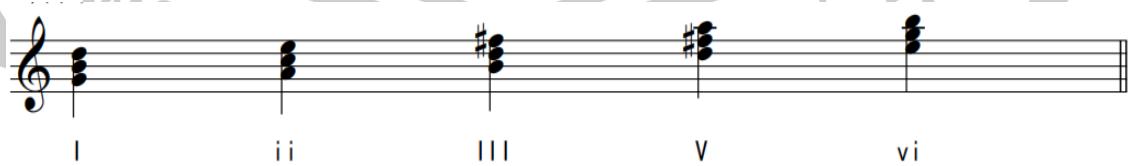


Figure 64. Harmonic connection of G Gong scale

Source: Keke Pan, 2024



Figure 65. Harmonic connection of C Gong scale

Source: Keke Pan, 2024



Figure 66. Harmonic connection of G Zhi scale

Source: Keke Pan, 2024

#### 1.4.1) Harmony progression

Part A (Sections 11-18), Sections 11-14 continue on the main chord, which further clarifies the characteristics of the mode. Bar 15 enters the dominant chord, bar 16 is SII7, and at the end of the section, the main chord returns. Because the melody of this piece is more prominent, the harmony is relatively simple and direct. The lower part has been doing smooth progressions of unison, thirds, and fifths, with less use of jumps. The two middle parts are basically doing unison. Maintain and accentuate the main melody of the high voice.

Part A' (measures 19-26), measures 19-20 are the main chords of the CGong mode, marking the shift from GGong mode to CGong mode, measures 21-22 use the SVI7 chord, and then enter the DIII chord, the end of the section. The part returns from SVI to the main chord. Similar to part B, the melody of this part is also more prominent, so the harmony is relatively simple and direct. The low part has been doing smooth progression of unison, third, and fifth, with less use of jumps. The middle two parts are basically maintaining the same tonal and highlighting the main melody of the high voice.

Part B (measures 27-41), the mode of this part changes to the G Zhi mode. The starting note is not the main chord, but the SII chord, and then enters the SIV chord, and proceeds to the main chord in measure 29, 29-. The functional progression of T-S-D-T is made in measure 31, the chord progression is S-D in measures 32-35, and the T-S-D full cadence chord connection is made in measures 36-40. The melody part in this part is still more prominent. The low part has been doing smooth progressions of unison, second and fourth degrees without using jumps. The two middle parts are basically doing unison or progressive progression, setting off the high notes. The main melody of the voice.

#### 1.4.2) Part progression

In the piece "Jasmine", the harmony progressions are mostly of the following types:

1. Progress in the same direction + proceed in the opposite direction

Sections 26-27, 27-28, 29-30, and 35-36 all use same-direction progression + reverse progression.

2. Proceed in the same direction (parallel)

Sections 11-14, 17-18, 19-20, and 21-22 all use the same direction (parallel).

3. Progress in the same direction + proceed diagonally

Sections 20-21 and 32-33 use same-direction + diagonal progression.

4. Progress in the same direction + proceed in the opposite direction + proceed diagonally

Sections 14-15, Sections 15-16, Sections 16-17, Sections 22-23, Sections 23-24, Sections 24-25, Sections 25-26, Sections 28-29, Sections 29-30, Sections 30-31, Sections 31-32, 33-34, 34-35, and 36-37 all use same-direction + reverse-direction + diagonal progression.

#### 1.4.3 Cadence

The cadence of this piece is:

Part A, Sections 16-18 form the harmonic progression of "IV-I", ending with a stable change.

Part A', Sections 25-26 form the harmonic progression of "IV-I" , ending with a stable change.

Part B, Sections 35-40 form the harmonic progression of "I-IV-V-I", the return of the main chord is delayed, and the unstable state is prolonged. A conflict between two opposite unstable functions, S and D, is formed. This conflict is only resolved when returning to the main chord. This harmonic progression is called a complete cessation.

## 2) "Dong fang hong"



QR code 4: Dong fang hong

### 2.1) Introduce

"Dong fang hong" is one of the famous contemporary "new folk songs". It is based on the lyrics of the traditional northern Shaanxi folk song "Baima Diao". The lyrics are sincere and simple, and the melody is concise and high-pitched. It expresses the Chinese people's pursuit of liberation and their struggle for democracy and freedom. It is an ode full of praise and gratitude to the Communist Party of China and its leader Mao Zedong. The song was first sung in northern Shaanxi. It was later successfully adapted by professional musicians and became widely circulated. It has become a household name in China and an important piece known to women and children. It was even once called China's "second national anthem." In July 1957, the Central People's Broadcasting Station began to broadcast "Dong fang hong" performed by the Warring States period Bianzhong unearthed in Changtaiguan, Xinyang, Henan. With the successful launch of my country's first artificial satellite "Dong Fang Hong No. 1" on April 24, 1970, "Dong Fang Hong" also carried this artificial satellite to resound throughout the world, intending to "let the strongest sound in the universe resound" Space".

## 2.2) Mode characteristics

The piece "Dong fang hong" uses the "So, La, Si, Re, Mi,Fa#" scale. According to the structural characteristics of the pentatonic scale, the pentatonic mode has only one major third, which is formed between Gong and Jue. so it is inferred that the work is in G Gong system mode. The appearance of f# marks that this work is a hexatonic scale. In addition, the ending tonal of the music is on the Z tonal , so the mode of this work is D Zhi hexatonic mode. The picture below shows the D Zhi mode scale.



Figure 67. D Zhi modal scale

Source: Keke Pan,2024

## 2.3) Musical form

Bian zhong's work "Dong fang hong" was arranged by Mr. He Kun, a teacher from the Conservatory of Music of Pingdingshan University. The whole song starts with the sound of zhi and the final note falls on the sound of zhi, with the first and last notes being the same. The composition is short and concise, but has a rather subtle structural relationship.

Bianzhong's work "Dong fang hong" consists of two parts, with a two-section structure, section A from 1 to 17 Sections, and section A' from 18 to 34 Sections. Section A' is a variation and repetition of section A. The melody of the two sections is the same, and the melody is The voice positions, harmonies and registers are different. Each part is composed of four phrases in the "start, carry, turn and combine" style. The musical form structure is as follows:

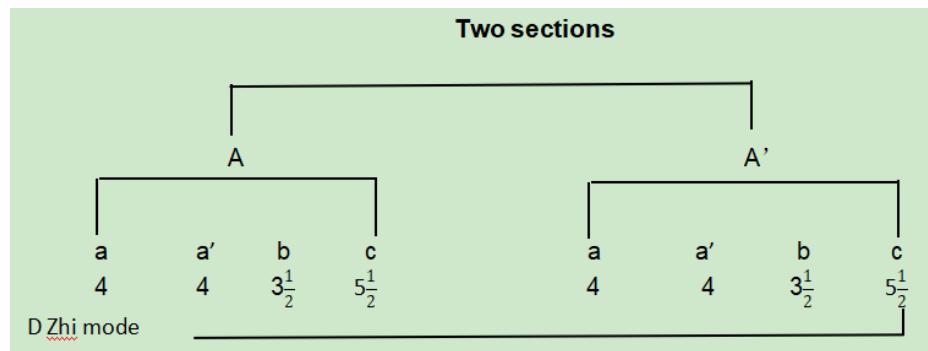


Figure 68. Musical form

Source: Keke Pan, 2023

From Figure 69, Section A is divided into four phrases. A phrase starts with the tonic of the Z mode and is mainly composed of the backbone sounds "d-g-a", which is the "starting" sentence; the a' phrase inherits the development of the musical material of a phrase and forms a "final ending" with it, which is the "inheritance" sentence; the B phrase has a partial tonal, and uses the largest octave jump interval in the whole song, which makes the music mood firmer and more exciting. At the same time, the neat structure of the first two sentences is broken in terms of sentence length, and cleverly uses the weak start. Snapping, causing the rhythm of the phrase to tighten, strengthening the cohesion in tonal, and completing it in one go. The contrast of this series of musical elements makes it have the distinctive functional characteristics of the "turn" sentence; the c phrase combines the musical materials of the a and b phrases, It is a "combination" sentence that echoes the previous one.

In addition, judging from the degree of phrase development, the phrase structure also presents a very interesting phenomenon: the whole song uses Sections 1-2 as the core tonal material, and the development of Sections 3-4 is closely related to Sections 1-2. They are reflections of each other. Subsequent development has always revolved around this core material, using the "face-stretching" development method common in traditional Chinese music. Through the continuous increase of tonal materials, the sentence structure has been continuously expanded.

The A' section is a variation of the A section

4

*Niu zhong* *Yong zhong1* *Yong zhong2* *Bo zhong*

*p* *mf* *mf* *mf*

*mp*

6

*Niu zhong* *Yong zhong* *Yong zhong2* *Bo zhong*

*mp* *mf*

11

*Niu zhong* *Yong zhong1* *Yong zhong2* *Bo zhong*

ป บ น ท ใจ



Figure 69. Sections 1-17

Source: Kun He,2021

"Dong fang hong" generally follows the traditional Chinese pentatonic mode, which is a single tonal chiral mode. The whole song is in whole tonal except for two tonal tonal s. It basically conforms to the pre-Qin ritual and music system. "Great music must be easy, and great rituals must be simple." requirements. The melody is concise and unified, and the intervals are progressive, which increases the smoothness of the tune; in terms of rhythm, it is mainly balanced rhythm, which coincides with the solemn mood and the firm and high-spirited revolution in the carol. The spirit, as well as the pursuit of simplicity, clarity and rigor, also make it catchy and easy to sing, thus having a broad mass base.

#### 2.4) Harmony

This piece is in the mode of D Zhi. The picture below shows the harmonic connection of the D Zhi mode scale.

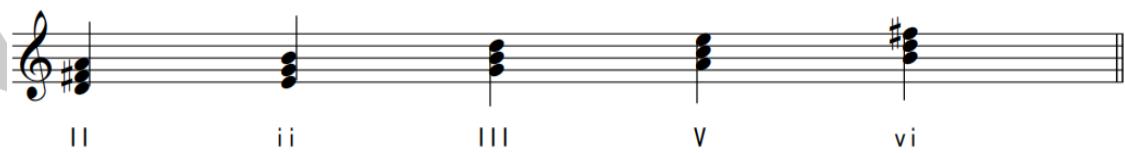


Figure 70. Harmonic connection of D Zhi mode scale

Source: Keke Pan,2024

#### 2.4.1) Harmony progression

Part A (measures 1-17), this main melody alternates between Niu zhong, Yong zhong I, and Yong zhong II. The melody of the work is outstanding, and the harmony is simple and clear. Measures 1-2 present the melody motive of the song. The starting chord is S. In measure 2, it immediately enters the main chord, forming the S-T chord progression. Measures 3-4 repeat the chords of measures 1-2, clarifying it again. Mode tonality. Starting from measure 5, the chord repeats between S and D. From measure 13, 1 enters the cadence. The harmonic progression of the entire section is S-T-S-T-DVII-SII7-D-SII7-D-T.

Part A' (measures 18-34), this part is a variation and repetition of part A. The main melody is the same, but the harmony has changed. The melody appears in different positions in the three upper parts. The lower part is in the same degree, second degree, second degree, and second degree. The smooth progression of thirds and fourths are all half notes, and the levels of harmony are fuller. The starting chord of part B is the main chord, and the entire harmonic progression is T-SII-D-S-DVII-SII-T-SII-D7-T. The last section is very unique. It progresses to the subordinate chord after the main chord, which reflects the composer's unfinished emotions and ends with an open ending.

#### 2.4.2) Part progression

In the piece "Dong fang hong", the harmony progressions are mostly of the following types:

##### 1. Proceed in the same direction

Sections 14-15 and 31-32 all use the same direction.

##### 2. Proceed in the same direction + proceed in the opposite direction

Sections 15-16 use simultaneous progression + reverse progression.

##### 3. Progress in the same direction + proceed diagonally

Sections 13-14 and 33-34 both use the same direction + diagonal progression.

##### 4. Proceed in the same direction + proceed diagonally + proceed in the opposite direction

Sections 30-31 and 32-33 both use same-direction progression + diagonal progression + reverse progression.

### 2.4.3 Cadence

In part A (measures 1-17), the cadence ending with an unstable functional chord (D or S) is called a half-cadence, and the ending with a dominant harmony is called an orthometric half-cadence. Sections 14-17 form the "S-D" harmonic progression, which is called the positive half cadence.

Part B (Sections 18-34), Sections 31-34 form the "S-D-T" harmonic progression, the return of the main chord is delayed, and the unstable state is prolonged. A conflict between two opposite unstable functions, S and D, is formed. This conflict is only resolved when returning to the main chord. This harmonic progression is called a complete cessation.

## 5.2 The performance of Bianzhong

Bianzhong is a percussion instrument with a fixed pitch, and its pronunciation has the most serious impact. The player needs to use two T-shaped mallets to strike, and the lower bell uses thick wooden sticks to sense the sound. Performance techniques are rarely recorded in various ancient documents in my country, and are only scattered in decorative pictures on unearthed cultural relics.

### 5.2.1 Bian zhong performance in ancient documents

Iconology is a research method that interprets the meaning, symbols and metaphors of works through the study of visual images. Iconology and iconography emphasize the organization and thinking of these images and themes, and use internal and external knowledge to analyze the content of the works. . (Panofsky, Erwin., 1993) The ultimate goal of this method is to determine what is depicted in the work and try to reveal what deeper meaning the creator expressed consciously or unconsciously. (Panofsky, Erwin, 1993)

In 1978, a painted mandarin duck box from the Warring States Period was unearthed from the tomb of Marquis Zeng Yi in Suixian County, Hubei Province. It is now in the Hubei Provincial Museum. It is in the shape of a mandarin duck and has two wonderful lacquer paintings on both sides of its abdomen: the left side depicts scenes of bell-ringing and Bian zhong-beating.



Figure 71. Painted Mandarin Duck Box

Source: [https://paper.hehechengde.cn/cdrb/pad/content/202309/08/content\\_59462.html](https://paper.hehechengde.cn/cdrb/pad/content/202309/08/content_59462.html)

In the early Warring States period, people were feasting, fishing, hunting, and attacking war-patterned teapots. The body of the teapot depicts scenes from archery ceremonies in ancient times. The upper layer in the middle is an image of banquets, and the lower layer is an image of playing music. In the music scene, two people on the left ring the bell, the third on the left plays the recorder, the fourth on the left plays the short tubular instrument, the second on the right plays the Bian zhong, and the one on the right hammers the drum. From this, we can understand the performance of the Bianzhong and the composition of the band. Now collected in Gu Gong Museum.

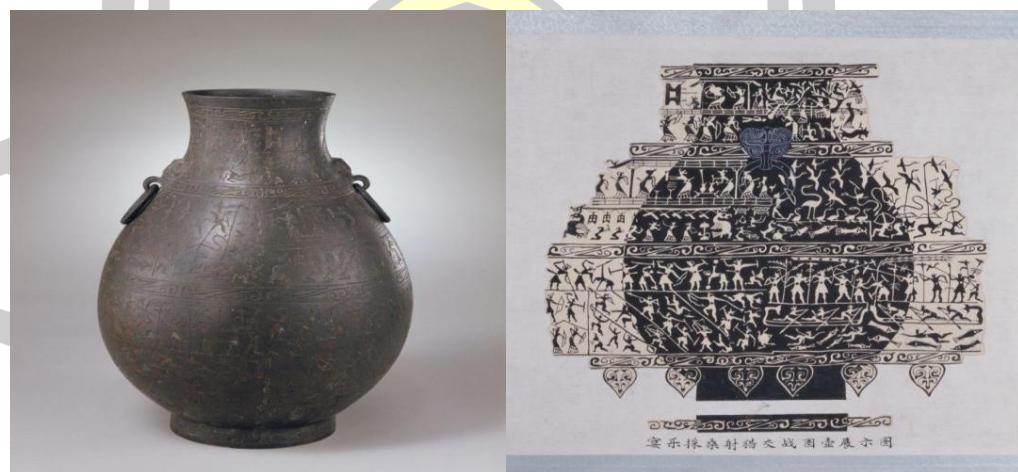


Figure 72. Feasting, Fishing, Hunting, Attack and War Pattern Pot

Source: <https://www.dpm.org.cn/collection/bronze/234670>

In 1951, a bronze mirror with Yanle archery and hunting patterns engraved on it was unearthed from M1 in Zhaogu Village, Huixian County, Henan Province. There are two women on the left playing Bianzhong, and two women on the right knocking on the weaving pan. The rest of the images can be identified, including cooking, cooking, etc. Passing food, shooting hunting, netting birds, rowing, etc., reflect the life scenes of the nobles at that time.

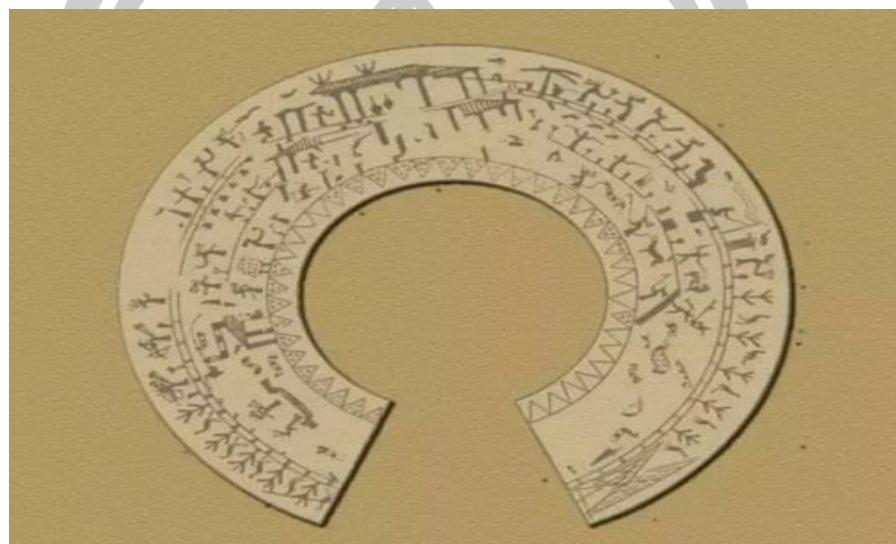


Figure 73. Yanyue hunting pattern engraved bronze mirror

Source: [https://www.sohu.com/a/340114316\\_120306640](https://www.sohu.com/a/340114316_120306640)

In 1990, the Shandong Zhangqiu girl mountain music and dance figurines from the mid-Warring States Period were unearthed. They consist of 26 human figurines, 4 musical instruments, and 8 auspicious birds. The group of pottery figurines are divided into performance figurines, singing figurines, dancing figurines, View figurines, as well as band playing figurines and other different shapes.



Figure 74. Shandong Zhangqiu Girl Mountain Music and Dance Figurine

Source:[https://www.sohu.com/a/440634038\\_182897](https://www.sohu.com/a/440634038_182897)

In 2006, Jinan Wuying Mountain music and dance acrobatic figurines from the Western Han Dynasty(202BC-220AD) were unearthed from the southern slope of Wuying Mountain in the northern suburbs of Jinan, Shandong. 22 painted pottery figurines were molded on a pottery plate less than 67 cm long and 47.5 cm wide. Among them, the 8 people who played music either played the sheng, played the harp, or held the stick to ring the bell, or played the flat small drum, or the large drum.



Figure 75. Jinan Wuying Mountain Music, Dance and Acrobatics

Source: [http://hrczh.cass.cn/sxqy/kgx/202303/t20230317\\_5633907.shtml](http://hrczh.cass.cn/sxqy/kgx/202303/t20230317_5633907.shtml)

In 1954, a Han tomb in Beizhai Village, Jiehu Town, Yinan County, Shandong Province was unearthed from the late Eastern Han Dynasty(202BC-220AD), a picture

of music and dance in Yinan Beizhai. The picture is divided into four groups from left to right. The second group is an accompaniment band, and the band is divided into two groups: upper and lower. , the upper team is for playing drums, banging Bianzhong, and knocking stonal Bian zhong, while the lower team is for playing panpipes, beating cymbals, and playing the harp. (Compiled by Yinan Han Tomb Museum,2001)



Figure 76. Yinanbei Village Music and Dance Show

Source: <https://m.fx361.com/news/2023/1210/22959208.html>

Nanyang Han Dynasty(202BC-220AD) music and dance portrait stonal was unearthed in 1973 from a portrait stonal tomb in Nanyang County (now Wangcheng District). The portrait stonal is located on the left side of the lintel of the first back room. In the portrait, there is a bell hanging from the right on a bamboo basket stand, with a musician on both sides holding a bamboo basket in one hand and a staff in the other to ring the bell.



Figure 77. Nanyang Han Dynasty(202BC-220AD) music and dance portrait stonal  
Source:<https://www.chnmus.net/ch/collection/appraise/details.html?id=51215131536>

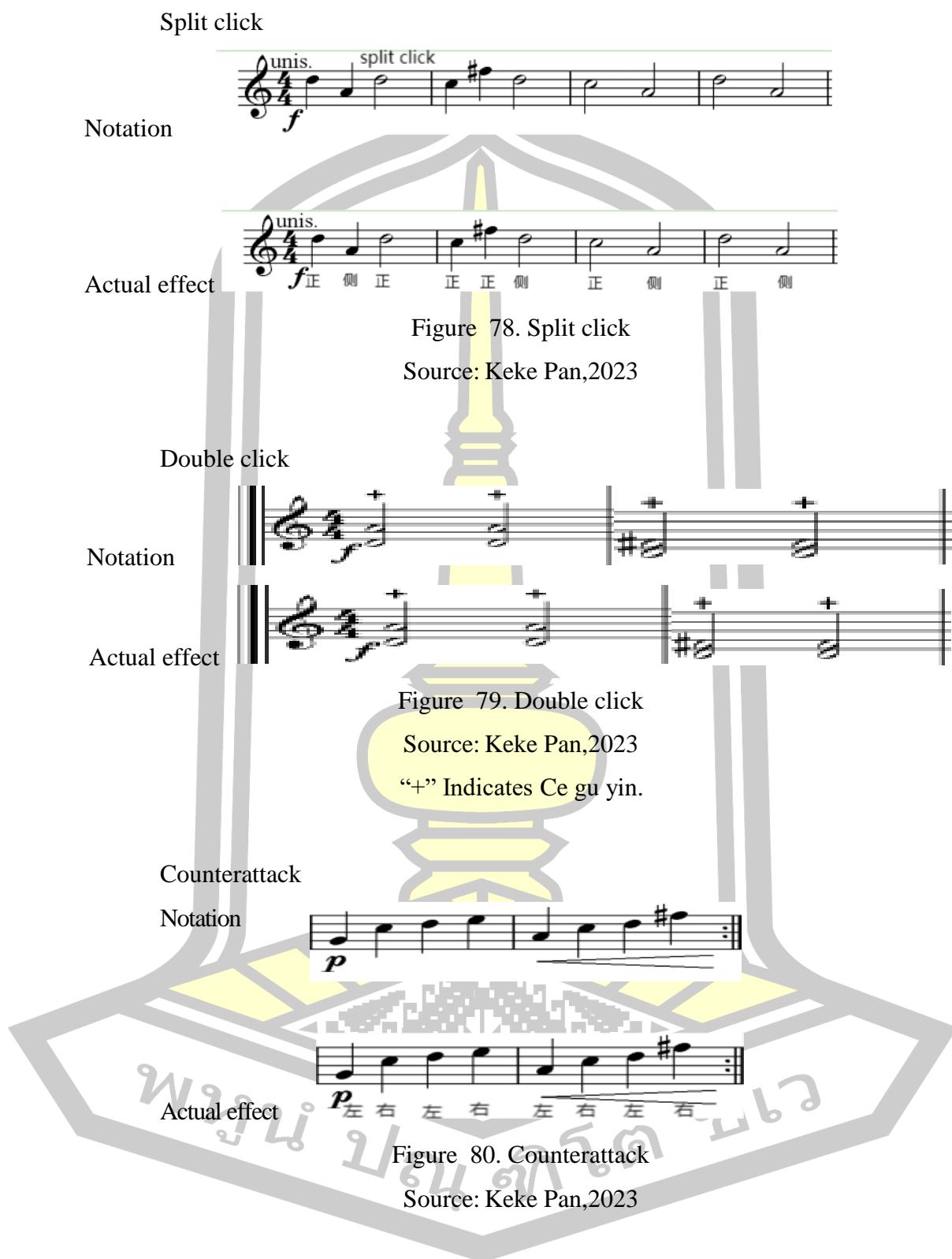
Through archaeological discoveries, the ancient Bianzhong was relatively simple to prepare and the way to play was relatively simple. Xu Gongning Bianzhong was relatively large in scale, divided into three layers and five performance areas. Players usually used wooden mallets or rubber hammers to hit different parts of the bell body. to produce musical notes. Bell bodies of different sizes and thicknesses will emit different pitches, so the player must skillfully master the tonal of each bell. Playing Bianzhong requires close collaboration between players. Each player is responsible for a group of bells, and they need to accurately follow the instructions of the score to ensure the harmony and accuracy of the music. Bianzhong performance usually requires teamwork and tacit understanding, with each player playing an indispensable role.

### 5.2.2 Bianzhong performance techniques

Xu Gongning Bianzhong playing tools are traditional wooden T-shaped mallets and cylindrical wooden hammers. The T-shaped hammer is used for button bells and Yongzhong, and the cylindrical wooden hammer is used for tungsten bells. Bianzhong's performance technique are very rich, and almost all percussion performance techniques can be used in Bianzhong's performance. A kind of double tonal is a characteristic of Bianzhong. Each bell has two different pitches. One bell can be used to perform an interval of performance. When playing, the player holds hammers in both hands and can play single tonal or double tonal., rolls and special sound effects and a series of performance techniques. The playing techniques of Bianzhong are slightly richer than those of common percussion instruments, such as fast cross-stroke and rolling, single-click, split-click, double-click, rocking and other playing techniques.

#### 1) Split click Double click Counterattack

Split click refers to using two drumsticks to hit the main drum sound or side drum sound part of the bian zhong respectively. Double click refers to hitting any interval within the arm length range at the same time. It is difficult to play long distance intervals unless the speed is very slow. Counterattack refers to switching hands and striking the clock face separately. These three are the most common basic playing methods.



The following focuses on the work "Yingshi Yongyong" as an example to introduce in detail Bianzhong's performance technique and musical performance.

### 1.1) Performance techniques and musical expression in "Introduction"

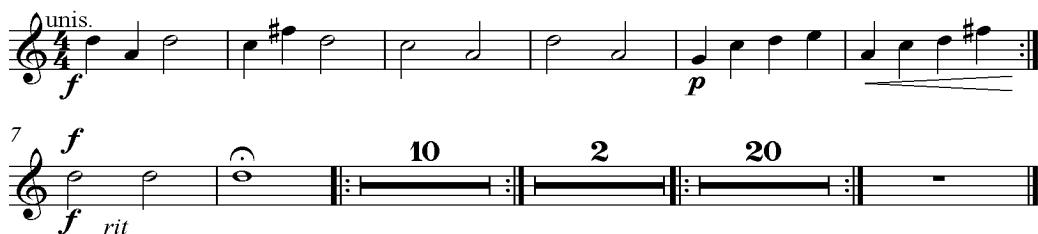


Figure 81, Introduction

Source: Kejie Fang, 2012

The picture above is an example of the score played by Xu Gongning Bianzhong in the "Introduction" part of "Ying Shi Yong Yong". It uses a traditional T-shaped mallet, and the sound it produces when striking the Bianzhong is very bright, clear, and has a metallic sound quality. When playing the introduction part, players mostly use single-click and cross-hit techniques.

This section is mainly played by three groups of upper and middle Bianzhong. The melody range is relatively smooth and there are few big jumps in the sixth and seventh degrees. Small jumps of broken chords mostly using fourths and inversions. The composer wrote the melody very smoothly, and coupled with the sound quality of the traditional T-shaped mallet striking the Bianzhong, the music became brilliant, solemn, and more solemn.

### 1.2) Performance techniques and musical expression in "Feast"

"Ying Shi Yong Yong" is a movement of the large-scale elegant music suite "Gu Ying Fengyun" composed by composer Professor Fang Kejie. The whole song is rich in content and divided into five parts, namely introduction, sacrifice, feasting, peach blossoms and ending. Some of the banquet works express scenes of the king entertaining guests and ministers enjoying themselves at a banquet.



Figure 82. Feast

Source: Kejie Fang, 2012

The Figure 82 is an example of the score of "Yue". The side drum sounds E flat and F sharp are used many times to enrich the melody lines. At the beginning of the piece, single-click and split-shot techniques were used. Continuous quarter notes appeared within one section (section 11 of the previous score). At this time, the performer needed to play these notes on the Bianzhong at a slightly faster speed. When played, the player's single-click playing technique will affect the overall speed and sound quality. Therefore, when playing this ascending broken chord, the player needs to use the right hand → left hand → right hand → left hand exchange technique. Go play these notes. In measure 42, a new playing technique appears, which is the double-

click technique. At the end of measure 43, there are descending decomposed chords in the song. At this time, the cross-attack method is used, but at this time, the cross-attack technique of the left hand → right hand → left hand → right hand is used to play the phrase. Because this melody is very quiet and very gentle, the performer must control the strength of his or her wrist when playing to allow the music to have a contrast between strength and weakness.

### 1.3) Performance techniques and musical expression in "Tao Yao"

50

59

3

2

p

纽钟 + (+为侧鼓音)

ພអុន បនុ ពិ ទេ ខេវ

2

67

74 2 unis.

81 div.

86 unis. **p**

92 **p**

98 **p** div. **Moderato**

104

111

117 Solo

Figure 83. Tao Yao

Source: Kejie Fang, 2012

The Figure 83 is an example of the notation of "Taoyao". In this section, the music uses a lot of double-click and cross-hit playing techniques. At the beginning of the "Tao Yao" part, the Bian zhong and bone flute sounded at the same time to provide the singer with a prelude. Then Bianzhong went into the sequence of single click→double click→quick attack to finish Sections 58-76, followed by three single

click techniques to set off the singing melody, and then used a large number of double-click techniques, connected with this. The special fast-attack technique in the song is very different from the attack in the banquet part. First of all, the duration of the notes uses a fast rhythm of two eighth notes per beat instead of the original quarter notes. For the rhythm of one beat, the second is that its gestures will be completed in the form of left→right→left→right→left→right→left→right→right→left→right→left→right→left→right→left→right→left the Bianzhong technique of rapid combat. Repeat the previous double-click technique in measure 87 until measure 91. In section 92, the fighting technique is used again until the end of "Taoyao". Because the Xu Gongning Bianzhong does not have the main drum sound in the middle of the middle drum like other Bianzhong, its striking position is slightly lower, so the tonal is crisper, softer, and more magnetic. Therefore, players should pay attention to the best position of the Zheng gu yin sound of Bianzhong when playing.

#### 1.4) Performance techniques and musical expression in "Epilogue"

98      *p*      **Moderato**

104

111

117      Solo

Figure 84. Epilogue

Source: Kejie Fang, 2012

The Figure 84 is an example of the notation of the "Epilogue" part of "Ying Shi Yong Yong". At the beginning of this section, double-click and single-click are used to play in sequence, and later the cross-stroke technique is added. At the end of the section, the double-click technique is used to make the song close to the beat strongly.

The "Epilogue" section summarizes the whole song. The double-click technique makes the music more brilliant. The reappearance of the theme from the 99th bar to the end makes the music reach its peak again. The ending part also plays a role in summarizing the whole song. Bianzhong plays a solo for a short section, and then the theme is introduced. The band Bianzhong has a unique timbre, and five sets of bells occupy the melody part, making the song brilliant and grand. In the end, the band came together and ended the song with a majestic and peaceful atmosphere.

## 2) Bullet strike、Rocking

To play the hammer, use a neutral mallet with greater elasticity. After striking the hammer, relax your wrist immediately and let it automatically bounce on the clock a few times before disappearing. Bounce is suitable for use on mid-range and high-pitched bells with smaller bells. Bounce has no effect on bells in the bass range. Rocking is to place the hammer between two bells and quickly hit the side drum sounds of two adjacent bells.

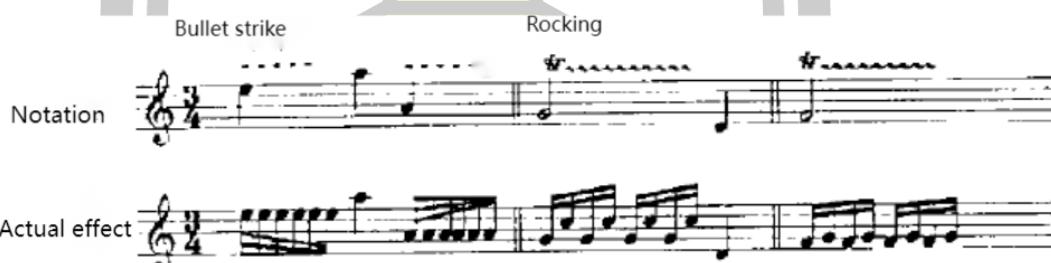


Figure 85. Bullet strike Rocking

Source: Keke Pan, 2023

## 3) Stun attack Smother attack、Sweep attack

After striking the bell, immediately cover the bell's tunnel to stop the lingering sound, which is called "stop blow" (also called "stop sound"). First cover the tunnel part of the struck bell, and then hit it to make a dull sound without any echo,

which is called muffled blow. Use the brush to sweep quickly from low to high or from high to low, which is called sweeping.

The figure shows musical notation and the resulting sound effect. The notation is in treble clef, common time, and consists of three measures. The first measure is labeled 'Stun attack' and shows a series of eighth notes. The second measure is labeled 'smother attack' and shows a series of eighth notes with a 'sm' symbol above them. The third measure is labeled 'sweep attack' and shows a series of eighth notes with a 'sw' symbol above them. Below the notation is the 'Actual effect', which is a musical performance of these three techniques. The 'smother attack' section is highlighted with a yellow box.

Figure 86. Stun attack Smother attack, Sweep attack

Source: Keke Pan,2023

#### 4) Glissando Counterattack

Glissando is a regular drum sound in which adjacent Bianzhong are struck in rapid succession. On the Bianzhong, it is only used for the upper and middle groups, and can be used for upward, downward or two-way glissando. There are two ways to play Counterattack, one is to shake with the left hand and click with the right hand, and vice versa; the other is to use the left hand to quickly hit single notes in succession to produce a sustained long sound effect, and the right hand to click on a certain sound pattern, and vice versa. Of course.

The figure shows musical notation and the resulting sound effect. The notation is in treble clef, common time, and consists of three measures. The first measure is labeled 'glissando' and shows a series of eighth notes. The second measure is labeled 'counterattack1' and shows a series of eighth notes with a 'tr' symbol above them. The third measure is labeled 'counterattack2' and shows a series of eighth notes with a 'tr' symbol above them. Below the notation is the 'Actual effect', which is a musical performance of these three techniques. The 'glissando' section is highlighted with a yellow box.

Figure 87. Glissando Counterattack

Source: Keke Pan,2023

### 5) Strike the bell stand

It is divided into three types: hitting rack, rolling rack and hammering rack. Striking rack is to use drumsticks to hit the wooden frame of the Bian zhong. Rolling rack is to use drumsticks to quickly and alternately hit the wooden frame of the Bian zhong. Hammering is to use drumsticks to hit the wooden frame faster. Hit the wooden frame of the Bian zhong vigorously to create a special sound effect.

Figure 88. Fight

Source: Kejie Fang, 2012

Figure 89. Roll hit

Source: Kejie Fang, 2012

Figure 90. Hammering

Source: Kejie Fang, 2012

### 5.3 Summary

Table 18. The repertoire and performance techniques of the Xu Gongning Bianzhong

Xu Gongning Bianzhong repertoire analysis	The performance techniques of Xu Gongning Bianzhong
1)Judging from the mode and tonality of the music scores, the music scores all use pentatonic and hexatonic scales, and the structure of the music mostly adopts the composition technique of "starting, inheriting, turning and combining" of Chinese folk music.	1)Bian zhong performance in ancient Documents:Painted Mandarin Duck Box,Feasting, Fishing, Hunting, Attack and War Pattern Pot,Yanyue hunting pattern engraved bronze mirror,Shandong Zhangqiu Girl Mountain Music and Dance Figurine etc.
2)Judging from the style of the music score, most of the music is played at medium or slow speeds, and its style is generally solemn, solemn, and harmonious, without the need for Allegro.	
3)From the perspective of rhythm and beat, the music is mainly played in unison, with simple tunes and slow beats. The tunes are simple, serious, not complicated, and the rhythm pattern is relatively simple.	2)Bianzhong performance techniques: Split click,Double click,Counterattack, Bullet strike,Rocking,Stun attack, Smother attack,Sweep attack,Strike the bell stand.
4)From the perspective of the cultural thought of Bianzhong, the cultural attribute of Bianzhong, a double tonal (third degree), reflects the idea of "harmony" in Chinese philosophy, which is one of the core concepts of Chinese culture.	

Source: Keke Pan,2023

## CHAPTER VI

### The guidelines of transmition and development of Xu Gongning Bianzhong in the university

The School of Music of Pingdingshan University is the first university in mainland China to establish an elegant orchestra and the first in mainland China. It is the only university that offers Bian zhong courses and is also the department with the most standardized teaching activities. This chapter takes it as a key inspection object, carry out systematic measures and detailed records on curriculum, teaching staff, artistic practice and talent training, etc. and comprehensively sorts out the role of Xu Gongning Bianzhong art in Universitys and universities. transmition and development.

6.1 The transmition and development of Xu Gongning Bianzhong in classroom teaching in the universities

- 6.1.1 Teaching system
- 6.1.2 Teaching process
- 6.1.3 Assessment method

6.2 The transmition and development of Xu Gongning Bianzhong in extracurricular practicalactivities

- 6.2.1 Professional show
- 6.2.2 Public welfare activities
- 6.2.3 Public welfare classes

6.3 Practical teaching evaluation

- 6.3.1 Student feedback
- 6.3.2 Teacher feedback
- 6.3.3 Social feedback

6.4. Summary

## 6.1 The transmission of Xu Gongning Bianzhong in classroom teaching in the universities

### 6.1.1 Teaching system

The so-called teaching system refers to a unified whole composed of various elements such as knowledge structure, teaching content, teaching methods, teaching process and teaching evaluation in teaching activities in the universities. This chapter records and describes the content of senior executives within the school.

#### 1) Course credit setting

"Grace Training" is a professional elective course offered by the Conservatory of Music. The course code is 32090802. The professional training plan adopts a "modular" curriculum system. This course belongs to the regional music culture module and includes band training, dance team training and singing. Team training, the teaching of Bian zhong courses is part of the band training. By teaching traditional Chinese ritual music culture and ancient music performance knowledge, students can master the Bian zhong performance technique, and at the same time develop the spirit of teamwork and learn the methods and methods of instrumental ensembles. Techniques, practice and rehearse original pieces of court music with the ancient traditional music style of the Central Plains, highlighting the ritual music characteristics of the pre-Qin era and inheriting the excellent traditional music of China.

This course is arranged in semesters 3-6, with 17 weeks per semester, 4 classes per week, and a total of 272 class hours. 4 credits will be awarded upon completion.(Wenzong Liu,interviewed,2023)

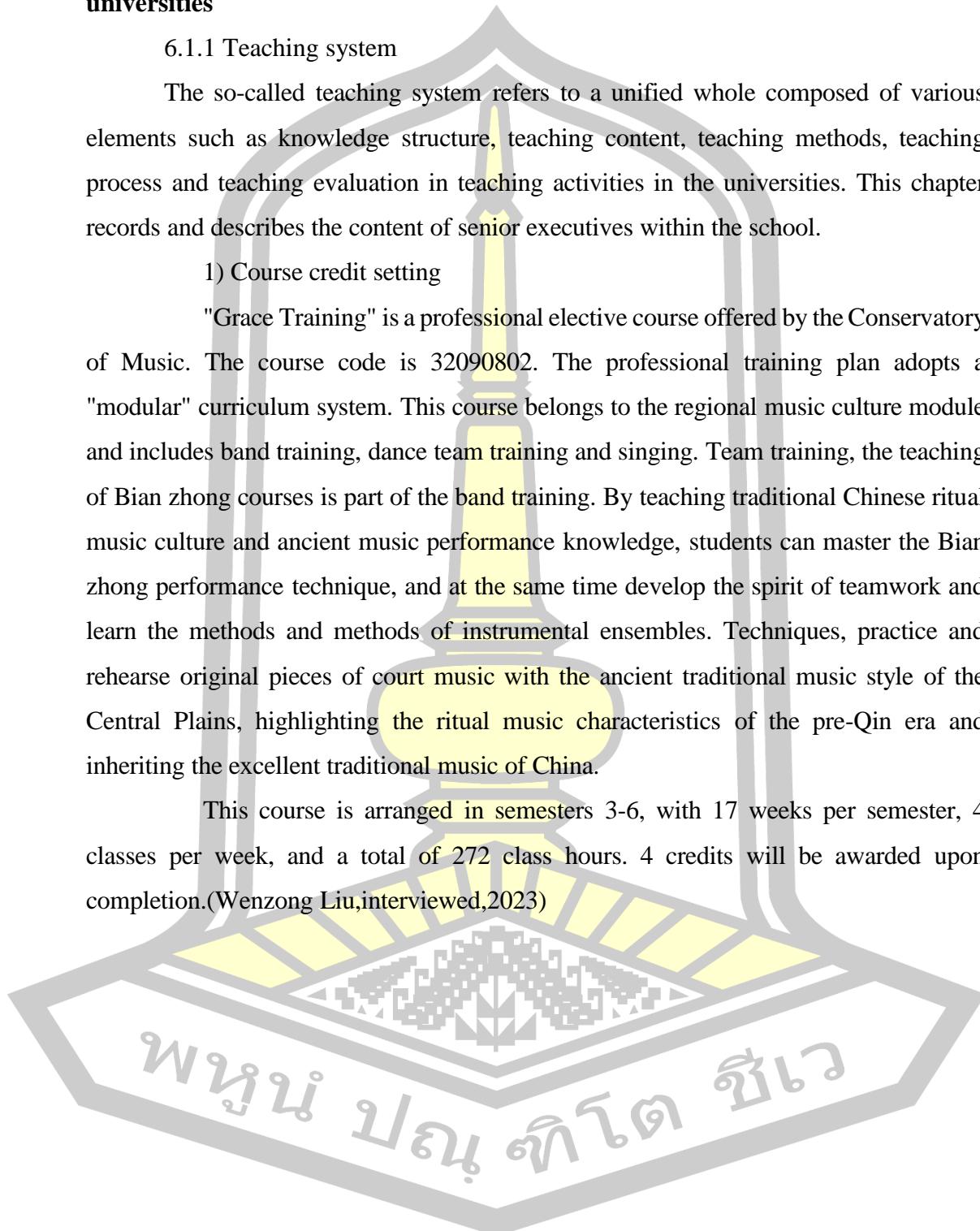


Table 19. course schedule

Teaching arrangements for the third semester												
序号	Course category	course code	Course Title	Course properties	company name							
						credit	hours	teach	practica	Week number	start week	end week
1	Required courses	31091003	Music Theory (3)	Required	music Academy	2	60	20	16	18	1	18
2	Required courses	31091008	Chinese music history	Required	music Academy	2	60	26	10	18	1	18
3	Required courses	31091005	Harmony (1)	Required	music Academy	2	60	20	16	18	1	18
4	Required courses	31091203	Major	Required	music Academy	1	30	9	9	18	1	18
5	Required courses	31091501	Chorus and Conducting	Required	music Academy	2	60	20	16	18	1	18
6	Required courses	31091208	Stage performance (1)	Required	music Academy	2	60	16	20	18	1	18
7	Required courses	31091101	Qu yi (1)	Required	music Academy	2	60	16	20	18	1	18
8	Required courses	31091305	choreographer	Required	music Academy	2	60	18	18	18	1	18
9	Elective courses	32091301	Piano basics	Elective	music Academy	1	30	9	9	18	1	18
10	Elective courses	32091101	Yayue rehearsal	Elective	music Academy	1	30		30	18	1	18
11	Elective courses	32091403	Rehearsal class	Elective	music Academy	1	30		30	18	1	18

Source:Keke Pan,2023

## 2) Faculty

The interactive teaching model of "internal training + external introduction, please come in + go out" has formed a strong team of teachers that connects "inside the school + outside the school, teachers + experts", laying a solid core for the effective implementation of the curriculum. Assure.

Since there are no full-time Bian zhong performance teachers in the school, our school has trained professional percussion teachers to take on the teaching of Bian zhong and band rehearsals through teacher ability improvement plans and out-of-town training. Currently, the main teachers in charge are teachers Zhang Yang, Li Wenliang, and He Kun.

Outside the school, Professor Zhou Chunyi, deputy director of the Cultural Resources Research Center of Peking University, came to our school and gave a three-day lecture on traditional Chinese music theory and elegant music composition to the teachers of the Ya Music Orchestra. Regularly invites deputy director of Peking University Cultural Resource Center, director of the Music Center of China Conservatory of Music, former professor Zhou Chunyi of Nanhua University in Taiwan, former president of Henan Academy of Arts and national first-class composer Fang Kejie,

Wuhan Conservatory of Music Tan Jun, Li Youping, Vice President of Wuhan Conservatory of Music, and Huang Datong, well-known scholars and experts from Hangzhou Normal University, came to the school to give knowledge lectures on traditional Chinese theory, Bian zhong composition, elegant music performance, etc., and hired Zhou Chunyi, Fang Kejie, and Huang Datong as Visiting professor of our University. (Wei Liu,interviewed, 2023)



Figure 91. Professor Zhou Chunyi teaches teachers and students of our school

Source: Keke Pan,2019



Figure 92. Dean Fang Kejie's rehearsal work

Source: Keke Pan,2019

### 3) Course teaching objectives

3.1) Knowledge objectives: Be able to play music of a corresponding level and have basic sight-reading ability of music scores. Have a certain understanding of the musical structure of Bian zhong orchestration. Understand the difference between court elegant music and secular music, and improve your understanding of ritual and music civilization.

3.2) Ability goal: Have communication technique and teamwork spirit, and be able to develop a serious, realistic, diligent and good scientific research spirit and study style.

3.3) Competency goals: Firmly establish the position of cultivating people with moral integrity, abide by professional ethics, possess humanistic background and scientific literacy, and have the professional ideals and professional beliefs of teachers who love education and students.

### 4) Course content

Table 20. Course content

chapter number	Chapter (knowledge point) name	Teaching and Learning Content
1	Basic training on Bian zhong performance	<p>(1) Teaching content: performance of each part of Bian zhong and basic coordination with plucked parts, windpipe parts, and percussion parts</p> <p>(2) Practical content: playing etudes</p> <p>(3) Self-study requirements: practice strictly according to classroom requirements</p> <p>Key point: Pay attention to the stability of the beat rhythm</p> <p>Difficulty: volume ratio between parts</p>

Table 20 (Continued)

chapter number	Chapter (knowledge point) name	Teaching and Learning Content
2	Rehearsal of Ying Long Fengyun Suite	<p>(1) Teaching content: Arrangement of different movements</p> <p>(2) Practical content: practice one by one according to the parts</p> <p>(3) Self-study requirements: practice strictly according to classroom requirements</p> <p>Key point: Pay attention to the stability of the beat rhythm</p> <p>Difficulty: volume ratio between parts</p>
3	Book of Songs Suite Rehearsal	<p>(1) Teaching content: Arrangement of different movements</p> <p>(2) Practical content: practice one by one according to the parts</p> <p>(3) Self-study requirements: practice strictly according to classroom requirements</p> <p>Key point: Pay attention to the stability of the beat rhythm</p> <p>Difficulty: volume ratio between parts</p>

Source:Keke Pan,2023

#### 4.1) Practice song

Etude is a piece of music specially designed to improve performance technique. It usually contains one or several specific technical topics, with the basic purpose of improving a certain aspect of technique. Teacher He Kun from the Conservatory of Music created a set of Bian zhong etudes based on the characteristics of Xu Gongning Bianzhong, which greatly improved the students' learning results.

## Bian zhong Etude

Range table

Kun He

Range table showing four staves of musical notation:

- Niu zhong:** Treble clef, 4/4 time, 8 notes: 8,  $\sharp 8$ ,  $\flat 8$ , 8,  $\sharp 8$ ,  $\sharp 8$ , 8,  $\sharp 8$ ,  $\flat 8$ ,  $\sharp 8$ .
- left yongzhong:** Treble clef, 8 notes: 8,  $\sharp 8$ , 8,  $\sharp 8$ ,  $\sharp 8$ ,  $\sharp 8$ , 8,  $\sharp 8$ ,  $\sharp 8$ ,  $\sharp 8$ .
- Right side yongzhong:** Treble clef, 8 notes: 8,  $\sharp 8$ ,  $\sharp 8$ ,  $\sharp 8$ ,  $\sharp 8$ ,  $\sharp 8$ , 8,  $\sharp 8$ ,  $\sharp 8$ ,  $\sharp 8$ .
- Bo zhong:** Bass clef, 8 notes: 8, 8, 8, 8, 8, 8, 8, 8.

Marked "+" as side drum sound

Figure 93. Bianzhong range table

Source: Kun He, 2019

Yong Zhong scale exercises on the right side

Musical score for Yong Zhong scale exercises on the right side, showing seven staves of music for different gong mode scales:

- C gong mode scale:** Treble clef, 4/4 time, 8 notes: 8, 8, 8, 8, 8, 8, 8, 8.
- D gong mode scale:** Treble clef, 4/4 time, 8 notes: 8,  $\sharp 8$ , 8,  $\sharp 8$ ,  $\sharp 8$ ,  $\sharp 8$ , 8,  $\sharp 8$ ,  $\sharp 8$ ,  $\sharp 8$ .
- E gong mode scale:** Treble clef, 4/4 time, 8 notes: 8,  $\sharp 8$ , 8,  $\sharp 8$ ,  $\sharp 8$ ,  $\sharp 8$ , 8,  $\sharp 8$ ,  $\sharp 8$ ,  $\sharp 8$ .
- F gong mode scale:** Treble clef, 4/4 time, 8 notes: 8,  $\sharp 8$ , 8,  $\sharp 8$ ,  $\sharp 8$ ,  $\sharp 8$ , 8,  $\sharp 8$ ,  $\sharp 8$ ,  $\sharp 8$ .
- G gong mode scale:** Treble clef, 4/4 time, 8 notes: 8,  $\sharp 8$ , 8,  $\sharp 8$ ,  $\sharp 8$ ,  $\sharp 8$ , 8,  $\sharp 8$ ,  $\sharp 8$ ,  $\sharp 8$ .
- A gong mode scale:** Treble clef, 4/4 time, 8 notes: 8,  $\sharp 8$ , 8,  $\sharp 8$ ,  $\sharp 8$ ,  $\sharp 8$ , 8,  $\sharp 8$ ,  $\sharp 8$ ,  $\sharp 8$ .
- B gong mode scale:** Treble clef, 4/4 time, 8 notes: 8,  $\sharp 8$ , 8,  $\sharp 8$ ,  $\sharp 8$ ,  $\sharp 8$ , 8,  $\sharp 8$ ,  $\sharp 8$ ,  $\sharp 8$ .

## 4.2) Playing technique practice

There are few records on the playing technique of the Bian zhong in various ancient documents in my country. Through performance practice, some commonly used performance techniques have been summarized. In the classroom, teachers teach students research techniques such as single click, double click, cross attack, glissando, special sound effects, etc., and lead students to develop drumsticks of different materials and shapes, enriching the Bian zhong tonal effects.

#### 4.3) Bian zhong repertoire practice

The Conservatory of Music invited Fang Kejie, a national first-class composer, to create two concert repertoires for Xu Gongning Bianzhong. As a repertoire for daily training, one is the "Ying Long Fengyun" suite, which includes "Ying Long Fengyun" and "Ying Long Fengyun". "Guo Feudian", "Ying Ru Chunfeng", "Ying Shi Yong Yong", and the other one is the "Book of Songs" suite, including "The Book of Songs. Waqiu", "The Book of Songs. Lu Ming", "The Book of Songs. Nuo", etc. (See the appendix for the works).

#### 4.4) Teaching methods and methods

Rehearsal classes are taught in groups according to the categories of musical instruments, mainly using conventional teaching methods such as lecture, demonstration, discussion, and observation. The entire teaching process includes: the teacher checks the content of the previous lesson, the students return to Class, The teacher teaches and demonstrates the new lesson content, the students follow the lesson classroom practice, and the students help each other learn the teacher checks the classroom learning effect students practice after class.

In recent years, under the guidance of the OBE educational philosophy, Bian zhong rehearsal classes have adhered to the "student-centered" concept and made full use of modern classroom education methods such as boppos and flipped classroom to continuously update teaching content, change educational concepts, and improve educational technique. Improvement, etc., strengthen the application and promotion of teaching results, enhance students' interest in learning, and improve classroom learning effects.

OBE education concept (Outcome based education, OBE) is also called outcome-oriented education, ability-oriented education, goal-oriented education or demand-oriented education. The OBE educational concept is a curriculum system construction concept that is goal-oriented, student-oriented, and adopts reverse thinking. It is an advanced educational concept.

The effective teaching design of BOPPPS emphasizes students' participatory active learning, allowing students to learn to learn through learning by doing and learning by doing. The focus of the reform content is on "what students have learned", reverse design, and plans to reform from the aspects of teaching content

organization, teaching method presentation, teaching process design, and teaching evaluation. The abbreviation BOPPPS represents six key parts of instructional design and activities: Bridge-in, Objective, Pre-assessment, Participatory Learning, Post-assessment and Summary.



Figure 95. BOPPPS

Source: <http://jgxy.xynu.edu.cn/info/1077/5116.htm>

Due to the large size of Bian zhong, both teaching and performance are subject to venue constraints. Especially the three-year epidemic has brought great difficulties to Bian zhong teaching. In order to solve the problem of Xu Gongning's difficulty in carrying out on-site experimental teaching of bian zhong, In line with the national "Golden Course" construction requirements for "gender equality", we are preparing to develop a virtual simulation experiment of Xu Gongning Bianzhong performance and creation. This experiment will reconstruct a set of virtual Bian zhong and performance scenes that are completely consistent with the shape, scale, and proportion of Xu Gongning Bian zhong, based on basic cognition (basic knowledge teaching)-performance practice (performance technique training)-comprehensive creation (innovation ability Cultivation) .The module design is guided by three-level progressive and three-level integration ideas. The learning content is from shallow to deep and the learning objectives are from low to high. The basic cognitive module provides the necessary basic knowledge for the learning of the performance practice

module. The performance practice module provides the necessary performance technique for the learning of the comprehensive creation module. The comprehensive creation module is implemented on the basis of further consolidating and deepening basic knowledge and performance technique. Creation and editing of musical works - cultivation of creative and editing abilities. This experiment can broaden the breadth and depth of traditional music teaching, improve students' learning enthusiasm and initiative, extend students' learning time and learning space, cultivate students' collaborative interaction ability and cooperative innovation spirit, and at the same time, allow this ancient musical instrument to be used in the new era. Bloom more brilliantly.(Wenliang Li,interviewed,2023)

#### 4.5) Teaching venue

The Conservatory of Music has always identified experimental teaching as a key link in cultivating high-quality, applied innovative talents. It adheres to social needs and market demand as the guide, with ability training as the core, strengthens practical teaching and innovative new mechanisms for industry-university-research cooperative education, and focuses on students' comprehensive The cultivation of quality and practical ability is the main line, taking the innovation of practical teaching system and practical teaching model as the breakthrough point, focusing on the construction of professional basic laboratories, building a professional integrated practical teaching platform for classroom, extracurricular and social practice, optimizing and coordinating experimental teaching and Regarding the relationship between theoretical teaching, we must ensure that practical teaching and theoretical teaching "grasp both hands, and both hands must be strong."Currently, the Conservatory of Music has 248 piano rooms (including ethnic instrument rooms and piano rooms), 1 chorus classroom, 2 dance classrooms, 1 elegant music rehearsal hall, and 1 concert hall. The current total laboratory area is 3,361 square meters. ; The total assets are 8,446,838.27 yuan; there are 4 management personnel, 1 part-time and 3 full-time. Among them, the Yale Rehearsal Hall is located in Room 102 on the first floor of the Art Building, with a total area of 200 square meters. It contains a set of Xu Gongning Bianzhong, several music stands, and audio and video players. From 2012 to 2018, Bian zhong were usually held in this rehearsal hall. rehearse. The concert hall is located at the end of the first floor of the Art Building, with a total area of 800 square meters and

a capacity of 480 spectators. It contains a set of Xu Gongning Bian zhong, several music stands, and audio and video players. Today, Bian zhong rehearsals are usually held here.

According to Liu Wenzong, director of the Yayue Teaching and Research Office, a data room will be established in 2024 to collect, organize and preserve books, periodicals, audio-visual materials, etc. about the Central Plains ritual music culture and traditional Chinese music. The Yale rehearsal room will also be upgraded into a Bian zhong museum. , telling and inheriting the profound Chinese story with Chinese gold and stonal .(Wenzong Liu,interviewed,2023)

#### 6.1.2 Teaching process

Teaching activities are one of the core aspects of talent training, including teacher teaching and students' practice. Through the study of theory and singing and performance technique, students can systematically master the theoretical knowledge and performance technique of Xu Gongning Bianzhong.

Bian zhong music theory has not yet been systematized and curriculated, and there are no unified teaching materials. Performance class teachers generally teach Xu Gongning Bianzhong history, origins, shape structure, and sound series characteristics in the course module. Well-known experts are regularly hired to do "Chinese traditional music theory" , "Ritual Music Culture", "Bian zhong Performance Method" and other related lectures.

The study of practical courses mainly consists of two parts: solo and ensemble. The course basically runs through 3-6 semesters of study. Generally speaking, the class model follows the following steps: review and assess the content of the previous class, explain new content, demonstrate and teach new content, students learn and imitate, and teachers individually review, comment, and summarize, etc. Sometimes the above procedures may not be followed exactly, and will be randomly adjusted based on the actual teaching content and progress.

#### 6.1.3 Assessment method

1) Type and number of questions in the assessment format, assessment time, etc.

Question type: Semester repertoire library

Quantity: Choose 1 piece

### Assessment time: Week 17

Students select works from the semester repertoire library as assessment tracks based on their own circumstances to test their instrument performance technique and musical proficiency. The difficulty level of the works selected by students is also calculated into the score.

#### 2) Course assessment composition and proportion of each part

It consists of two parts: the final exam score and the usual score, and is scored according to a hundred-point system. Among them, the usual score = 60% technique + 40% other, the total score = 50% daily score + 50% final score, and the final total score is converted into a five-level system to reflect the student's performance.

#### 3) Assessment method

The examination is conducted through on-site interviews. The scoring method is in accordance with the unified regulations of the University. It is scored on a five-level system and is scored by the teacher. The syllabus is used as the criterion to ensure comprehensive, fair and accurate scoring.

Through the music works performed by students, observe the students' mastery of the intonation, rhythm, musical performance, etc. of the Bian zhong works. Are the intonation and rhythm accurate, are the performance methods correct, and is the music smooth? This is used to test students' mastery of technique and knowledge in this semester's study.

#### 4) The relationship between course assessment methods and target evaluation

Through on-site assessment, students are tested on their mastery and application of the Bian zhong performance knowledge learned this semester, as well as whether they can bring into play the spirit of teamwork, and their mastery and application of instrumental ensemble methods and techniques.

## 6.2 The transmission of Xu Gongning Bianzhong in extracurricular practical activities

Extracurricular practical activities are the continuation and extension of classroom teaching activities. They provide a broad intellectual background for

classroom teaching, reflect students' self-more, pay attention to students' flexible use of knowledge in various extracurricular activities, and expand the depth of classroom-related content in a targeted manner. and breadth, to help students obtain "intelligence beyond and above knowledge" in independent practice, and ultimately achieve an overall improvement in students' quality. Bian zhong's extracurricular teaching practice activities mainly include special concerts, charity performances, etc. Compared with classroom teaching activities, extracurricular practical activities enrich the channels of knowledge sources. Students can not only learn professional knowledge in the ivory tower, but also come into contact with the knowledge and experience of musical predecessors in society. Only by integrating students with society as early as possible can they keep up with the trend of social development and lay a solid foundation for leading social culture.

### 6.2.1 Professional show

Table 21. Statistics of Bian zhong performance activities in the past two years

Number	Time	Place	Type	Repertoire	Performers
1	October 1, 2022	Pingdingshan University Conservatory of Music Concert Hall	report concert	"Lu Ming", "Ying Shi Yong Yong", "Wan Qiu"	Liu Jiahui (Bo zhong 1), Huang Rui (Bo zhong 2), Zhang Yiwen (Yong zhong 1), Fan Yilin (Yong zhong 2), Liu Rui (Niu zhong)
2	March 30, 2023	Pingdingshan University Conservatory of Music Concert Hall	"National Training Plan" Exhibition	《"Lu Ming", "Ying Shi Yong Yong", "Wan Qiu"》	Liu Jiahui (Bo zhong 1), Huang Rui (Bo zhong 2), Zhang Yiwen (Yong zhong 1), Fan Yilin (Yong zhong 2), Liu Rui (Niu zhong)
3	April 24-27, 2023	Xuchang Museum	Three Kingdoms Culture and Tourism Festival "Bian zhong Going Home" Performance	"Deer Ming", "Ode to Shang", "Wanqiu", "East Wind is Red"	Liu Jiahui (Bo zhong 1), Huang Rui (Bo zhong 2), Zhang Yiwen (Yong zhong 1), Fan Yilin (Yong zhong 2), Liu Rui (Niu zhong)
4	May 30, 2023	Pingdingshan University Conservatory of Music Concert Hall	report concert	"Lu Ming", "Ying Shi Yong Yong", "Wan Qiu"	Liu Jiahui (Bo zhong 1), Huang Rui (Bo zhong 2), Zhang Yiwen (Yong zhong 1), Fan Yilin (Yong zhong 2), Liu Rui (Niu zhong)
5	October 26, 2023	Pingdingshan University Conservatory of Music Concert Hall	report concert	"Deer Ming", "Shang Song", "Zheng Feng"	Liu Jiahui (Bo zhong 1), Huang Rui (Bo zhong 2), Zhang Yiwen (Yong zhong 1), Fan Yilin (Yong zhong 2), Liu Rui (Niu zhong)

Table 21 (Continued)

Number	Time	Place	Type	Repertoire	Performers
6	November 11, 2023	Pingdingshan University Conservatory of Music Concert Hall	Experts observe the performance	"Lu Ming", "Ying Shi Yong Yong", "Wan Qiu", "What grass is not yellow"	Liu Jiahui (Bo zhong 1), Huang Rui (Bo zhong 2), Zhang Yiwen (Yong zhong 1), Fan Yilin (Yong zhong 2), Liu Rui (Niu zhong)
7	December 4, 2023	Pingdingshan University Conservatory of Music Concert Hall	"National Training Plan" Exhibition	"Lu Ming", "Ying Shi Yong Yong", "Wan Qiu", "What grass is not yellow"	Liu Jiahui (Bo zhong 1), Huang Rui (Bo zhong 2), Zhang Yiwen (Yong zhong 1), Fan Yilin (Yong zhong 2), Liu Rui (Niu zhong)
	November 11, 2023	Pingdingshan University Conservatory of Music Concert Hall	Experts observe the performance	"Lu Ming", "Ying Shi Yong Yong", "Wan Qiu", "What grass is not yellow"	Liu Jiahui (Bo zhong 1), Huang Rui (Bo zhong 2), Zhang Yiwen (Yong zhong 1), Fan Yilin (Yong zhong 2), Liu Rui (Niu zhong)
	December 4, 2023	Pingdingshan University Conservatory of Music Concert Hall	"National Training Plan" Exhibition	"Lu Ming", "Ying Shi Yong Yong", "Wan Qiu", "What grass is not yellow"	Liu Jiahui (Bo zhong 1), Huang Rui (Bo zhong 2), Zhang Yiwen (Yong zhong 1), Fan Yilin (Yong zhong 2), Liu Rui (Niu zhong)

Source:Keke Pan,2023

### 6.2.2 Public welfare activities

#### 1) "Xu Guo Bian zhong Home"

On the morning of April 25, 2023, the "Xu State Bian zhong Go Home" exhibition premiered at the Xuchang Municipal Museum. Two thousand six hundred years later, the important ritual and music instruments of the Xu State of the Zhou Dynasty(1046 BC-256 BC) were played again in their hometown of Xuchang. The actors were dressed in gorgeous classical long-sleeved dark clothes, holding bells, Bian zhong, drums, zithers and other musical instruments. They performed four distant songs from "The Book of Songs· Zheng Feng", "That (Yinnuo)", "Deer Ming" and "The East

Is Red". Music from pre-Qin to modern times. Among them, "The Book of Songs·Zheng Feng" is the folk music of Zhengdi in the pre-Qin period, including Xuchang area; "Na" is a work by descendants of the Shang Dynasty to worship their ancestors as soup; "Lu Ming" is a poem played when the emperor and the princes were entertaining guests. Music; "The East is Red" is a well-known modern red song. This "Xu State Bian zhong Go Home" performance is one of the series of activities of the 14th Three Kingdoms Cultural Tourism Week in Xuchang, which reproduces the appearance of the ritual and music culture of the Zhou Dynasty(1046 BC-256 BC) in Xu State.



Figure 96. Xu Guo Bian zhong Home Performance

Source: Keke Pan,2023

The "Xu Guo Bian zhong Returns Home" exhibition will be held for three days, from April 25th to 27th, at 10:00, 14:00, and 16:00 each day. It will be located in the east hall of the second floor of Xuchang Museum. Pingdingshan University was invited to participate in the "Xu Guo's Bian zhong Returning Home" exhibition. By replicating and restoring Xu Guo's important ritual music instruments, training an ancient music performance team, building a Xu Guo's ritual music cultural exhibition room and displaying Xu Guo's ritual music venues, it reproduced more than two thousand years of history. The ritual music of Xu Guo before.



Figure 97. Program

Source: Keke Pan, 2023

## 2) Three days of National Day fun

From October 1st to 3rd, 2022, elegant music performances were carried out in the concert hall of the Art Building of Hubin Campus from 19:00-19:30 and 20:00-20:30 every day, and "Zheng Feng" and "Lu Ming" were performed. "The two tracks brought an audio-visual feast to the students, showing the elegance and splendor of traditional ritual and music civilization, and conveying the pursuit of spiritual values in the new era such as sincerity, gentleness and respect, integrity and self-love, and harmony between family and country.



Figure 98. Three Days of National Day Music Performance

Source: Keke Pan, 2023

### 6.2.3 Public welfare classes

Through various types of public welfare classes at all levels, we actively carry out popular education activities based on the excellent traditional Chinese culture, organize a series of theme activities and on-site practical experience activities related to transmission projects, and continuously improve the traditional music curriculum system with the characteristics of ritual and music culture.

#### 1) The first lesson of school

On the morning of September 24, 2022, the "First Lesson of the Term" was held in the Concert Hall of the Art Building, and a Yale classroom demonstration and observation activity was carried out for all freshmen in the class of 2022. He Kun, the teacher in charge of the orchestra, first led the students to learn about Xu Gongning Bianzhong, Bian zhong, drums, zither, guqin, bone flutes, xun and other ancient instruments, and conducted an ensemble performance of Bian zhong.



Figure 99. Performance of the first lesson of school

Source: Keke Pan, 2023

After the activity, the students all said that through this "Bian zhong Charity Class", they learned about Bian zhong culture for the first time and enhanced their sense of national cultural identity. Next, they must actively promote the creative transformation and innovative development of China's excellent traditional culture. It

is our duty to rejuvenate the ancient Chinese traditional Yayue civilization in the new era.

## 2) National training program classroom

In 2022, the Henan Provincial Department of Education has determined the county construction goals of the "National Training Plan" project, further highlighting the main responsibilities of teacher training counties, coordinating and integrating teacher training resources at all levels, and establishing a hierarchical and classified teacher training system. Five-level linkage, city training, county training, and school-based training, high-quality training for all staff, so that every teacher has an appropriate development platform, and each continuing education cycle can achieve advanced growth. Our school will start from 2022. In 2016, we began to undertake the "National Training Program" for counties and urban areas, focusing on the theme of "promoting excellent traditional culture" and focusing on the combination of theory and practice. Through the performance of ancient musical instruments, we use an immersive approach to deepen the essence of music, focus on music experience, and improve The ability to integrate excellent traditional music into the classroom. These Universities come from various places in the province and play a strong role in promoting the spread of ritual and music culture in the Central Plains.

The students said that this time they walked into the elegant music activity, whether it was the performance effect of the harmonious harps, the sonorous bells and drums, the overflowing elegant sounds, and the long and lingering ancient rhymes, or the learning effect of the cultural knowledge of Central Plains ritual music and the performance of ancient musical instruments and bells. We were amazed and deeply shocked by them. We had a deeper understanding of the Chinese nation's national customs and customs that are harmonious with etiquette and music, and enhanced our national self-confidence and pride.



Figure 100. National training students experience playing ancient instruments

Source: Keke Pan,2023



Figure 101. Audience experience Bian zhong performance

Source: Keke Pan,2023

In the days to come, he will be committed to the transmission and promotion of Bian zhong art in commercial performances, museum performances, tourist attraction performances, large-scale celebrations, school studies, academic exchange activities, and art fund training projects. Increase practical efforts in other aspects and make due

contributions to the transmission of China's excellent traditional music culture.  
(Wenzong Liu,interviewed,2023)

### 6.3 Practical teaching evaluation

#### 6.3.1 Student feedback

In November 2023, the author interviewed the students who played Bian zhong. Most of them were sophomores and juniors in the Conservatory of Music.

Yiwen Zhang, a student of Yong zhong performance, said that my major is percussion and I had no chance to come into contact with Bian zhong before enrolling. Fortunately, I chose a rehearsal class for Bian zhong performance after enrolling. Due to the staff limit, this class is difficult to get. , here, I learned from the teacher the cultural knowledge of Central Plains ritual music, understood the physical structure, shape characteristics and tonal system of Xu Gongning Bianzhong, systematically learned the performance technique of Bian zhong, rehearsed repeatedly based on the works, and participated in many performance practice activities , also received many honors, and used practical actions to play and spread the right voice of China.(Yiwen Zhang,interviewed,2023)

Rui Liu, a student of Niu zhong performance, said that Bian zhong are the first of the "eight tonal s" of ancient Chinese musical instruments. They are known as the "important instrument of the country" that can only be played in the prosperous times. They represent the highest level of music culture, metallurgy and casting at that time. Achievement. The most amazing thing is its side drum sound. The front drum and side drum sounds are different. There is a pattern, they are all in thirds, either major thirds or minor thirds. The practice of Chinese twelve-temperament began in the Western Zhou Dynasty(1046 BC-256 BC) or earlier. The temperament system of Zeng Houyi's Bian zhong came into being more than 2,000 years earlier than the piano, known as the "King of Western Instruments". Moreover, I have never seen such a beautiful one. The manufacturing of bronze is very complicated, especially if it is placed more than 2,400 years ago. It allows the world to see the breadth and depth of Chinese culture. Let us also worship, respect and admire the wisdom and artistic attainments of our ancestors.(Rui Liu,interviewed,2023)

Rui Huang, a student who plays the Bian zhong, said that every time he attends class, he takes a reverent and cautious attitude. In front of this "behemoth" that carries a rich history, national self-esteem, self-confidence and pride arise spontaneously, and the Bian zhong also. Perhaps our ancestors have given it a soul from ancient times to the present. Every time it is played, it seems to be connected to the gods. The majestic and solemn "sound of gold and stonal " makes people feel spiritually cleansed.(Rui Huang,interviewed,2023)

Jiahui Liu, a student of the Bian zhong, said that I especially like the Bian zhong rehearsal class. I was extremely surprised when I saw the Bian zhong for the first time. The mystery and domineering momentum of the Bian zhong make people fascinated by them. When you hit it with a mallet, you can feel its beautiful tonal, mellow sound quality, high treble and deep bass. It seems to have a mysterious penetrating power, taking me into thousands of years ago, and I have to marvel at the working people of ancient times. of wisdom.(Jiahui Liu,interviewed,2023)

Yilin Fan, a student of Yongzhong, said that our Bian zhong Orchestra has a good tradition that old students guide new students. Action guidance and moral education of new students all rely on the mentoring and guidance of old students. This is the tradition and characteristic of the orchestra.(Yilin Fan,interviewed,2023)

### 6.3.2 Teacher feedback

Zhikui Cheng, dean of the Conservatory of Music, once said that the teachings of ritual music are popular all over the world, making people cultivate their moral character, understand the way of heaven, be modest and polite, and have orderly manners. This is the connotation and significance of my country's ancient ritual music culture, and it is also the original intention of the saints to make ritual music. We usually convey to students during the teaching process of Bian zhong Ritual and Music courses, especially in the first class, that people have eight virtues: filial piety, brotherhood, loyalty, trustworthiness, propriety, righteousness, integrity, and shame. The music has eight tonal s: gold, stonal , silk, bamboo, gourd, soil, leather and wood. This kind of cultivation of students, in addition to their own performance technique and expression of musical behavior, is more influenced by the excellent traditional Chinese culture rooted in their hearts.(Zhikui Cheng,interviewed,2023)

Teacher Yang Zhang , who teaches Bian zhong performance, believes that the phenomenon of Bian zhong has finally been rooted in the hearts of us Chinese people.

In fact, it can be summarized in four words: hardworking and kind. What this Bian zhong ultimately expresses is a sound of kindness. Our contemporary university teachers should tell children that they should be confident and treat their lives in the most kind and hard-working way in China. (Yang Zhang,interviewed,2023)

### 6.3.3 Social feedback

Kou Qi, director of the Xuchang Museum, said that Pingdingshan University has replicated and restored Xu Gongning Bianzhong, an important instrument of Xu Guoli and music from more than 2,000 years ago. The splendidness of music culture is of great significance to carrying forward excellent traditional culture, enriching people's cultural life and enhancing national cultural confidence. (Kou Qi,interviewed,2023)

Kai Cui, director of Pingdingshan City Culture and Art Center, said that in this mysterious rhythm, we seem to be able to hear the echo of the wisdom of our ancestors and feel the profound charm conveyed by Xu Gongning Bianzhong. The clear yet powerful sound of Bian zhong allows the audience to embrace history through thousands of years and feel the thickness and warmth brought by Bian zhong. Pingdingshan University has taken the lead among universities in the province and even the country in promoting the innovative transmition and development of excellent traditional culture.( Kai Cui,interviewed,2023)

An audience member who watched the Bian zhong performance praised: Listening to the palace ritual music from 2,400 years ago, the sound of nature; appreciating the visually stunning feast of "a generation of wonders that amaze the world, and an eternal sound that shakes the mustard sky", let everyone be intoxicated, feast their eyes and ears , I can't help but sigh - this music can only be found in heaven, how many times can you hear it in the world! It brings people endless enjoyment of beauty and makes them forget to leave.

#### 6.4 Summary

Table 22. The guidelines of transmition and development of Xu Gongning Bianzhong

The transmition guidelines	The development guidelines
<p>1) Pingdingshan University offers Bian zhong acting courses. Teach students to learn traditional Chinese ritual and music culture, Bianzhong performance techniques, and instrumental ensemble methods. Rehearse original pieces of court music with the ancient traditional music style of the Central Plains.</p>	<p>1)The course adopts the interactive teaching model of "internal training + external introduction, please come in + go out", forming a strong team of teachers that connects "inside the school + outside the school, teachers + experts", laying a solid foundation for the effective implementation of the course. core guarantee.</p>
<p>2)Students learn the performance technique of Bian zhong and rehearse Bian zhong "Ying Long Fengyun" suite, "Book of Songs" suite and other pieces.</p>	<p>2)Under the guidance of OBE educational philosophy, Bian zhong rehearsal classes adhere to the "student-centered" approach concept, make full use of modern classroom education methods such as boppos and flipped classroom, and continuously update teaching content, change educational concepts, and improve educational technique, etc.</p>
<p>3)The Conservatory of Music continues to expand the scope of Bian zhong culture through various concerts, charity classes and other practical activities.</p>	<p>3)The Conservatory of Music of Pingdingshan University plans to develop a virtual simulation experiment of Xu Gongning Bianzhong performance and creation.</p>

Source:Keke Pan,2023

## CHAPTER VII

### Conclusions, Discussion and Suggestions

#### 7.1 Conclusion

Taking Xu Gongning Bianzhong as the research object, the researchers studied the physical structure and tonal system of Xu Gongning Bianzhong through documentary materials and field work, analyzed the performance repertoire, sorted out the performance techniques, and investigated the inheritance and development of Xu Gongning Bianzhong at Pingdingshan University. The results of the research report conclude that:

7.1.1 Investigate the physical structure and tonal system of the Xu Gongning Bianzhong. The physical structure is divided into Yong zhong, Niu zhong and Bo zhong. The structural shapes of Xu Gongning Bian zhong have their own characteristics, including yong, xuan, wu, zheng, mei, zhuan, zheng jian, gu bu, xian, yu, sui, heng, etc. The decorative characteristics, including Cicada pattern, double ring pattern, Kui dragon pattern, Spiral piece, etc.

7.1.2 Analyze the repertoire performance techniques of the Xu Gongning Bianzhong. Analyze four musical works from the aspects of mode characteristics, musical form, harmony, etc, and summarize the playing methods of Xu Gongning's bells: split click, double click, counterattack, strike the bell stand, etc.

7.1.3 The guidelines of transmition and development of the Xu Gongning Bianzhong. Through investigation and interviews, the transmition and development path of Xu Gongning Bianzhong in Pingdingshan University was obtained. Pingdingshan University offers chime performance courses to teach students to learn traditional Chinese ceremonial music culture, chime performance techniques, and rehearse chime music works. Through various concerts, charity classes and other practical activities, the scope of school culture continues to expand. The course adopts advanced teaching concepts such as OBE. In addition, Pingdingshan University also plans to conduct virtual simulation experiments on Xu Gongning Bianzhong performance and creation.

## 7.2 Discussion

7.2.1 Investigate the physical structure and tonal system of the Xu Gongning Bianzhong. Regarding the physical structure and tonal system of the Xu Gongning bianzhong, the conclusions reached by the researchers are basically consistent with those of scholars such as Wang Zichu (2007) "Two Groups of Spring and Autumn Tombs Excavated from the No. 4 Spring and Autumn Tomb in Jiuxian, Ye County, Henan Province" and Chen Yan (2011) "Analysis of Musical and Cultural Factors of Chime Bells Excavated from the Xuling Cemetery". but due to the particularity of Xu Gongning Bianzhong studied in this paper, the institute conducted a detailed, in-depth and systematic analysis of various data and discovered some typical rules:

The appearance of the "Shang" sound in the Yong zhong sound series is an iconic message, indicating that the tradition of abstaining from using "Shang" in the Western Zhou sound series has been broken; The "Shang" sound is set on the main drum sound of Niu zhong, forming a pentatonic series.

The tonal system of the Zheng gu yin of the compiled dynasty has the sound "zhi", which is different from the standard of "Zheng gu yin sounds cannot include zhi" in tonal system.

7.2.2 Analyze the repertoire performance techniques of the Xu Gongning Bianzhong. Most scholars use the Bianzhong of HouyiZeng, Regarding the performance techniques of Bianzhong, the views are basically consistent with those in Hongxiang Gao 's (1988) "Research on Zeng Yuhou's Arranging Techniques" and Jun Tan 's (1999) "Research on the Development of Bianzhong and Bianzhong Series Percussion Hammers". Because Xu Gongning Bianzhong were unearthed relatively late, they have not entered the field of vision of many scholars. There are very few organic and systematic studies on Xu Gongning Bianzhong' repertoire and performance techniques. Taking this as the starting point, the author made a detailed analysis and discussion from the aspects of mode, harmony and musical form, and systematically sorted out Bian zhong performance in ancient documents, which has not been covered in other literature.

7.2.3 The guidelines of transmition and development of the Xu Gongning Bianzhong. Bianzhong are not only a ritual instrument, but also a musical instrument. Only through the performance of musical instruments can the living inheritance of

cultural relics be realized. Governments, schools, orchestras, etc. can inherit the ancient art of Bianzhong through the cultivation of Bian zhong talents and artistic practice. This paper A comprehensive survey on the inheritance and development of Xu Gongning Bianzhong in classroom teaching and extracurricular practice. However, because it is based on Pingdingshan University as a case study and is unique, it is rarely mentioned in the research results of other scholars. However, regarding the transmission of Bianzhong and technology the research provides new ideas and reference for this paper.

### 7.3 Suggestions

#### 7.3.1 Suggestions for further research:

- 1) In next study, Government departments should strengthen the integration and development of science and technology, create new artificial intelligence chime instruments.
- 2) In next study, Composers should further explore regional cultural resources and actively create chime works that are academic, artistic, and ornamental and more in line with the requirements of the new era.
- 3) In next study, Educational institution a base for excellent Chinese traditional culture should be established and the construction of a base for excellent Chinese traditional culture should be organized.
- 4) In next study, Bianzhong teaching materials should be developed to lay a solid theoretical foundation for the inheritance and promotion of Bian zhong art.

#### 7.3.2 Suggestions for application of research results

- 1) Government departments can use the results of this research to strengthen and expand the Bian zhong brand, carry out the dissemination and performance activities of Bian zhong culture, combine with tourism culture, create a rich Bian zhong culture tourism brand and related cultural products, and produce Bian zhong that are easy to carry Handicrafts, etc., enhance the brand effect of Bian zhong in all aspects and angles.
- 2) Music education institutions in universities, middle schools and primary schools can use the results of this study to carry out a series of teaching and learning activities for students to understand Bian zhong music.

3) Cultural service institutions such as museums, tourist attractions, performance groups, and Confucius temples can use the results of this study as special projects for cultural promotion and dissemination. Ceremonial music such as apprenticeship ceremonies, weddings, and Confucius worship will be fully restored and widely used in people's lives to help practice the core socialist values.

4) Conservatoires of Universitys and universities can use high-tech means such as computer multimedia to establish "Bian zhong and Chinese national musical instrument timbre libraries", Bian zhong performance and creation virtual simulation laboratories, and continuously introduce new technologies in exploring Bian zhong performance techniques and research on Central Plains music culture. Results.



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## APPENDIX

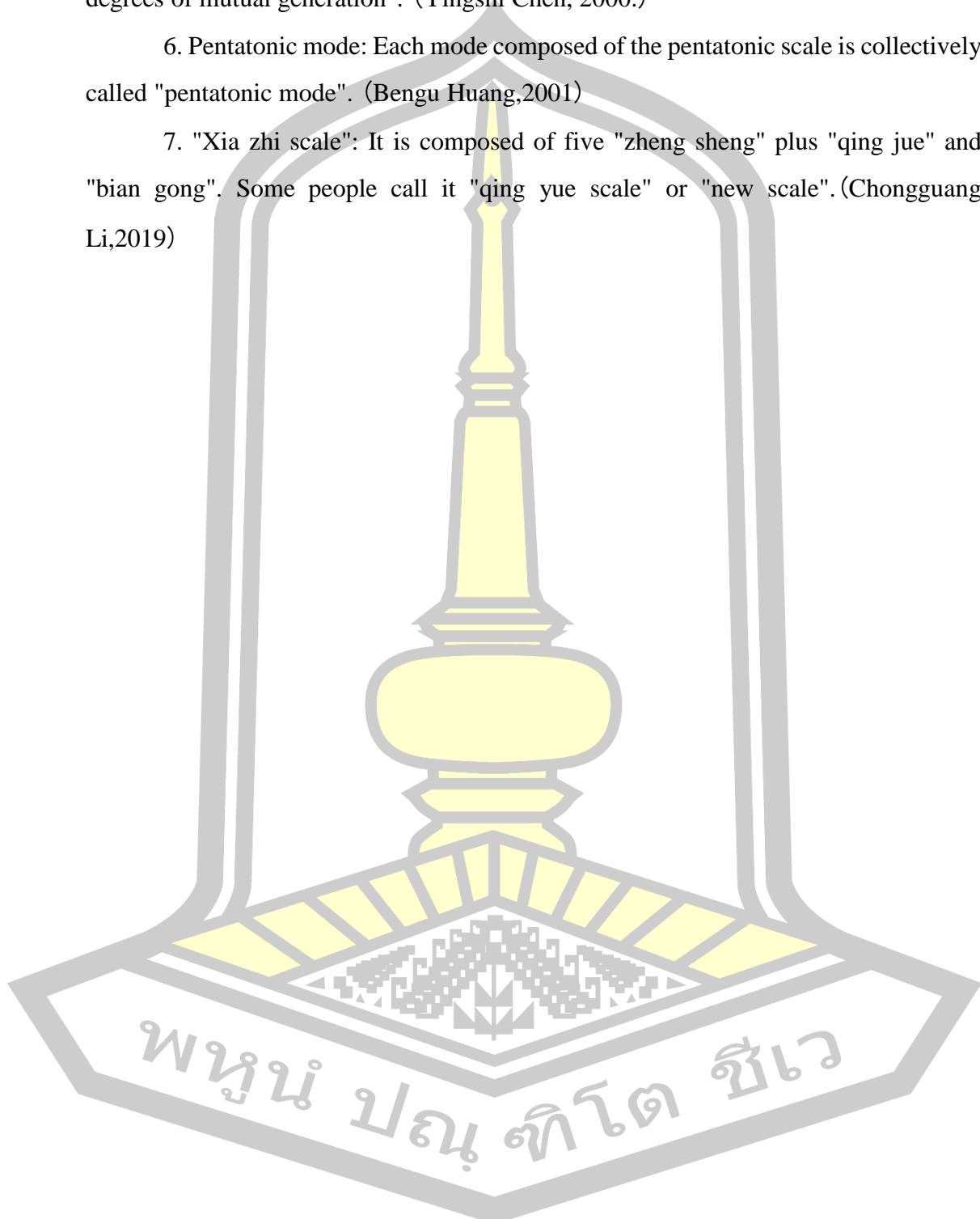
### Appendix I: Explanation of Special Terms in Dissertation

1. Pentatonic scale: "Gong, Shang, Jiao, Zheng, Yu" are all "sounds", and the "sounds" are organized to form "sound". If the "tonal s" are arranged in a ladder-like manner in order of high and low, they form a "tonal scale". The scale composed of five tonal s is called the "pentatonic scale". "Gong, Shang, Jiao, Zheng, Yu" are equivalent to "1, 2, 3, 5, 6" in the simplified musical notation. The ancients regarded the five names "Gong, Shang, Jiao, Zheng, and Yu" as "zhengsheng" to show their special and important status in Chinese music.(Yaxiong Du,2004)
2. Heptatonic scale: In addition to using the five "positive tonal s" of "Gong, Shang, Jiao, Zheng, and Yu", the heptatonic scale also uses "Bian Zheng" (equivalent to #4 in the simplified musical notation) and "Bian Gong" (corresponding to the number 7 in the musical notation), "Qingjiao" (corresponding to the 4 in the musical notation) and "Qingyu" (corresponding to the b7 in the musical notation). (Bengu Huang,2001)
3. Ya Yue scale: It is composed of five "zheng tonal s" plus two tonal s of "bianzheng" and "biangong". (Yaxiong Du,1995)
4. Twelve equal temperament: The temperament system that divides the octave into twelve equal semitonal s is called twelve equal temperament.Twelve equal temperament is a temperament system commonly used in the world. It was first invented by Zhu Zaiyi, a mathematician and musicologist in the Ming Dynasty of China. (Yaxiong Du,2004)
5. The law of mutual generation of fifths: In the Spring and Autumn Period (770 BC - 476 BC)document "Guan Zi·Di Yuan Pian", it is recorded that the process of finding the five tonal s using the "three-point profit and loss method" is: divide the string length or pipe length that produces a certain musical sound into equal parts. For three parts, remove one-third and leave two-thirds, which is called "three-thirds loss-"; add one-third of the original length to make four-thirds, which is called "three-thirds gain--" . "Gong" is three points to gain one to get "Zheng", "Zheng" is three points to lose one to get "Shang", "Shang" is three points to gain one to get "Yu", "Yu" is three

points to lose one to get "Jiao". The law generated by this method is the "law of five degrees of mutual generation". (Yingshi Chen, 2000.)

6. Pentatonic mode: Each mode composed of the pentatonic scale is collectively called "pentatonic mode". (Bengu Huang,2001)

7. "Xia zhi scale": It is composed of five "zheng sheng" plus "qing jue" and "bian gong". Some people call it "qing yue scale" or "new scale".(Chongguang Li,2019)



## Appendix II: Xu Gongning Bian zhong phonemes

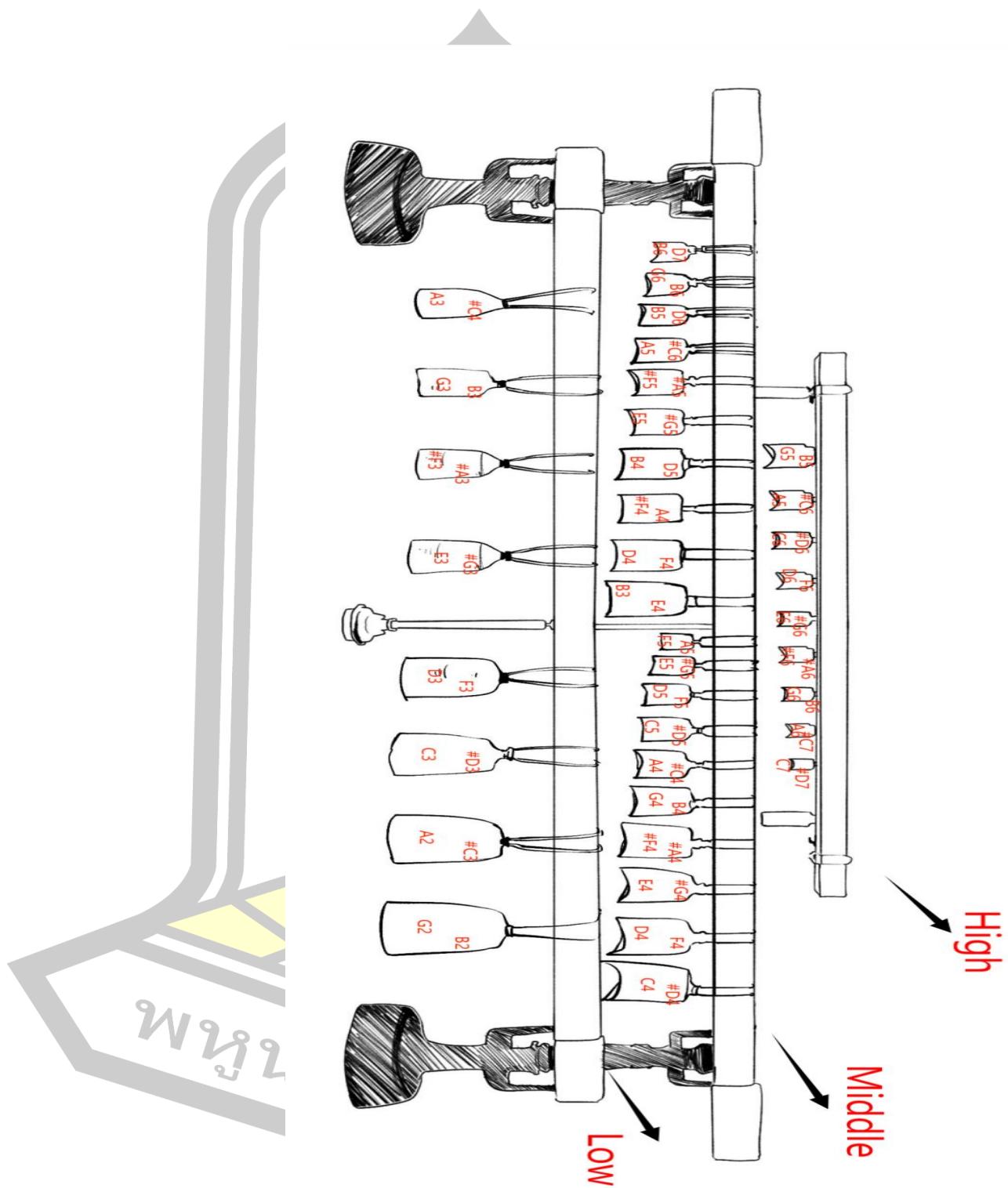


Table 1: Phoneme table of Bo zhong

Name of Bianzhong	Zheng gu yin sound	Side drum sound
Bo zhong 1(groupA)	Large character group G	Large character groupB
Bo zhong2(groupA)	Large character group A	small character group #c
Bo zhong3(groupA)	small character group c	small character group #d
Bo zhong4(groupA)	small character group d	small character group f
Bo zhong1(groupB)	small character group e	small character group #g
Bo zhong2(groupB)	small character group #f	small character group #a
Bo zhong3(groupB)	small character group g	small character group b
Bo zhong4(groupB)	small character group a	Small print 1 group #c

Table 2: Phoneme table of Yong zhong

Name of Bianzhong	Zheng gu yin sound	Side drum sound
Yongzhong1(groupA)	Small print 1 group #c	Small print 1 group #d
Yongzhong2(groupA)	Small print 1 group d	Small print 1 group f
Yongzhong3(groupA)	Small print 1 group e	Small print 1 group #g
Yongzhong4(groupA)	Small print 1 group #f	Small print 1 group #a
Yongzhong5(groupA)	Small print 1 group g	Small print 1 group b
Yongzhong6(groupA)	Small print 1 group a	mall print 2 groups#c
Yongzhong7(groupA)	Small print 2 group c	mall print 2 groups#e
Yongzhong8(groupA)	mall print 2 groups d	mall print 2 groups f
Yongzhong9(groupA)	mall print 2 groups e	mall print 2 groups #g
Yongzhong10(groupA)	mall print 2 groups 4	Small print 1 group a
Yongzhong1(groupB)	small character group b	Small print 1 group e
Yongzhong2(groupB)	Small print 1 group d	Small print 1 group f
Yongzhong3(groupB)	Small print 1 group #f	Small print 1 group a
Yongzhong4(groupB)	Small print 1 group b	Small print 2 groups d
Yongzhong5(groupB)	mall print 2 groups e	Small print 2 groups #g

Yongzhong6(groupB)	mall print 2 groups #f	Small print 2 groups #a
Yongzhong7(groupB)	mall print 2 groups a	mall print 3 groups #c
Yongzhong8(groupB)	mall print 2 groups b	mall print 3 groups #d
Yongzhong9(groupB)	mall print 3 groups g	mall print 3 groups b
Yongzhong10(groupB)	mall print 3 groups b	mall print 4 groupsd

Table 3: Phoneme table of Niu zhong

Name of Bianzhong	Zheng gu yin sound	Side drum sound
Niuzhong1	mall print 2 groups g	mall print 2 groups b
Niuzhong2	mall print 2 groups a	mall print 3 groups #c
Niuzhong3	mall print 3 groups c	mall print 3 groupsbe
Niuzhong4	mall print 3 groups d	mall print 3 groups f
Niuzhong5	mall print 3 groups e	mall print 3 groups g
Niuzhong6	mall print 3 groups #f	mall print 3 groups #a
Niuzhong7	mall print 3 groups g	mall print 3 groups b
Niuzhong8	mall print 3 groups a	mall print 4 groups #c
Niuzhong9	mall print 4 groups d	mall print 4 groups f

Table 4. Details of Xu Gongning's daily training observations

Site	Pingdingshan University Conservatory of Music	interviewee	teacher, performer
<b>Observation process:</b>			
This part of the observation is mainly to observe the daily rehearsal of Xu Gongning Bianzhong, which lasts for about four weeks. The researcher will use cameras, mobile phones, recording pens, computers and other tools to record the entire process in detail and keep an observation log.			

**Observation object:**

1. Understand the training situation of Xu Gongning's Bianzhong.
2. Learn the performance techniques of Xu Gongning Bianzhong.
3. Collect bell music scores compiled by Xu Gongning.

Table 5. Observation details of Xu Gongning's Bianzhong performance

Site	Pingdingshan University Conservatory of Music	interviewee	performer
<b>Observation process:</b>			
Watch 4 performances of Xu Gongning Bianzhong, record and analyze the repertoire, personnel, and performance effects.			
<p><b>Observation object:</b></p> <ol style="list-style-type: none"> <li>1. Understand the performance form, music structure, music style, etc. of Xu Gongning Bianzhong.</li> <li>2. Analyze the performance repertoire of Xu Gongning Bianzhong.</li> <li>3. Understand the musical connotation and artistic value contained in the "instrument" itself.</li> </ol>			

Table 6. Details of Xu Gongning's management observation

Site	Pingdingshan University Conservatory of Music	interviewee	Manager
<b>Observation process:</b>			
Interviewed the management staff of the Yayue Teaching and Research Section of the Conservatory of Music of Pingdingshan University, and conducted an in-depth and detailed observation of Xu Gongning Bianzhong. researcher will use cameras, mobile phones, tape recorders, computers, sound detectors, rulers and other tools to record the entire process in detail and keep observation logs.			
<p><b>Observation object:</b></p> <ol style="list-style-type: none"> <li>1. Understand the physical structures and its tuning system of Xu Gongning's Bianzhong bells.</li> <li>2. Collect more information about Xu Gongning Bianzhong.</li> <li>3. Understand the daily maintenance and management methods of Xu Gongning Bianzhong.</li> </ol>			

### Appendix III: Interview



Figure 1. Group photo with the leader of the Chime Band



Figure 2. Interview with Chime Band teacher



Figure 3. Experience chime playing



Figure 4. Experience chime playing



Figure 5. Interview with the leader of the Chime Band

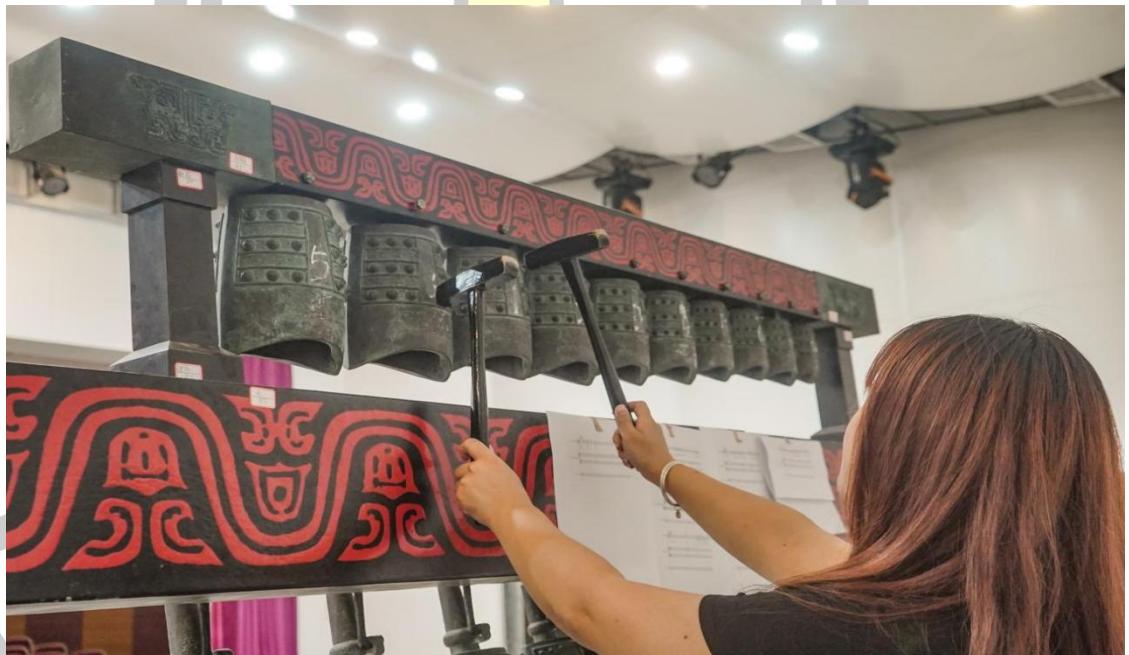


Figure 6. Chime performer



Figure 7. Chime performer



ພ້ອນ ປນ ຄີໂຕ ຂ່າວ



Figure 9. Chime performer



Figure 10. Chime performer



Figure 11. Chime performer



Figure 12. Group photo with chime players

#### Appendix IV: Interview with Bianzhong manager, composer, players

##### (1) Interview data of Ms. Yanhui Li

Date of interview	March 1, 2023
Content of the interviews	performance practice of the Xu Gongning Bianzhong
Place of interview	Pingdingshan University Conservatory of Music
Subject of the interview	Prof. Yanhui Li
Time	9:00-11:00 a.m.
Recorder	Keke Pan
Remark	Bian zhong Band Manager
Contents	<p>1.What is the history and reproduction of Xu Gongning's Bian zhong?</p> <p>Answer: In 2002, in the north of Changzhuang Village, Jiuxian Township, Ye County, Pingdingshan, Henan Province, China first discovered the 2,600-year-old Xu Gongning Bian zhong, 200 years earlier than the world-famous Zeng Hou Yi Bian zhong. The tomb of Xu Gongning was excavated due to theft of the ancient tomb. Most of the funerary objects had been stolen by the tomb robbers. Perhaps due to the weight of the bronze ritual music, a relatively complete batch of Xu Gongning's Bian zhong and related parts were retained. This provides a new physical example for us to re-understand Bian zhong.</p> <p>In 2009, under the guidance of Professor Zhou Chunyi of the University of Nanhua in Taiwan, Pingdingshan University prepared to establish the Ya Ensemble, which was the first Yat Ensemble established by a mainland university. In 2010, he went to Suizhou, Hubei to investigate the reproduction of Bian zhong and other musical instruments, and reached a cooperation with Suizhou Bian zhong Culture Media Co.,</p>

Ltd., using the "lost wax casting method" to make a 1:1 copy of a set of Xu Gongning's Bian zhong, which are now placed in the Music Museum Academy Music Rehearsal Room.

2. Are there any records about Bian zhong in historical documents?

Answer: The Bian zhong is a percussion instrument with a fixed pitch, and its pronunciation is very penetrating. The player needs to strike with two T-shaped mallets, while the lower bell is struck with a thick wooden stick. There are very few records about Bian zhong playing skills in various ancient documents in my country. They are only scattered in decorative pictures on unearthed cultural relics. For example, Painted Mandarin Duck Box, Feasting, Fishing, Hunting, Attack and War Pattern Pot, Yanle hunting pattern engraved bronze mirror, Shandong Zhangqiu Girl Mountain Music and Dance Figurine, Jinan Wuying Mountain Music

3. What is the spirit of etiquette and music contained in Xu Gongning Bian zhong?

Answer: Bian zhong contain philosophical thoughts, humanistic spirit, and moral values such as "benevolence, justice, fraternity," "kindness and peace," "honesty and trustworthiness," "humility and courteousness." In recent years, Bian zhong and the unique spirit of Chinese culture they convey have appeared on the international stage many times, demonstrating the cultural confidence of a great country and conveying the development concept of "peace, friendship, and joint construction of harmony" to the world.

## (2) Interview data of Mr. Kejie Fang

Date of interview	March 16, 2023
Content of the interviews	performance practice of the Xu Gongning Bianzhong
Place of interview	Pingdingshan University Conservatory of Music
Subject of the interview	Prof. Kejie Fang
Time	3:00-5:00 p.m.
Recorder	Keke Pan
Remark	Composer
Contents	<p>1. What are the characteristics of tonal system of this set of Xu Gongning's Bian zhong?</p> <p>Answer: This set of Bian zhong is a replica of the Xu Gongning Bian zhong unearthed in Ye County. The shape and structure are exactly the same. However, because the individual sounds of the original Bian zhong have become "mute", and the set of Bian zhong copied by Pingdingshan University is not only displayed as a cultural relic, Instead, it needs to be passed on in a living manner through performance practice, which involves the issue of coordination with other musical instruments. During the musical instrument reproduction process, we communicated with industry experts such as Zhou Chunyi, Wang Zichu, and Fang Jianjun many times, and finally determined that Huang Zhonglu was</p> <p>D. The vocal range ranges from the upper G to the lower F, spanning 5 octaves.</p> <p>2. What scores did you compose for Xu Gongning's Bian zhong?</p> <p>Answer: From 2013 to the present, I have composed two concerts for Xu Gongning Bian zhong of the Conservatory of Music of Pingdingshan University, "Ancient Ying Fengyun"</p>

and "The Book of Songs" elegant music special performance.

3. Please introduce the content of the concert?

Answer: "Gu Ying Fengyun", Pingdingshan is the ancient Ying country. The work describes the ancestors of the ancient Ying country, who migrated from a distant foreign land and settled here. Through 4 chapters, it shows the glory and greatness of the Guying Kingdom.

The themes of the "Book of Songs" elegant music concert are all taken from the "Book of Songs", including 7 works, all of which are folk songs in Henan.

4. Please introduce the characteristics of Bian zhong music?

Answer: 1) Judging from the mode and tonality of the music scores, the music scores all adopt the pentatonic and hexatonic scales and the D palace system mode. The structure of the music mostly adopts the composition technique of "starting, inheriting, turning and combining" of Chinese folk music.

2) Judging from the style of the music score, most of the music progresses at medium speed and slow speed, and its style is generally solemn, solemn, and harmonious. Allegro will never be used in solemn sacrificial music or palace music. Only such performance can it embody the "neutral" and "peaceful" style pursued by Confucianism.

3) From the perspective of rhythm and beat, the music is mainly played in unison, with simple melody and slow beat. The melody is simple, serious and not complicated. The rhythm pattern is also relatively simple, which demonstrates the solemnity and calmness of Huaxia Zhengsheng.

5. What is the cultural thought of Bian zhong?

Answer: The cultural attribute of a two-tonal (third) Bian zhong reflects the idea of "harmony" in Chinese philosophy,

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	<p>which is one of the core concepts of Chinese culture. It reflects the "beauty of harmony" of "the unity of nature and man", embodies the "harmony of historical rhythms", "pleasure to be an adult", "pleasure to open the wind", and "le body happiness" with "the one who enjoys the pleasure also enjoys" as the core. Aesthetic thoughts such as "righteous heart".</p> <p>6. Can it be used as research material?</p> <p>Answer:Can.</p>
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### (3) Interview data of Mr. Yang Zhang

Date of interview	April 10, 2023
Content of the interviews	performance practice of the Xu Gongning Bianzhong
Place of interview	Pingdingshan University Conservatory of Music
Subject of the interview	Prof. Yang Zhang
Time	9:00-11:00 a.m.
Recorder	Keke Pan
Remark	Percussion teacher, teaching Bian zhong performance
Contents	<p>1. What are the structural characteristics of Xu Gongning's Bian zhong?</p> <p>Answer: The total height of Xu Gongning's Bian zhong is 2.36 meters, the bottom plate is 0.81 meters wide, and the length is 6.71 meters. The overall appearance is solemn and grand. The bell frame of the Bian zhong is a copper-wood structure, supported by four bronze warriors and several columns. The beams are wooden. The painting is decorated with lacquer, and both ends of the beam are covered with bronze sets engraved with dragon patterns. There are two bronze figures with swords on each of the middle and lower</p>

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beams, supporting the beam frame with their heads and hands, and there are copper pillars in the middle for reinforcement. The complete set of Bian zhong has a total of 37 pieces, which can be divided into three types: Yong zhong, Niu zhong, and Bo zhong. There are five groups in total. It is a multi-component set of Bian zhong, including two groups of Bo zhong, with 4 pieces in each group; and two groups of Yong zhong, with 10 pieces in each group. ; A set of Niu zhong, 9 pieces in total. The bell body is decorated with Kui dragon pattern, S-shaped oblique moiré pattern, spiral mei pattern, and flat chi pattern. The structural shape of the bell has its own characteristics, including yong, xuan, wu, zheng, mei, zhuan, zheng jian, gu bu , xian, yu, sui, heng, etc.

2. What are the performance techniques of Xu Gongning's Bian zhong?

Answer:Xu Gongning Bianzhong playing tools are traditional wooden T-shaped mallets and cylindrical wooden hammers. The T-shaped hammer is used for Niu zhong and Yongzhong, and the cylindrical wooden hammer is used for tungsten bells. Bianzhong's performance technique are very rich, and almost all percussion performance techniques can be used in Bianzhong's performance. The playing techniques of Bianzhong are slightly richer than those of common percussion instruments, such as Split click, Double click , Counterattack Stun attack、Smother attack、Sweep attack、Strike the bell stand.

3. Please talk about it in detail.

Answer:Split click refers to using two drumsticks to hit the main drum sound or side drum sound part of the bian zhong respectively.

Double click refers to hitting any interval within the arm

length range at the same time. It is difficult to play long distance intervals unless the speed is very slow.

Counterattack refers to switching hands and striking the clock face separately. These three are the most common basic playing methods.

After striking the bell, immediately cover the bell's tunnel to stop the lingering sound, which is called "stop blow" (also called "stop sound").

First cover the tunnel part of the struck bell, and then hit it to make a dull sound without any echo, which is called muffled blow.

Use the brush to sweep quickly from low to high or from high to low, which is called sweeping.

It is divided into three types: hitting rack, rolling rack and hammering rack . Striking rack is to use drumsticks to hit the wooden frame of the Bian zhong. Rolling rack is to use drumsticks to quickly and alternately hit the wooden frame of the Bian zhong. Hammering is to use drumsticks to hit the wooden frame faster. Hit the wooden frame of the Bian zhong vigorously to create a special sound effect.

#### (4) Interview data of Ms.Renya Wang

Date of interview	June 6, 2023
Content of the interviews	performance practice of the Xu Gongning Bianzhong
Place of interview	Pingdingshan University Conservatory of Music
Subject of the interview	Prof. Renya Wang
Time	10:00-12:00 a.m.
Recorder	Keke Pan
Remark	Leader of Yuan Ya Orchestra

Contents	<p>1. How is the art of Bian zhong passed down in the classroom?</p> <p>Answer: In order to pass on the Bian zhong culture in a more standardized and effective manner, the Conservatory of Music offers professional elective courses. By teaching traditional Chinese ritual and music culture and ancient music performance knowledge, students can master the Bian zhong performance skills and practice and rehearse the palace music style of ancient traditional music in the Central Plains. Yale original music. This course is arranged in semesters 3-6, with 17 weeks per semester, 4 classes per week, and a total of 272 class hours. 4 credits will be awarded upon completion.</p> <p>We regularly invite famous scholars such as former Professor Zhou Chunyi of Nanhua University in Taiwan, former dean of Henan Academy of Arts and national first-class composer Fang Kejie, Tan Jun of Wuhan Conservatory of Music, Vice President of Wuhan Conservatory of Music Li Youping, and Huang Datong of Hangzhou Normal University. , experts came to the school to give knowledge lectures on traditional Chinese theory, Bian zhong composition, elegant music performance, etc.</p> <p>2. What is the Bian zhong class teaching model like?</p> <p>Answer: Group teaching mainly adopts conventional teaching methods such as lecture method, demonstration teaching method, discussion method, and observation method, and mainly focuses on practical exercises. In recent years, under the guidance of the OBE educational philosophy, modern classroom education methods such as boppos and flipped classroom have been fully utilized to continuously update teaching content, transform educational concepts, and improve educational skills.</p> <p>Li Wenliang, a young teacher at the Conservatory of Music, continues to promote classroom innovation and combines</p>
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multimedia technology to develop a virtual simulation experiment of Xu Gongning's Bian zhong performance and creation. This experiment will reconstruct a set of virtual Bian zhong and performance scenes that are completely consistent with the shape, scale, and proportion of Xu Gongning's Bian zhong, allowing this ancient musical instrument to shine even brighter in the new era.

### 3. What is the practice in recent years?

Answer: The Conservatory of Music attaches great importance to the construction of the second classroom, and expands the depth and breadth of classroom-related content through art performances, concerts, charity classes, etc., actively participates in national and provincial professional competitions, and has achieved excellent results, which is worthy of recognition. It is worth mentioning that on May 10, 2013, the press conference of the Pingdingshan University Elegant Ensemble was successfully held at the Pingdingshan Art Center, and brought a wonderful performance of "Gu Ying Fengyun" with historical background. In October 2013, at the invitation of the China Conservatory of Music, he went to Beijing to participate in the 5th Traditional Music Festival and gained a good reputation; in December 2019, the "Book of Songs" elegant music performance was successfully held at the Pingdingshan Art Center, allowing the thousand-year Bian zhong to resonate with the sound of gold and jade. , the majestic melody gushed out, solemnly telling the glorious pre-Qin ritual and music civilization.

In recent years, He Kun, a young teacher at the Conservatory of Music, has adapted "Jasmine" and "Dong Fang Hong", which has played a strong role in promoting the inheritance and innovation of Bian zhong art.

## Appendix V: Repertoires

### Lu Ming

Kejie Fang

Largo  $\text{♩} = 46$

1

12

23

34

45

Niu zhong  
Yong zhong1  
Yong zhong2  
Bo zhong

55

Niu zhong  
Yong zhong1  
Yong zhong2  
Bo zhong

63

Niu zhong  
Yong zhong1  
Yong zhong2  
Bo zhong

71

Niu zhong  
Yong zhong1  
Yong zhong2  
Bo zhong

79

79

Niu zhong  
Yong zhong1  
Yong zhong2  
Bo zhong

86

Niuzhong Yong zhong1 Yong zhong2 Bo zhong

击架

93

Niu zhong Yong zhong1 Yong zhong2 Bo zhong

100

Niu zhong Yong zhong1 Yong zhong2 Bo zhong

p

110

Niu zhong Yong zhong1 Yong zhong2 Bo zhong

f

119

Niu zhong Yong zhong1 Yong zhong2 Bo zhong

f

130

Niu zhong

Yong zhong1

Yong zhong2

Bo zhong

140

Niu zhong

Yong zhong1

Yong zhong2

Bo zhong

## Wan Qiu

Adagio  $\text{♩} = 56$ 

Kejie Fang

1

Niu zhong *p*

Yong zhong1

Yong zhong2 *p*

Bo zhong *p*

---

8

Niu zhong

Yong zhong1 *p*

Yong zhong2

Bo zhong *p*

---

16

Niu zhong *pp* **击架** *mf*

Yong zhong1 *p* **击架** *mf*

Yong zhong2 *p* **击架** *mf*

Bo zhong *p* *mf*

---

23

Niu zhong

Yong zhong1

Yong zhong2

Bo zhong *f*

---

28

Niu zhong

Yong zhong1

Yong zhong2

Bo zhong *f* **滚击架子** *p* **滚击架子** *p* *f*

34

Niu zhong: - - - - *p* - - - -

Yong zhong1: - - - - - - - -

Yong zhong2: - - - - - - - -

Bo zhong: - - - - - - - -

41

Niu zhong: - - - - *f* - - - -

Yong zhong1: - - - - *f* - - - -

Yong zhong2: - - - - *f* - - - -

Bo zhong: - - - - *f* - - - -

47

Niu zhong: - - - - *f* - - - - *p* - - - -

Yong zhong1: - - - - *f* - - - - *p* - - - -

Yong zhong2: - - - - *f* - - - - *p* - - - -

Bo zhong: - - - - *f* - - - - *p* - - - -

54

Niu zhong: - - - - *f* - - - - *f* - - - -

Yong zhong1: - - - - - - - -

Yong zhong2: - - - - - - - -

Bo zhong: - - - - - - - - *p* - - - -

62

Niu zhong: - - - - *f* - - - - *f* - - - -

Yong zhong1: - - - - *f* - - - - *f* - - - -

Yong zhong2: - - - - *f* - - - - *f* - - - -

Bo zhong: - - - - *f* - - - - *f* - - - -

70

Niu zhong *f*  
Yong zhong1 *f*  
Yong zhong2 *p*  
Bo zhong *f* *p*

76

Niu zhong *p*  
Yong zhong1 *p*  
Yong zhong2 *p*  
Bo zhong *p*

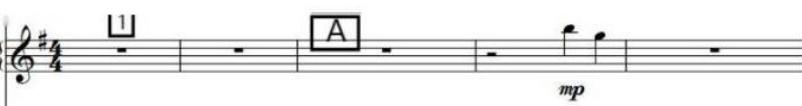
84

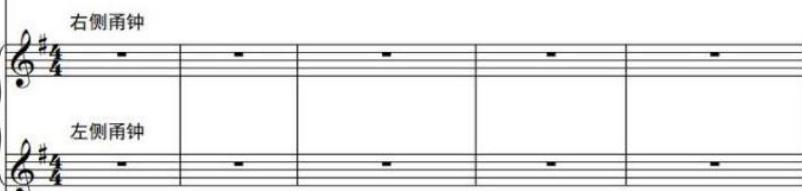
Niu zhong *pp*  
Yong zhong1 *p*  
Yong zhong2 *p*  
Bo zhong *p*

## Jasmine

 $\text{♩} = 50$ 

Kun He recompose

Niu zhong {    
 *mp*

Yong zhong {    
 *右侧甬钟*   
 *左侧甬钟*

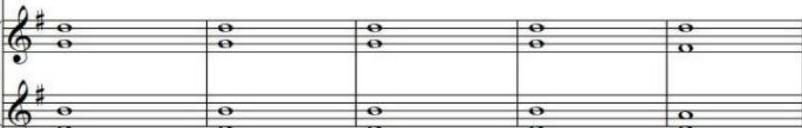
Bo zhong { 

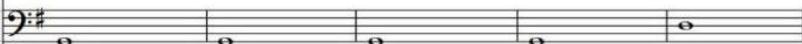
Niu zhong { 

Yong zhong { 

Bo zhong { 

Niu zhong {    
 *f*

Yong zhong { 

Bo zhong { 

Musical score for three instruments: Niu zhong, Yong zhong, and Bo zhong. The score is divided into three sections by horizontal lines. Each section contains three staves, one for each instrument. Measure numbers 16, 20, and 24 are indicated in boxes above the staves. Measure 16 starts with a treble clef, measure 20 with a bass clef, and measure 24 with a treble clef. Measure 24 ends with a box labeled 'D'.

**Measure 16:** Niu zhong (Treble clef) plays eighth-note patterns. Yong zhong (Treble clef) and Bo zhong (Bass clef) play sustained notes. The key signature is one sharp (F#).

**Measure 20:** Niu zhong (Bass clef) plays eighth-note patterns. Yong zhong (Treble clef) and Bo zhong (Bass clef) play sustained notes. The key signature is one sharp (F#).

**Measure 24:** Niu zhong (Treble clef) plays eighth-note patterns. Yong zhong (Treble clef) and Bo zhong (Bass clef) play sustained notes. The key signature is one sharp (F#). The measure ends with a box labeled 'D'.

28

Niu zhong

Yong zhong

Bo zhong

32

Niu zhong

Yong zhong

Bo zhong

36

Niu zhong

Yong zhong

Bo zhong

39

Niu zhong

Yong zhong

Bo zhong



Dong Fang Hong

Kun He recompose

1

*Niu zhong* *Yong zhong1* *Yong zhong2* *Bo zhong*

*p* *mf* *mf* *mf*

*mp*

*d = 40*

6

*Niu zhong* *Yong zhong1* *Yong zhong2* *Bo zhong*

*mp* *mf*

11

*Niu zhong* *Yong zhong1* *Yong zhong2* *Bo zhong*

*p*

2

16

Niu zhong

Yong zhong1

Yong zhong2

Bo zhong

21

Niu zhong

Yong zhong1

Yong zhong2

Bo zhong

26

Niu zhong

Yong zhong1

Yong zhong2

Bo zhong

31

Niu zhong

Yong zhong1

Yong zhong2

Bo zhong



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