Zimingzhong Tour

Hello everyone. Welcome to our new temporary exhibition Zimingzhong. For the next thirty minutes, I will tell you about some of these magnificent and musical clocks that have been loaned to us for the first time from the Palace Museum in Beijing.

But before that, let me introduce myself. My name is Anirudh or you can call me Andy and I am a volunteer here at the Science Museum. I am not an expert in this subject, but I love the collection in this gallery and am very glad to share my enthusiasm for Zimingzhong with you.

Section 1 - Introduction

Let's begin with the term Zimingzhong. It is a Chinese word that means bells that ring themselves. These clocks are so named because they play musical tunes and depict moving scenes apart from telling the time. Zimingzhong were made both in Britain and China and were enthusiastically collected by the Chinese emperors in the 1700s. At that time, the Qing dynasty was ruling over China and this was a period of great prosperity and social change in China.

The three notable emperors of the Qing dynasty were the Kangxi emperor, Yongzheng emperor and Qianlong emperor and you will see about them more in this exhibition.

Coming to our first timepiece here, we have the moving pagoda zimingzhong. This piece was made in London and travelled all the way, about 8000 kms, to the Forbidden city where the Chinese emperors lived. When the clock is wound, the nine tiers of the pagoda slowly rise. The pagoda rises one tier at a time, starting with the top level. When the pagoda reaches its tallest height, it stays there until the mechanisms are activated again; then the pagoda sinks back one tier at a time starting with the tier second from the bottom. The clock plays a popular Chinese folk song called Molihua (which means a jasmine flower). At the time, this song was one of the first Chinese songs to be widely recognised outside of China.

Section 2 - History

This section of the gallery focusses on the earliest Zimingzhong that reached China and why these emperors were interested in collecting Zimingzhong.

From 1500s onwards, European missionaries such as Matteo Ricci and Louis Le Comte brought European scientific knowledge to China and hoped to convert Chinese people to Christianity. It was at this time that Matteo Ricci presented the first Zimingzhong to the emperor and the emperor at that time was fascinated by it.

Matteo Ricci wrote a book about it. This book was a bestseller at the time and was translated into more than 16 languages. Reading about the emperor's fascination with the clocks encouraged other Europeans to send zimingzhong to China. In the 17th century, Britain was the lead manufacturer of clocks.

Why did these emperors love these clocks so much? These clocks were surely used for organising the time and work of people in the Forbidden city. Prior to these clocks, the emperors used sun dials, so these clocks were much more accurate. These clocks are also very beautiful to look at-they moved in intricate ways and produced intricate music. I like to think that there was also something magical about them - they moved and sang all by themselves for someone who did not understand much of the mechanics in the clocks. However, these exquisite clocks served not only for time keeping and aesthetic purposes, but they were also symbols of power and international influence within the imperial court.

One reason why the emperors were fascinated with these Western timepieces was because they were very accurate in telling the time. This helped the emperor and the court astronomers in timing celestial events such as eclipses. The interest in the celestial events can be seen in this Zimingzhong here. At the top of this piece is an armillary sphere. This instrument dates back to 300 BCE in Ancient China and ancient Greece and it shows the movements of stars and planets around Earth. Predicting celestial events was crucial for the emperor because at the time, people believed that the emperor was the link between Heaven and Earth. Being able to accurately predict celestial events indeed reinforced that notion, showcased their mastery of the heavens and also validated their divine right to rule.

Another reason why the emperors collected these time pieces was because it demonstrated their their international reach and sophistication. For example, this Zimingzhong here shows a print of the coronation of the King of France, Louis XIV on the back. Displaying this clock would have showcased the international reach of the emperor Qianlong.

It is important to appreciate this multi-faceted significance of Zimingzhong - they were instruments not only for time keeping, but they were also celestial observers and reflections of imperial authority.

Section 3 - Trade

Moving on, we now explore how some of the earliest Zimingzhong made their way 8000 kms from Britain to China on land and sea. These time pieces travelled on the ships of the English East India Company like this one here all the way from Britain to an English East India company port such as Madras before heading off to the bustling port of Guangzhou, which is on the southern coast of China. This journey involved several checkpoints, where fees were collected, and the ships were monitored by custom officials to prevent any smuggling.

To help these ships navigate the intricate river systems such as the Zhujiang Delta (also known as the Pearl River) , the ships hired Chinese guides near Macao.

When the ships arrived at Guangzhou, they were not let into the port. This was because the ships carried cannons that could potentially be a threat to the main port. The ships were instead anchored at Pazhou island, just outside the port. Here merchants at Guangzhou would control the trade between China and the West.

All the goods included zimingzhong were unloaded onto smaller vessels. In return, Chinese goods such as silk, porcelain, tea were loaded back in to the ship. Here you can see one of the tea chests with six caddies holding different varieties of Chinese tea made for Britain. And here, you can see some porcelain which was a popular import in Europe. These Chinese goods were very popular in Britain and France at the time and the Western countries were paying huge amounts of silver to procure these goods. In return, China was very self-sufficient and did not need any products from Britain and France. This caused a trade imbalance. One of the ways to counter the trade imbalance was the use of Zimingzhong. These products had high value in China, particularly among the emperor and the elite. The custom officials of the emperor, called the Hoppo, wanted to pay tributes and gifts to the emperors as an act of loyalty of their province. They carefully selected the pieces to give to the emperor. The pieces then travelled about 2000 kms to reach the Forbidden city.

Section 4 - Mechanics

We will now delve into the mechanics of the Zimingzhong. The internal mechanisms in these clocks enabled them to keep time accurately and this type of technology is still used today in mechanical clocks and watches. As I mentioned previously, these clocks also did other things than telling time accurately - this included playing music and moving objects within the clock.

One such example is this zimingzhong here. When this zimingzhong is wound, the birds swim on the pond and three of these lotus flowers opens. The mechanism which powers this was made in Guangzhou. However, the music mechanism was made in Europe. The internal mechanism of this clock has recently been uncovered by Dr. Yu-Hsun Chen who works at the National Taiwan University of Science and Technology. Since this clocks is a historical object, they cannot be opened directly. Therefore, the researchers had to reverse engineer the mechanisms based on observing modern clocks and the different mechanisms known at the time of the making of these zimingzhong.

Another zimingzhong here (made in England) has its moving parts powered by a single mechanism. There are moving figures and glass rods. Above the base is a farmhouse equipped with a revolving waterwheel. Inside the house is a woman working with a spinning wheel. In the yard, a hen and a brood of chicks flap their wings and peck. A goose is swimming in the pool. A dog is barking by the pool,

seemingly playing with the goose. A white enamel clock dial is placed at the top front of the farmhouse. When it is wound, the 13 animals move, plays music and turns the glass rods to look like flowing water. The pendulum clock inside the tower has its own separate clock mechanism.

To understand the workings of these clocks, I invite to you to explore the interactive models in this section lent to us by the Hong Kong Science Museum.

(Show them the molihua). As you can see in this model, when I wind it, the cylindrical barrel is set rolling which uses these pins to pluck a hammer which strikes a bell and creates a beautiful melody.

In these models here, you see that the energy of the wound spring is lost quickly. A crucial mechanism in the development of these clocks is the anchor escapement mechanism. An escapement is a part of the clock that controls the release of energy in small regular intervals and is an indispensable component of mechanical clocks. This is controlled by the swinging of the pendulum.

It is now known that this mechanism was not new to China. It was mentioned in this ancient text from Sung Su, written in 1088 in China which talks about a water-powered astronomical clock tower. The waterwheel on this tower works very much like an escapement that is found in European clocks. However, this mechanism seems to have been lost by the time these clocks arrived. These European clocks introduced a new clock mechanism unfamiliar to most in China at that time.

Section 5 - Tools and Techniques

In this section, we shall explore how these clocks were made and who made these clocks.

Zimingzhong were made by many highly skilled makers in Britain, Forbidden city and Guangzhou.

Let’s look at the British clocks first. In the 1700s, half of the world's clocks and watches were made in Britain, particularly in London and the north of England, most notably Lancashire. The surge in foreign trade created producer-entrepreneurs who commissioned masters to produce these clocks. These masters outsourced production of the different mechanisms to hundreds of different makers.

A standout figure in British clockmaking was James Cox. Not much is known about the makers though as it was not typical for their work to be signed.

The Temple Zimingzhong here is an example of the collaborative nature of these creations with contributions from various artists. James Cox commissioned it and it was made by James Upjohn, a watchmaker. It is likely that Upjohn ordered individual

parts such as figurines and screws from a wide range of specialist makers. James Upjohn wrote a memoir that reveals that he made this Zimingzhong for James Cox. The book described the rich decoration and musical moving parts. It also tells that this Zimingzhong was sold for about 2000 pounds in 1770 - this would be about 350, 000 pounds today.

In the forbidden city, the Kangxi emperor established clockmaking workshops in the late 1600s called Ziminzhongchu where European and Chinese makers collaborated to make, store, repair and create hundreds of Zimingzhong. This also allowed the emperor to use local talent which was much cheaper than importing from Europe. The emperor could also provide specific instructions as per his liking.

Many of the zimingzhong were also made in Guangzhou. These can be identified through their blue enamel decoration. Enamel was often used to cover a metal like copper or silver. To create this enamel, they maker formed a powdered glass paste and mixed it with cobalt oxide, which gave It this blue colour. This paste was then applied to metal and heated a high temperature, fusing it to the surface.

The making of these clocks involved materials like gold, silver, enamel, pearls, shark skin(called shagreen) , precious stones and techniques like cabinet making, gilding, engraving, sculpting, painting on enamel, clock and watch making, and musical mechanisms of these clocks. You can see some of the tools involved in making the elaborate mechanisms in Zimingzhong over here.

I want to talk about a few of the techniques that I find very interesting here now. One of them is a technique called Ormulu. This involved pouring molten metal onto a mould, leaving it to set and then applying powdered mercury and gold to the surface. This was then heated, and the mercury evaporated leaving the gold fused to the surface of the metal.

Here is an example of such a Zimingzhong. On top of this zimingzhong, you can see four glass spheres decorated with gilt-metal flowers and leaves. If you look closely, you will be able to see tiny traces of blue. These are form the feathers of a Kingfisher. This process of applying the feathers onto metal is not as dian cui (which means a dipping of blue). This technique was very popular during the Qing dynasty.

Section 6 - Design

Now that we have seen the mechanisms of the Zimingzhong, and learn about how they were made, let us look at some of the designs and decorations that adorn these pieces. This will offer us a glimpse into the cultures of the British and Chinese people who crafted and cherished these pieces.

This piece here has a drawing made by Charles Magniac who worked for James Cox. The designs could have been used for making the Zimingzhong. Where were these designs come from?

For the Zimingzhong made in Britain, the predominant decorative movements in Britain at that time were Rococo and Chinoiserie. Rococo is a flowing and highly lavish and decorative style with motifs from nature such as flowers, fruits, leaves, shells and animals. The other style that emerged in this period was Chinoiserie and it drew inspiration from China, India and Japan. As most Britons had never been to China, the designs also sprung from assumptions derived from European travel writings and imported Chinese products, which in turn carried assumptions that Chinese had about the Europeans.

This piece is decorated with Penjing (making trees and plants in miniature). Penjing was a popular art form in the 1700s China which used real or artificial flowers.

These designs can be seen in this zimingzhong featuring a turbaned figure. This design represented a generalised view of a European imagined East. Other such elements include elephants and palm trees.

Some other designs made in Britain represented rural utopia. Designs of humans and nature living in harmony was popular in 1700s. This was referred to as Arcadia and it was a calming anecdote to the rising industrialisation and urbanisation in Britain. This piece here has engravings of rural scenes and Joshua Reynolds portraits.

On the other hand, the Chinese made zimingzhong in the forbidden city workshops and Guangzhou boasted rich symbolism. These design were often dictated by the Emperor to reflect his aesthetic vision. The used symbols to express concepts like longevity, auspiciousness and good fortune. The decorations featured bats and winged figures and served as examples of symbolism in Chinese craftsmanship. In this figure, hidden within the floral decoration, you can see 9 bats. The Chinese word for bat, fu, sounds similar to the word for good fortune. Bats are therefore an auspicious symbol in China. The petals of the lotus flower symbolise purity as lotus flowers grow out of the mud to blossom.

In the bottom tier of this zimingzhong, there is an intricate scene of daily life in China-from humble farmers to scholarly elite. When the clock wound, these figures move. The vaselike structure on top is in the shape of a gourd fruit, a symbol of fertility because of its large number of seeds.

Section 7 - Conclusion

As we conclude our exploration of Zimingzhong, we look at the the decline of British Zimingzhong trade. This decline coincided with the Jiaging Emperor's rise to power. He was the sun of Qianlong emperor ad he thought that collecting Zimingzhong was

an extravagant expenditure. One of the timepieces from this time period is this Elephant Zimingzhong here. The elephant in this piece has eyes that roll and a tail and trunk that sway when this mechanism is wound.

While this trade may have declined, these historical treasures continue to live on at the Palace Museum and are studied by dedicated professionals. The knowledge of the conservators of the Palace Museum has helped pass down these objects for 5 generations, ensuring appreciation of these timepieces. Today about millions of visitors visit these pieces at the Palace Museum each year.

As we come to the end of the tour, I thank you for joining me on this tour and I will be here if you have any more questions.