

European Turned Ivories at the Chinese Imperial Court: A Study in Early Modern Cross-Cultural Knowledge Transmission (1617-1735)

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Abstract

In the early 2000s, the Palace Museum in Beijing discovered various early modern European lathe-turned objects in the museum's storage spaces. Fruitful and understudied, such works offer valuable entry points for interrogating cross-cultural exchanges of artisanal, mathematical, scientific, and medicinal knowledge. By providing a chronological history of the known European turned works that entered the Ming and Qing Chinese imperial collections, as well as examining the Jesuit missionaries employed by the court of the Kangxi Emperor (1661-1722), this paper investigates exchanges of artisanal and mathematical knowledge between sixteenth and eighteenth-century China and Europe.

Introduction

In the early 2000s, a group of curators and researchers at the Palace Museum in Beijing discovered a pair of identical lathe-turned ivory objects in the museum's storage spaces (fig. 1).¹ Each tower-shaped ivory is composed of three distinct sections joined together by screws. The top features a tulip above a concentric pierced sphere with six openings, within which is a hollow cube with an aperture carved in each of its six sides; further nested in this cube is a die with one black dot painted on each side.² Two cylindrical openwork boxes, one wider than the other, make up the middle and bottom sections. Both are embellished with basket-weave openwork and rosette patterns created using the so-called "rose-engine lathe," a machine that

¹ Gugong bowuyuan 故宮博物院 (Palace Museum Beijing), *Gu Gong Diao Ke Zhen Cui 故宮雕刻珍萃 (The Palace Museum Collection of Elite Carvings)* (Beijing: Zijincheng chubanshe, 2002), catalog no. 183; Yue Liu, "Cong yi jian qinggong yiliu de xiangya qi wu shuo qi 從一件清宮遺留的象牙器物說起 (Speaking about a Qing Court Ivory Crafted Object)," *Zijincheng 紫禁城 / The Forbidden City Monthly* 203 (December 2011): 40. The lathe, along with the bow drill and the potter's wheel, is one of the few complex tools known to have existed since antiquity. The art of turning involves attaching a piece of raw material, which could be ivory, wood, horn, or metal, to a machine with a moving mechanism that rotates the object. The turner then holds a sharpened tool against the raw material and gouges shavings from it. Georg Laue ed., *Gedrehte Kostbarkeiten = Turned Treasuries* (München: Kunstammer Georg Laue, 2004), 19.

² Liu, "Cong yi jian qinggong yiliu de xiangya qi wu shuo qi," 40.

gained popularity in Europe during the second half of the sixteenth century because of its ability to create complex geometric patterns according to a preset program.³



Figure 1. *Turned Ivory Tower*, one of a pair. 17th century. Turned ivory. Palace Museum Beijing. Source: Ching-fei Shih, “Yeshi bolaiyin: qinggong zhong de huashi xuanchuang 也是舶來品: 清宮中的花式鏤床 (Another Item from Over the Sea: Rose-Engine Lathes at the Qing Court),” *Taida Journal of Art History* 32 (2012): 7.

³ Ching-fei Shih, “Unknown Transcultural Objects: Turned Ivory Works by the European Rose-Engine Lathe in the Eighteenth-Century Qing Court,” in *EurAsian Matters: China, Europe, and the Transcultural Object, 1600-1800*, eds. Anna Grasskamp and Monica Juneja (Cham: Springer International Publishing, 2018), 63.

The exact origins of the ivory objects are unknown. The pair is part of the “old collection” of the Forbidden City and was originally housed in one of the side halls attached to Yangxindian 养心殿, or the Hall of Mental Cultivation.⁴ Stylistic comparisons suggest that the ivories are not native to China; instead, they exist within a larger group of European turned works created in southern Germany during the seventeenth century.⁵ Comparable examples survive in numerous European museums, including the Kunstindustrimuseet in Copenhagen, the Kunsthistorisches Museum in Vienna, and in various private collections. Klaus Maurice’s 1985 *Sovereigns as Turners*, for instance, includes a 1700 ivory object bearing the coat of arms of Duke Leopold of Lorraine (1679-1729). Now in a private collection, this work is the Palace Museum ivories’ closest stylistic counterpart as they share the tulip at the top, the pierced sphere, the two cylindrical openwork boxes with basket-weave patterns, a single vertical central support, and the three gadrooned bun feet.⁶ Other similar examples include a seventeenth-century Nuremberg turned ivory double box and cover, formerly in the Lily & Edmond J. Safra collection, as well as a set of double boxes from the cabinet of the French turner and collector Nicolas Grollier, Comte de Servière (1593-1686).⁷

The presence of a pair of seventeenth-century European turned ivories at the Chinese imperial court prompts numerous questions: How and when did European turned objects arrive in China? What functions did they serve at the imperial court? What implications did these objects have in Europe, and how do these meanings compare to the ways in which Chinese intellectual and artistic circles later came to understand them? Closer examinations of the intercultural exchange of objects, texts, and people will help elucidate how European turned objects at the Chinese imperial court played a role in the cross-cultural dissemination of technological and artisanal knowledge.

⁴ Gugong bowuyuan 故宫博物院 (Palace Museum Beijing) and Qing shi shan hou wei yuan hui 清室善後委員會 (Committee for the Disposition of Qing’s Imperial Possessions), *Gugong wupin diancha baogao* 故宮物品點查報告 (*Palace Items Auditing Report*) (Beijing: Xianzhuang shuju, 2004), Lü 呂 3370; Shih, “Unknown Transcultural Objects,” 61; Wang Zilin 王子林, *Ming Qing huanggong chenshe* 明清皇宮陳設 (Beijing 北京: Zijincheng chubanshe, 2011), 82.

⁵ Shih, “Unknown Transcultural Objects,” 59. The pair of turned ivory objects in Beijing is atypical of the ivory tradition in China. The majority of Chinese ivory artworks are hand-carved instead of turned. They frequently take the form of plaques, handles, vessels, or small, delicate objects such as jewelry, game pieces, combs, and personal ornaments. There was also a tendency throughout the centuries to use ivory as inlay. The majority of the ivory art objects from the late Ming to the early Qing periods were carved sculptures featuring figural Buddhist or Daoist subjects, many of which were cleverly designed to accentuate the natural curve of the animal tusk. Michael J. Vickers and Fiona Saint Aubyn, *Ivory: A History and Collector’s Guide* (London: Thames and Hudson, 1987), 233, 237.

⁶ Klaus Maurice, *Der drehende Souverän: Materialien zu einer fürstlichen Maschinenkunst*, trans. Dorothy Ann Schade (Zürich: Ineichen, 1985), 112.

⁷ Sotheby’s, *Property from the Collections of Lily & Edmond J. Safra: Volume VI, European Furniture, Fine & Decorative Works of Art* (New York: Sotheby’s, 2011), lot. 773. This object is illustrated in Charles Plumier’s 1701 *L’art de Tourner* and the 1719 catalog of the Grollier collection. Charles Plumier, *L’art de Tourner* (Lyon: Jean Certe, 1701), pl. LXIII; Nicolas Grollier de Servière, *Recueil d’ouvrages Curieux de Mathématique et de Mécanique Ou, Description Du Cabinet de Monsieur Grollier de Servière. Avec Des Figures En Taille Douce* (Lyon: D. Forey, 1719), pl. XI.

Few scholars, apart from Dr. Shih Ching-fei from the National Taiwan University, have examined the European turned objects in the Forbidden City. The works first appeared in a simple catalogue entry in 2002, but they did not receive substantial scholarly attention until Shih's 2007 article published in the *National Palace Museum Research Quarterly*.⁸ Shih's subsequent publications explore the European dating and origins of these works, as well as the impact of European lathe-turning techniques and practices on the Chinese artistic sphere. In addition to Shih's work, researchers Guo Fuxiang and Liu Yue at the Palace Museum in Beijing have also conducted searches for similar European turned works within the imperial collection. The results have been remarkably fruitful, as various objects have been discovered in the Palace Museum's storage spaces, including a number of wooden turned goblets from Nuremberg, a small turned multi-layered container made out of rhinoceros horn, and a wooden turned vessel in the shape of a flower petal with additional internal compartments.⁹ While Shih, Guo, and Liu's work have made valuable contributions to the study of global art history and early modern cross-cultural relations, all of these scholars focus primarily on the Chinese artistic sphere, leaving many of the connections to early modern Europe unexplored.

This paper builds upon Shih's 2011 article "Concentric Ivory Spheres from Canton," in which she argues that European turning techniques filtered into the local artistic sphere during the early eighteenth century, when workshops in Canton began incorporating them in the production of the *guigongqiu* 鬼工球, or 'demon's craft balls' (fig. 2).¹⁰ According to Shih, the procedure of making these Chinese concentric ivory spheres matches European turning techniques in the following ways: first, the craftsman selects a piece of ivory and uses a lathe to turn the cylinder into a sphere; then, numerous holes are bored into the sphere at calculated intervals; and finally, the turner inserts angled cutting tools into the bored holes and creates internal spherical layers. The tools utilized in this process, including the frame for securing the raw material on the lathe, the adjustable pedestal for the placement of the tools, and the angled layered hook knives, were also adapted from Western-style lathes. Moreover, the practice of

⁸ Gugong bowuyuan, *Gu Gong Diao Ke Zhen Cui*, cat. 183; Ching-fei Shih, "Xiangya qiu suojian zhi gongyi jishu jiaoliu: Guangdong, qinggong yu shensheng luoma diguo 象牙球所見之工藝技術交流: 廣東、清宮與神聖羅馬帝國 (Concentric Spheres and the Exchange of Craft Techniques: Canton, the Ch'ing Court and the Holy Roman Empire)," in *The National Palace Museum Research Quarterly* 故宮學術季刊 25, no. 2 (2007), 90.

⁹ Ching-fei Shih, and Yue Liu, "Shi tan qinggong shoucang de ji jian shensheng luoma diguo che xuan zuopin 試談清宮收藏的几件神圣罗马帝国车旋作品 (Discussing a few Turned Works from the Holy Roman Empire in the Qing Imperial Collection)," in *The Imperial Palace Met Foreign Cultures: Sino-Foreign Interaction in Material Culture in the 17th and 18th Centuries: 17, 18 世紀的中外物質文化交流*, eds. Wanping Ren, Fuxiang Guo, and Bingchen Han (Xiamen: Gugong bowuyuan Collection of Foreign Objects 故宮博物院外國文物館, 2018), 97-9.

¹⁰ Ching-fei Shih, "Ni suo bu zhidao de Guangdong xiangyaqiu 你所不知道的廣東象牙球 (Concentric Ivory Spheres from Canton)," in *The Forbidden City Monthly* 203 (December 2011): 32. While Chinese lathe-turning practices date back to the fifth century BCE, lathes were primarily used as tools for furniture-making, jade-cutting, and woodworking rather than for creating delicate ivory art objects. Vickers and Aubyn, *Ivory*, 228-9.

connecting different parts of a turned object using screws did not exist in China prior to the introduction of Western examples.¹¹



Figure 2. *Carved layered ivory object with dragons among clouds (21 layers).* 19th century. Turned and carved ivory. National Palace Museum Taipei. http://antiquities.npm.gov.tw/Utensils_Page.aspx?ItemId=13460

Source: “Demon’s Ball: Cantonese Ivory Cutting as the Highest Degree of Perfection 2017/12/30 ~ 2018/06/10,” National Palace Museum Taipei, last modified December 30, 2017, <https://south.npm.gov.tw/uploads/20171228/1dc002da-f41a-4ab1-af35-a8129f8776f4.pdf>.

¹¹ Shih, “Ni suo bu zhidao de Guangdong xiangyaqiu,” 32. While there exists a long-standing tradition in Chinese art of openwork decoration, the technique of making these concentric ivory spheres with repeated patterns and holes bored at calculated intervals was not previously employed in Chinese craft. Such a technique, however, frequently appeared in turned ivory objects in European court collections from the mid-sixteenth century onward. Thomas DaCosta Kaufmann, “Scratching the Surface: The Impact of the Dutch on Artistic and Material Culture in Taiwan and China,” in *Mediating Netherlandish Art and Material Culture in Asia*, eds. Thomas DaCosta Kaufmann and Michael North (Amsterdam: Amsterdam University Press, 2014), 220.

While Shih's argument has been well-received and accepted by the National Palace Museum in Taipei in its 2018 special exhibition "Demon's Ball: Cantonese Ivory Cutting as the Highest Degree of Perfection," no distinct study has yet investigated the specific ways in which knowledge and techniques were transferred from the European workshops to the Chinese imperial court, as well as to the local craftsmen in Canton.¹² This paper bridges this gap in two ways. First, by providing a chronological history of the known European turned works at the Chinese court prior to the mid eighteenth century, I explore how and when European turned objects first arrived in China, as well as how they paved the way for the subsequent cross-cultural transfer of technological and artisanal knowledge. Second, my paper explores the transmission of lathe-turning craft knowledge between sixteenth and eighteenth-century China and Europe by examining how European individuals, particularly Jesuit missionaries who worked at the Chinese imperial court during the Kangxi reign (1662-1722), contributed to the dissemination and development of mathematical and artisanal knowledge in China. Such knowledge was then picked up by local craftsmen and adapted into the 'demon's craft balls' that Shih's articles vividly describe.

The study of lathes and turned ivories has been rather neglected in both the fields of art history and the history of science and technology. Turned ivories have often been dismissed as products of a mechanical manufacturing process, of elitist and dilettante pastimes of princes at pre-programmed machines, and as "toys" and "useless artifacts" belonging to "the province of the lighter disciplines."¹³ In contrast, I demonstrate that turned works are brilliant displays of embodied knowledge and can serve as historical documents of the transfer of artworks, skilled individuals, scientific knowledge, and technological progress across oceans.

Lathe-turning in Europe

Lathe-turned artwork gained widespread appeal in Europe between the sixteenth and eighteenth centuries, when lathe-turning came to be regarded as a suitable aristocratic leisure activity for princes and nobles all over Europe, from Austria, Bavaria, and Saxony to Florence, Denmark, Sweden, and Russia.¹⁴ It was believed that working the lathe, which requires a great deal of technical skill and concentration, could help sharpen judgment, nurture patience, and provide respite from strenuous political affairs.¹⁵

The art of turning is also deeply grounded in a thorough knowledge of mathematics, geometry, and perspective, all of which were deemed as essential skills for a competent ruler.¹⁶ The correlation between lathe-turning and mathematical studies is evident in Charles Plumier's influential 1701 *L'art de Tourner*, which describes the process of making "a perfectly exact ball on the lathe" as follows (fig. 3):

¹² "Demon's Ball: Cantonese Ivory Cutting as the Highest Degree of Perfection 2017/12/30 ~ 2018/06/10," National Palace Museum Taipei, last modified December 30, 2017, <https://south.npm.gov.tw/uploads/20171228/1dc002da-f41a-4ab1-af35-a8129f8776f4.pdf>.

¹³ Laue ed., *Turned Treasures*, 21.

¹⁴ Maurice, *Der drechselnde Souverän*, 32.

¹⁵ Maurice, *Der drechselnde Souverän*, 7.

¹⁶ Maurice, *Der drechselnde Souverän*, 45.

First, it is necessary to turn the material into a cylinder A. The diameter of the base of this cylinder must be equal to the diameter of the ball you intend to make, and the height or length of this same cylinder should be exactly equal to the diameter of the same base. Draw a line b, as lightly and as finely as you can, exactly at the midpoint along the length of this cylinder between the two bases. Next, hollow out a wooden socket C in a way that you can insert a portion of your cylinder B inside it. Then remove, with the point of a *grain-d'orge*, the superfluous material from the portion which remains outside the socket, up to the point that one reaches the circle b. Having completed this portion, remove it from the first socket and insert the turned portion into socket F, in a way that the opening you have made in this second socket exactly receives the turned portion of the cylinder. Then, with the point of the same *grain-d'orge*, remove the remaining excess material until you reach the remainder of the circle, and you should obtain a truly precise, exactly round ball E.¹⁷

It is clear from Plumier's extended explanation that in order to produce a geometrically accurate turned sphere, one must work out the proper measurements, produce exacting calculations, and pierce the raw ivory cylinder at precisely determined points. The finished product is the ultimate manifestation of the turner's grasp of mathematics and geometry. Because of this, lathe-turning was viewed as an effective way for a prince to strengthen his technical understanding of the mathematical sciences.

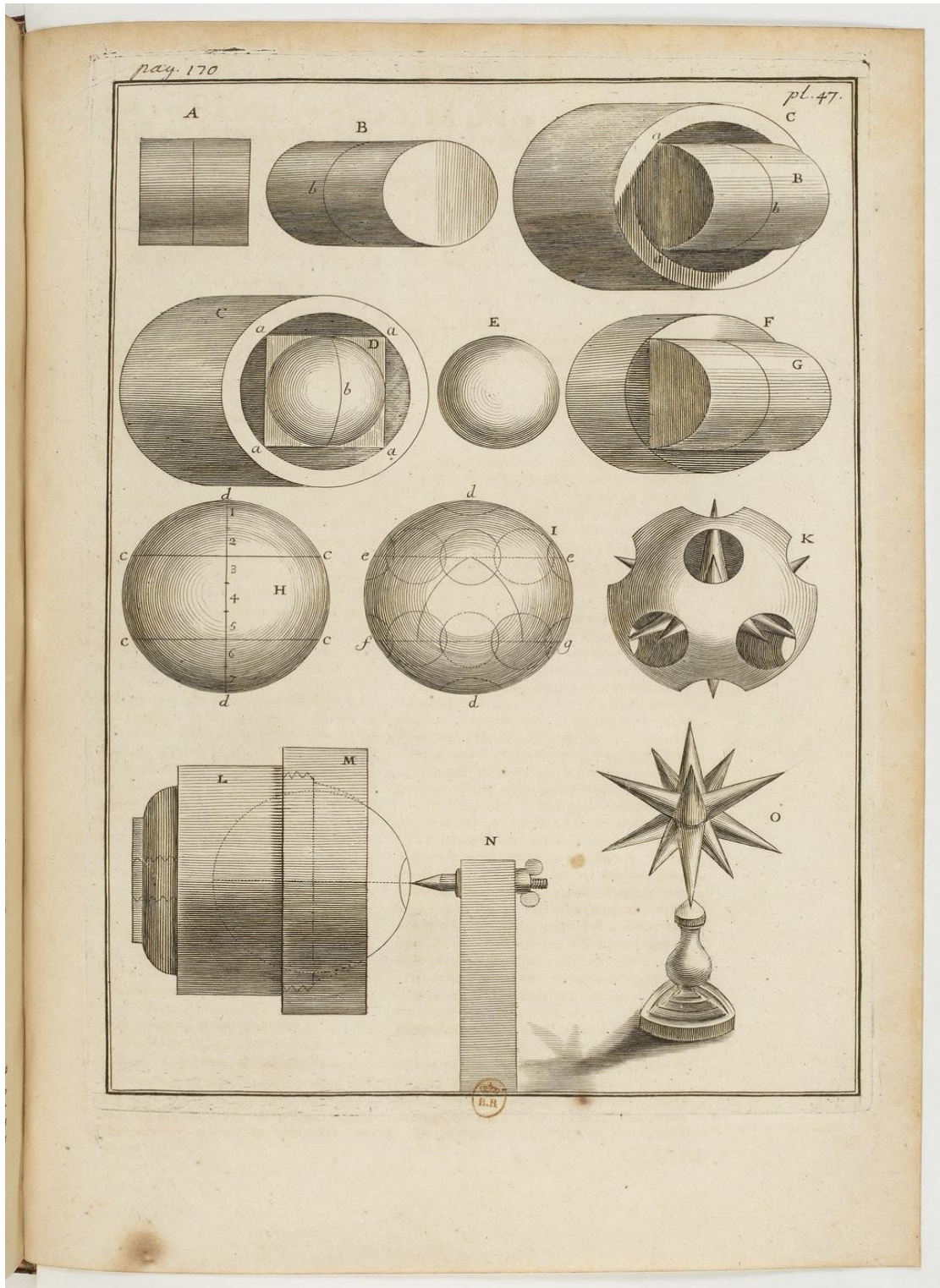
Import of European Turned Works to China

European turned objects, such as the Palace Museum's turned ivories, most likely arrived in China during the seventeenth and eighteenth centuries as diplomatic gifts or foreign tribute. European diplomatic efforts in Qing China began during the Shunzhi era (r. 1644-1661). The first Dutch embassy arrived in 1656, followed by that of Russia (1656), Portugal (1670), France (1698-1700), and Britain (1793).¹⁸ The number of foreign embassies increased greatly during the subsequent Kangxi reign, as the Kangxi Emperor demonstrated deep interest in foreign marvels, especially objects related to the Western sciences. Europe, on the other hand, was primarily interested in political or economic partnerships with China, of which the degree of success varied.¹⁹

¹⁷ Passage edited for clarity. Charles Plumier, *The Art of Turning*, trans. Paul L. Ferraglio Brooklyn (New York: Paul L. Ferraglio, 1975), 175-6, pl. 47 (1701 French edition), pl. LX (1749 French edition). Plumier's text included "everything that has to be known in order to learn the art of turning without a master of the trade." Treatises on turning enabled a new method of learning in which the interested party can learn how to turn without the help of a tutor. Maurice, *Der drehselnde Souverän*, 112; Joseph Connors, "Ars Tornandi: Baroque Architecture and the Lathe," *Journal of the Warburg and Courtauld Institutes* 53 (1990): 223-5.

¹⁸ Federica A. Broilo, "Making Sense of Diplomatic Gift Exchange between East and West," in *Face to Face: The Transcendence of the Arts in China and beyond: Historical Perspectives Edited by Rui Oliveira Lopes* (Lisbon: Centro de Investigação e Estudos em Belas-Artes (CIEBA), 2014).

¹⁹ Broilo, "Making Sense of Diplomatic Gift Exchange between East and West," 465.



Source gallica.bnf.fr / Bibliothèque nationale de France

Figure 3. Plate 47 from the 1701 edition of Charles Plumier's (1646-1704) *L'art de Tourner* (Lyon: Jean Certe, marchand libraire ruë Merciere, à l'Enseigne de la Trinité., 1701).

European turned works were already being sent overseas by the early seventeenth century. For instance, in the spring of 1613, the first Dutch diplomatic mission to the Ottoman Empire presented a state gift consisting of ninety-three crates, which also included a number of turned ivory objects.²⁰ Spectacular gifts of such rarities and marvels helped demonstrate the Dutch Republic's power and access to valuable merchandise, and thus became typical of the kinds of material culture that the Dutch utilized to facilitate negotiations of global trade and diplomacy.²¹

Some European turned ivories may have reached the Chinese imperial court by the early seventeenth century. On September 1, 1617, Bavarian Duke Maximilian I (1573-1651) commissioned and dedicated a *Kunstschränk* containing rare *artificialia* and *scientifica* as a diplomatic gift to Ming Emperor Wanli (r. 1573-1620).²² The gift was made via the Jesuit mission and transported to China by Flemish Jesuit Nicolas Trigault (1577-1628), who visited the Bavarian court in Munich in August 1616 to recruit skilled missionaries and procure funds and gifts for the China Mission.²³ The accompanying dedication letter from the Duke, now in the *Archiv der Deutschen Provinz der Jesuiten*, reveals that the cabinet and its rare contents were strategic gifts intended to establish diplomatic and economic relations between Bavaria and China.²⁴

Maximilian's six-layer ebony *Kunstschränk* had silk-covered compartments containing illuminated manuscripts, scientific instruments, clocks and automata, silver life-casts, religious images, as well as an extensive group of turned ivories, including:²⁵

...a sphere with miniature images of Christ and Mary, two openwork spheres containing further turned spheres and polygons inside, a cup set, two vase-cups with silver life-cast cypresses, several ivory boxes, a tower-shaped miniature vessel containing pyramidal and conical game figures, and finally, a carved statuette of the Virgin Mary and a micro-carving of ivory, which showed a crucifixion figure and was embedded in a ring.²⁶

²⁰ Claudia Swan, "Dutch Diplomacy and Trade in Rariteyten: Episodes in the History of Material Culture of the Dutch Republic," in *Global Gifts: The Material Culture of Diplomacy in Early Modern Eurasia*, eds. Zoltán Biedermann, Anne Gerritsen, and Giorgio Riello (Cambridge: Cambridge University Press, 2018), 178-9.

²¹ Swan, "Dutch Diplomacy and Trade in Rariteyten," 179.

²² Annette Schommers, "Der Kunstschränk Herzog Maximilians I. von Bayern für den Kaiser von China," in *Wunder Welt: der Pommersche Kunstschränk*, eds. Christoph Emmendorffer, Christof Trepesch, and Maximilianmuseum (Augsburg: Maximilianmuseum, 2014), 97; Nicolas Standaert, *An Illustrated Life of Christ Presented to the Chinese Emperor: The History of Jinchong Shuxiang (1640)* (Sankt Augustin: Institut Monumenta Serica, 2007), 20.

²³ Schommers, "Der Kunstschränk Herzog Maximilians I. von Bayern für den Kaiser von China," 97.

²⁴ Schommers, "Der Kunstschränk Herzog Maximilians I. von Bayern für den Kaiser von China," 102. Thomas DaCosta Kaufmann, "Remarks on the Collections of Rudolf II: The Kunstkammer as a Form of Representatio," *Art Journal* 38, no. 1 (1978): 22.

²⁵ Standaert, *An Illustrated Life of Christ Presented to the Chinese Emperor*, 23-4. Maximilian's *Kunstschränk* most likely resembled the famous contemporary "Pommerscher *Kunstschränk*," commissioned by Duke Philip II, Duke of Pomerania-Stettin (1573-1618) from Philipp Hainhofer (1578-1647) in 1610. See Julius Lessing, Adolf Brüning, and Kunstgewerbemuseum (Staatliche Museen zu Berlin), *Der Pommersche Kunstschränk* (Berlin: Veröffentlichung der Orlop-Stiftung, 1905).

²⁶ Schommers, "Der Kunstschränk Herzog Maximilians I. von Bayern für den Kaiser von China," 102.

Between October 1617 and February 1618, the *Kunstschränk* traveled from Munich to Lisbon via Hamburg. From there it went on to Goa on April 16, 1618, aboard a ship with Nicolas Trigault and twenty-two other Jesuits. They reached Goa on October 4, 1618, and the cabinet was subsequently transported to Macau. In February 1620, Trigault reported back to Maximilian I that the *Kunstschränk* could not travel any further inland due to armed conflict on the continent. The cabinet was reportedly still in Macau in October 1624.²⁷

While it is unclear whether Maximilian's *Kunstschränk* ever made it to the Chinese imperial court, two key items from the cabinet appeared in Beijing in 1640. In his 1665 *Historica narratio*, Jesuit missionary Johann Adam Schall von Bell reports that on September 8, 1640, he successfully presented a wax relief featuring an image of the "Adoration of the Magi," as well as an illuminated manuscript of the *Life of Christ* with a silver cover, to the Chongzhen Emperor (r. 1628-1644):

I turned into Chinese the *Life of our Saviour*, which painted on parchment, written in golden letters and bound as a book with a silver cover was given by Maximilian the Most Serene Duke of Bavaria to the Mission of China and I took care to have it written in golden letters on the back of the pages. I added also the images of the three Kings paying respect to the infant JESUS. They were made of wax modelled on living men and distinct by their colours so that one would have said that they were alive. This was also given by the Most Serene Duke to be offered to the king.²⁸

The two objects mentioned in Schall von Bell's description match the *Kunstschränk*'s known contents. According to the explanatory document that once accompanied the *Kunstschränk*, the second level of the *Kunstschränk* was divided into two drawers of the same size, the left of which contained a wax image of the "Adoration of the Magi." Moreover, the third drawer on the fourth level held a text titled *Das Leben unseres Herrn Jesus Christus [...]*. Written in gold on parchment, the body of the text and its fifty illustrations were held together by a silver cover decorated with an image of the four evangelists.²⁹ Since two objects from Maximilian's *Kunstschränk* did successfully make it to the Chinese imperial court before 1640, it is possible that the other works in the cabinet, including the collection of turned ivories, also survived the journey and arrived at the imperial court in Beijing during the early seventeenth century.

²⁷ Schommers, "Der Kunstschränk Herzog Maximilians I. von Bayern für den Kaiser von China," 106.

²⁸ Schommers, "Der Kunstschränk Herzog Maximilians I. von Bayern für den Kaiser von China," 106; Cited in Standaert, *An Illustrated Life of Christ Presented to the Chinese Emperor*, 46; Original: Ms. ARSI, Jap. Sin. 143 (9), f. 192r-v; Johann Adam Schall von Bell, and Johannes Foresius, *Historica narratio de initio et progressu missionis Societatis Jesu apud Chineses* (Vienna: Cosmoverius, 1665).

²⁹ Schommers, "Der Kunstschränk Herzog Maximilians I. von Bayern für den Kaiser von China," 97-8, 112-3. Written in elegant Latin, this document provides a detailed description of the cabinet's construction, and specifies the locations, materials, production processes, and functions of several objects within the *Kunstschränk*. For the seventeenth-century Jesuit gift bearer, this text served as a manual that aided his explanation of the *Kunstschränk*'s rare and unique contents to the Chinese emperor. Religion and diplomacy were largely intertwined during the early Qing era.

The earliest explicit reference to a Western turned ivory object at the Chinese court appears in Qing government official Gao Shiqi's 高士奇 *Jingjin wengao* 經進文稿.³⁰ Gao lived from 1645 to 1704 and was one of the Kangxi Emperor's favorite courtiers. In his text, Gao recalls seeing a group of three foreign marvels in the Forbidden City, one of which was a pierced concentric ivory sphere with five to nine movable internal layers, as well as a die at its core. The object was most likely turned in one piece on a lathe as the exterior showed no evidence that the layers were glued together. Gao was apparently at a loss as to who made such marvelous objects when an attendant informed him that the works all came from overseas via a ship.³¹ This textual record from one of Kangxi's closest associates confirms the presence of Western turned objects at the Kangxi court. Given this evidence, it is all but certain that the emperor would have known of their existence.

By the end of the Kangxi reign, the Chinese imperial court was most definitely aware of European turned objects. The Russian Embassy of 1720, led by Leon Vassilievitch Ismailov on behalf of Tsar Peter I, presented various gifts to the Kangxi Emperor, including "rich furs, clocks, repeating watches set in diamonds, mirrors; and the battle of Poltava, nicely turned in ivory, done by his Czarish Majesty's own hands, and set in a curious frame."³² The embassy was given an audience with the emperor on December 2, 1720, when the gifts from the Tsar were presented.³³ Given this evidence, we can be certain that European turned ivories existed at the Chinese imperial court by at least 1720.

Similar objects turned in wood were presented to Kangxi's successor Yongzheng (r. 1722-35). In 1733, a group of Jesuit missionaries offered a "Western wooden hundred-layered goblet 洋木百套杯" from Nuremberg to the Yongzheng Emperor.³⁴ This object was most likely akin to the numerous surviving examples in both the Palace Museum in Beijing and the National Palace Museum in Taipei. The arrival of these European turned objects during the seventeenth and eighteenth centuries not only introduced unique foreign marvels to the Chinese court, but also played a role in transmitting technological and artisanal knowledge related to European lathe-turning to the Chinese artistic and scholarly spheres.

Knowledge Transmission

Increased importation of foreign turned curios and machinery ultimately led to the transfer of European turning techniques to the Chinese artistic sphere. By the Yongzheng reign, the Qing Imperial Workshop was able to produce its own works of turned ivory using imported Western

³⁰ The exact dates for Gao Shiqi's works are unknown. Shih, "Ni suo bu zhidao de Guangdong xiangyaqiu," 27.

³¹ Ching-fei Shih, "'Xuanze' ji 'zhuan'yi': quanqiu shi shiye xia de 'xiyang' duoceng mutaobei 「選擇」及「轉譯」: 全球史視野下的「西洋」多層木套杯 (Perspectives of the Qing Court on Wooden Nesting Cups from the 'Western Ocean)," *Yishuxue yanjiu* / 藝術學研究 21 (December 2017): 24.

³² Broilo, "Making Sense of Diplomatic Gift Exchange between East and West," 466; John Bell, *Travels from St. Petersburg, in Russia, to Diverse Parts of Asia* (Glasgow: Printed for the Author by R. and A. Foulis, 1763), 13.

³³ Bell, *Travels from St. Petersburg*, 16.

³⁴ Ching-fei Shih, "A Hundred-Layered Goblet from the Western Ocean," *Orientations* 48, no. 4 (2015): 63.

lathes.³⁵ The earliest known instance of a Western style lathe at the Chinese court dates to 1722, when “a metal lathe” (铁镞床一个) was presented to the Kangxi Emperor as foreign tribute.³⁶ This machine was likely similar to the extant rose-engine lathe in the Palace Museum, which was used by the Qing Imperial Workshop to produce clocks and watches.³⁷ Lathe-turning at the Chinese court reached its peak between 1727 and 1733, when numerous turned ivory boxes were ordered to be made by the designated lathe-turning workshop (*xuanzuo* 镞作) within the Imperial Household system (fig. 4).³⁸ In the fifth month of the tenth year of Yongzheng’s reign (1732), the archives of the imperial turning workshop recorded that the emperor ordered the production of “some ivory boxes with good designs by employing the western lathe machines.”³⁹ Moreover, in the third month and seventh year of the Yongzheng reign (1729), the emperor ordered the lathe-turning workshop to produce “ten pieces of small ivory boxes for containing heat avoiding balsam (*baersamu xiang* 巴爾薩木香).”⁴⁰ The making of these objects was likely successful not only because of the existence of European turned examples and machines at court, but also due to the presence of knowledgeable European individuals.

Skilled Europeans employed by the Qing court likely transmitted information regarding Western lathe-turning to Chinese artisans within the Palace Workshop system, who in turn disseminated this knowledge into the local artistic sphere.⁴¹ Of the various European denominations operating in China between the late sixteenth and early eighteenth centuries, the Society of Jesus formed the basis of the European presence at the Chinese court. Jesuit employment in the palace peaked during the reign of the Kangxi Emperor (r. 1662-1722). Kangxi had an immense interest in the Western sciences, and he employed numerous Jesuits at

³⁵ Founded during the Kangxi era, the Qing Imperial Workshop encompassed an established turning workshop that produced numerous turned ivory objects for imperial use. Forty-two workshops existed within the Imperial Workshop system prior to the twenty-third year of the Qianlong reign (1758), including the turning workshop. Jui-Nan Tan 覃瑞南, “Qianlong shiqi gongting gongyi jiang zuo zhi yanjiu 乾隆時期宮廷工藝匠作之研究,” *Tainan nüzi jishu xueyuan xue* 台南女子技術學院學 21 (2002): 190; Shih, “Unknown Transcultural Objects,” 69.

³⁶ Shih, “Ni suo bu zhidao de Guangdong xiangyaqiu,” 34. Kangxi 61st year (1722) Tribute List (所子進單) includes “one metal lathe” (铁镞床一个).

³⁷ Shih, “Ni suo bu zhidao de Guangdong xiangyaqiu,” 35.

³⁸ Shih, “Unknown Transcultural Objects,” 71.

³⁹ Shih, “Unknown Transcultural Objects,” 70.

⁴⁰ Shih, “Unknown Transcultural Objects,” 69.

⁴¹ It is also possible that European lathe-turning techniques were first introduced by Jesuits to local artisans in Canton, who then brought the technology with them to the imperial court. Ivory craftsmen working in the palace workshop in the late Kangxi, Yongzheng, and early Qianlong periods were mostly from the Jiangnan regions. Traditional Chinese ivory objects such as brush holders, screens, and small carvings from the Kangxi and Yongzheng reigns were also primarily tributes from Canton. More research is needed to further explore this hypothesis; however, given the preciousness of the ivory material and the expense involved in their production, it is more likely that such a craft was first attempted by the imperial workshop. Ching-fei Shih, “Zi shi gui gong shou, neng chuan xian ke qing: Qianlong chao gongting de xiangya xiangong 自是鬼工手，能傳仙客情：乾隆朝宮廷的象牙「仙工」 (From the Hands of Spirits, Conveying the Quality of Immortals: Ivory ‘Immortal Works’ from the Qianlong Court),” *Gugong xueshu jikan* 故宮學術季刊 / *The National Palace Museum Research Quarterly* 34, no. 1 (2016): 114.

his court as physicians, tutors, scientists, artists, and translators.⁴² Jesuit missionaries under Kangxi worked on a variety of tasks, including directing the Astronomical Bureau, spearheading a systematic survey of the empire, and producing astronomical instruments, heavy artillery, paintings, maps, calendars, clocks, and other devices with complex mechanisms.⁴³



Figure 4. Turned Ivory Boxes. Yongzheng Period (r. 1723-35). 18th century. Palace Workshop. Turned ivory. Palace Museum Beijing. Sources: Ching-fei Shih, “Yeshi bolaiyin: qinggong zhong de huashi xuanchuang 也是舶來品: 清宮中的花式鏤床 (Another Item from Over the Sea: Rose-Engine Lathes at the Qing Court),” *Taida Journal of Art History* 32 (2012): p. 227, fig. 20; Ching-fei Shih, “Unknown Transcultural Objects: Turned Ivory Works by the European Rose-Engine Lathe in the Eighteenth-Century Qing Court,” in *EurAsian Matters: China, Europe, and the Transcultural Object, 1600-1800*, edited by Anna Grasskamp and Monica Juneja, Transcultural Research – Heidelberg Studies on Asia and Europe in a Global Context (Cham: Springer International Publishing, 2018), p. 68, fig. 5.

⁴² Catherine Jami, *The Emperor’s New Mathematics: Western Learning and Imperial Authority During the Kangxi Reign (1662-1722)* (Oxford: Oxford University Press, 2012), 139. Evelyn Sakakida Rawski, Jessica Rawson, and the Royal Academy of Arts eds., *China: The Three Emperors, 1662-1795* (London: Royal Academy of Arts, 2005), 26, 28, 210.

⁴³ Rawski, Rawson, and the Royal Academy of Arts, *Three Emperors*, 181.

The Jesuit conversion method of “*propagatio fidei per scientias*,” or propagation of faith through science, intended to evangelize the target society using science as a springboard. By offering gifts of European scientific ingenuity and impressing Chinese scholars with their knowledge about the natural world, the Jesuit missionaries were able to establish the mission within Chinese imperial and scholarly circles, and subsequently speak of Christianity.⁴⁴ As Nicolas Trigault effectively concluded in the *Annua* of 1610: “first the talk of is science, but thereafter always of virtue.”⁴⁵ Though the Jesuits’ ultimate goal was to establish Christianity in China, their scientific and technological contributions were longer lasting than the influence of their religious beliefs.

Kilian Stumpf: The Jesuit Turner

Archival evidence regarding a Jesuit at the Kangxi court who knew how to work the lathe provides some insight into the specific ways in which craft knowledge traveled from Europe to China. German Jesuit Kilian Stumpf (1655-1720) worked at the Qing court between 1694 and 1720. Stumpf was a gifted scientist, mathematician, and maker of astronomical instruments.⁴⁶ After receiving permission to go to the Far East in 1688, Stumpf was recruited by Claudio Filippe Grimaldi, who was on a diplomatic mission in Europe to acquire scientific instruments and recruit qualified young missionaries for the Kangxi Emperor. Stumpf arrived in Macao in 1694 and went on to Canton, where he proved his technical ability by successfully repairing the rusty instruments that Grimaldi had brought back from Europe. Chinese officials in Canton noticed his technical expertise and he was soon summoned to Beijing by the Kangxi Emperor. Upon his arrival in the capital in July 1695, Stumpf was immediately received by the emperor and subjected to a series of rigorous examinations in the fields of mathematics and astronomy.⁴⁷ The Jesuit’s training in physics, mathematics, astronomy, and medicine greatly impressed the Kangxi Emperor, who then kept him in Beijing and employed him in the Astronomical Ministry. During his twenty-five years in Beijing, Stumpf founded an imperial glassmaking workshop, served as the director of the Ministry of Astronomy from 1711 until his death in 1720, and made more than 600 instruments and machines for surveying, astronomical observations, and military and civil purposes.⁴⁸

⁴⁴ Klaus Maurice, “*Propagatio Fidei per Scientias: Jesuit Gifts to the Chinese Court*,” in *The Clockwork Universe: German Clocks and Automata, 1550-1650*, eds. Klaus Maurice and Otto Mayr (Washington: Smithsonian Institution, 1980), 31.

⁴⁵ Nicolas Trigault, *Historie von Einfubrung der Christlichen Religion in das grosse Konigreich China durch die Societas Jesu* (Augsburg 1617; Latin edition, 1615), cited in Maurice, “*Propagatio Fidei per Scientias*,” 31.

⁴⁶ Emily Bryne Curtis and International Chinese Snuff Bottle Society, *The Kangxi Emperor’s Glasshouse: Della Fornace Di Vetri* (Hoboken, NJ: The Author, 1990), 10.

⁴⁷ Sebald Reil, *Kilian Stumpf, 1655-1720: ein Würzburger Jesuit am Kaiserhof zu Peking* (Münster: Aschendorff, 1978), 57.

⁴⁸ Claudia von Collani, “Kilian Stumpf (Jilian Yunfeng) - Mediator between Würzburg and China,” in *Dongxi Jiaoliu Luntan*, ed. Huang Shijian (Shanghai: Shanghai Wenyi Chubanshe, 2001), 259, 264-5. In 1696, Kangxi ordered the establishment of the imperial glassworks, which was headed by Stumpf and housed in the French Jesuit compound. The Kangxi Emperor granted the French Jesuits a compound within his palace enclosure in 1693. The complex was located northwest of the Forbidden City. Curtis and International Chinese Snuff Bottle Society, *The Kangxi Emperor’s Glasshouse*, 7.

Stumpf was also a skilled turner. The Bibliothèque Nationale de France holds an eighteenth-century French manuscript titled *Journal of the voyage of China made in the years 1701, 1702, and 1703*, compiled by Jean de Fontaney and other Jesuits.⁴⁹ The journal documents the voyage of a ship transporting a group of Jesuits headed by Fontaney, who were returning to China after a trip to France around 1700. For the entry on Father “Kilian Stromp” [Stumpf], the text describes “Stromp” as the head of the emperor’s glassmaking workshop, as well as “a turner who makes very lovely works.”

It appears that Stumpf not only produced turned works himself, but also tutored local craftsmen in the palace workshop. Bavarian Jesuit Ignatius Kögler (1680-1746), who joined Stumpf in Beijing in 1717, reported back to Rome in 1720 about the success of Stumpf’s glassmaking workshop. He mentions in his report that the Manchu and Chinese artisans in Stumpf’s glassworks “learned from the Master himself the practice of molding into every sort of shape, of coloring in pleasing shades, of carving in different designs with the lathe, and of polishing.”⁵⁰ Stumpf also mentions his Chinese students in a letter sent to Tirso Gonzales, Superior General of the French Jesuit missionaries in China, on January 11, 1704. In the letter, Stumpf writes about a pupil of his “who at the bidding of the Emperor for three years is my student in the glassmaking art.”⁵¹ The artisans in Stumpf’s workshop included the individuals sent each year to the palace by the Governor of Shandong, as well as a few artisans from Guangzhou.⁵² Given that European lathe-turning techniques were later picked up by turners in Guangzhou, it is possible that this knowledge was transmitted from the Jesuits to local artisans in the palace workshops, and then passed on into the local artistic sphere by Stumpf’s students. The fact that a European turner worked at the Chinese court and exchanged knowledge with local craftsmen and scholars enriches our understanding of the transfer and adaptation of Western lathe-turning technology and techniques to China.

Kangxi and European Mathematics in China

The presence of Jesuit turners and scholars at the Qing court also facilitated the transfer of theoretical and mathematical knowledge related to lathe-turning. Beginning in 1700, Stumpf and a few other Jesuits taught mathematics, especially topics related to astronomical calculations, in the so-called “calendar office” to young individuals at the imperial court.⁵³ Jesuits and Chinese court turners also had access to European mathematical treatises and turning manuals through the Jesuit libraries in Beijing. Founded in 1693, the Beitang Library housed the concentrated holdings of the four Jesuit cathedrals in Beijing, as well as the private

⁴⁹ Jean de Fontaney, and other Jesuits, “Journal Du Voyage de La Chine Fait Dans Les Années 1701, 1702 et 1703,” 18th century, Historique de la conservation Proviend des Archives nationales, MM. 926, NAF 2086, Bibliothèque Nationale de France, <https://archivesetmanuscrits.bnf.fr/ark:/12148/cc39524x>. I am deeply indebted to BGC PhD candidate Julie Bellemare for finding this document in the archives and sharing it with me.

⁵⁰ Curtis and International Chinese Snuff Bottle Society, *The Kangxi Emperor’s Glasshouse*, 9.

⁵¹ Curtis and International Chinese Snuff Bottle Society, *The Kangxi Emperor’s Glasshouse*, 9.

⁵² Curtis and International Chinese Snuff Bottle Society, *The Kangxi Emperor’s Glasshouse*, 9.

⁵³ Reil, *Kilian Stumpf*, 70.

collections of various notable missionaries in the capital.⁵⁴ According to Hubert Verhaeren's 1969 *Catalogue de la Bibliothèque du Pe-Tang*, the Beitang Library held several important sources related to European lathe-turning, including the 1701 edition of Plumier's *L'art de Tourner*, as well as Saxon court turner Hans Lencker's 1571 *Perspectiva Hierinnen auff's kürtzte beschrieben*.⁵⁵ Curiously, the copy of Plumier's text in the Beitang library includes handwritten notes in Manchu on some of the plates, indicating that it was used by someone well-versed in the language.⁵⁶ This individual could be Chinese, or a European missionary working at the Qing court, as many of them were familiar with Manchu. One could imagine Kilian Stumpf consulting these texts in his glassmaking workshop and teaching local craftsmen essential turning techniques. Mathematical knowledge related to lathe-turning thus likely also entered the Chinese local workshops via the Jesuit missionaries working at the Qing court.

The Kangxi Emperor's personal interest in the study of the Western sciences further facilitated the transfer of European mathematical and scientific information into the Chinese scholarly and artistic circles. While the earliest known Chinese text on mathematics dates back to the Zhou dynasty (1046–256 BCE), the Chinese mathematical tradition was in decline before the end of the sixteenth century. Major foundational works and theories, such as the first-century CE *Nine chapters on mathematical procedures* (*Jiuzhang suanshu* 九章算術) and the thirteenth-century algebraic method called 'celestial element' (*tianyuan* 天元), were lost and forgotten.⁵⁷ The last few decades of the sixteenth century, however, saw a renewal of interest in "practical" or "technical learning."⁵⁸ The Society of Jesus entered the picture at this precise moment, when late Ming scholars began to place greater emphasis on the study of the mathematical sciences. Though European mathematical knowledge first entered China during the early seventeenth century, when Matteo Ricci and Xu Guangqi translated the first six books of Euclid's *Elements of Geometry* into Chinese in 1607, it did not receive substantial imperial and scholarly attention until the Kangxi reign.⁵⁹ Underlying Kangxi's rule was a vision that promoted broad learning. The emperor sought to combine knowledge from his own Manchu heritage with Han Chinese cultural traditions, Tibetan Buddhism, and Western technology and sciences. He found teachers wherever he discovered a high standard of expertise and sampled all kinds of fields of study.⁶⁰

Between the 1670s and the 1690s, Kangxi studied Western mathematics, geometry, philosophy, medicine, and physics with at least five different Jesuit tutors.⁶¹ The Calendar Controversy of 1668-69, in which mistakes were found in the official calendar issued by the Imperial Astronomical Bureau, convinced Kangxi that Western calendar calculations were more

⁵⁴ Lars Laamann, "The Current State of the Beitang Collection Report from a Fact-Finding Mission to the National Library of China," *Bulletin of the European Association of Sinological Librarians* 9, accessed February 17, 2019, <http://www.easl.org/beasl/be9bei.html>.

⁵⁵ Hubert Verhaeren, and Mission catholique des Lazaristes a Pekin, *Catalogue de la Bibliothèque du Pe-t'ang* (Paris: Societe d'Edition Les Belles Lettres, 1969), cat. 578 and cat. 3946.

⁵⁶ Verhaeren, *Catalogue de la Bibliothèque du Pe-t'ang*, cat. 578.

⁵⁷ Jami, *The Emperor's New Mathematics*, 14-5.

⁵⁸ Jami, *The Emperor's New Mathematics*, 15.

⁵⁹ Jami, *The Emperor's New Mathematics*, 24.

⁶⁰ Rawski, Rawson, and the Royal Academy of Arts, *Three Emperors*, 210.

⁶¹ Jami, *The Emperor's New Mathematics*, 139.

accurate than those of the Chinese.⁶² As a result, Belgian Jesuit Ferdinand Verbiest (1623-88) was appointed as the assistant director of the Astronomical Bureau in charge of the calendar, as well as Kangxi's first Jesuit tutor.⁶³ In the 1670s, Verbiest taught Kangxi how to use Western mathematical instruments and some rudimentary concepts in Western geometry, statics, and astronomy.⁶⁴ From 1690 to 1691, Kangxi studied mathematics in Chinese with Antoine Thomas (1644-1709) and Thomas Pereira (1645-1708). At the same time, he enlisted French Jesuits Jean-François Gerbillon (1654-1707) and Joachim Bouvet (1656-1730) to teach him mathematics, geometry, and philosophy in Manchu. Gerbillon and Bouvet completed teaching Kangxi Euclidean geometry in July 1690 and went on to instruct him in the related concepts of practical geometry until January 1691. One month later, Kangxi began studying philosophy, medicine, and then physics in October of the same year.⁶⁵ The Jesuits' teachings culminated in an imperial publication titled *Origins of Pitchpipes and the Calendar Imperially Composed* (*Yuzhi lili yuanyuan* 御製律曆淵源). Compiled during the last ten years of Kangxi's reign under the emperor's close supervision, this text aimed to set imperial standards in mathematics, astronomy, and musical theory.⁶⁶

The lessons on the Western sciences were modeled on the traditional Chinese imperial study of the Classics, or the *rijiang* 日講 (Daily Tutoring on the Classics), which the emperor had been participating in since he was a child. A typical lesson included a prepared explanation by the Jesuits, which they would have written out beforehand, followed by an exercise that helped the emperor better understand the concepts.⁶⁷ Bouvet's autographed diary manuscript

⁶² Catherine Jami, "Revisiting the Calendar Case (1664-1669): Science, Religion, and Politics in Early Qing Beijing," *Korean Journal of History of Science* 27, no. 2 (September 2015): 462.

⁶³ According to Verbiest, the Emperor engaged in the study of astronomy, geometry, arithmetic, cosmography, geodesy, gnomonics, ballistics, mechanics, optics, catoptrics, perspective, static hydraulics, pneumatics, music, watchmaking, and meteorology. Johns, Christopher M. S., *China and the Church: Chinoiserie in Global Context* (Oakland, CA: University of California Press, 2016), 25; Pierre Arizzoli-Clémentel, and Musée national de Versailles et des Trianons, *Kangxi, empereur de Chine: 1662-1722: la cité interdite à Versailles* (Paris: Réunion des musées nationaux, 2004), 75.

⁶⁴ Jami, *The Emperor's New Mathematics*, 142. Verbiest also translated over thirty Western scientific texts into Chinese for the emperor, including Euclid's *Elements*.

⁶⁵ Jami, *The Emperor's New Mathematics*, 143.

⁶⁶ Jami, *The Emperor's New Mathematics*, 1, 5.

⁶⁷ Jami, *The Emperor's New Mathematics*, 139, 149.

describes the lesson on April 8, 1690 (or April 10, 1690 according to Gerbillon's records) as follows:⁶⁸

The emperor came back to Beijing, and he came to the Yangxindian, where we were. First we gave him our explanation of Euclid that he understood very well, then, having had brought [to him] the tables of sines, tangents and secants with their logarithms that F. Thomas had put into Chinese characters for him, he wanted to see a few uses of them in an observation that was made on the spot with a semi-circle.⁶⁹

Kangxi not only studied theories from textbooks, but also participated in hands-on learning using models, tools, and Western scientific instruments. A set of polyhedral proportional wooden blocks representing the Platonic Solids, made by the Palace Workshop during the Kangxi era, survives today in the Palace Museum in Beijing.⁷⁰ Similar sets of polyhedral models also existed in the European sphere. For example, an eighteenth-century *Jeu de solides geometriques* made by Nicolas-Alexandre Baradelle for Louis XV (1710-1774) survives in the Louvre and most likely served as a pedagogical aid in the French king's studies of mathematics and geometry.⁷¹ It is thus likely that the wooden models of the Platonic Solids in

⁶⁸ Isabelle Landry-Deron, "The Kangxi Emperor's Lessons in Western Sciences as Recounted by the Jesuit Fathers J. Bouvet and J.-F. Gerbillon," in *Acta Pekinensia: Western Historical Sources for the Kangxi Reign: International Symposium Organised by the Macau Ricci Institute, Macao, 5th-7th October 2010* (Macau: Macau Ricci Institute, 2013), 261. The diaries kept by Gerbillon and Bouvet both survive today. The Bibliothèque Nationale de France holds an autographed manuscript most likely from Bouvet's own hand. This manuscript may have been a rough copy, a later report, or an abridged version, as the dates can be imprecise at times, and the text begins and ends rather abruptly. Nevertheless, it serves as a vital source in Bouvet's own hand that provides invaluable information about Jesuit activities at the Manchu court. Though Gerbillon's original travel records are lost, they survive partly in Jean-Gaptiste Du Halde's *Descriptions of the Empire of China*, published in 1735, several decades after it was written. Volume 4 of Du Halde's text records Gerbillon's eight voyages to China, the second of which was when the lessons took place (Gerbillon returned to China on October 18, 1689). While Gerbillon's testimony of the lessons with the Chinese Emperor is preserved to some extent, it is regrettable that his original manuscript is lost, as it is known that Du Halde frequently edited his primary sources. Together, Bouvet and Gerbillon's accounts cover their daily activities from October 18, 1689 to November 10, 1691. Bouvet's text covers the period of time from February 1690 to November 1691, while Gerbillon's account documents 1689 to September 1691. Though they often differ by a few days in their dating, the 26 months in which they overlap can be corroborated between the two sources to present a rather consistent and clear understanding of Kangxi's lessons with his Jesuit tutors.

⁶⁹ Jami, *The Emperor's New Mathematics*, 148.

⁷⁰ Rawski, Rawson, Royal Academy of Arts, *Three Emperors*, 424, cat. 150. First mentioned by Pythagoras in the fifth century BCE, the five regular polyhedra, the tetrahedron, hexahedron, octahedron, dodecahedron, and icosahedron, are the only convex polyhedra with equivalent sides, vertices, and faces. Martin Kemp, *The Science of Art: Optical Themes in Western Art from Brunelleschi to Seurat* (New Haven: Yale University Press, 1992), 63.

⁷¹ Béatrix Saule, and Catherine Arminjon, *Sciences & curiosités à la cour de Versailles: exposition, Château de Versailles, 26 octobre 2010-27 février 2011* (Paris: Réunion des musées nationaux, 2011), 174. Samuel Quiccheberg's 1565 *Inscriptiones*, which was begun in 1563 when Quiccheberg was working with the collections of Duke Albrecht V of Bavaria (1528-1579), suggests that Class 4 Inscription 2 should include "regular solids of various shapes, beautifully constructed of transparent rods." This reference suggests that such sets may have also existed during the sixteenth century in the Duke of Bavaria's collection. Quiccheberg, Meadow, and Robertson, *The first treatise on museums*, 1, 19, 67.

Beijing, along with their accompanying explanatory document, were also used by Kangxi in his lessons on the Western sciences.

Though Kangxi's study of the European sciences probably never encompassed the actual labor of turning at a lathe, as it did in the European princely sphere, Kangxi was exposed to all the necessary information related to lathe-turning. He would have no difficulty understanding the theoretical and mathematical knowledge needed to create a geometrically accurate form on a lathe. The combination of an intellectually curious Chinese emperor who was interested in Western mathematics, a Jesuit well-versed in lathe-turning and mathematics who closely served the emperor and directly tutored locals, as well as the simultaneous import of numerous European turned objects into the Chinese court at this specific time, creates a vivid image of cross-cultural knowledge transmission. Investigations of European turned objects in the Chinese imperial collection thus offer a rare glimpse into the ways in which material objects unite the early modern East and West in their common pursuit for scientific knowledge and artistic achievement.

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While lathe-turning was viewed as a suitable leisure activity for the European elite, this craft was primarily performed within the Chinese artistic sphere by artisans within the imperial and local workshops. The early modern European emphasis on lathe-turning as a fruitful and meditative experience for the ruling elite thus did not translate into the Chinese imperial circle. Instead, the value of the craft was predominantly placed on the exquisite products that it produced.

The collecting and display of European turned works by Kangxi's grandson Qianlong illustrate the reception of these remarkable artworks at the Qing court and demonstrate the differing ways in which lathe-turned works came to be appreciated in the post-Kangxi era. By the Qianlong reign, the imported Western lathes were reportedly no longer in working condition due to missing parts and long periods of disuse.⁷² However, European turned objects formed part of the Qianlong Emperor's vast imperial art collection, in which they were seen and valued as top-grade curios. One of Qianlong's small treasure boxes, now in the National Palace Museum in Taipei, contains 32 tiny curios, including jade, porcelain, bronze, miniature paintings, as well as one particular ivory cup with a removable cover (象牙帶蓋筒狀盒; fig. 5).⁷³ The ivory container holds an imported ruby ring and was most likely made using Western lathe-turning techniques.⁷⁴ The form and execution of this object is reminiscent of turned-ivory examples in prominent European *Kunstammer* collections. The Bayerisches Nationalmuseum

⁷² Archival records state that in the forty-first year and twelfth month of Qianlong's reign (1777), Jesuit Jean-Mathieu Tournu Ventavon (Wang Dahong 汪達洪, 1733-1787) was summoned to Yuanmingyuan to help the court turner fix the broken Western lathe in Shuifa dian 水法殿, which could no longer turn intricate patterns due to a missing part. Shih, "Ni suo bu zhidao de Guangdong xiangyaqiu," 36.

⁷³ Guoli gugong bowuyuan, and Maxwell K. Hearn, eds., *Splendors of Imperial China: Treasures from the National Palace Museum, Taipei* (New York: Metropolitan Museum of Art, 1996), cat. 107.

⁷⁴ Ching-fei Shih, "Yeshi bolaipin: qinggong zhong de huashi xuanchuang 也是舶來品: 清宮中的花式鏤床 (Another Item from Over the Sea: Rose-Engine Lathes at the Qing Court)," *Taida Journal of Art History* 32 (2012): 174.

in Munich, for instance, holds a turned ivory canister made of nine pieces, supposedly turned by the Elector of Bavaria, Maximilian I, in 1610.⁷⁵ Though it is not identical to the ivory container in Taipei, the two share similar cylindrical forms and methods of fabrication. Likewise, a 1610 turned-ivory box in the Kunsthistorisches Museum in Vienna by Hans Wecker (d. 1577), court turner to the Duke of Bavaria in Munich, also assumes the form of a lidded ivory container and shows evidence of lathe work on its body.⁷⁶



Figure 5.

Left: *Square Sandalwood Curio Case* 紫檀多宝格方匣. Qianlong period (r. 1735-96). 25 cm x 25 cm x 21 cm. National Palace Museum Taipei. http://antiquities.npm.gov.tw/Utensils_Page.aspx?ItemId=627075. Source: Guoli gugong bowuyuan, and Maxwell K. Hearn, eds., *Splendors of Imperial China: Treasures from the National Palace Museum, Taipei* (New York: Metropolitan Museum of Art, 1996), cat. 107. <https://theme.npm.edu.tw/selection/Article.aspx?sNo=04001112>.

Right: *Ivory container with a removable cover* 象牙帶蓋筒狀盒. 18th century. National Palace Museum Taipei. Source: Ching-fei Shih, “Yeshi bolaipin: qinggong zhong de huashi xuanchuang 也是舶來品: 清宮中的花式鏤床 (Another Item from Over the Sea: Rose-Engine Lathes at the Qing Court),” *Taida Journal of Art History* 32 (2012): p. 216, fig. 2a.

What can the existence of this European-style turned ivory object in the Qianlong Emperor’s treasured curio box tell us about Qianlong’s appreciation of foreign turned works, his understanding of Western technology and art practices, and the reception of turned ivory objects at the eighteenth-century Qing court? Objects in the imperial collection were assigned individual grades, which allowed them to be stored in rank-appropriate containers. Those belonging to the top grade were wrapped in silk cloths and kept in small, portable curio boxes, or the *duobaoge* 多寶格. They could only be retrieved and displayed when the emperor wanted to enjoy them. Lower grades, on the other hand, were intended for display around the palace. Once an object entered a display shelf or box, it transformed into a *guwan* 古玩, or a classical

⁷⁵ Maurice, *Der drechselnde Souverän*, 62.

⁷⁶ Laue ed., *Turned treasures*, 21.

object for pleasure, and its status was elevated beyond the utilitarian realm.⁷⁷ The presence of a European turned ivory object in one of the Qianlong Emperor's treasured curio boxes thus demonstrates the value that Qianlong placed on foreign works and Western lathe-turned objects in his collection.

Qianlong and the European turned work in his intricately designed duobaoge are curiously reminiscent of early modern European princes and their accumulation of complex turned pieces inside their curated Kunst- and Wunderkammern. While the exact theoretical and representational implications of the turned ivories in the two disparate collections may differ, the works inherent value as collectable objects of wonder furthers the link between Qing China and its early modern European counterparts, especially in terms of collecting practices and artistic appreciation.

Conclusion

By forging connections between European and Chinese scholarship on lathe-turning, this paper analyzes a form of early modern cross-cultural interaction centered on the interchange of mathematical and artisanal knowledge. In doing so, it aims to elucidate the specific ways in which information traveled across cultural and geographical boundaries and offer an effective entry point for a broader interrogation of early modern diplomatic and cross-cultural exchanges of artisanal, mathematical, scientific, and medicinal knowledge.⁷⁸

While scholarship on turned ivories exists in culturally-specific fields, few have interrogated the topic through an intercultural lens. As composite works of art, turned-ivory objects in China function as effective "sites of transculturation."⁷⁹ They stand as testaments to a period of globalization and exchange, as well as embodiments of the intermingling of disparate

⁷⁷ Hui-chun Yu, "The Intersection of Past and Present: The Qianlong Emperor and His Ancient Bronzes" (PhD diss., Princeton University, 2007), 77, 96, 105-6.

⁷⁸ A potential avenue for future scholarship would be to explore a more complete cycle of "exchange" through not only examining the early modern transmission and adaptation of objects, people, and knowledge from Europe to China, but also exploring the reciprocal movement from China to Europe. Further studies could also lead to contributions to the history of applied mathematics, the study of diplomatic relations and global trade, as well as the influence of intercultural interactions on the development of medicine. For example, one could explore the relationship between turned objects and *materia medica*, as Qing display archives frequently suggest that turned works were stored in the palace alongside medicinal materials.⁷⁸ This, coupled with the fact that precious natural materials such as horn and bone are often imbued with medicinal properties in both Chinese and European contexts, might reveal new perspectives regarding the function and reception of turned works at the Chinese and European courts. Moreover, images and texts composed by Jesuits at the Qing court, such as the geometric woodcuts in Ferdinand Verbiest's 1674 *Xinzhi lingtai yi xiangzhi* 新製靈臺儀象志 resembling European geometric treatises by artists and turners including Wenzel Jamnitzer, Hans Lencker, and Lorenz Stoer, could open up new conversations regarding the early modern exchange of information via people, texts, and objects. Shih and Liu, "Shi tan qinggong shoucang de ji jian shensheng luoma diguo che xuan zuopin," 98. Gugong bowuyuan 故宮博物院 (Palace Museum Beijing), *Gu gong bo wu yuan cang Qing gong chen she dang an* 故宮博物院藏清宮陳設檔案. (Beijing: Gu gong chu ban she 故宮出版社, 2013); Michael Mathias Precht, Wenzel Jamnitzer, Hans Lencker, and Lorenz Stör, *Jamnitzer, Lencker, Stoer drei Nürnberger Konstruktivisten des 16. Jahrhunderts* (Nürnberg: Albrecht-Dürer-Ges., 1969); Ferdinand Verbiest, *Xinzhi lingtai yi xiangzhi: Shiliu juan* 新製靈臺儀象志: 十六卷 (*Description du nouvel observatoire*) (Beijing: Nei Fu, 1674).

⁷⁹ Stuart Hall, "Creolization, Diaspora and Hybridity in the Context of Globalization," in *Créolité and Creolization: Documenta 11 Platform3*, edited by Okwui Enwezor (Ostfildern-Ruit: Hatje Cantz, 2003), 190.

pictorial traditions and methods of production at a specific transcultural moment in history. With their creation came a type of cultural identity that is not only reflective of the interactions between cultures, but also deeply rooted in the history and tradition of both regions. The study of turned objects in China and their historical trajectories can thus offer a more accurate representation of historical and cultural encounters and enrich the history of the East and the West.