

Article

Jesuits, Kangxi Emperor, and the Compilation of European Mathematics

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Abstract

The Kangxi period (1662–1722) is a pivotal time in the history of Chinese science. Deeply influenced by the conflict between Yang Guangxian (1597–1669) and the Jesuits in the 1660s, the Kangxi emperor (1654–1722) began to study European sciences. He not only learned Western science himself but also encouraged his sons to learn from the Jesuits. In 1713, he established the Academy of Mathematics to promote the calendar reform. Using both Chinese and European sources, I will reconstruct the activities of the Academy of Mathematics within a global and social context, as well as its connection to the grand celebration of Kangxi's sixtieth birthday in 1713. I also aim to highlight the roles of the Jesuits, the Kangxi Emperor, Prince Yinzhi (1677–1732), and the scholars involved in the translation and compilation of the mathematical encyclopedia *Shuli jingyun* (數理精蘊, *Imperially Commissioned Basic Mathematical Principles*) from an institutional perspective.

Keywords: Jesuits; Kangxi Emperor; Academy of Mathematics; *Shuli jingyun*

1. Introduction

At the end of the Ming dynasty, missionaries such as Matteo Ricci (利瑪竇, 1552–1610) arrived in China and began introducing science from Europe. During the reign of the Chongzhen (崇禎) Emperor, under the leadership of Xu Guangqi (徐光啓, 1562–1633) and with the assistance of Jesuit missionaries, large-scale translations of Western mathematics, astronomy, and related fields were undertaken, exerting a profound influence on Chinese literati.

The Kangxi era (1662–1722) experienced a second wave of Western learning following the late Ming period. Driven by the anti-Christian campaign led by Yang Guangxian (楊光先, 1597–1669), the Kangxi Emperor personally sought to acquire Western knowledge from missionaries, ordered the compilation of books on mathematics, astronomy, and music, and initiated national map surveying. Kangxi's curiosity about Western learning was unmatched among Qing emperors. Through regular study of European scientific topics, he enhanced his academic status as a Manchu. On several occasions, he criticized the mathematical skills of the Han literati. His interest in science was not only personal but also a strategic political move. He even appointed his third son, Prince Yinzhi (胤祉, 1677–1732), to supervise the compilation of mathematical works under imperial control.

With the Kangxi Emperor's support, a group of missionaries assisted in translating astronomical and mathematical works. Building on these efforts, Chinese literati compiled the mathematical encyclopedia *Yuzhi Shuli jingyun* (御制數理精蘊, *Imperially Commissioned Basic Mathematical Principles*, first printed in copper movable type, 1722). Over the past four decades, I have analyzed the Western origins of the mathematical knowledge introduced to



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China during the Kangxi reign, as well as the essential roles played by the Kangxi Emperor, missionaries, and Qing mathematicians. I also elaborated on the impact of these developments during the Qing dynasty. The research was based on mathematical manuscripts from the Kangxi era held in the National Library of China, the Palace Museum in Beijing, and the Institute for the History of Natural Sciences at the Chinese Academy of Sciences.

From 1993 on, I had the opportunity to visit Europe and Japan multiple times, conducting further systematic research on Kangxi-era mathematical manuscripts kept in Paris, Lyon, Rome, and Sendai (Japan). Additionally, I have been increasingly focusing on the social, political, and religious contexts of this mathematical transmission, adopting a global historical perspective. This article, based upon previous research and Chinese archival materials discovered in Rome, as well as official sources, Manchu memorials, and the collected writings of Qing literati, will reconstruct the activities of the *Suanxueguan* (算學館, Academy of Mathematics) at the *Mengyangzhai* (蒙養齋, Studio for the Cultivation of the Youth) and its connection to the grand celebration of Kangxi's sixtieth birthday in 1713.¹ It aims to highlight the role of Jesuit missionaries in the translation of mathematical books and to deepen understanding of the compilation process of the *Shuli jingyun* within a global and historical context.

2. From the Yang Guangxian's Anti-Christian Case to Mathematical Activities Around 1690

In the third year of Kangxi's reign (1664), when Kangxi was 10 years old, with support from the Four Regents, Yang Guangxian launched an attack against Johann Adam Schall von Bell (湯若望, 1592–1666). The following year, Schall was dismissed from his position as director of the Imperial Astronomical Bureau, and five Christian astronomers from this bureau were executed. In 1668, due to a calendar issue, Kangxi sent officials to the Jesuit church to consult with missionaries, which led to a debate between Ferdinand Verbiest (南懷仁, 1623–1688) and Chinese astronomers over the measurement of the sun's shadow. Verbiest succeeded because of the accuracy of his predictions. Witnessing the debate made a strong impression on the young Kangxi. He lamented that no one in the entire court understood calendrical science and felt deep regret in his heart. He said, "If I do not understand mathematics and astronomy myself, how can I judge right from wrong?"² This episode motivated him to study these subjects. In 1668, Kangxi also inquired about Western history and culture from the Jesuits. Lodovico Buglio (利類思, 1606–1682), Gabriel de Magalhães (安文思, 1610–1677), and Verbiest compiled the *Yulan Xifang yaoji* (御覽西方要紀, *Imperially Commissioned Essentials of the West*) for his reference.

After the astronomical debate concluded, the emperor began to pay attention to Jesuit missionaries skilled in mathematics and recruited them to serve at the imperial court. In 1669, Claudia Filippo Grimaldi (閔明我, 1638–1712) arrived in Guangzhou, and in 1671, he was summoned to Beijing, where he worked at the Astronomical Bureau the following year. Tomás Pereira (徐日昇, 1645–1708), a Portuguese Jesuit who studied in Coimbra, left Lisbon in 1666, traveled to Goa, India, and arrived in Macao in 1672 (Dehergne 1973, p. 200). The following year, he reached Beijing and assisted Verbiest with calendrical matters.

In the 1670s, Kangxi studied with Verbiest Euclidean geometry, geography, as well as philosophy and logic included in *Qionglixue* (*The Science of Investigating Principles*, 窮理學). However, being still young, Kangxi had not yet fully grasped these subjects. At that time, the number of Jesuits in China was minimal, and on 15 August 1678, Verbiest, fearing this would threaten the mission, wrote an appeal to European Jesuits. This letter, printed on woodblocks for distribution in Europe, called for more Jesuits to be sent to China.

During this period, Kangxi frequently inquired about the presence of missionaries skilled in mathematics and medicine. In 1685, as Verbiest, having grown older and weaker,

was unable to perform his duties at the Astronomical Bureau, he recommended Antoine Thomas (安多, 1644–1709), a Jesuit in Macao, as his replacement. In response, Kangxi called Verbiest, Pereira, and Grimaldi to the palace, appointing Grimaldi as imperial envoy to Macao to escort Antoine Thomas to Beijing. Thomas, who had taught mathematics at the College of Coimbra and authored the *Synopsis Mathematica* (Douai, 1685) to provide Jesuits with essential mathematical and astronomical knowledge for evangelization in China, arrived in Beijing in 1685 (Bosmans 1924, 1926; Thomaz de Bossierre 1977; Golvers 2013, 2014, 2017). He was later appointed Kangxi's tutor in mathematics and astronomy and took charge of the Astronomical Bureau.

In response to Verbiest's appeal, King Louis XIV of France sent Jean de Fontaney (洪若, 1643–1710), Joachim Bouvet (白晉, 1656–1730), Jean-François Gerbillon (張誠, 1654–1707), and other “King's Mathematicians” to China (Gatty 1963; Landry-Deron 2001, 2002). Their mission, in the interest of France and the king's glory, was to preach the Christian doctrines in China, conduct astronomical and meteorological observations, and study Chinese sciences and technology. They brought thirty cases of scientific instruments and books, gifts from the French king, Duke du Maine, and the Royal Academy of Sciences. To avoid conflict with the Portuguese padroado, they traveled through Siam and Ningbo, arriving in Beijing on 7 February 1688. On 22 March, Kangxi held an audience with the “King's mathematicians” in the *Qianqing gong* (乾清宮, Hall of Heavenly Purity), where he graciously offered them tea. Joachim Bouvet and Jean-François Gerbillon were invited to stay in Beijing to serve as imperial tutors, teaching the emperor European mathematics and anatomy. From then on, the French Jesuits played a significant role in introducing mathematical and astronomical knowledge during the Kangxi era.

Starting in late 1689, Joachim Bouvet, Jean-François Gerbillon, Tomás Pereira, and Antoine Thomas were regularly called to the imperial court, where they systematically taught the Kangxi Emperor mathematics (Landry-Deron 1995). In March 1690, Gerbillon and Bouvet started to translate the *Eléments de géométrie* by Ignace-Gaston Pardies (1636–1673), a Jesuit mathematician and professor at the Collège de Clermont. This book became Kangxi's geometry textbook and was translated not only into Manchu but also into Chinese. The Chinese version was later included in the *Shuli jingyun* (Han 1997a). Meanwhile, Antoine Thomas translated his *Synopsis Mathematica* into Chinese under the title *Suanfa zuanyao zonggang* (算法纂要總綱, *General Compendium of Mathematical Methods*), along with the *Jiegenfang suanfa* (借根方算法, *Mathematical Methods of the Borrowed Root and Its Powers*), an algebra textbook. The former covered rules for addition, subtraction, multiplication, and division, as well as proportions, square and cube root extractions, and geometric topics like volume calculations. The latter was the first translation into Chinese of a work on Western algebra, explaining algebraic operations and methods for solving equations. To aid in teaching, the missionaries employed mathematical tools such as calculators, Napier's rods, proportional compasses, and solid geometry models. They even designed a specialized mathematics study desk for Kangxi, which is still held at the Palace Museum in Beijing.

After a period of rigorous study, Kangxi's scientific skills advanced significantly. On the fourth day of the first month in the thirty-first year of his reign (20 February 1692), Kangxi called together the Grand Secretaries and Manchu-Han ministers to the *Qianqing men* (乾清門, Gate of Heavenly Purity). There, he personally discussed with them issues related to music, the calendar, the problem of π , and predicted the gnomon's shadow at noon. Topics covered include mathematics, astronomy, and water flow calculations. The event was recorded in official documents as well as in personal writings. For example, Wang Xi (王熙, 1628–1703) mentioned that Kangxi asked a mathematician skilled in the *Nine Chapters* to demonstrate methods before him. This mathematician, named Fang Zhengzhu

(方正珠), was the grandson of early Qing thinker Fang Yizhi (方以智, 1611–1671) and the son of mathematician Fang Zhongtong (方中通, 1634–1698). Kangxi's actions left a lasting impression on his ministers, who admired him but also felt a subtle pressure. They advised him to compile treatises on music and calendrical science for future generations. Politics drove Kangxi's display: it was a chance to impress his ministers and showcase the talents of the Manchu ruler. Notably, systematic education in mathematics and calendar science provided by Jesuits over the past two years enabled Kangxi to incorporate European knowledge into this impressive display (Han 2014, p. 1220). However, due to a shortage of talented mathematicians, the planned reforms in calendrical science could not be implemented. At that time, besides Mei Wending (梅文鼎, 1633–1721), the most famous mathematician in the Qing dynasty, there were no other skilled mathematicians. Additionally, in the years after 1692, Kangxi was busy with his campaign against Galdan, which temporarily halted his mathematical pursuits.

In 1699 and 1701, Joachim Bouvet and Jean de Fontaney returned separately from France, bringing more than twenty Jesuits, including Dominique Parrenin (巴多明, 1665–1741) and Pierre Jartoux (杜德美, 1669–1720). Additionally, missionaries from other countries arrived in Beijing to serve at court, which once again sparked Kangxi's interest in calendrical science. Kangxi's enthusiasm for Western learning had a profound influence on the scholar-officials around him. In 1702, Li Guangdi (李光地, 1642–1718), who was the governor then, seeking to please the emperor, presented to him Mei Wending's *Lixue yiwèn* (曆學疑問, *Doubts on Calendrical Science*). In 1703, Kangxi presented Li Guangdi with the newly completed Chinese version of *Elémens de Géométrie*, entitled *Jihe yuanben* (几何原本) and the *Suanfa yuanben* (算法原本, *Elements of Mathematical Methods*; i.e., the seventh volume of Euclid's *Elements of Geometry*). In the same year, he also composed a scientific treatise entitled *Yuzhi Sanjiaoxing tuisuan falun* (御制三角形推算法論, *Imperially Composed Treatise on the Derivation of Triangles*), in which he first proposed the theory that Western learning originated in China. That same year, Li Guangdi invited Mei Wending to Baoding to teach mathematics to his students. During his term as Governor of Zhili from 1698 to 1705, Li Guangdi promoted the study of classics and mathematics, gathering talented students such as Wei Tingzhen (魏廷禎, 1669–1756), Wang Lansheng (王兰生, 1679–1737), Wang Zhirui (王之銳, 1675–1753), Chen Wance (陳萬策, 1674–1734), and Xu Yongxi (徐用錫, 1657–1736), all of whom were well-versed in Neo-Confucianism and had deep knowledge of mathematics, astronomy, and musical temperaments. Li Zhonglun (李鍾倫, 1663–1706), Li Guangdi's son, and Mei Juecheng (梅穀成, 1681–1763), Mei Wending's grandson, also came to Baoding to study mathematical science under Mei Wending (Han 1997b). The successful cultivation of young mathematicians laid the foundation for Kangxi's later scientific enterprise. In 1705, Mei Wending was received by Kangxi in Dezhou to discuss mathematics—an event widely celebrated and highly influential in academic circles, which undoubtedly contributed to the advancement of the mathematical sciences.

The Kangxi Emperor also placed strong emphasis on educating his sons, requiring them, from a young age, to learn both Manchu and Chinese, as well as the Four Books and Five Classics, poetry, calligraphy, painting, and music. He trained them in horsemanship, archery, and firearms, and was especially eager to develop their scientific skills by prioritizing scientific instruction. For princes who showed talent and interest in mathematics, he not only personally tutored them but also sometimes assigned Jesuits as teachers. When he discovered that his third son, Yinzhi, possessed exceptional scientific talent and other admirable qualities, Kangxi began instructing him in the principles of geometry. Around 1690, Yinzhi began learning Western scientific knowledge, with Jean-François Gerbillon and Antoine Thomas serving as his mathematics tutors, guiding him in geometry and arithmetic. Beyond mathematics, Kangxi personally led his young sons in observing

solar eclipses inside the palace. Later, he also arranged for his fifteenth son, Yinwu (胤禩, 1693–1731), and his sixteenth son, Yinlu (胤祿, 1695–1767), to study musical temperament together with Yinzhi under the Italian missionary Teodorico Pedrini (德理格, 1671–1746).

3. Establishment of the Academy of Mathematics

The fifty-second year of Kangxi's reign (1713) was significant in the history of science. On the eighteenth day of the third month, a grand celebration marked Kangxi's sixtieth birthday. From the *Changchun yuan* (暢春園, Villa of Everlasting Spring) to the Forbidden City, the street was decorated with lanterns and banners carrying congratulatory slogans. The festival included many ceremonies, such as granting favors, celebrations, and banquets. Not only did imperial princes, ministers, and officials from the *Nanshufang* (南書房, The Southern Study) and *Wuying dian* (武英殿, The Hall of Martial Valor) attend, but also approximately twenty mathematicians from the Studio for the Cultivation of Youth, along with officials from the Astronomical Bureau, such as Zang Jide (臧積德), He Junxi (何君錫), and Liu Yikui (劉一葵), attended. Interestingly, Jesuits Kilian Stumpf (紀理安, 1655–1720), José Soares (蘇霖, 1656–1736), Joachim Bouvet, and Dominique Parrenin also participated in the birthday events, presenting gifts to Kangxi, including a box of calculating rods, a large set of compasses, a small set of compasses, as well as red wine, which was favored by Kangxi, and various Western medicines, such as cinchona bark that had previously cured the emperor's malaria. The Astronomical Bureau presented the Kangxi *Perpetual Calendar* along with a complete set of mathematical tables for extracting cube roots. The ministers' gifts mainly included paintings, porcelain, silk, rare books from the Song and Ming dynasties, vessels, the Four Treasures of the Study, and some European scientific instruments.

The Studio for the Cultivation of the Youth was likely established around 1711–1712. However, the official founding of the Academy of Mathematics at the Studio occurred on the twentieth day of the ninth month in the fifty-second year of Kangxi's reign,³ as also detailed by Wang Lansheng. The purpose of establishing the Academy of Mathematics was to translate Western mathematical books and to compile the *Lüli yuanyuan* (律曆淵源, *Origin of Pitchpipes and Calendar*), which includes three books entitled *Shuli jingyun*, *Qinruo lishu* (欽若曆書, *Imperial Commissioned Calendrical System*), and *Lülü zhengyi* (律呂正義, *Exact Meaning of Pitchpipes*). From the emperor's serious studies around 1690 to the actual reform of calendrical science in 1713, more than twenty years of preparation had passed.

The establishment of the Academy of Mathematics was directly connected to the French Royal Academy of Sciences, which was then translated as the *Gewu qiongli yuan* (格物窮理院, Academy for the Investigation of Things and Exhaustion of Principles). Joachim Bouvet, a corresponding member of the Academy, and Jean-François Foucquet (傅聖澤, 1665–1741) introduced the Academy and its scientific work to the Kangxi Emperor. The Chinese astronomers conducted astronomical observations to determine the obliquity of the ecliptic at the Villa of Everlasting Spring, as well as nationwide map surveying in different provinces under the guidance of the missionaries—activities similar to those of the Royal Academy of Sciences. The Academy of Mathematics gathered a group of missionaries to translate and compile mathematical and astronomical books. In addition, the court issued an edict requiring local authorities to send young scholars skilled in mathematics and music to the capital for testing. About 300 candidates were sent to Beijing, and 72 were ultimately chosen.⁴ Renowned scholars, such as Fang Bao (方苞, 1668–1749), were also recruited into the academy. Since Yinzhi demonstrated significant talent in calendrical science, Kangxi appointed him to oversee the work. Yinzhi regularly submitted progress reports to Kangxi, and his efforts were crucial to the completion of the *Lüli yuanyuan*. Additionally, some scholars involved in compiling the *Gujin tushu jicheng* (古今圖書集成, *Com-*

plete Collection of Illustrations and Writings from the Earliest to the Present) also contributed to the *Lüli yuanyuan*, all under the patronage of Yinzhi.

At the same time, Li Guangdi, striving to meet the emperor's expectations, trained a group of young scholars under the guidance of Mei Wending. These scholars were later chosen to serve at the Academy of Mathematics and worked on compiling mathematical works. Chen Houyao (陳厚耀, 1648–1722) of Taizhou, recommended by Li Guangdi, was later appointed as vice president of the Imperial Academy (國子監司業) and contributed to the compilation of the *Shuli jingyun*. Recommended by Li Guangdi, Wang Lansheng and Mei Juecheng were later awarded the title of *juren*, and exceptionally permitted to take part in the palace examination. In 1713, Wang Lansheng played a significant role in proposing to the Kangxi Emperor to compile a treatise on mathematics and music, while Mei Juecheng later became the chief editor of mathematical works. The special policy of permitting those skilled in mathematical and calendrical sciences to participate in the metropolitan and palace exams showed Kangxi's high regard for science. He Guozong (何國宗, 1687–1766), from a family of officials at the Astronomical Bureau, received personal instruction from Kangxi, became a *jinshi* in 1712, and was later appointed as a compiler at the Hanlin Academy. The following year, he was assigned to compile the *Lüli yuanyuan*. Gu Chenxu (顧陳埏, 1678–1747), among others at the Academy of Mathematics, would later take on essential roles (Han 2015).⁵

From Manchu memorials dating back to around 1712, Kangxi developed a strong interest in mathematics. During this period, he also instructed Joachim Bouvet to study the *Yijing* (Book of Changes, 易經) and expressed interest in Cheng Dawei's (程大位, 1533–1606) *Suanfa tongzong* (General Source of Computational Methods, 算法統宗), directing officials Hesu (和素) and Li Guoping (李國屏) to review it, and stating, "This book is useful" and "it is excellent."⁶ News of Kangxi's praise for this work, once it spread from the palace, led to its reprinting by Cheng Dawei's grandson.

In addition, Kangxi personally lectured on the Chinese version of *Elémens de géométrie*, the *Elements of Mathematical Methods*, and topics such as measurement, trigonometry, and the Gougu (勾股) theorem (i.e., the Pythagorean theorem). His teaching was very practical and effective. Xu Tianjue's (徐天爵) son, after only two months of study, had mastered "all the difficult calculations in various disciplines," leading Xu Tianjue to praise the emperor, saying, "His Majesty must surely possess a secret method for teaching with such clarity and simplicity."⁷ Those who attended these lectures were young scholars.

4. The Jesuits' Activities Around the Establishment of the Academy of Mathematics

Around 1713, Jesuits such as Kilian Stumpf, Pierre Jartoux, Jean-François Foucquet, Franz Thilisch (楊秉義, 1670–1716), Luigi Gonzaga (孔祿食, 1673–1718), Karl Slaviček (顏嘉樂, 1678–1735), and Dominique Parrenin were frequently called upon to help compile mathematical tables and explain their principles, which demonstrated the Kangxi emperor's strong interest in mathematics. Several of these mathematical tables still exist today, in Beijing, Paris, Lyon, and Rome. Additionally, Matteo Ripa (馬國賢, 1682–1746) and Teodorico Pedrini were involved in copperplate engraving and music around the same time.

Kilian Stumpf was summoned to court by Kangxi, who had heard of his intelligence, and arrived in Beijing in 1695. Skilled in optics and instruments, he established a glass factory and produced the first colored glassware at court in 1697. Starting in 1700, Portuguese Jesuit José Soares suggested to Kangxi that Chinese students should be taught astronomy at the Astronomical Bureau, with Soares and Stumpf serving as instructors. Between 1705 and 1720, Stumpf managed church affairs and represented the interests of the Portuguese

Jesuits. In 1711, he succeeded Grimaldi as director of the Astronomical Bureau, focusing on calculating solar positions and compiling astronomical tables until his retirement due to illness in 1719.

Pierre Jartoux, who had a strong scientific background and a keen interest in mathematics, arrived in China in 1701 and frequently appeared at the court. He lectured on mathematics to Kangxi and his sons, translated mathematical works, and assisted with map surveying and the compilation of the Imperial Atlas of China. Between 1713 and 1720, during the compilation of the *Shuli jingyun*, Jartoux shared with Mei Juecheng, Ming Antu (明安圖, 1692?–1763?), and others at the Academy of Mathematics three infinite series formulas by Isaac Newton and James Gregory, known as “Jartoux’s Three Methods.” Mei Juecheng included Jartoux’s methods in the appendix *Chishui Yizhen* (赤水遺珍, *Pearls Lost in the Red River*, 1745) of the *Meishi congshu jiyao* (梅氏叢書輯要, *Essentials of Mei’s Mathematical Collection*), calling them “quick methods for looking for precise lü for the circumference and the diameter” (求周徑密率捷法) and “quick methods for calculating chord and arrow (of a segment of circle)” (求弦矢捷法), providing new algorithms for calculating π and trigonometric values (Martzloff 1997). Pierre Jartoux possessed a deep understanding of the development of calculus in Europe, and Jean de Fontaney praised his mastery of analysis, algebra, mechanics, and horology.⁸ This praise coincided with Jartoux’s activities in China. He also corresponded with Leibniz (Widmaier 1990). Although spreading science was not his primary goal, the mathematical knowledge he introduced attracted the attention of Qing mathematicians, who built on his work and achieved new results in infinite series expansions, marking an important chapter in Qing mathematics history.

Having previously been a mathematics professor at the Jesuit College in La Flèche, Jean-François Foucquet arrived in China in 1699. He initially spent a year and a half in Fujian, followed by eleven years in Jiangxi, where he studied Chinese texts, read the Five Classics, and especially focused on the *Book of Changes* (Witek 1982). In 1711, on Bouvet’s recommendation and by imperial order, he arrived in Beijing on August 7 to study the *Book of Changes*. Bouvet had previously studied it, but from 1711, Kangxi gradually lost interest in Bouvet’s research and shifted his focus to calendrical works. On Jartoux’s suggestion, Foucquet began teaching and translating European mathematics and astronomy for the emperor. Previously, Antoine Thomas had introduced the method of the borrowed root and its powers, a kind of algebra. Starting in 1712, Foucquet began teaching the *A-er-ra-ba-la xinfa* (阿爾熱巴拉新法, *New Method of Algebra*), a sort of symbolic algebra (Jami 1986). Archival documents mention Foucquet’s translation of symbolic algebra, and Wang Dao-hua (王道化) from the Imperial Household told Stumpf: “On the eighteenth day of the tenth month, an imperial edict was issued: ‘Regarding the new algebra, I sent an edict from Rehe, originally instructing all Westerners to revise it together. Why is it that only Foucquet has worked on it alone? Pass this on to all Westerners and have them work on it together, though Foucquet may explain it in Chinese. It must be completed quickly. Respect this.’”⁹ In letters from Hesu and Li Guoping to Foucquet, Parrenin, and Jartoux, the symbolic algebra is specifically mentioned, along with a decree from the third prince Yinzhi requiring missionaries to send all European algebraic books to the Hall of Martial Valor—clearly an imperial order from the Kangxi Emperor.

Hesu, Li Guoping, and Wang Daohua were officials from the Imperial Household responsible for coordinating with missionaries. These events took place between 1712 and 1713. The new algebra mentioned here refers to the *New Method of Algebra*, whose manuscript is now kept in the Vatican Library. This was the first Chinese book to introduce symbolic algebra. However, Kangxi did not recognize the true value of symbolic algebra; instead, he remarked that Foucquet’s “mathematics skills are just so-so” (算法平平尔)¹⁰ and as a result, this work was neither published nor widely circulated.

Additionally, starting on the fifth day of the sixth month in the fifty-second year of Kangxi's reign (26 July 1713), Luigi Gonzaga contributed to the compilation of the *Shubiao genyuan* (數表根源, *Origins of Mathematical Tables*). Gonzaga, an Italian Jesuit, arrived in Macao in 1707, was appointed as a mathematician to serve at the Qing court in 1708. However, he was not particularly skilled at mathematics. Officials from the Imperial Household thought he was irritable and acted without thinking things through, and considered him unsuitable for the role. As a result, all the Westerners were called together for consultation, and a report was prepared for the emperor. Stumpf then gathered Franz Thilisch, Jean-François Foucquet, Pierre Jartoux, and others to help compile the relevant works on numerical tables.¹¹ In 1713, Hesu and Li Guoping repeatedly wrote to Stumpf, Foucquet, Thilisch, and Jartoux, urging them to complete the translation of the *Shubiao wenda* (數表問答, *Questions and Answers on Mathematical Tables*) for presentation to the Kangxi Emperor (Han 2007). This work clearly referred to methods for calculating logarithmic tables. They also completed the *Yuzhi Shubiao jingxiang* (御制數表精詳, *Imperially Commissioned Accurate and Detailed Mathematical Tables*), the *Shubiao* (數表, *Mathematical Tables*), and the *Duishu chanwei* (對數闡微, *Explanation of Logarithms*). *Duishu chanwei* was essentially a table of common logarithms, which was later included in the *Shuli jingyun*.

Between 1714 and late 1716, additional works were compiled, including the *Duishu guangyun* (對數廣運, *Extended Application of Logarithms*) and various other tables, such as logarithmic tables for sines, tangents, and secants. The creation of these tables was closely linked to astronomical calculations, and some were made smaller for portability. The *Shuli jingyun* introduced methods for constructing logarithmic tables, including those by the English mathematician Henry Briggs (1561–1630) in his *Arithmetica Logarithmica* (1624). The Dutch mathematician Adriaan Vlacq's (1600–1667) *Trigonometria artificialis: sive magnus canon triangulorum logarithmicus* (1633) was also translated into Chinese. The details about the compilation and the scholars involved are not fully clear. However, archival documents reveal the Jesuits' role and the sources used for the logarithms in the *Shuli jingyun*.

Starting in March 1690, the compilation of the Chinese version of *Elémens de géométrie* (*Jihe yuanben*) took considerable time. Even until 1713, Kangxi told Yinzhi, "The *Jihe yuanben* contains many points requiring mutual verification. You must pay the utmost attention to its revision."¹² Kangxi's standards for editing the *Jihe yuanben* were very strict, and he issued a special decree: "If a single error remains in a finished book, what sort of standard is that? Proofread it carefully!"¹³ It was precisely because of Kangxi's diligence and high standard that the *Shuli jingyun* was not published with copper movable type until 1722.

The Jesuit Ignaz Kögler (戴進賢, 1680–1746) might also have joined in the compilation of the mathematical work in later years of the Kangxi reign. He arrived in Macao in 1716. Summoned by the Kangxi Emperor, he traveled with Karl Slaviček (1678–1735) and arrived in Beijing in January of the following year. When he arrived in Beijing, he brought with him astronomical books by the Italian Jesuit Giovanni Battista Riccioli (1598–1671), geometric works by the French Jesuit Claude François Milliet de Chales (1621–1678), René Descartes' (1596–1650) mathematical book, and books on cartography and other calendar calculations. Officials from the Imperial Household Department examined him and found that he was "proficient in various mathematical methods,"¹⁴ and among European missionaries at the time, he seemed most distinguished. During the late Kangxi era, he also introduced mathematics related to algebra. Due to his expertise in astronomy, he worked at the Astronomical Bureau, where he helped with calendar reform using lunisolar tables based on Newton's theory (Han 2018, pp. 202–7).

While Western mathematical works were being compiled, Kangxi also became interested in traditional mathematical classics. The *Zhoubi suanjing* (周髀算經, *The Gnomon of the Zhou [Dynasty]*), the most ancient and important of the *Suanjing shishu* (算經十書, *Ten Math-*

ematical Classics), significantly influenced traditional mathematics, especially its approach to problems related to the *Gougu* theorem. Since Western learning was introduced in the late Ming dynasty, Chinese literati had started studying it. Kangxi had some exposure to this work, though his specific motivations remain unclear. Two points are noteworthy: first, the Jesuits themselves were very interested in this text. Foucquet, for instance, owned a Ming edition and conducted specialized research on it.¹⁵ He even mentioned this book in his correspondence. Foucquet's research likely sparked Kangxi's interest in the *Zhoubi*. Second, Mei Wending discussed the *Zhoubi* in his *Lixue yiwèn* (曆學疑問, *Doubts on Calendrical Science*), and in its supplement, highlighted the antiquity of ancient calendars, arguing for the westward spread of calendrical science. Kangxi read the *Lixue yiwèn* as early as 1702 and was familiar with Mei Wending's ideas. It is also worth noting that the *Shuli jingyun* begins with an "Explanation of the *Zhoubi* Classic," clearly reflecting the editors' intention to present ancient Chinese mathematical works as the foundation of Western learning, with Western methods based on the *Zhoubi suanjing*.

5. Conclusions: The Fate of the Academy of Mathematics

Since the late Ming Dynasty, the spread of Catholicism in China faced many obstacles. The Nanjing anti-Christian Incident (1616) and the anti-Christian campaign led by Yang Guangxian during the early Kangxi period had a profoundly negative impact on the spread of Western learning in China. The Jesuits' work on calendar reform, artillery manufacturing, and the Treaty of Nerchinsk contributed to the issuance of the "Edict of Toleration" in 1692, which promoted the spread of Catholicism. However, the arrival of papal legate Carlo Tommaso Maillard de Tournon (1668–1710) in China in 1705 sparked a major conflict between the Qing court and the Holy See, casting doubt over the future of Catholicism in China.

The papal legate's ban on Chinese Christians' worship of Confucius and ancestors deeply disturbed the Kangxi Emperor. He anticipated ongoing issues caused by Catholicism in China. At the end of 1706, after Xiong Cilü (熊賜履, 1635–1709) and Li Guangdi finished lecturing the emperor on Zhu Xi's (朱熹, 1130–1200) works, Kangxi dismissed the eunuchs, called Li Guangdi and Xiong Cilü over, and said: "Do you know that the Westerners are increasingly mischievous? They are even attacking Confucius! The reason I treat them well is merely to make use of their skills. Their calendrical science is truly excellent. You are both knowledgeable; whenever you meet local officials or experts in these matters, you can relay my intentions."¹⁶ Clearly, Kangxi's ongoing employment of Jesuits was driven purely by a desire to "use their skills." (用其技藝) Breaking the missionaries' monopoly and allowing Han Chinese and Manchu to learn calendrical science independently became a key goal in Kangxi's later years—a view shown in some missionary letters.

In response to the conflict caused by the papal legate, Kangxi attempted to communicate with Rome by sending missionaries to obtain a clear response from the Pope. However, since the envoys did not return as expected, Kangxi grew increasingly anxious and often asked the missionaries for "news from the West" (*xiyang xiaoxi*, 西洋消息). Bad weather and the long distance between China and Europe considerably slowed communication between the Holy See and Kangxi; some envoys even died at sea. This information blockade made the Chinese Rites Controversy more complicated. Some missionaries, worried about their mission, sometimes hid news, especially papal decrees that banned the worship of Confucius and ancestors. Over time, this hiding became obvious, leading Kangxi to lose trust in the missionaries. By 1711 at the latest, Kangxi's distrust was evident: "Now what the Westerners said is inconsistent from one time to another; you must be on your guard."¹⁷

However, even in 1716, Kangxi was still issuing the Red Manifesto, attempting once again to communicate with the Pope.

In his later years, Kangxi increasingly believed that the Catholic Church might cause trouble and undermine his rule, and grew wary of the missionaries. However, throughout his life, he remained fascinated by Western mathematics and astronomy, and even in his old age, he requested that the Pope send experts in calendrical science, medicine, and paintings to serve at his court. A double standard clearly marked Kangxi's attitude toward science, skills, and Catholicism. On the one hand, his goal was to learn European mathematical and astronomical methods from the missionaries to promote calendrical reform. As a result, his third son summoned a group of scholars and established the Academy of Mathematics, which operated independently of the Astronomical Bureau, thus freeing calendrical and technical work from missionary control. On the other hand, Kangxi grew increasingly strict against Catholicism, ultimately leading to the ban of Christianity during the reign of the Yongzheng Emperor.

The modernization of science during the Kangxi era was a significant theme, involving both the transmission and reception of Western science. On the one hand, the spread of science was not the Jesuits' main goal; they primarily came to China to spread the Gospel and introduce Catholic doctrine. On the other hand, although the missionaries brought many Western scientific works, these were not widely published because the Kangxi Emperor did not fully grasp them. Therefore, they remained confined to the court and failed to promote the spread of Western science across China. The scientific efforts during the Kangxi era were impressive for a time, but eventually faded away quietly. One reason for this was that, after completing the calendar reform, the Academy of Mathematics no longer existed. When Yongzheng came to power, the fierce struggle for the throne led to the suppression of the third Prince, who was involved in organizing this scientific project. Yinlu, his younger brother, then took his place. Therefore, although many Jesuits arrived during Kangxi's reign, this did not lead to the modernization of Chinese science.

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Notes

- ¹ Based on Chinese sources such as Wang Yuanqi's 王原祁 *Wanshou shengdian chujì* 萬壽盛典初集 (*The First Collection of Kangxi Emperor's [Sixties' Birthday] Grand Ceremony*), Kangxi edition (1715–1716), I analyzed the social and political context of why the Academy of Mathematics was established, and provided a list of mathematicians there. See Han Qi, "A French Model for China: The Paris Academy of Sciences and the Foundation of the *Suanxue guan* (Academy of Mathematics)," paper presented at the 22nd International Congress of History of Sciences held in Beijing in July 2005, <https://www.academia.edu/8139621> (accessed on 10 August 2025), and "1713: A Year of Significance", a talk given at REHSEIS, CNRS in Paris (9 January 2007), <https://www.academia.edu/8278554> (accessed on 10 August 2025). Catherine Jami of CNRS chaired these two talks, took the idea and used

the same source without any acknowledgement, see her book *The Emperor's New Mathematics* (Oxford University Press, 2012), Chapter 12.

- 2 *Tingxun geyan* 庭训格言, Yongzhen edition, pp. 78–79.
- 3 *Shengzu shilu* 圣祖实录 (*The Veritable Record of the Kangxi Emperor*) No. 6, Beijing: Zhonghua shuju 中华书局, 2008, pp. 531–32.
- 4 Biography of Gu Chenxu, in Huang Zhongjun 黄鍾骏 ed., *Chouren zhuan sibian* 畴人传四编, juan 7, edition of *Liu youyu zhai congshu* 留有餘齋叢書, p. 14. Before 1713, besides those recruited through exams, Yang Wenyan (楊文言, 1652–1711) of Wujin, Jiangsu, who was well-versed in both general scholarship and astronomy, was recommended by Chen Menglei (陳夢雷, 1650–1741) and served directly under the auspices of the third Prince.
- 5 On a complete list of mathematicians at the Academy of Mathematics, see (Han 2018, p. 77).
- 6 *Kangxi chao Manwen zhupi zouzhe quanyi* 康熙朝滿文朱批奏折全譯 (*The Complete Translation of Manchu Memorials during the Kangxi Reign*), 1996. Beijing: Zhongguo shehui kexue chubanshe 中國社會科學出版社, pp. 805–6.
- 7 *Kangxi chao Manwen zhupi zouzhe quanyi* 康熙朝滿文朱批奏折全譯, p. 806.
- 8 See Jean de Fontaney's letter to Fr. La Chaise dated 15 January 1704, in *Lettres édifiantes et curieuses, écrites des missions étrangères, par quelques missionnaires de la Compagnie de Jésus* (Paris: Chez Nicolas le Clerc, 1708), Tome VIII, p. 88.
- 9 Biblioteca Apostolica Vaticana, Borgia Cinese 439.
- 10 *Zhongguo diyi lishi danganguan* 中国第一历史档案馆 ed., *Qing qianqi xiyang Tianzhu jiao zaihua huodong dangan shiliao* 清中前期西洋天主教在华活动档案史料, vol. 1, Beijing: Zhonghua shuju 中华书局, 2003, p. 52.
- 11 See note 9.
- 12 *Kangxi chao Manwen zhupi zouzhe quanyi* 康熙朝滿文朱批奏折全譯, p. 914.
- 13 *Kangxi chao Manwen zhupi zouzhe quanyi* 康熙朝滿文朱批奏折全譯, pp. 918–19.
- 14 *Kangxi chao Manwen zhupi zouzhe quanyi* 康熙朝滿文朱批奏折全譯, p. 1160.
- 15 This Ming edition is now housed in the British Library, featuring numerous marginal notes.
- 16 Li Guangdi 李光地, *Rongcun yulu xuji* 榕村语录续集, juan 6.
- 17 *Kangxi chao Manwen zhupi zouzhe quanyi* 康熙朝滿文朱批奏折全譯, p. 741.

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