Catherine Jami

The Emperor's New Mathematics: Western Learning and Imperial Authority during the Kangxi Reign (1662-1722). Oxford; New York: Oxford University Press, 2012.
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This densely written and subtly argued monograph represents the culmination of the author's decades-long effort to reconstruct the fortunes of "Western learning" in the closing decades of the Han Chinese Ming dynasty and the first century or so of the Manchu Qing dynasty, China's last. Jami's narrative of how early modern Jesuit mathematical cultures were transformed and how they transformed, in turn, the mathematical cultures of late imperial China opens with a rapid survey of both in the sixteenth century. She then synthesizes recent scholarship on the convergence of these mathematical traditions in the various works produced in the early 1600s by a number of Jesuit missionaries—Matteo Ricci (1552–1610), Giulio Aleni (1582–1649), and Sabatino de Ursis (1575–1620), among others—in collaboration with the prominent scholar-officials and Christian converts Xu Guangqi (1562–1633) and Li Zhizao (1565–1630). Based for the most part on mathematical textbooks written by Christopher Clavius (1538–1612), who had taught several of the missionaries at the Society's Collegio Romano, these texts were initially linked to others drawn from Jesuit sources, notably the Aristotelian commentaries produced at the Society's college in Coimbra.

Ironically, Li's and Xu's efforts to raise their foreign co-religionists' visibility by drawing them into a matter of statecraft (calendrical reform) spelled the sundering of this "heavenly learning." Their successors, including Johann Schreck (1576–1630), Giacomo Rho (1592–1638), Johann Adam Schall von Bell (1592–1666), and Ferdinand Verbiest (1623–1688), helped ensure that the reputation of what would come to be known as "Western learning" survived the dynastic transition in 1644 with new luster, but largely understood as mathematical and technical, not philosophical and metaphysical.

The most striking feature of Jami's account of this initial period is the attention paid to how Jesuit mathematical activity elicited all sorts of local interest (not always positive) and recognition (not always desired), be it from the surviving Southern Ming court, a regional warlord, or China's new Manchu masters; scholar-officials and the Jesuits' Muslim and Chinese competitors at the imperial Astronomical Bureau; and literati networks, especially in the Jiangnan area. Jami points to an especially significant turning point with scholars in this last category: they typically came to know "Western learning" through an encounter with Jesuit texts, not through a direct student-teacher relationship with a Jesuit master. The import of these different modes of engagement

becomes clear in part two, which centers on the Kangxi emperor's early investment in Jesuit mathematics. The emperor not only intervened on the Jesuits' behalf in the mid-1660s when they and their fellow Christians at the Astronomical Bureau stood accused of astronomical incompetence, astrological miscalculation, and unwarranted innovation; he also took Verbiest and others on as imperial tutors, a personal monopoly on a distinctive expertise that he deftly deployed to affirm his authority at the expense of his officials as well as the Chinese astronomical traditions they sought to uphold. A chapter on the provincial scholar Mei Wending (1633–1721) sketches a sharply contrasting picture. Thanks to his connections to various Jiangnan scholars, Mei added Jesuit manuscript texts on mathematics and astronomy to his reading of Chinese works on related topics. Analyzing Mei's collection of some of his own writings, Jami highlights the syncretic approach he took in integrating Western mathematical concepts and techniques into Chinese scholarly practices, historical narratives, and philosophical traditions.

Parts three and four work together to trace the Kangxi emperor's evolving engagement with "Western learning." Part three explores the depth of his immersion in lessons taught by his Jesuit tutors, from Verbiest in the 1670s to Tomás Pereira (1646–1708), Joachim Bouvet (1656–1730), Jean-François Gerbillon (1654–1707), and Antoine Thomas (1644–1709) in the 1690s. The textual evidence of these sometimes intensive sessions—the collaborative product of Jesuit writing and imperial editing—covered a range of topics that early modern Europeans would have considered pure and "mixed" mathematics (arithmetic, Euclidean geometry, logarithms, algebra, ballistics, horology, surveying and, of course, astronomy, to name a few). Yet Jami's concern is with other kinds of diversity evident in the emperor's Jesuit tutors, especially their conflicting political allegiances to the Portuguese *padroado*, the papacy, and the French Bourbon kings, as well as their competing intellectual affiliations to the mathematical textbook tradition established nearly a century earlier by Clavius, on the one hand, and more recent scientific approaches espoused by scholars working within the orbit of the Parisian Académie royale des sciences on the other.

The concluding chapter in part three characterizes "astronomy in the capital" in the critical period of the early 1690s, when the Kangxi emperor used his mastery of "Western learning" to hold his Jesuit experts and other officials and subjects, including the Jiangnan scholar Mei Wending, in a fragile balance. The Kangxi emperor's deliberate tipping of that balance is the subject of part four, which traces his move away from Jesuit mathematical specialists and towards indigenous constituencies whose mathematical expertise he had previously dismissed, notably the Chinese scholar-official and patron of mathematics

Li Guangdi (1642–1718), and Mei Wending. The shifting sands of imperial favor were due in part to the political and doctrinal tremors that shook Catholic China with increasing frequency at century's end, but Jami also points to the destabilizing problem of dynastic succession. These two factors intersected dramatically in 1711, when the Kangxi emperor's detection of an apparent inaccuracy in the Astronomical Bureau's calculation for the summer solstice seems to have moved him to call on the Jesuits to provide texts on "the principles of astronomy" similar to those his Jesuit tutors had prepared on other topics, but also to order his third son, Yinzhi (1677–1732), to establish and supervise an Office of Mathematics charged with the editing of mathematical works composed under imperial supervision. Efforts by Jean-François Foucquet (1665–1741) to satisfy the emperor's request indicate how complicated the field of mathematical expertise had become. If Foucquet thought that his corrections of the Tychonian astronomy in use at the Astronomical Bureau would both anticipate Yinzhi's criticisms and lay firmer foundations for a renewed Jesuit monopoly on imperial astronomy, his fellow Jesuits disagreed, revealing continuing tension between the Portuguese and French sides of the mission, a lack of tactical consensus, and concern over Foucquet's admittedly idiosyncratic attempts to detect traces of Christian doctrine in classical Chinese texts.

In the end, it was the newly established Office of Mathematics, staffed by Chinese scholars (mostly protégés of Li Guangdi) and Manchu astronomers associated with the Astronomical Bureau, that would assimilate the texts prepared decades earlier by Jesuit imperial tutors into the "Essence of numbers and their principles imperially composed" [*Yuzhi shuli jingyun*] (1722), an imperially-sponsored mathematical compendium of nearly 4,900 pages printed but a few months before the emperor's death. This editorial project effectively effaced key Jesuit contributions to a mathematical field now thoroughly restructured according to the logic of an imperial ideology, one that expressed the Kangxi emperor's benevolent concern for his subjects' welfare.

A central contribution to the history of mathematics that illuminates its cultural specificity and historical contingency, Jami's study intersects with three distinct literatures: the "new Qing history" and its de-essentialization of "China" as a geopolitical and cultural entity; recent studies of early modern globalization that refuse to equate Western forms of natural inquiry with modernity; and, finally, recent treatments of the Jesuit episode in China that envision cross-cultural encounter as a mutually responsive and transformational process. Jami's intervention in all three of these fields is visible in the book's focus on what she calls a "multiform rulership" (2) suited to controlling the multicultural Qing empire and practiced by the Kangxi emperor, whose reign (1662–1722) provides both the temporal and analytical lens for her study.

Within the Chinese cultural milieu, certain forms of technical expertise and astronomical knowledge had long had important institutional functions within a cosmological scheme linking proper preparation of the annual official calendar to good government. The Kangxi emperor's personal investment in such matters constituted an experiment, one that neither had nor set precedent for how "Western learning" could become a central component of imperial authority. And yet Jami's account of "the emperor's new mathematics" carries considerable import for how we might understand the complexities of how science moves across linguistic, cultural, and political boundaries, unshackled by presumptions about its trajectories.

As Jami remarks, the "Essence of numbers and their principles imperially composed" (1722) has been little studied by historians of mathematics: "it is not ancient, and it does not seem to include 'anything new', i.e. anything that is not found elsewhere in the world mathematical literature of its time"(5). Similar principles of historiographical inclusion and exclusion have governed the study of science and its global development, a phenomenon long taken as a proxy for Westernization and in turn as equivalent to modernization. Jami's careful deconstruction of this text—the textual showpiece of the Kangxi emperor's life-long investment in "Western learning" —in the closing part five of her monograph provides little support for such views. On the contrary, her analysis reveals the work's thoroughly hybrid character, neither European nor Chinese, neither ancient nor modern, neither Jesuit nor lay, but rather a synthesis of many different sources and traditions, all in the service of an imperial form of specialized knowledge. The subtlety of Jami's approach to processes of translation is especially rewarding. On her analysis, translations are always the result of collaboration and dialogue between producers and consumers of texts made to serve a wide range of purposes, a point Jami makes very effectively through the close reading of shifts in emphasis, changes in presentation layout, the transliteration of terms, the use of conceptual equivalents, and the careful collation of manuscript and printed versions of a text to hypothesize stages of composition. Readers will appreciate the many diagrams, tables, and photographs that explicate and illustrate the visual and material aspects of mathematical inscriptions; thanks are also due to the press for providing for footnotes and the inclusion of Chinese characters for technical terms, significant phrases, personal names, and titles of works throughout the main text, bibliography, and extensive index.

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