

What good's a text?

Textuality, orality, and mathematical astronomy in early imperial China

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A debacle

Background

- Han Empire (206 BCE – AD 220) dissolves into civil war and collapses.
 - Three great powers emerge, struggling for military & symbolic supremacy: Cao-Wei (north), Sun-Wu (southeast), & Liu-Shu (southwest)
 - In 222, Sun-Wu lay claim to the cutting edge of *li* “astronomy”—Liu Hong’s (c. 135-210) Supernal Emblem system—a symbolic victory over the other courts.
 - Shortly after, the Cao-Wei astronomical office works to surpass the Supernal Emblem system. After development, testing, and oversight meetings, the court holds a conference to discuss implementation.

The conference of 226

- Han Yi, assistant director of the state astronomical office, presents his astronomical system.
- Liu Hong’s former pupil Xu Yue surprises him with unfavorable test results based on the “real” Supernal Emblem system
- Han Yi is disgraced, reform is tabled.

A debacle

翊於課難徐岳：「乾象消息但可減，不可加。加之無可說，不可用。」岳云：「本術自有消息，受師法，以消息為奇，辭不能改，故列之正法消息。」翊術自疏。

[Han] Yi raised difficulty with Xu Yue over the test results: "The Supernal Emblem's *xiaoxi* can only be subtracted, it cannot be added. If you add it, there is no justification; it cannot be used!"

[Xu] Yue said, "The original method itself has *xiaoxi*; I have received the master method, and it is the *xiaoxi* that makes it astonishing. I am afraid that there is nothing that I could do to improve upon this, thus I have arranged here the proper method of *xiaoxi*."

[Han] Yi backed down (*Book of Jin*, 17.500).

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The legacy of Liu Hong

- We know more about Liu Hong (c. 135-210) than almost any other *li* expert of the period.
- Much of what we know is through Li Chunfeng (602-670), who was impressed with Liu Hong's historical impact—"an exemplar for the calculations of later generations"
- Liu Hong's Supernal Emblem system—how much do we really know?
 - General problems:
 - As text: we can't know how knowledge was produced
 - As tool: we can't know how knowledge was used
 - Specific problems:
 - Abridgment (?): Extant Supernal Emblem system preserved in *Book of Jin* (648) in one *juan* ("roll"); contemporary bibliographies record three- & five-*juan* editions.
 - Extant version omits the "astonishing" *xiaoxi* method (solar equation of center?)
 - Extant version mentions the date 206, though finished & submitted in 189

Framework of the present article

- **Assumption:** the production & circulation of technical knowledge in an ancient pre-print culture would have been quite complex,
 - i.e. astronomical knowledge obviously had an oral component.
- **Problem:** our only testimony is the written word (and we don't have much of that!)
- **Goal:** mine the written word for clues about the unwritten
- **Methodology:** analyze manuscripts on *li* "astronomy," mathematics, and related fields *as artifacts of practice and circulation* and bring this analysis to bear on received accounts of practice.
- **Outline:**
 - Introduction
 - The paleography & codicology of technical MSS
 - The context of the 226 debacle
 - Conclusion

Technical knowledge & MS transmission (summary)

Sources

- *Li* “mathematical astronomy”
 - *Wuxing zhan* (Mawangdui tomb 3, 168 BC): planetary omens, models, & tables
 - Calendars (3rd cent. BC – 6th cent. AD, tomb & administrative contexts)
- Mathematics
 - *Suan shu shu* (Zhangjiashan tomb 247, 186 BC): collected procedures & tables
- Hemerology (schematic calendar divination)
 - *Xingde* A, B, & C (Mawangdui tomb 3, 168 BC)
 - Daybooks (3rd – 2nd cent. BC)

Conclusions:

- Once we leave the “exact sciences,” the arbitrary, culturally-determined nature of knowledge systems makes it difficult to distinguish mistakes from innovations.
- Textual corruption is endemic.
- The quality of handwriting (literacy) does not guarantee the quality of the text (numeracy).
- The majority of mistakes are visual rather than computational.
- As collectors’ items, tomb texts may speak only to *popular* technical cultures.

Towards an oral culture of textual astronomy

The question of orality in early China

- Inspired by developments in anthropology and classics
- Exploration limited to philosophy, literature, and the classics
- Problems:
 - Received literature provides almost no evidence
 - Manuscripts provide *positive* evidence only of “visuality” of textual reproduction

On the oral culture of *li* “mathematical astronomy”

- Never been done
- “Obviously preposterous” due to *li*'s heavy reliance on numbers, tables, & diagrams
- *Li* is the **indoor** and **textual** aspect of the astral sciences, vis-à-vis its observational-interpretive counterpart *tianwen*

Towards an oral culture of textual astronomy

The written word is unreliable

- In a vacuum, the contradiction, corruption, and unstated assumptions of MS sources are extremely confusing
- Huang Yi-long: historians fabricate (ominous) celestial phenomena in their texts, and later experts are sardonically aware of this
- Experts like Han Yi risk staking their reputation on out-of-date editions
- Moral: texts are more hindrance than help *unless you already know what you're doing.*

Wang Fan (3rd cent) on cosmology:

Si l'un soumet (la théorie adoptée par Lu Ji) il l'épreuve des ombres du Soleil, on s'aperçoit que la valeur du rayon céleste est beaucoup trop grande. Or, du fait que cette théorie est très répandue et reproduite dans une multitude d'écrits, les lettrés moyens et ordinaires n'ont pas cherché à en vérifier (l'exactitude). Aussi n'ont-ils jamais osé s'opposer par la critique aux anciens procédés et se sont contentés de suivre ce qui leur était proposé (dans ces ouvrages) (*Kaiyuan zhanjing*, 1.15a–b; tr. Kalinowski 1990).

Towards an oral culture of textual astronomy

How did experts learn mathematical astronomy?

- Collected all mentions of transmission, 3rd cent BC – 3rd cent AD
- Circumstances:
 - Family tradition (Sima Qian, Liu Xin, etc.)
 - School, i.e. imperial academy or private (Zhang Heng, Zheng Xuan, etc.)
 - Tutelage (Empress Dowager Sui, etc.)
 - Exchange between equals (Tian Zhongshu, etc.)
- “Receipt” (*shou*) of knowledge involves geographic proximity, probably the “lecture” (*jiang*) education model common for the classics.
- **Note:** unlike the classics, no one described as picking up mathematical astronomy through reading.

Back to the debacle

Yang Wei's *coup de grâce*:

Now, the fact that Han Yi bases himself on Liu Hong's techniques means that he knows to esteem his techniques and treasure his methods. And yet he dismisses his discourse, forsakes his techniques, abandons his words, and strays from his endeavor. The inevitable result of this will be to make Hong's marvelous model cease to transmit to future ages. If he strays from it knowingly, then he has **intentionally forsaken his master**; if he bases himself upon it unknowingly, then he has **ignorantly arrived at a confused understanding** (*Book of Jin*, 17.503).

Han Yi is probably not stupid:

- He identifies and compensates for a real problem with the Supernal Emblem system—its value for the mean synodic month
- After extensive trials and oversight meetings, he's granted a conference
- Against *our* Supernal Emblem system, on the eclipses of 221-223, Han Yi loses 2 : 3 by a margin of only 10 minutes.

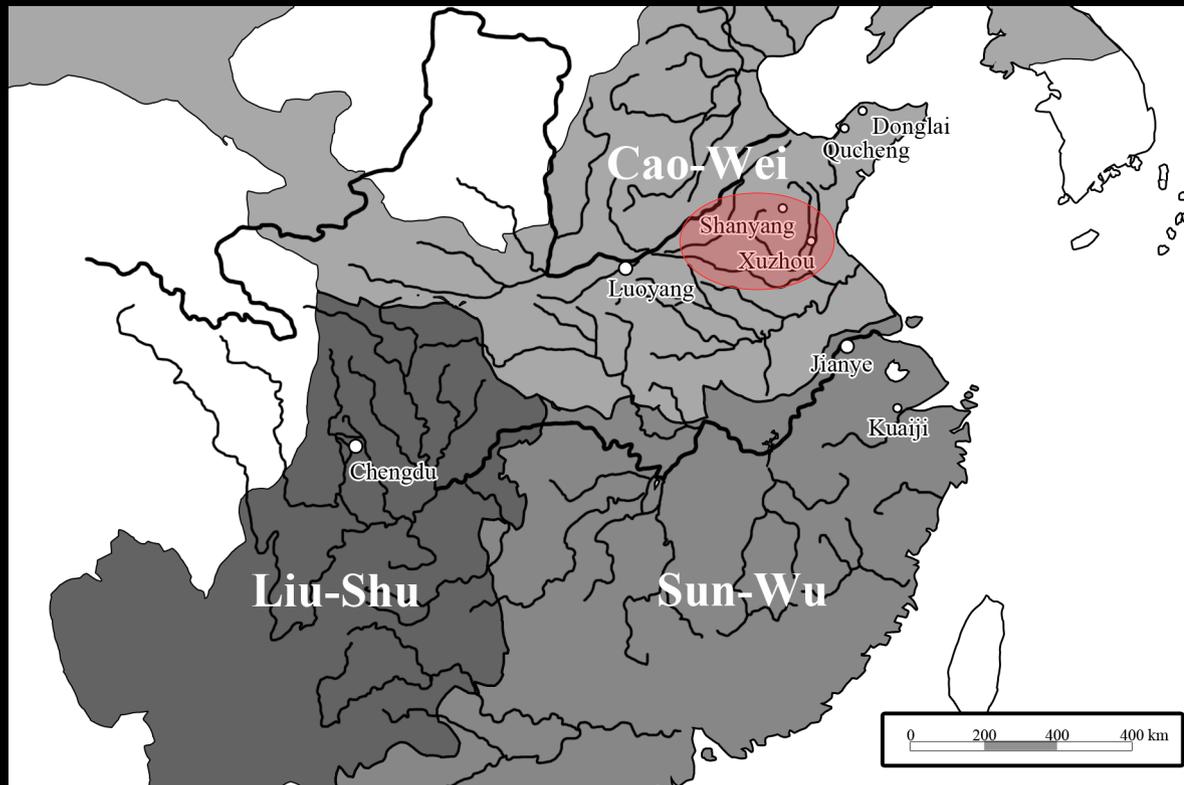
The transmission of Liu Hong's astronomy

What was Han Yi reading?

Xiandi (r. 189–220) Jian'an year 1 (196), **Zheng Xuan** received his method, and considering it to plumb all that is recondite and crown all that is subtle, he further added commentary and explanation to it (*Book of Jin*, 17.498).

The House of Liu were in [the state of] Shu (221–63), where they kept the Han Quarter-remainder system. Prefect of the Palace Writers for the State of Wu, **Kan Ze** (d. 243), received Liu Hong's Supernal Emblem method from **Xu Yue** of Donglai and added exegesis and commentary to it. Regular Palace Attendant **Wang Fan** considered [Liu] Hong's technique marvelous, and he used it to extrapolate the principles of Spherical Heaven [world-model cosmology] to formulate an instrument (armillary sphere) and discourse. Thus it was that the House of Sun used the Supernal Emblem system until the demise of Wu (*Book of Jin*, 17.503).

The transmission of Liu Hong's astronomy



Zheng Xuan (127-200), exegete

Makes sense:

- Zheng had life-long interest in math & astronomy
- Lived within 120 km of Liu in year of transmission
- Exchange between social equals (?)

Weird:

- Extant Supernal Emblem system dates >10 years *after* their exchange
- The Zheng edition soon disappears

The transmission of Liu Hong's astronomy



Xu Yue (??), private citizen

Makes sense:

- Hometown 70 km from Liu's fief

Weird: Taught **Kan Ze** in 230s

- **Kan Ze** only active in Sun-Wu capital region
- Sun-Wu adopted the Supernal Emblem system in 222.
- Transmission across tense state lines
- Liu Hong finished his work in 180 in **Kan Ze's** hometown.

The transmission of Liu Hong's astronomy



Wang Fan (3rd cent), ast. expert

- Expert
- Received Supernal Emblem System from Kan Ze in Sun-Wu.
- Emissary to Liu-Shu between 258-264

Conclusion: Liu-Shu maintained the Quarter-remainder system (86) out of tradition *not* ignorance.

Conclusion

- Result: more questions than answers (hurray!)
- On the sociology of early imperial *li*:
 - Old view: secret hereditary institutions stifled by bureaucracy
 - New view: eclectic characters connected by elaborate, overlapping networks of personal, professional, educational, and family ties extending across institutional, geography, and military divides.
- On the problematics of the written word:
 - Manuscript transmission → variation, Supernal Emblem system**s**
 - Experts tended to evaluate credibility based on experience, peer review, association, and date and reputation of oral instruction

(: merci :)