



福子丹
**Daniel P
Morgan**



The research leading to these results has received funding from the ERC under the EU 7th Framework Programme (FP7/2007-2013) / ERC Grant agreement n. 269804.

Doors Open and Shut
the Bureaucratic Insulation of the Astral Sciences in Imperial China and the First Waves of Foreign Influence

ESHS 7th International Conference
Prague, 22 September 2016

The 'secret' and 'official nature' of astronomy in China

J. Needham (1959), SCC v.3 :

From early times Chinese astronomy had benefited from State support, but the semi-secrecy which it involved was to some extent a disadvantage (193).

N. Sivin (1969), 'Cosmos and Computation':

The sense of cosmos... is safely buried in the very professional systems of the Chinese art's last millennium. But what killed the conviction that astronomy could be physics as well as mathematics? Was it merely the blighting hand of bureaucracy, offering technicians security in a hierarchy which had nothing to gain from theory? Was it... (4).

G.E.R. Lloyd & N. Sivin (2002), *Way and the Word*:

Although the civil service indeed supported major figures in cosmology, it did not on the whole support them as cosmologists (38).



Matteo Ricci (1600):

In China, it is forbidden under pain of death to study mathematics without the king's authorisation, but this law is no longer observed (cit. SCC v.3, 194).

The 'secret' and 'official nature' of astronomy in China

Situation of astronomy *circa* 1600, late-Ming (1368–1644)

1597, scholar Xing Yunlu imprisoned for private practice.

[1368:] At the beginning of the [Ming] State, the study of *tianwen* 天文 was strictly outlawed; those who practiced *li* 曆 were dispatched to the Wall, and those who created *li* were put to death (Shen Defu, *Yehuo bian*).

[1373 law: Astronomical Bureau] personnel are never to be allowed **transfer** or **[free] movement**; their sons & grandsons will **only** study *tian[wen]*, *li*, and mathematics, and they are not allowed to practice other professions. Those who do not study will be banished to the Southern Sea (*Da Ming huidian*, j. 223).

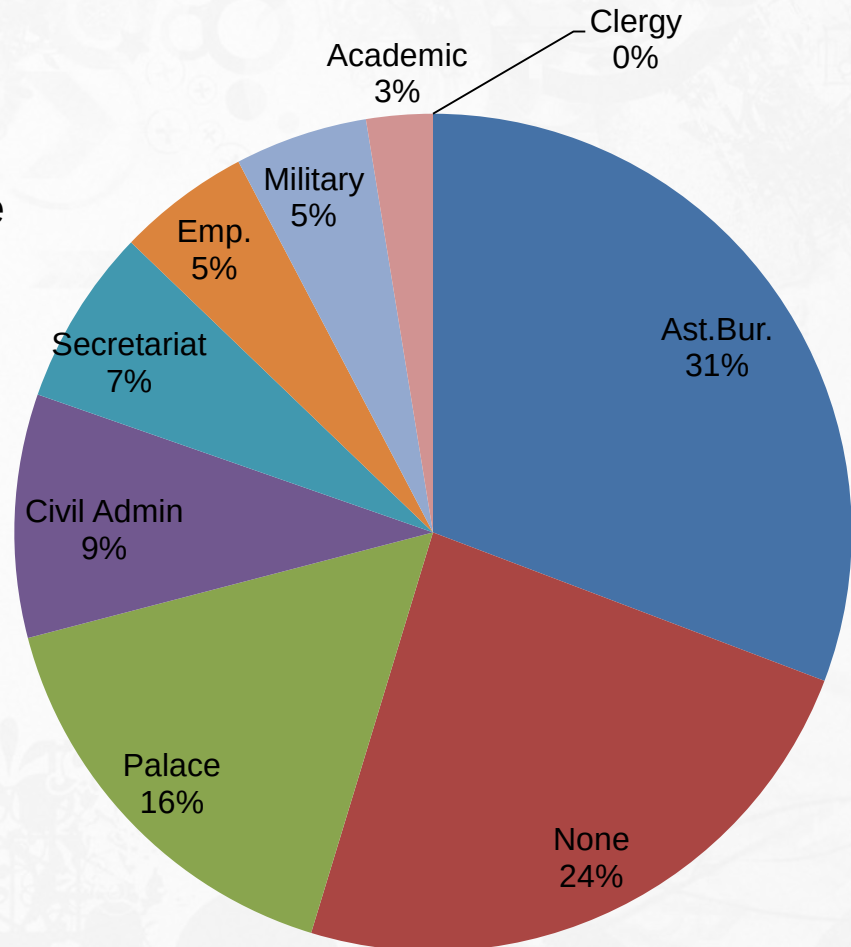
1607, Ricci's team completes translation of Euclid's *Elements*

- Euclid's *Elements* has been in China since the 13th century, in *Persian*, in the **Muslim Astronomical Bureau** 回回司天監 (+ *Almagest*, astrolabes, globes, etc.)
- Established in 1271, under Jāmal al-Dīn, the Muslim office is run separately from its Chinese counterpart, even after their integration in 1398, leaving little appreciable influence on Chinese-language astronomy.

The open Bureau (206 BCE – 420 CE)

Contributors to *li* mathematical astronomy (206 BCE – 420 CE)

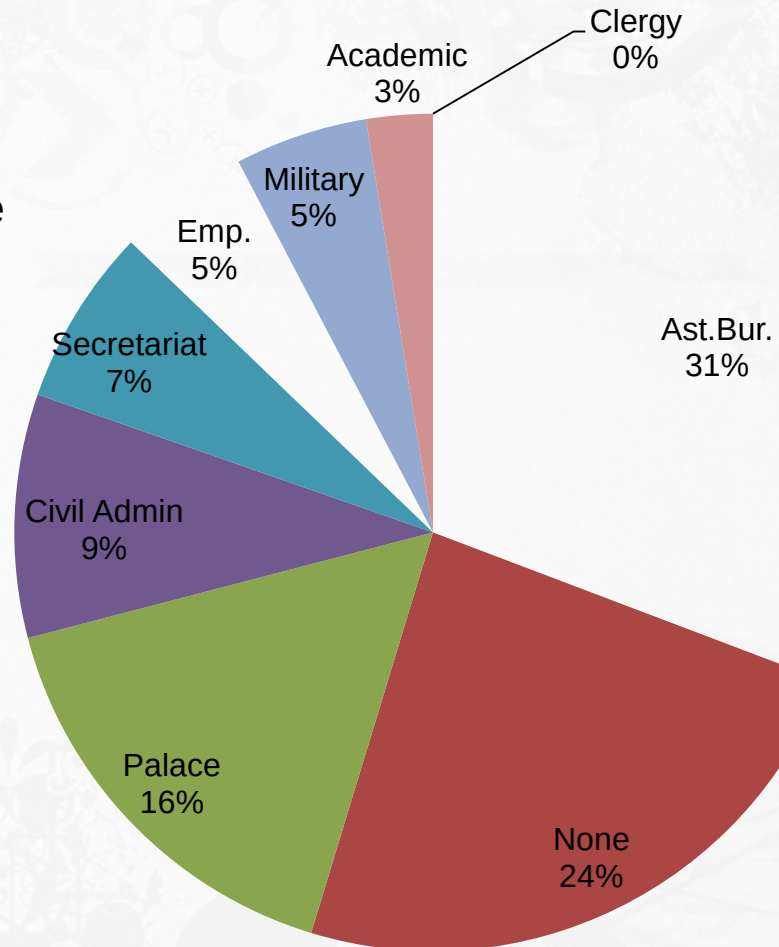
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- **Range:** 625 years
- **Names:** 117 (19/century)



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- **Sa**
 - Memorials (expert → throne)
 - submitting works,
 - petitioning for imperial action.
- **Ra**
 - Special edicts (throne → expert)
 - testing
- **Na**
 - commissioned works

Professional outsiders (64%)

- Recruitment (throne → expert)
- Public debates (expert → expert)
- Education/transmission (expert → expert)

Academic
Clergy 0%

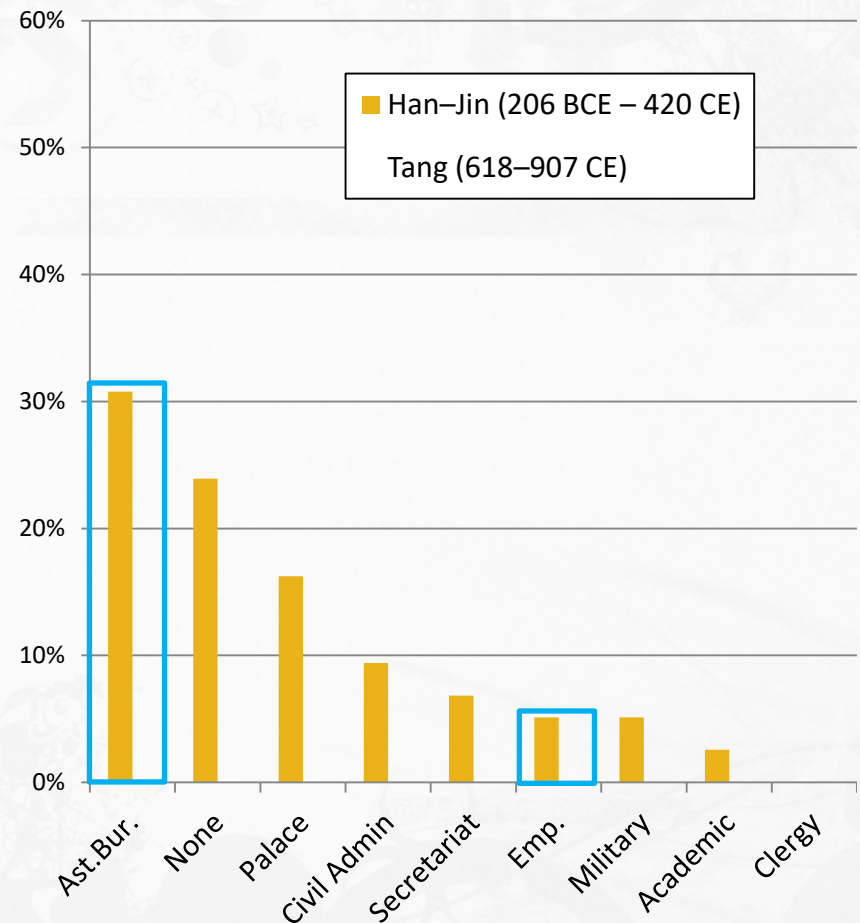
16%

None
24%

The open Bureau (206 BCE – 420 CE)

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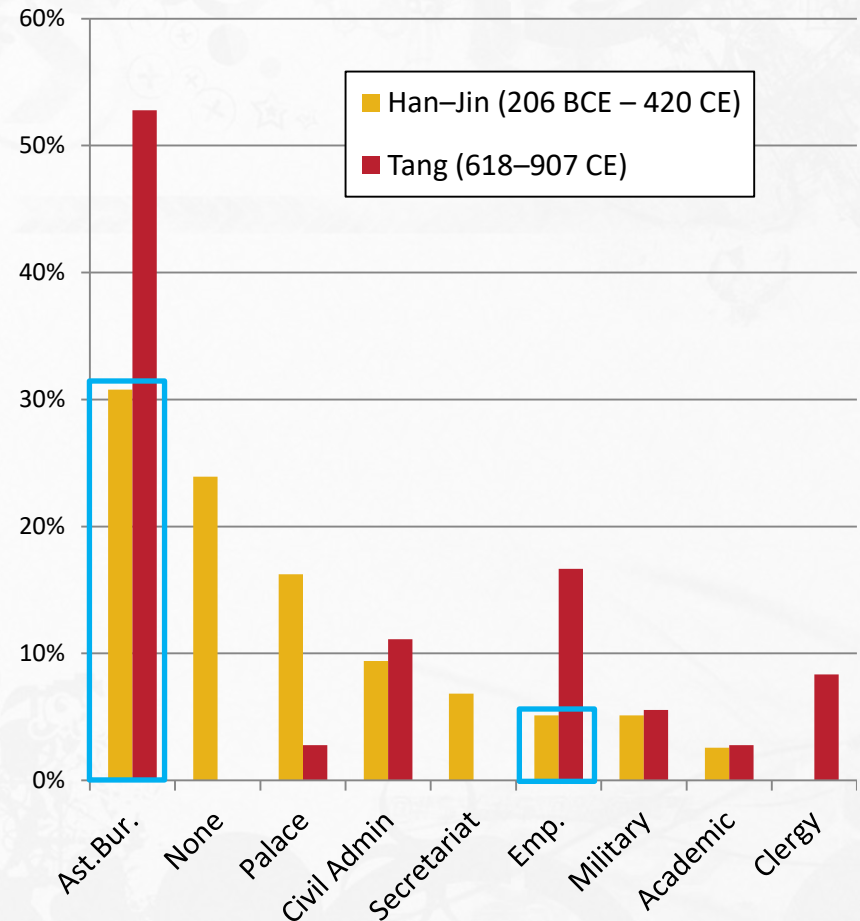
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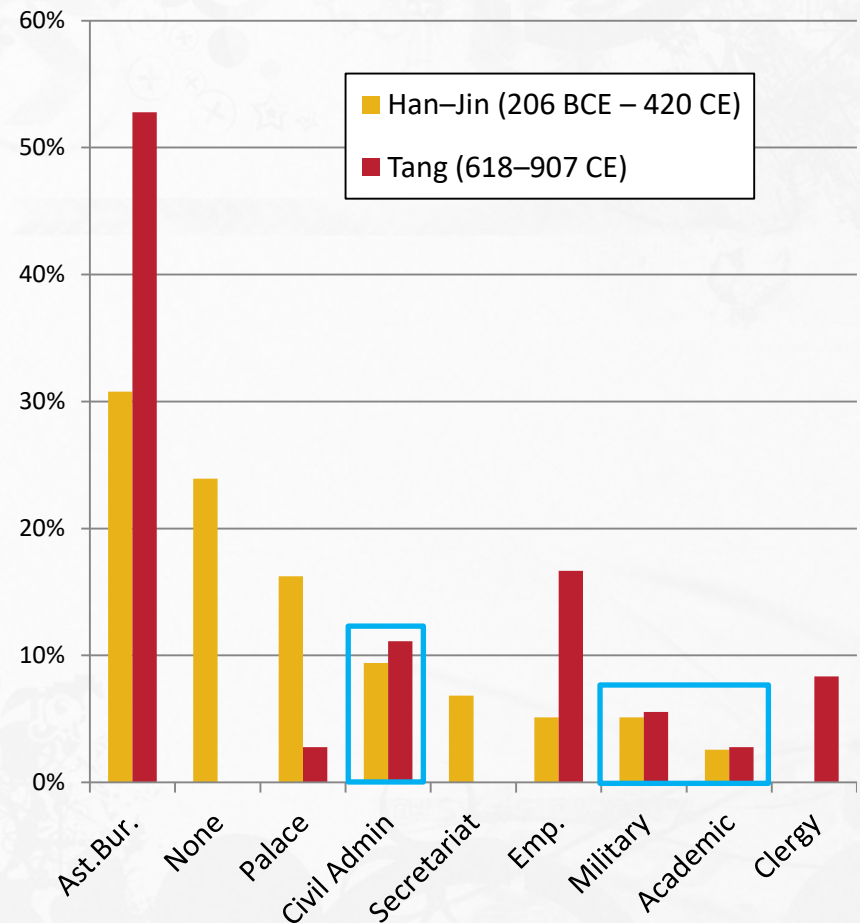
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 - 625 years
 - 289 years
- **Names:**
 - 117 (19/century)
 - 36 (12/century)



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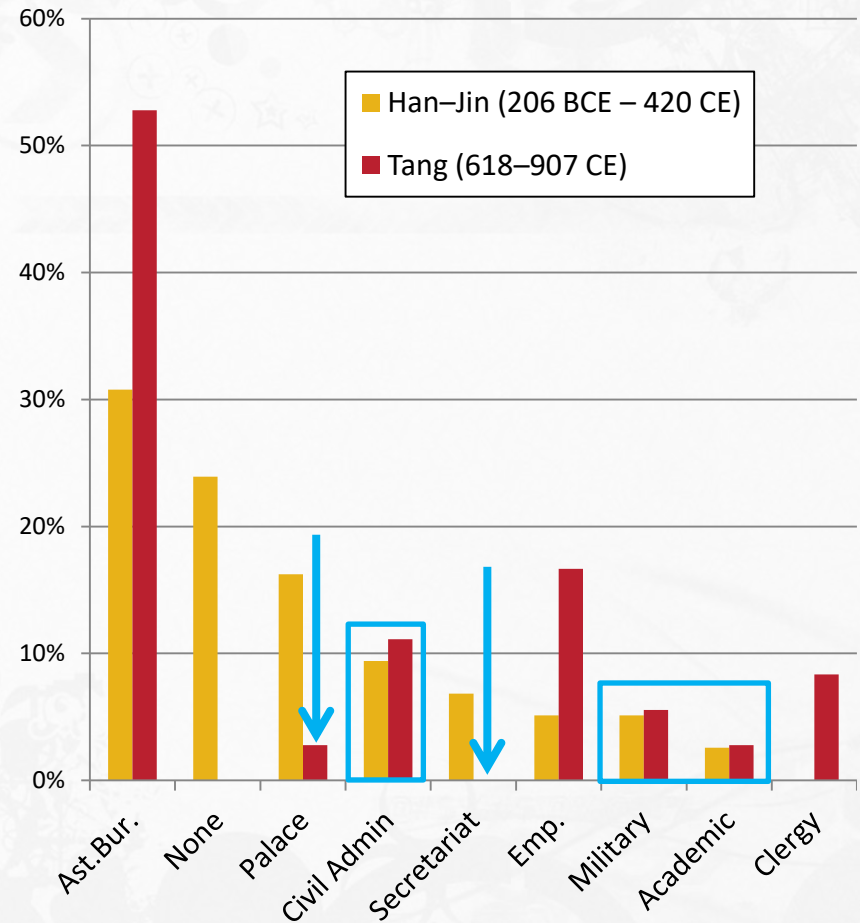
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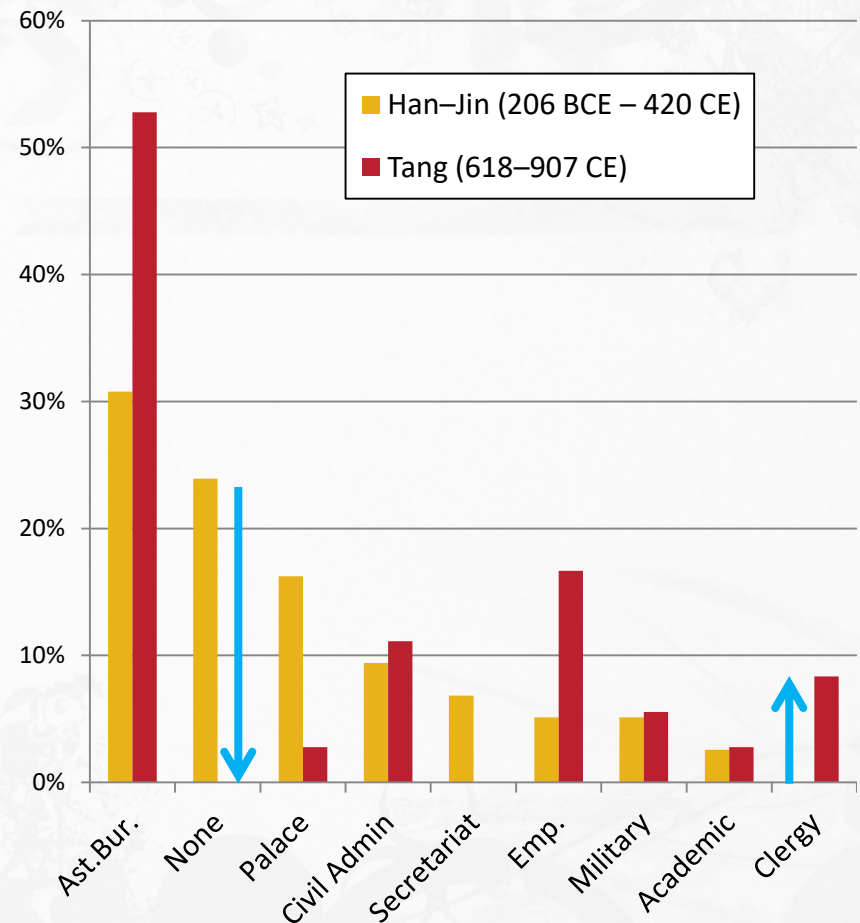
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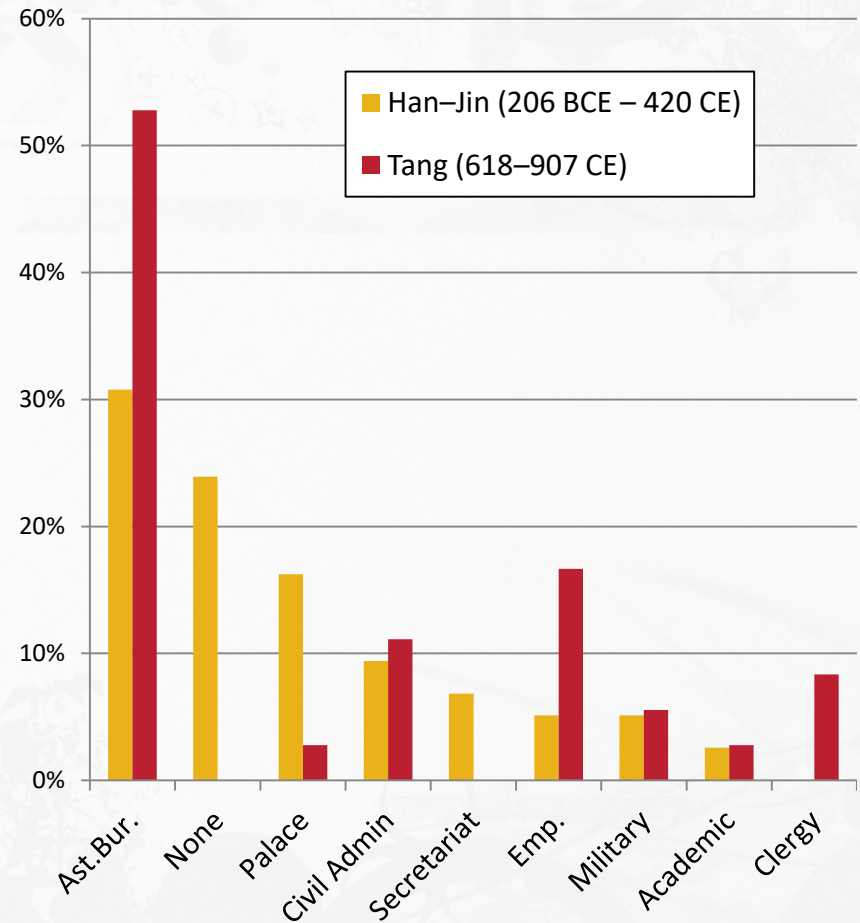
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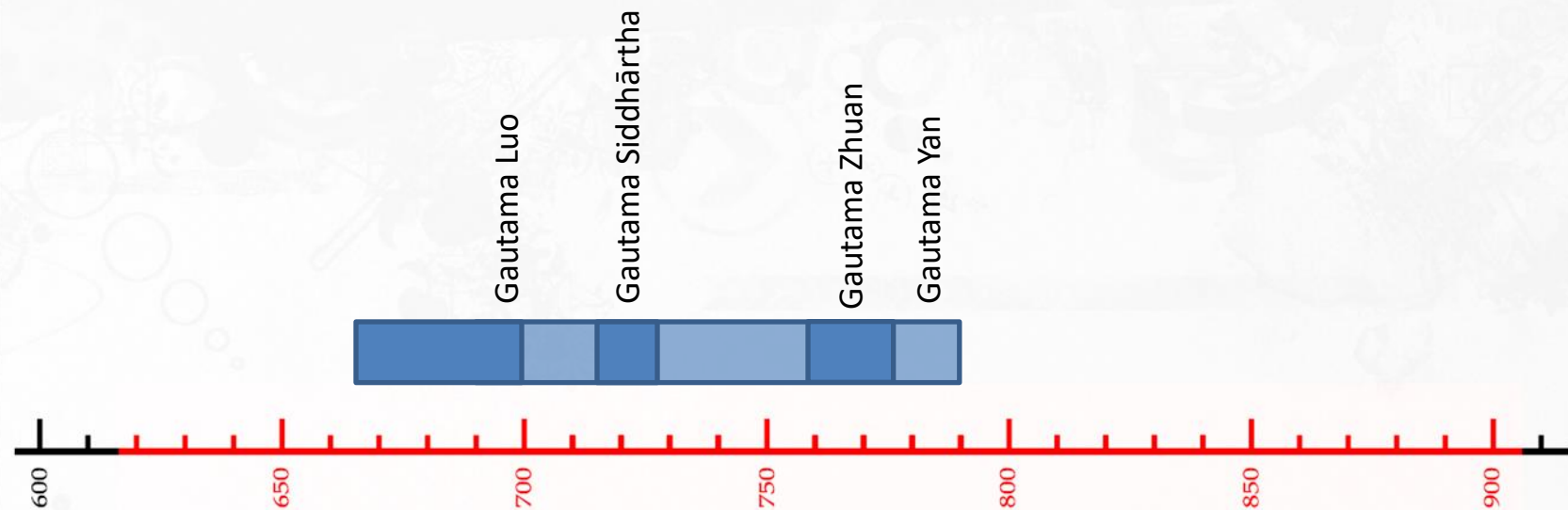
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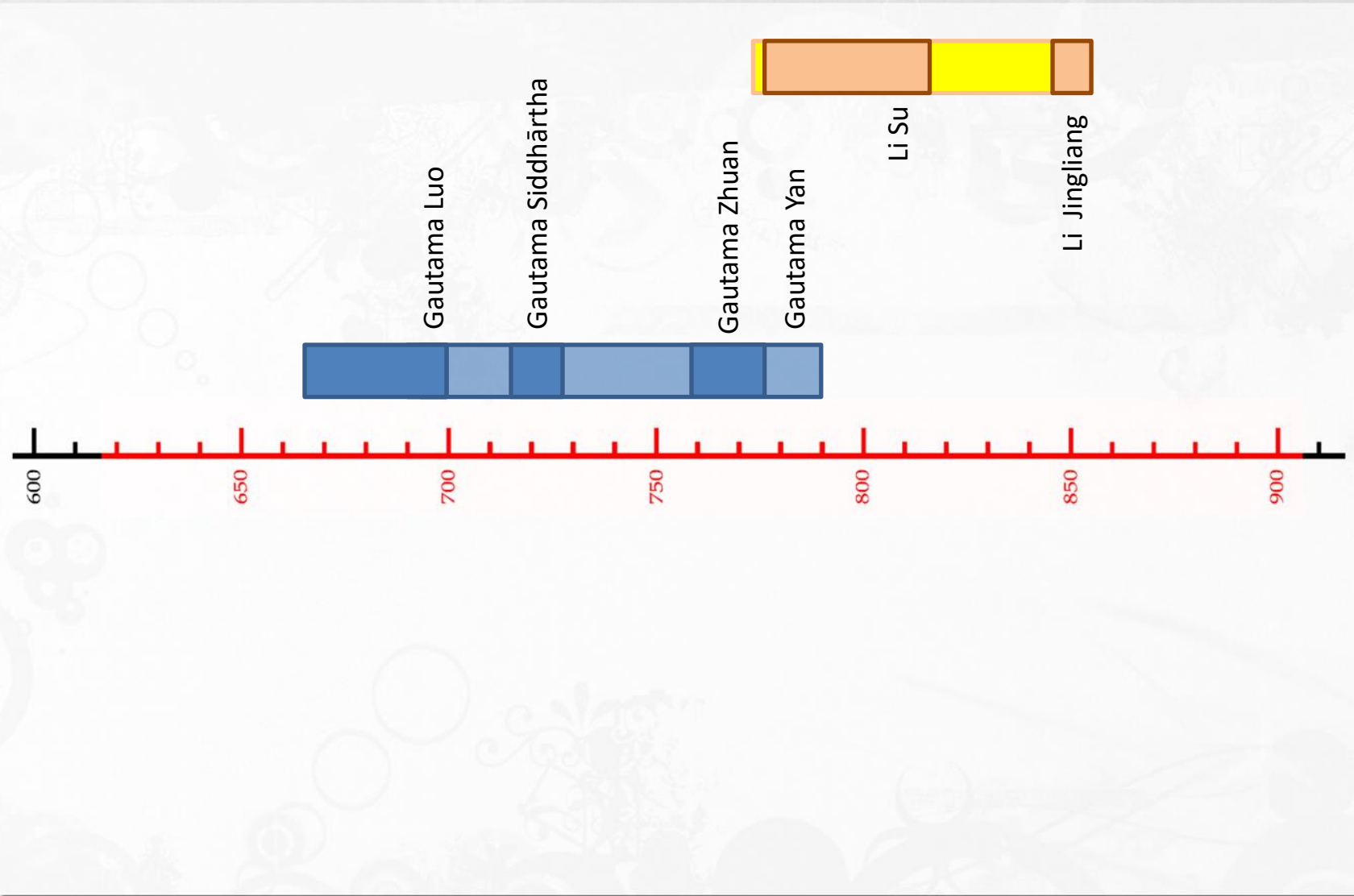
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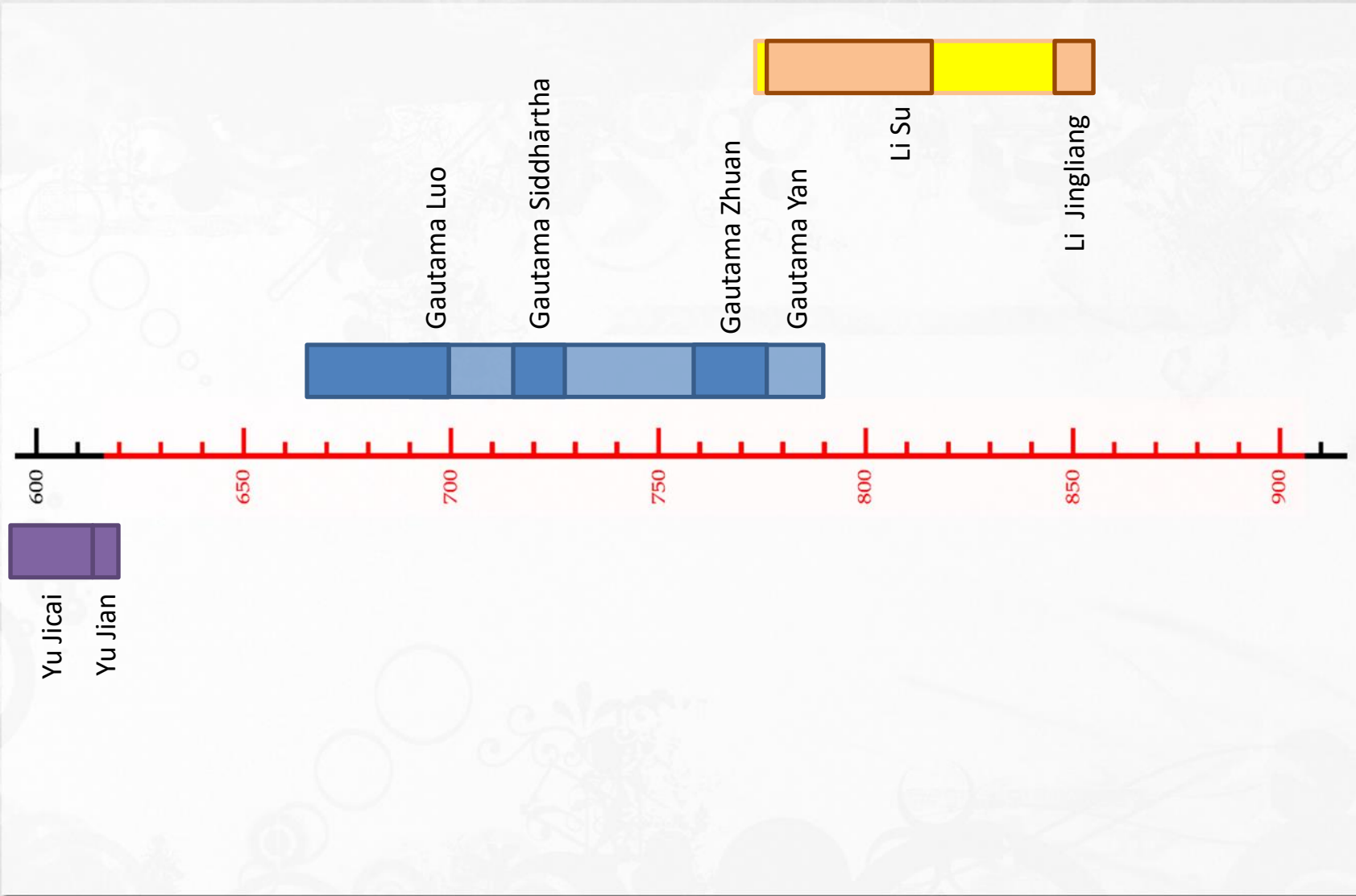
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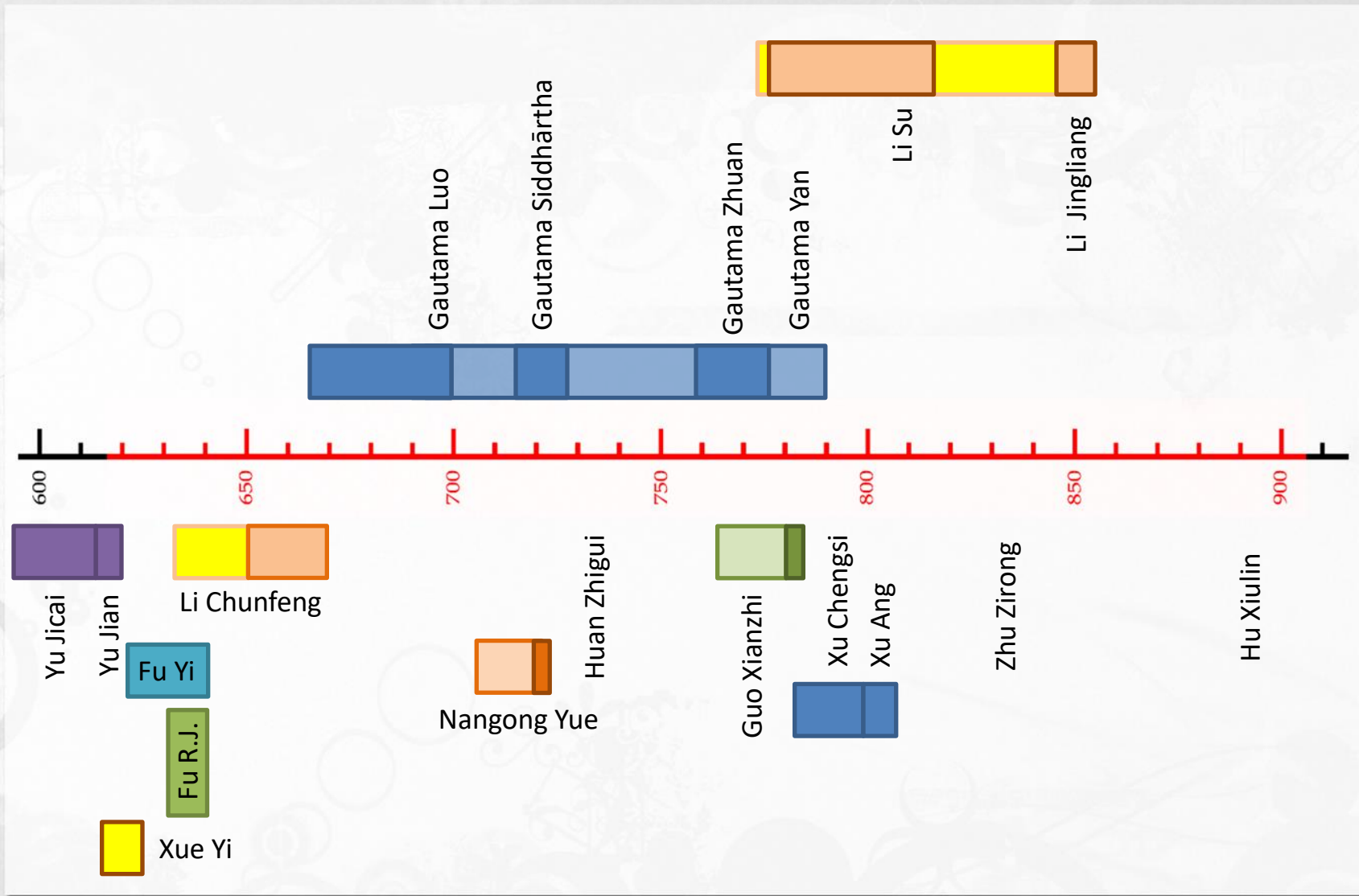
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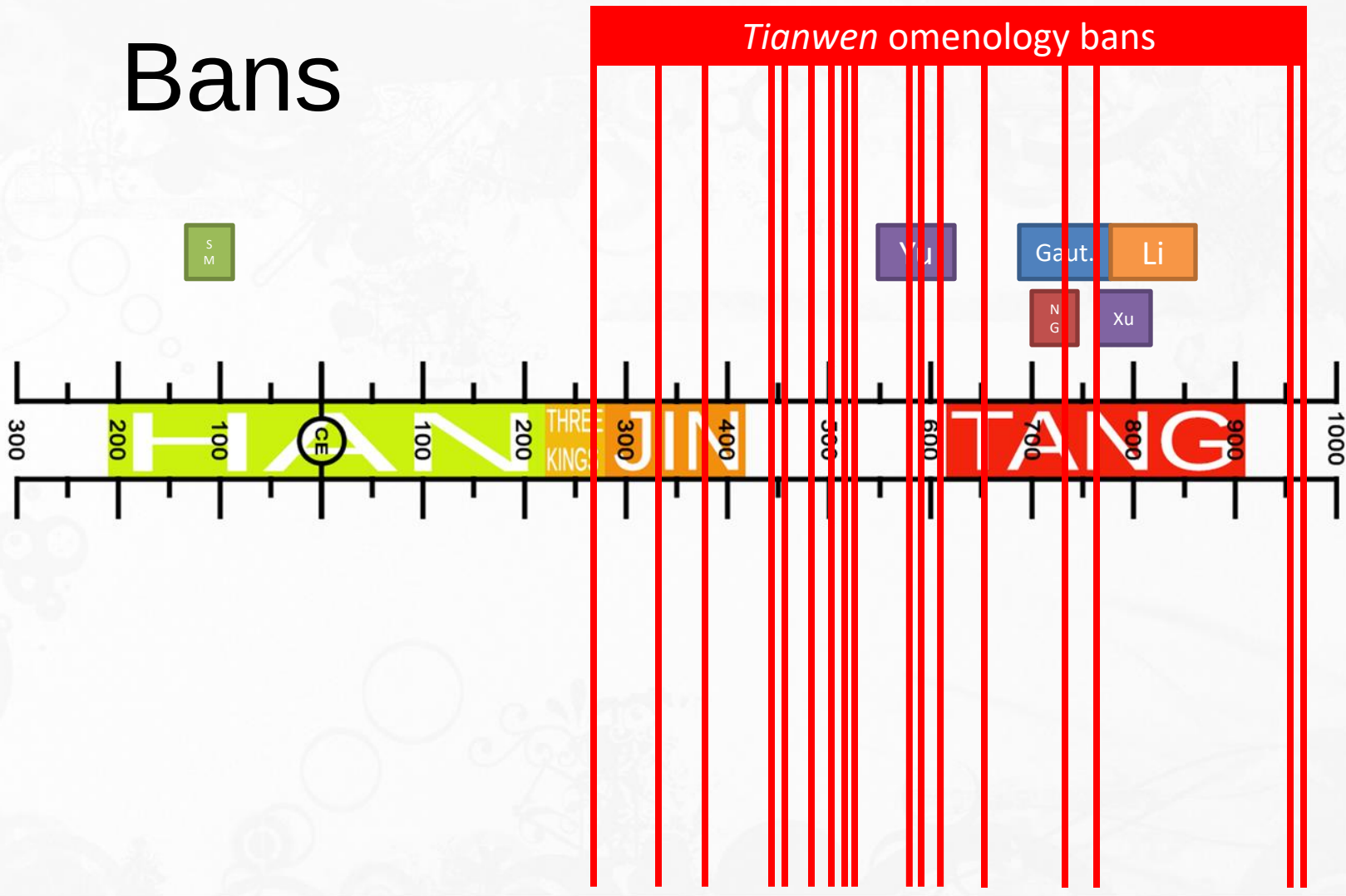
Clans and policy changes

Bans



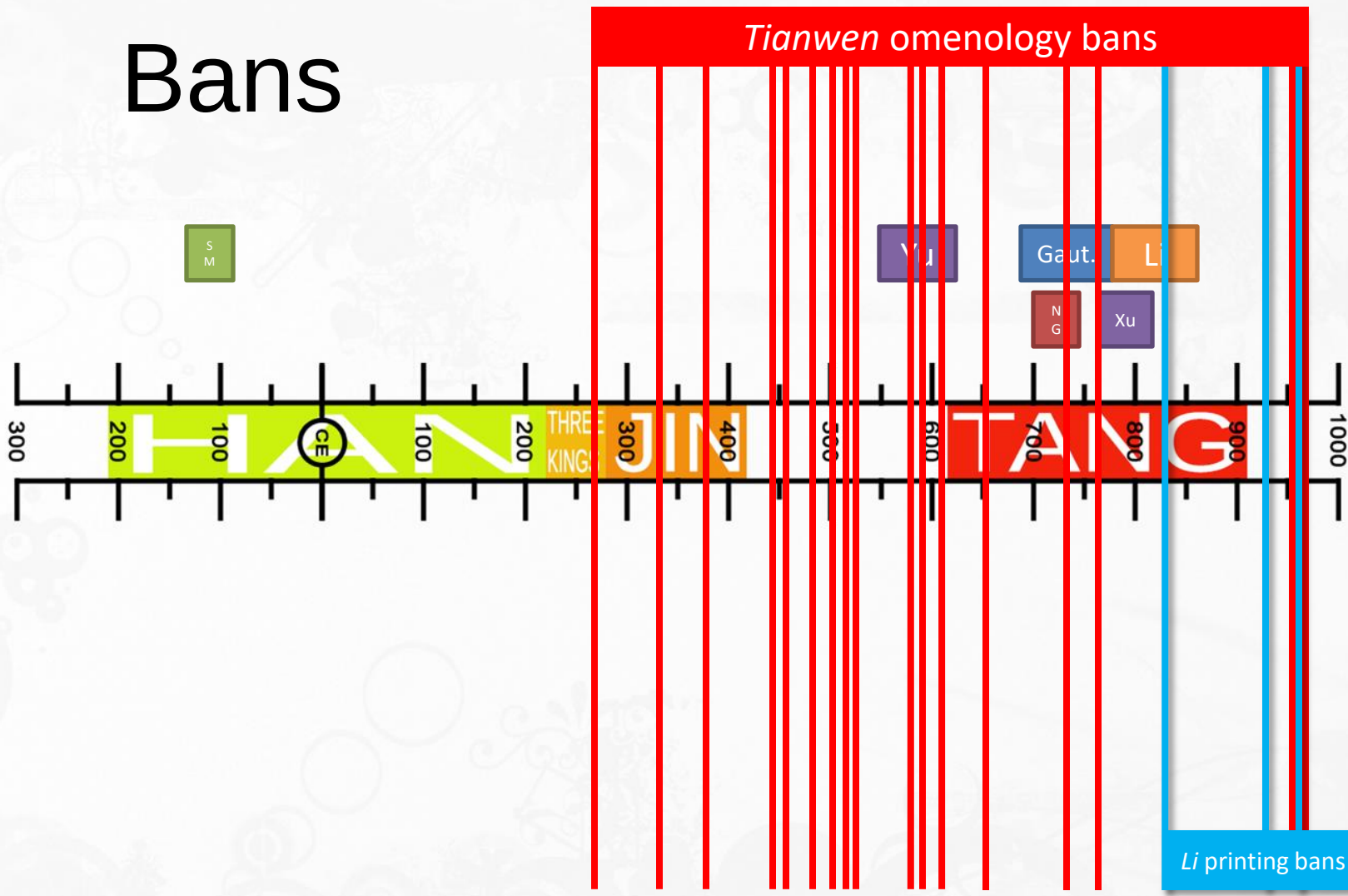
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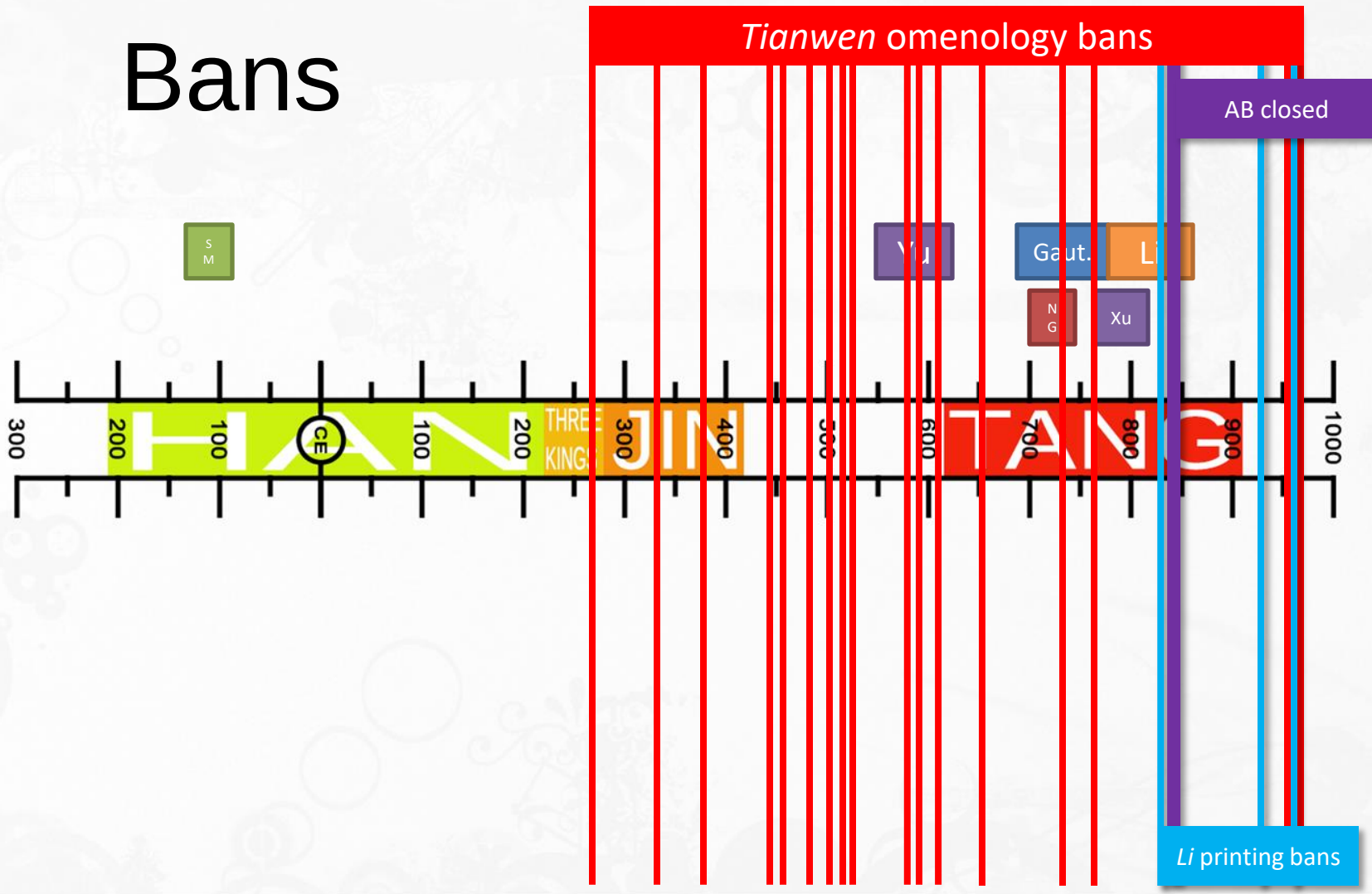
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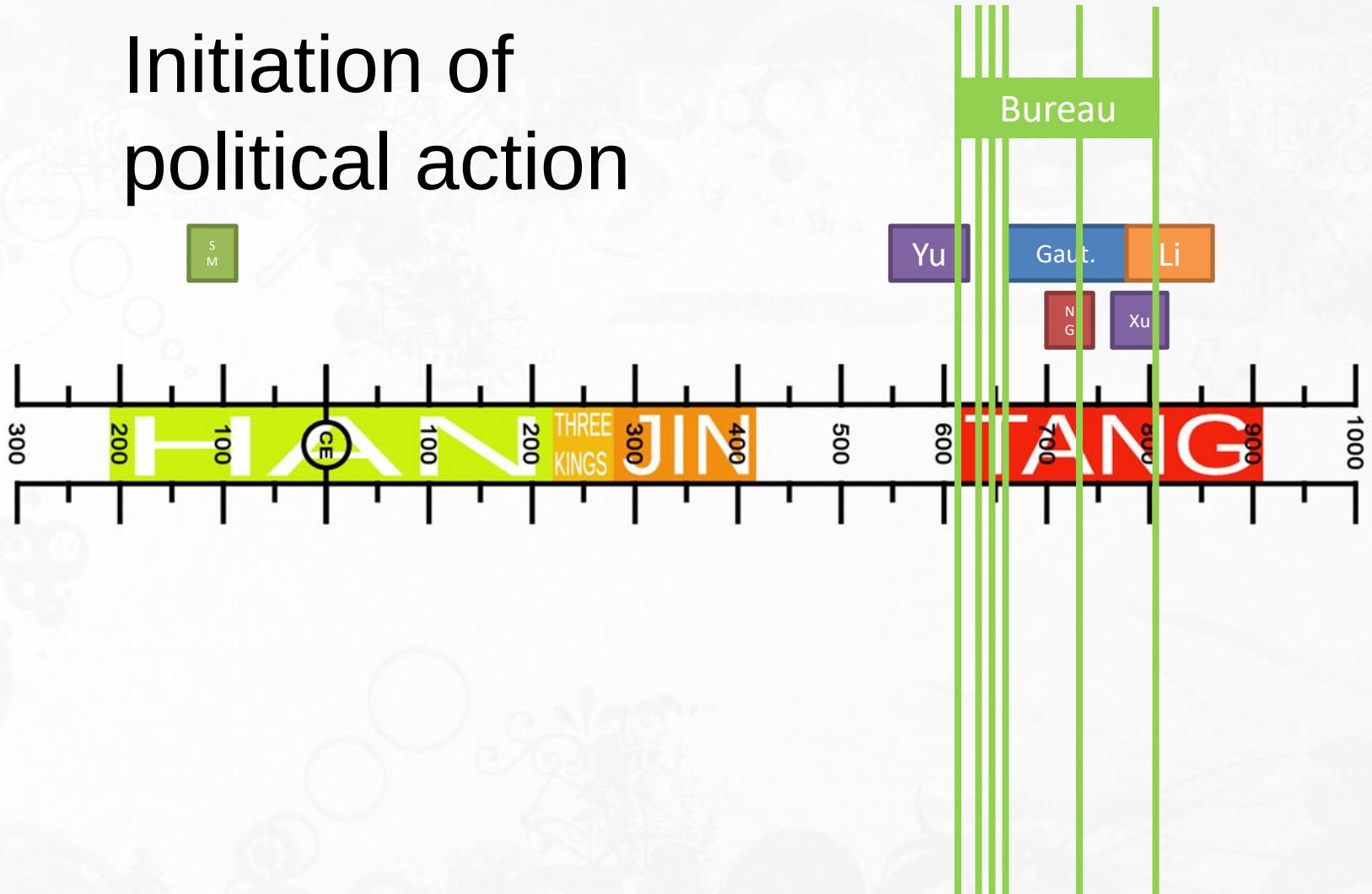
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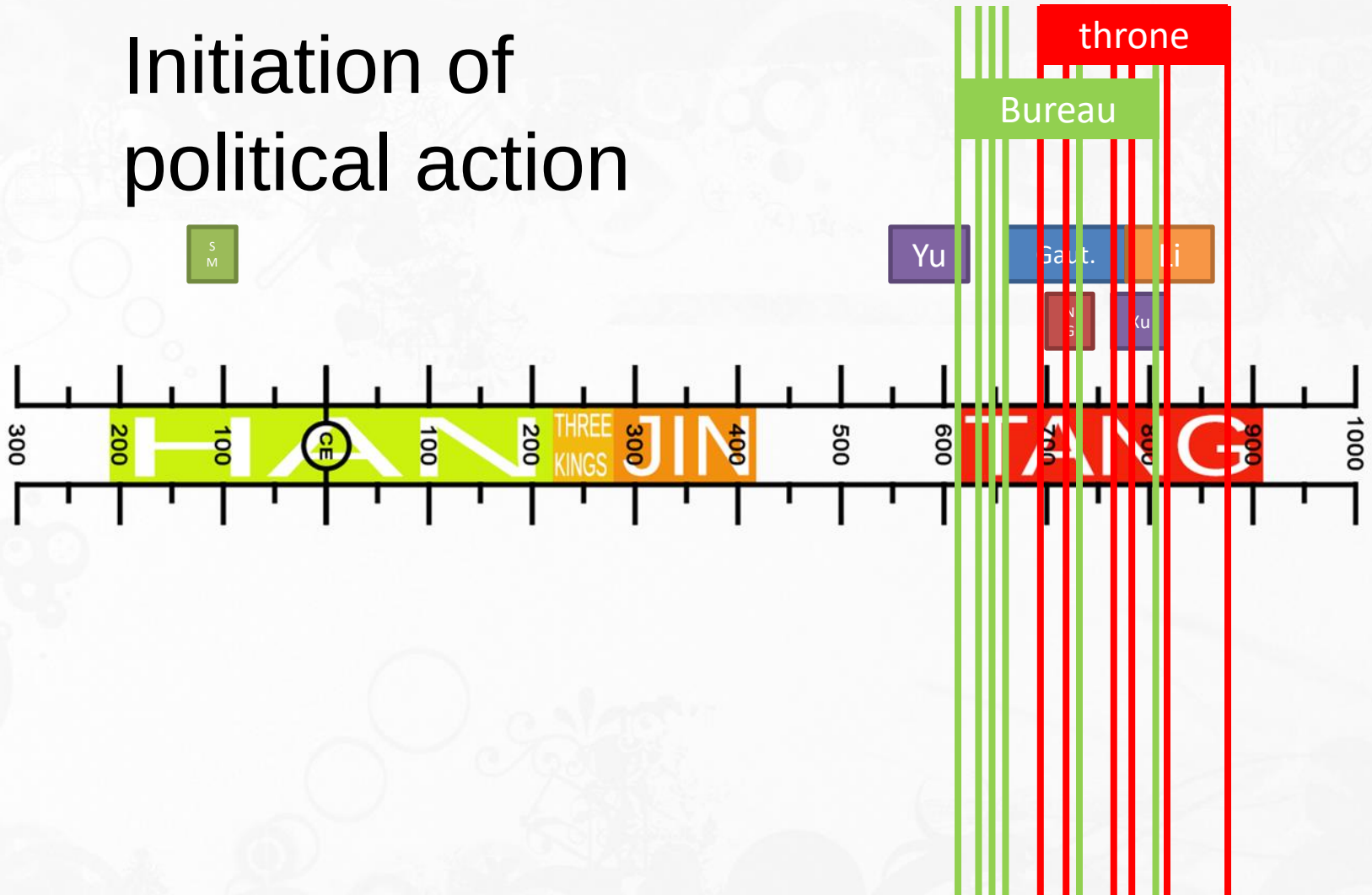
Clans and policy changes

Initiation of political action



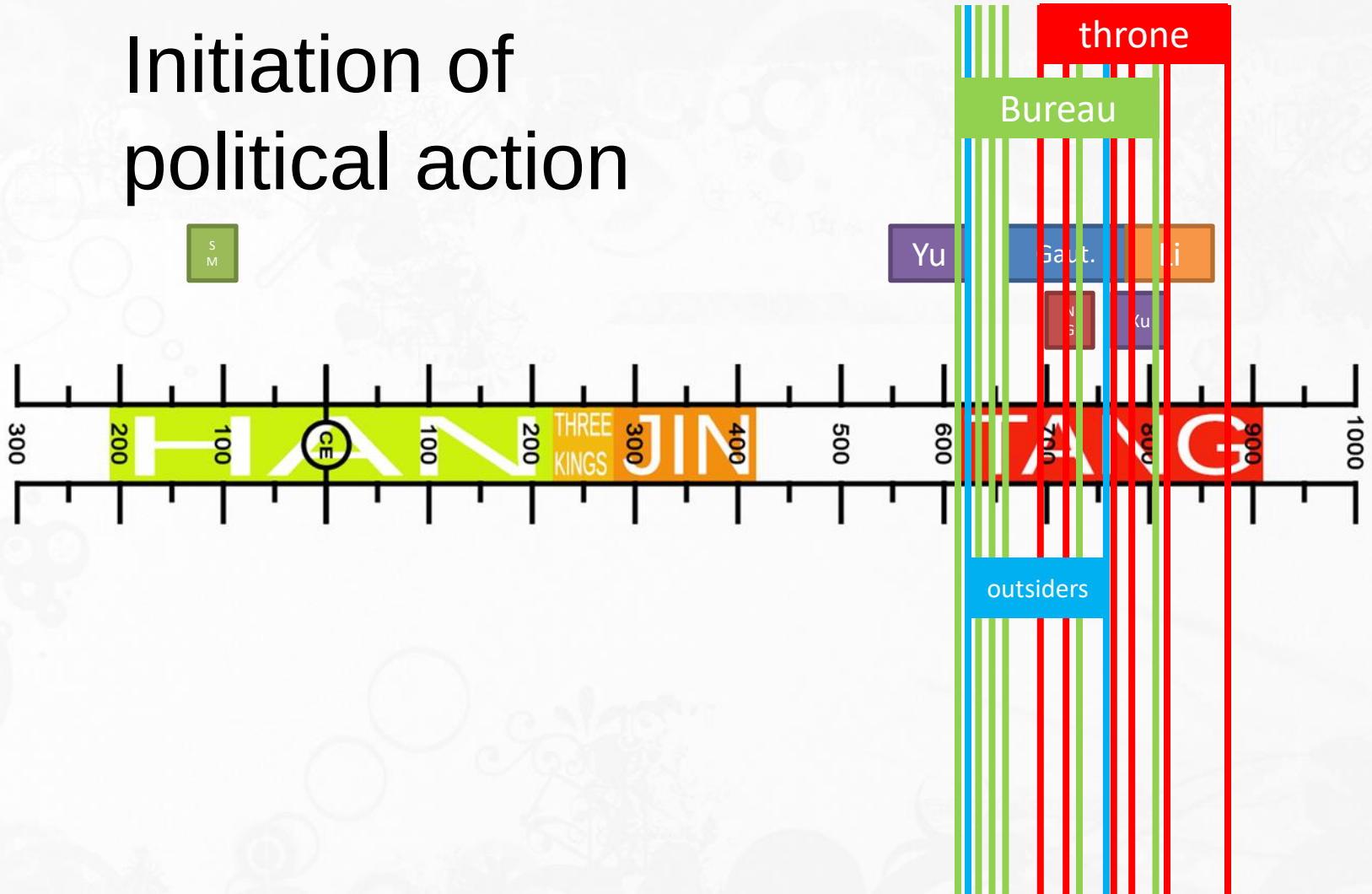
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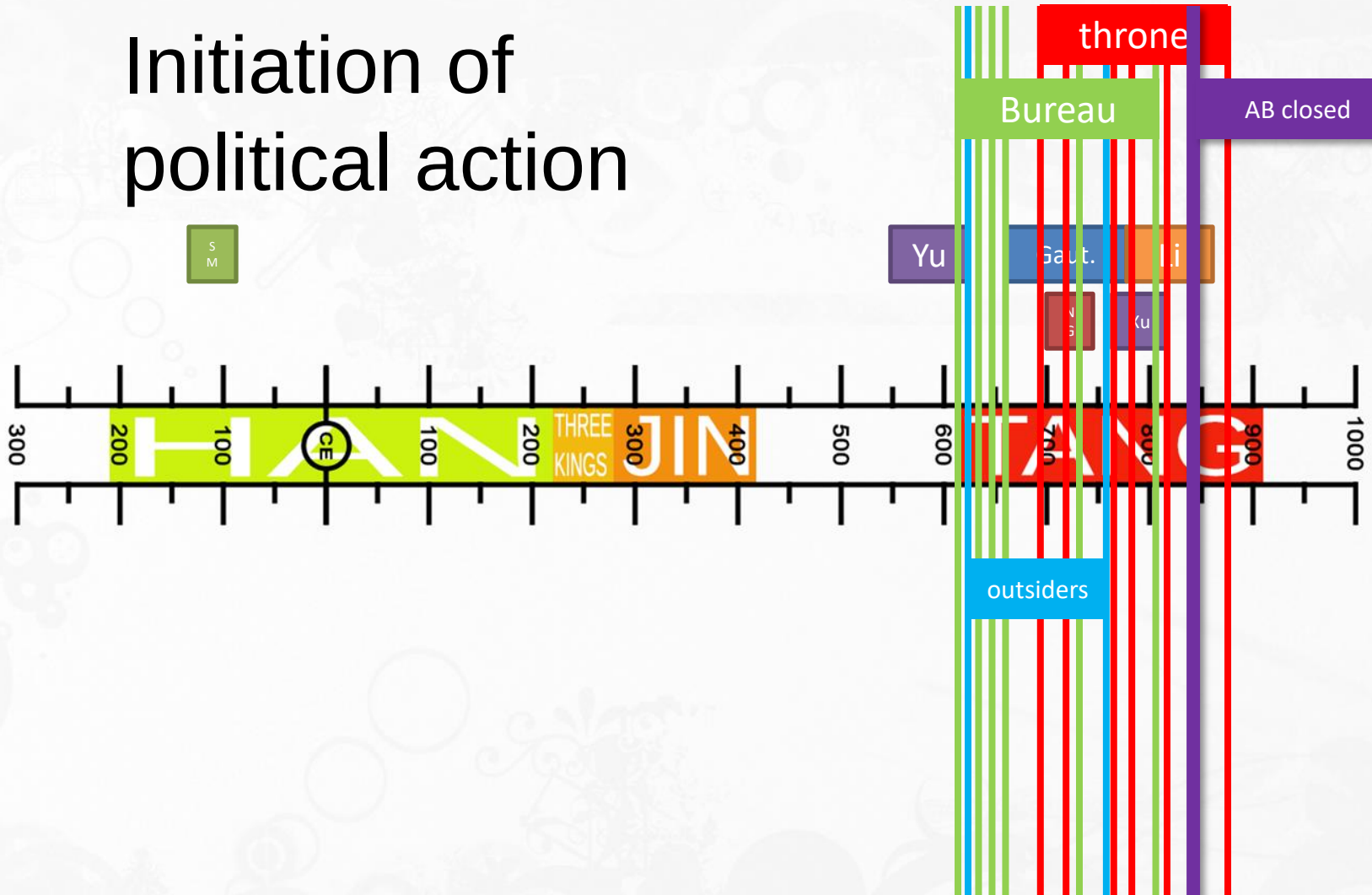
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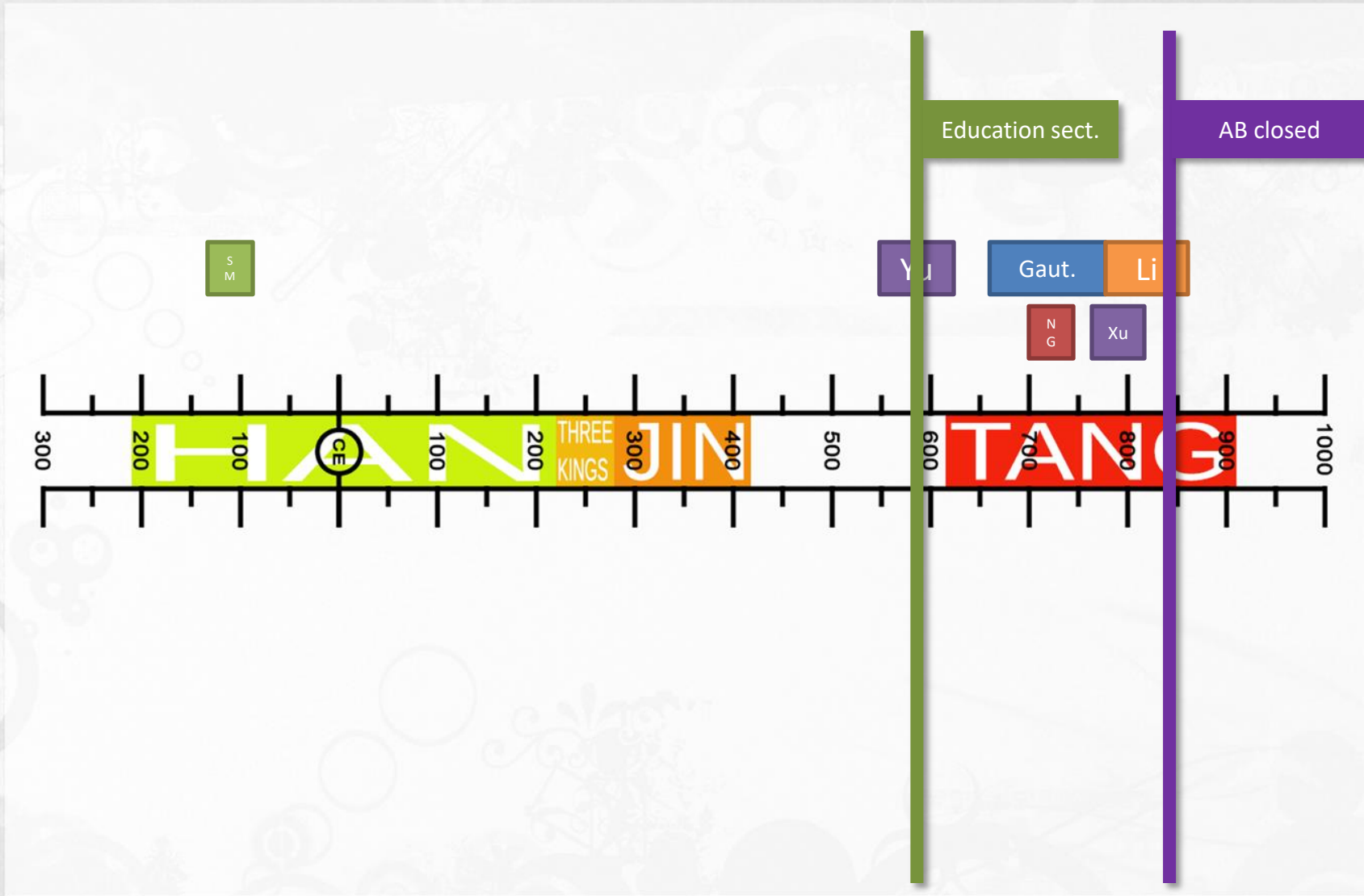


Clans and policy changes

Initiation of political action



Clans and policy changes



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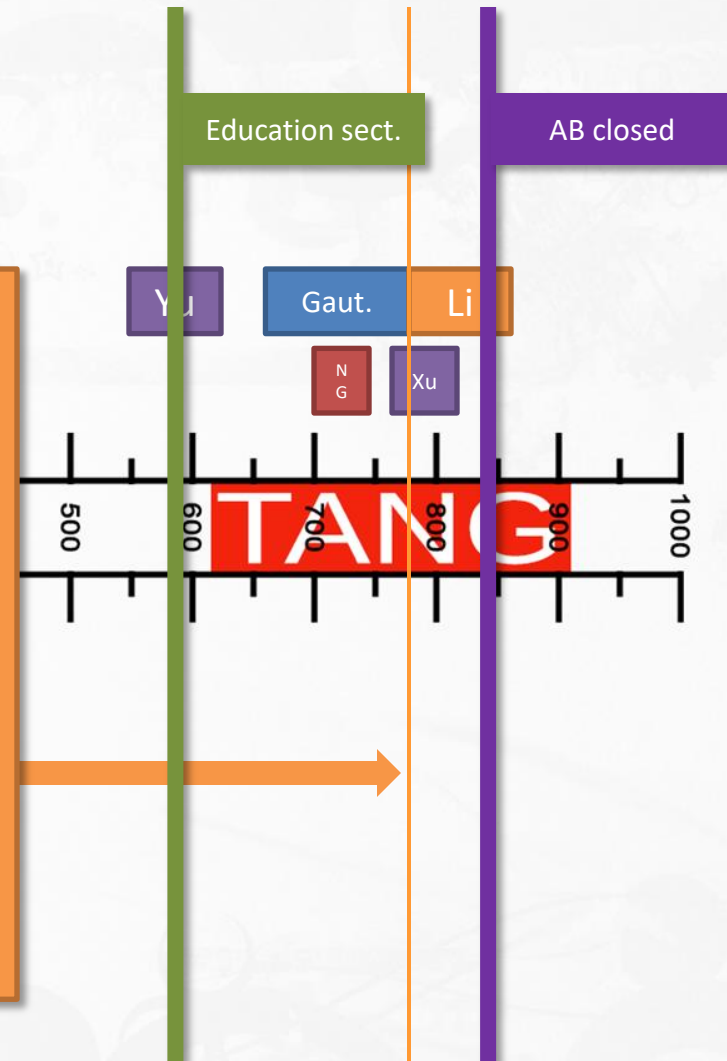
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Clans and policy changes

tianwen omenology

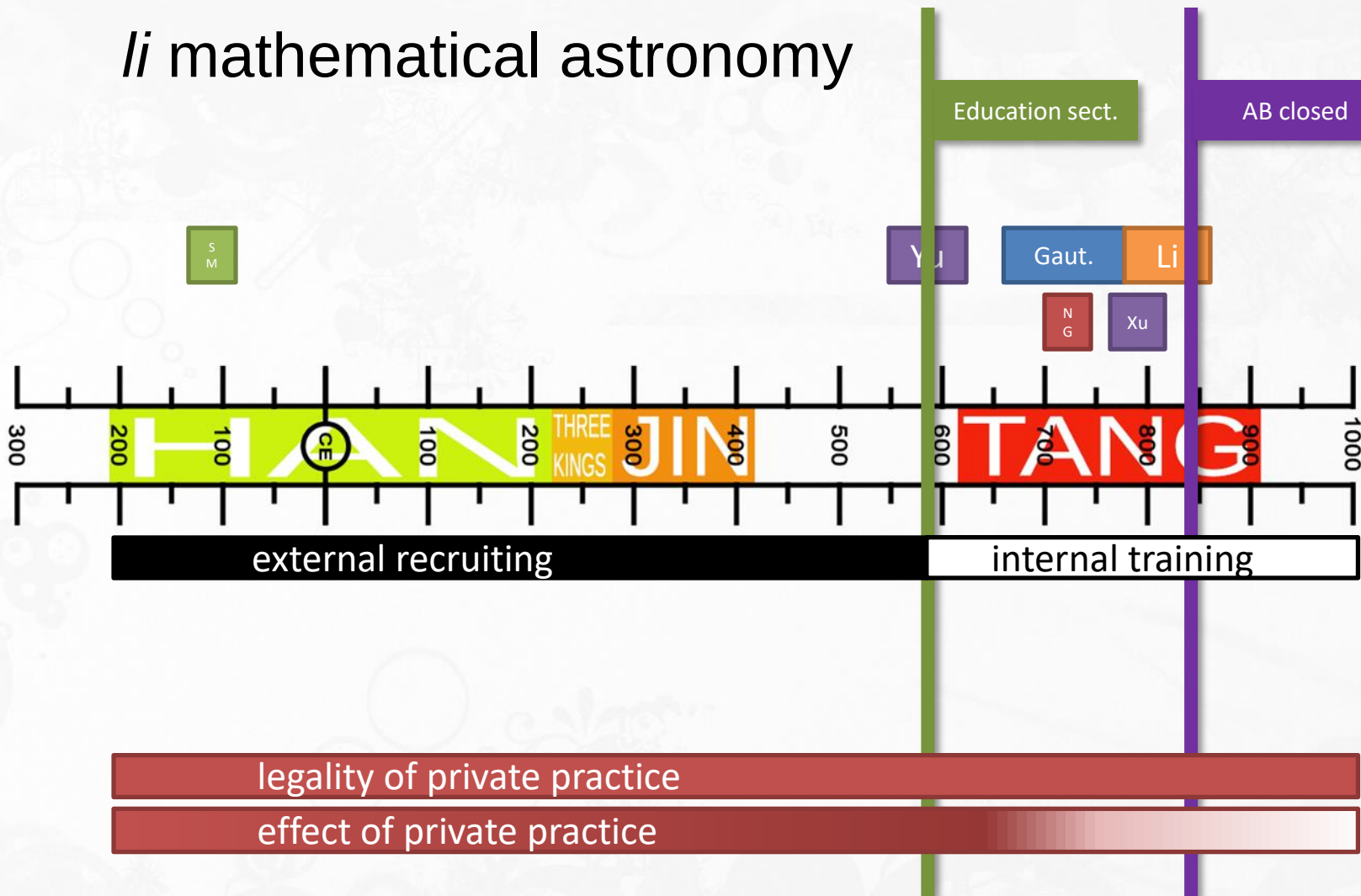
Imperial Edict, 2 March 767:

Since our difficulties [with the An Lushan Rebellion (755–63)], the sons and followers of the hereditary [technicians] have dispersed, and the staff of the [Astronomical] directorate is mostly missing. May that any officer or commoner of the various counties under heaven who understand the mysterious signs of *tianwen* [omenology] each ask the chief clerks of their respective circuits to report their names that they may be rendered to the Upper Capital (*Tang huiyao*, 44.19a).



Clans and policy changes

li mathematical astronomy



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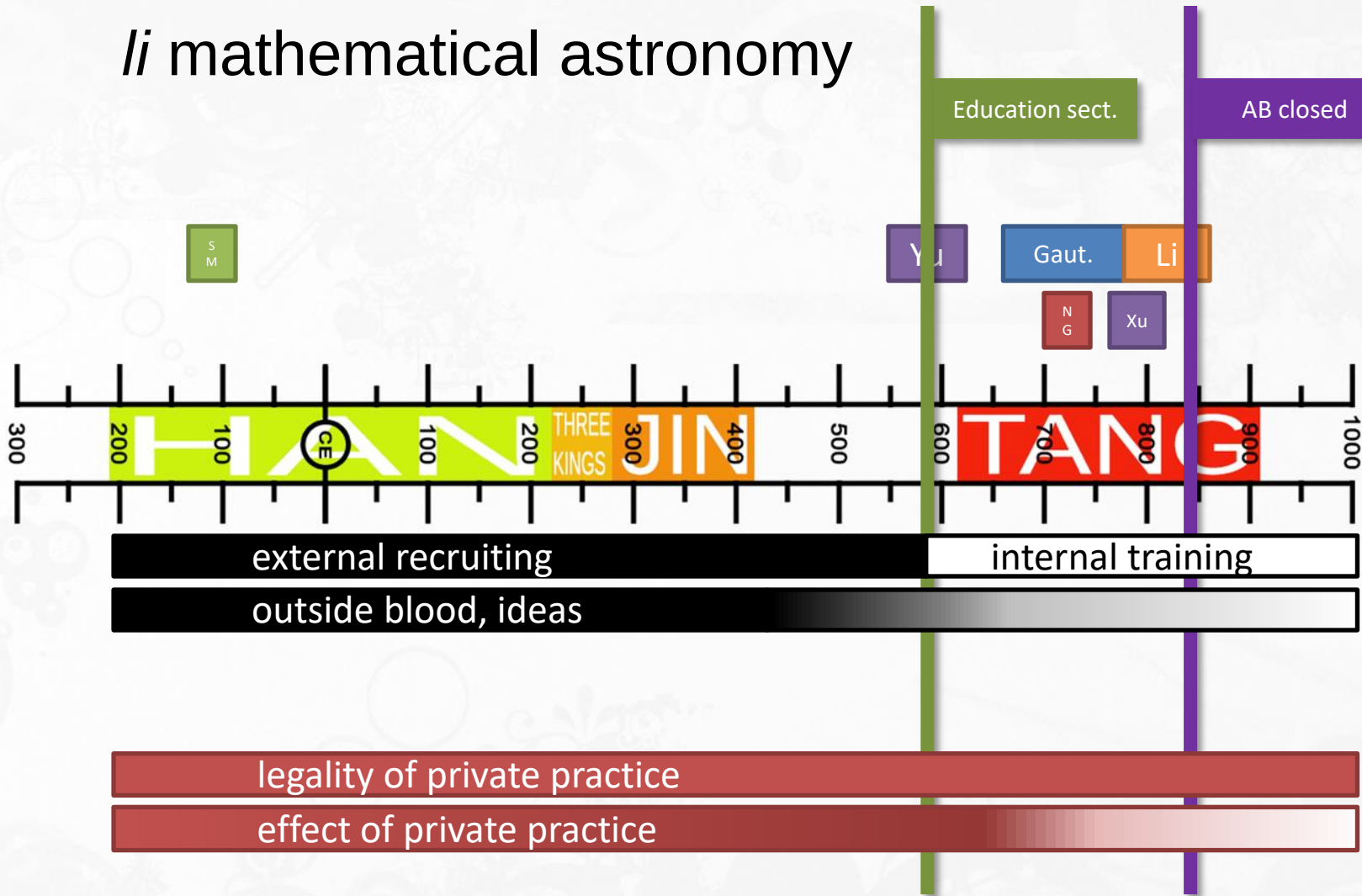
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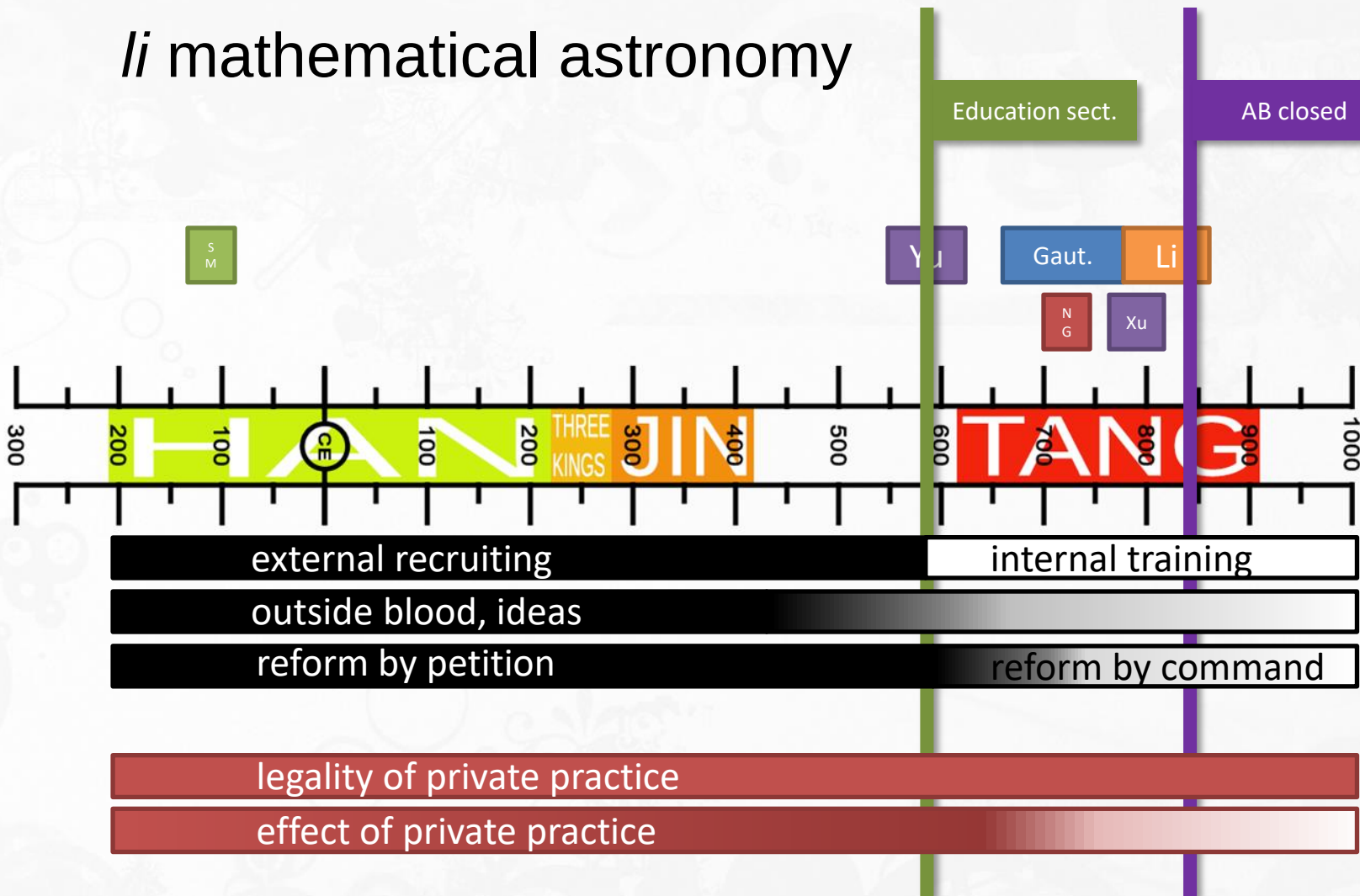
Clans and policy changes

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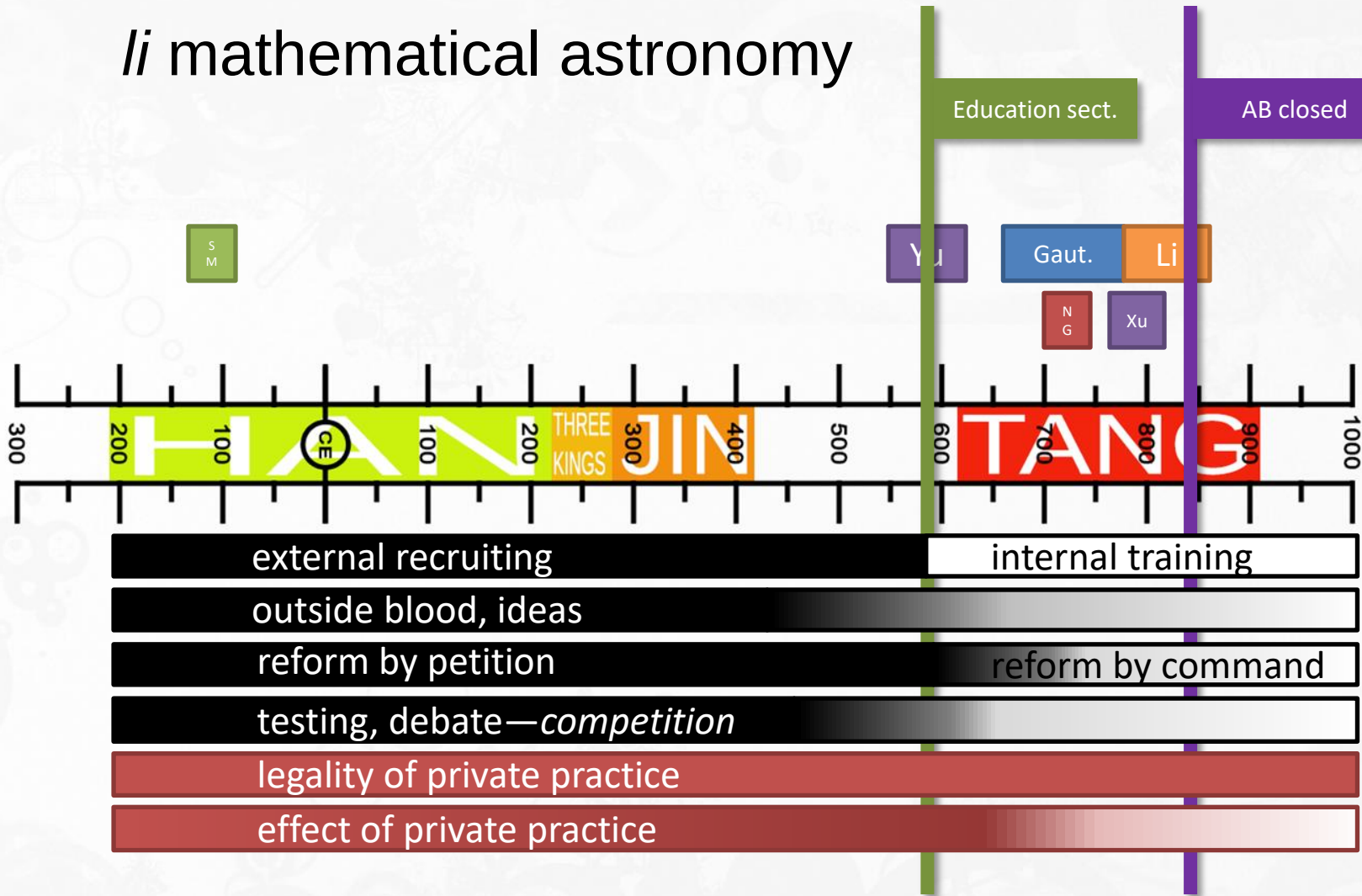
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Conclusion

- The Imperial Astronomical Bureau changed from an open, circulating meritocracy in the Han (206 BCE – 220 CE) to a closed, hereditary guild by the Ming (1368–1644):
 - Private practice of *li* 曆 mathematical astronomy illegal, 1368–
 - Separate Muslim Bureau/Office, 1271–
- In the Tang (618–907), government bans do disrupt the public–private dynamics of *li* practice, *but*
 - *later*, in terms of explicit bans
 - *Indirectly*, through education and professionalization (against omenology).
- Effect of Bureau directorship-clans no less important
 - Clans emerge *before* bans
 - Clans run the Bureau *longer* and *more directly* than throne.
- Unlike in the Ming, the Indian Gautama- and Persian Li-clans are not the *victims* of bureaucratic isolation, they are *in charge of it*.
 - Why, then, is there so little trace of their respective ancestral traditions in Tang astronomy?