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#### Mathematical Reasonings 1

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*How Did Mid-Qing (late 1790s) Scholars Use Ancient Calendrical Methods to Calculate Dates of Events Mentioned in Confucian Canons? -- A Study Focusing on Li Rui's (1768-1817) Zhaogao Riming Kao (Research on the Names of the Days in the Announcement by the Duke of Zhao, ca. 1800)*

**Abstract** - In ancient China, the texts about mathematical practices occurred not only in the mathematical books but also in the commentaries on Confucian canons. And some research has been done on the characteristics of the different mathematical knowledge in Confucian Classics, such as the works on the commentary on the *Rites of Zhou* in the 7<sup>th</sup> century by Zhu Yiwen (朱一文).

For historians specialized in the Confucian Classics, finding the dates of historical events recorded in Confucian canons is one of the important issues. *Zhaogao* (召誥 *The Announcement by the Duke of Zhao*) and *Luogao* (洛誥 *The Announcement announced in the Capital Luo*) are two successive chapters in *Shangshu* (尚書 *Book of Documents*, one of the 'Five Classics' for Confucians, a collection of politics related documents in ancient China). Some months and sexagesimal stems and branches of the dates (*ri ganzhi* 日干支; or names of the days, *riming* 日名) without year when the events took place are clear in the *Zhaogao*, while it can be determined that the *Luogao* was announced in the seventh year of the King Cheng of the Zhou (ca. 11<sup>th</sup> BCE) according to the text in the *Luogao* itself. Zheng Xuan (鄭玄 127-200 CE, a famous Confucian scholar who commented on all kinds of Confucian canons) believed that these two *Announcements* were announced in the fifth year and the seventh year of the King Cheng, respectively. Accordingly, Zheng Xuan alleged that the text of the *Zhaogao* was not correctly transmitted, and 'the second month' and 'the third month' should have been 'the first month' and 'the second month' in the original text. Kong Yingda (孔穎達 574-648 CE, who was in charge of compiling for the subcommentaries on the 'Five Classics' for Confucians) believed that the texts of the

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two *Announcements* were both shaped in the seventh year of the King Cheng, and that there were no mistakes on the months in the ancient editions. Kong Yingda also computed and proved it by a ‘mathematical method’, which was recorded in the subcommentary on the *Book of Documents*.

The mid-Qing scholars studied this topic further by using ancient astral-mathematical methods. At first, two classicists, Wang Mingsheng (王鳴盛 1722-1797) and Jiang Sheng (江聲 1721-1799) computed the total months between the fifth year and the seventh year of the King Cheng with the data in ‘the Six Ancient Calendars’ (*gu liuli* 古六曆), arguing against the opinion that the two *Announcements* had been written in the same year. And then, mathematician Li Rui (李銳 1768-1817) wrote the *Zhaogao rimingkao* (召誥日名考 *Research on the Names of the Days in the Announcement by the Duke of Zhao*, ca. 1800). Li Rui not only obtained a chronicle about the events in the two *Announcements*, but also he could suggest a daily table with the events that took place in the first and second month of the fifth year of the King Cheng using a reasoning and a computation grounded on methods, found in the Calendrical system named *Quarter-remainder* (*Sifen li* 四分曆, 85 CE). However, in order to make the result matched the conclusion by the ancient commentator Zheng Xuan, he adjusted the first year when the Duke of Zhou became a regent in his chronicle which could not be supported by other evidence. And, Li Rui’s work had a profound influence on the later mathematicians such as Luo Shilin (羅士琳 1789-1853).