

## SAW Conference on Writing histories of ancient mathematics – Reflecting on past practices and opening the future, 18th-21st centuries

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organized by Karine Chemla, Agathe Keller, Christine Proust and the SAW group  
Université Paris Diderot, Condorcet Building room 366A Klimt- 9:30 am to 5:30 pm

### Varieties of mathematical knowledge and practices used to read ancient texts

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*Diverse scholars' Ways of dealing with the "Method Duoji" (Duoji Shu) in 19<sup>th</sup> and 20<sup>th</sup> China*

**Abstract** – *Siyuan Yujian (Jade Mirror of the Four Unknowns)*, which was completed by Zhu Shijie in 1303, is a mathematical monograph mainly devoted to the "method of *Siyuan*" (use of four unknowns to solve questions with higher degree algebraic equations). Three sections of this book deal with a specific type of questions, that is, knowing the sum of a series of numbers of hay bales, one asks the number of layers of the haystack. Analogical questions were also given like recruiting troops with an increasing amount of days and calculating the layers of different shapes of fruit piles. However, in his 1303 book, Zhu only gave the first step and the last step of the solution (one question has a simple note by Zhu).

Later mathematicians and historians studied this book, attempting to restore its author's procedures. In 1922, Qian Baocong (1892-1974) published a paper on this topic, using modern mathematical series symbols to prove the correctness of several theorems about mathematical series. He stated that Zhu has used these "theorems" in his book. In later studies by Tang Tiandong (1926), Li Yan (1929), and Fang Zhushu (1939), modern symbols and formulas for mathematical series are usually used for interpreting these three sections in Zhu's work, but they are used in diverse ways. I will address how the historians in 1920s and 1930s used modern

symbols and formulas to interpret Zhu's questions.

On the other hand, several Qing dynasty scholars also studied this topic, and I focus on two of the earliest ones. They all wrote commentaries on these sections without using modern mathematical symbols, formulas or equations. For example, Luo Shilin (1789-1853) listed the numbers of different layers of the pile and used multiplications of two lists of numbers to disclose how a new series of numbers was constructed. Shen Qinpei (fl. 1820) used the figure of series of numbers to interpret the meaning of "*Luoyi*" (fall one), a term whose semantic meaning was also noticed by former 20<sup>th</sup> century historians. My paper will use a few case studies to compare these 19<sup>th</sup> and 20<sup>th</sup> century scholars's ways of expressing and interpreting the text.