Qin Dynasty bamboo slip sheds light on mathematics in administration

Numbers key part of governance in ancient China

CULTURE

By LUO JIANJIN

FILE

The bamboo slips in the Qin Dynasty stored by Peking University show many basic ideas on mathematics.

In the 1930s, Chinese scholars translated "*shuxue*" (literally meaning the study of numbers or counting) into "mathematics" in English, and then the term "*shuxue*" became a proper noun to describe the discipline of mathematics in Chinese.

But what terms were used earlier in history? From the Warring States period (475-221 BC) to the 400 years of the early Han Dynasty (206 BC-220), besides "*shu*" (number) and "*jiushu*" (nine categories of mathematics), what did ancient Chinese call the discipline of *shuxue*?

There was a term called "*jishu*" (counting), which appeared earlier than rod-arithmetic, arithmetic and arithmetic classics and also earlier than geometry, algebra, trigonometry and calculus. It was the first mathematical term for these ancient Chinese. "*Jishu*" is just a common name, but its meaning has endured great changes. Even today it is still a name for the sub-discipline of combinatorial mathematics.

The No. 2 issue of the 2015 *Journal of Peking University* indicated that a bamboo slip in the Qin Dynasty (221-206 BC) stored by Peking University described the meaning and value of counting, numbers and their applications in national administration. The bamboo slip has more than 800 Chinese characters, and represents the first long article in the history of Chinese mathematics.

Thus before *The Nine Chapters on the Mathematical Art* (the first detailed Chinese study of mathematics) gained currency, there was a notable period in which people utilized accurate counting to manage society. Although there were no works on mathematics handed down from pre-Qin times, it didn't mean mathematics didn't exist. Although there were no professional mathematicians, it didn't mean no people were good at counting at that time. Besides the *Mohist Canon* which mentioned many mathematical basics, the ancient philosophers in pre-Qin times, especially Guan Zhong (c. 725-645 BC), Xun Kuang (313-238 BC) and Han Feizi (c. 280-233 BC) expressed their opinions on counting in their representative works.

Guan carried out reforms in the State of Qi, one of the Seven Powers in the Warring States period, and put an emphasis on the rule of law in governance. In his work *Guanzi*, he indicated that wise kings managing state affairs should depend on the rule of law instead of individuals' intelligence, quantitative criteria instead of preaching, justice instead of seeking personal gains, and grasping the overall situation instead of niceties so that the state was effortlessly governed.

Moreover, Guan regarded measuring instruments and mathematical tools such as compasses, set squares, spirit levels and plumb lines as the kernel of the law, which became the highest rule of measuring right and wrong, the criterion of judging good and bad and the basis of conducting rewards and punishments. Guan defined hardness, weight, size, density, distance and quantity as objects that could be counted, in what was the first instance of an unambiguous definition of counting in the history of Chinese mathematics. It illustrated that Guan attached importance to the application of counting in strengthening governance and promoting prosperity.

In contrast to Guan, Xun pinpointed in *Xunzi* that a calculating king amassing wealth by heavy taxation would make a state perish. All kings, ministers and officials should use moral standards and laws to count the income and expenses of goods and wealth. Xun criticized kings and officials who regarded counting as a strict means of inspection and were only concerned with their personal gains and losses.

In *Han Feizi*, Han mentioned that the relationship between the monarch and his subjects was not as simple as a father-son relationship. Instead, it was a calculated relationship based on mutual gains and losses.

From the ancient philosophers' perspective, counting not only refers to measurement, but also represents people's strategic plans and measures. As a significant means of running a country, ancient philosophers thought highly of counting in governance.

Luo Jianjin is from the Institute for the History of Science and Technology at Inner Mongolia Normal University.

Liu Yangzhong: Communicator of classics

PEOPLE

By WANG WEIJIA

Liu Yangzhong (1946-2015) was a research fellow with the Institute of Literature at the Chinese Academy of Social Sciences (CASS). He served as an editorial board member of the Literary Heritage *journal and vice chairman of China Song Literature Society. He was mainly engaged in studies into classical Chinese poems.*

In academia, Liu Yangzhong was known for his erudition and was respected by his counterparts. Liu's life became known as the "four thousands." He read thousands of books, traveled thousands of miles, drank thousands of glasses of wine and recited thousands of poems.

Liu was strict with students and encouraged them to read widely, which represented his unique educational methods.

I still remember when I was enrolled in the Graduate School at CASS, Liu asked each student to write a 3,000-character-long introduction about ourselves in classical Chinese, common vernacular Chinese and English successively, in order to examine our knowledge base and writing ability.

Although we could not get a high mark through this "additional examination," this examination definitely became a form of encouragement and driving force for us to pursue eternal learning.

In addition, Liu also required us to write poems during our training, which reflected his teaching ideas on how to improve doctoral students' abilities regarding literature, theory and creation simultaneously.

Liu told us that we should always be in close company with books for our entire lives, extensively read, think deeply and deliberately utilize our knowledge so that we can achieve good scholarship and deliver results. Liu emphasized that we cannot read only for reading's sake, but that we should critically analyze, reject the dross and absorb the essence.

Thus, he asked us to write book reports regularly and he read each report thoroughly and gave remarks in order to help us improve.

Liu was one of the best students of Wu Shichang (1908-1986), a distinguished scholar on Redology (studies of Cao Xueqin's *Dream of the Red Chamber*). Wu was well versed in both Chinese and Western knowledge and good at both literature and history. Influenced by Wu, Liu spoke frankly, behaved honestly and never stopped writing throughout his whole life.

Liu was a prolific scholar and published more than 40 works, including *The Path to Studies of Song Poems*, *Exploration to Xin Qiji's Poems*, *History of Tang and Song Poems' Schools* and *Poems and Wine*, and hundreds of theses, essays and book reviews. At the same time, he supervised and cultivated a dozen master, doctoral and postdoctoral students.

Wang Weijia is from the Communication University of China.

Faces, scale and lines within Chinese sculptures

By WU YALIN

Ancient Chinese sculptors prioritized physiognomy, as they believed facial features and expressions could show one's real character. The second thing they kept in mind was the scale of sculptures. The third thing they considered was how they could show the significance of lines within the beauty and form of sculptures.

Physiognomy emerged as early as the Spring and Autumn period (770-476 BC). In the Sui Dynasty (581-618), physiognomy had already reached a peak. Sculpture-making at the time focused heavily on physiognomy, landscape painting and *fengshui*. In ancient China, sculpting pursued social utility. So both statues of Buddha and emperors were shaped on the basis of the ideal face in physiognomy. For instance, people always carved the statue of the emperor with elegant and long eyes, shaped the statue of a strong man with eagle eyes and molded the statue of a noble man with a full forehead and a square jaw which was a sign that he was blessed with good fortune.

There were many strict rules to follow when ancient sculptors were making statues of Buddha. In each dynasty, the size measurements for statues of Buddha were based on a masters' years of experience and passed on to apprentices through oral instruction. For instance, no matter how high the statue of Buddha should be or how dangerous the grottos were, craftsmen could follow sculpture-making rules to complete the statue coherently without hesitation.

The early statues' clothes were tightly fit to the statues' bodies, but as the times changed the lines of statues' clothes gradually evolved in various forms. Instead of physical lines, the lines of statues' clothes were regarded as "spiritual."

Wu Yalin is from The Guangzhou Academy of Fine Arts.