

Seminar SAW: History of Mathematics, History of Economical and Financial Practices
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Accounting in administrations, taxes, and salaries

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The place of figures in the administration of China's early empires (221 BCE to 220 CE)

Sources of information for the part taken by figures and statistics in the administration of China's early empires may be found in the dynastic histories, a textbook of mathematical problems of the type that faced officials in the conduct of their duties (such as the measurement of land or the collection of tax), archive documents that derived from just such administrative actions and the material evidence of standard weights and measures that were introduced from 221 BCE.

These sources describe the procedure for constructing standard instruments or vessels to measure length, capacity and weight. We read of the scales of measurement which varied from time to time, being based on a series of five units in each case that advanced by stages of ten or four. Material objects verify that these provided a footrule of 23 cm, the large unit of capacity named the *shi* 石 at 20 litres and the small weight of the *zhu* 銖 of 3.25 g. Measurements and calculations were expressed in units of the *yi* 億 of 100,000 downwards. Attention to fractions is seen in the algebraic examples and problems of the textbook, and it is evident in the measurement of time. The importance of figures and measurement is seen in arrangements for government minted coins in copper, according to a specified weight that varied from time to time; in the calculation of salaries of officials according to their place on a scale of sixteen places; in the assessment of tax, which varied between 1/30th and 1/10th of the produce or in measurement of land areas; and in judicial matters, such as the assessment of damage caused by a criminal, determination of the amount of a fine or the payment whereby a sentence of hard labour could be redeemed.

Meticulous accuracy here, for example in reporting the receipt and consumption of grain, contrasts with the rounded statements in large or small amounts that feature in officials' reports, perhaps claiming the infliction of a large number of casualties on enemy forces in battle, or reporting the high price of grain at a time of famine or its low price at a time of glut. As against rhetorical statements of such a type, we know of at least two military officers (Zhao Chongguo 趙充國 61 BCE and Feng Fengshi 42 BCE) who were capable of presenting well thought out figures for the supplies and costs of a campaign, and one official (Sang Hongyang 桑弘羊 executed 80 BCE) acknowledged as a mathematical genius, who unfortunately left no writings behind him.