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Meanings and uses of measuring units in pre-modern China

Chaired by

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In the last decades, the history of measuring units in pre-modern China has mainly followed two directions of research. On the one hand, it has focused on the system of measuring units—either those enacted by imperial institutions or those used by actors in different contexts—, attending to their material dimensions, the standards embodying them and the relevance of those measuring units for economic history. On the other hand, research has concentrated on the political and cultural implications of the reforms of systems of measuring units and their uses.

This panel intends to widen the scope in this field of research and raise new kinds of questions with respect to measuring units and the systems they formed.

— What was the intellectual and scientific work engaged in the actual design of measuring units and material standards for them?

— How were measuring standards actually made and used? Dealing with such questions implies taking into account several types of actors. We intend to focus on the making and use of measuring standards in various social contexts, hoping to cast light on the different social uses of measuring units and how these social milieus connected with each other regarding issues of measurement.

— How were actors measuring and using measured quantities? The point, here, is to identify the knowledge involved in the activity of measuring, to understand how this knowledge was acquired. Moreover, our intention is to identify the strategies devised by actors to deal with the values they obtained. Again, here, it is hoped that such questions can allow us to identify, through the variety of their practices, distinct social milieus and the kinds of knowledge they shared.

— How can we assess the part played by measurement in the context of various types of activities and how practices of measurement were organized? The contexts of tax payment or of the organization of labor appear to be as interesting as those of business or domestic activities.

With this set of issues, we hope to contribute to bridge the gap between economic history, social history, political and cultural history, on the one hand, history of science and technology, on the other. At the same time, we expect that such a perspective can bring these fields closer to an anthropological study of actors of the past in their knowledge activities.

Abstracts

Approaching the scientific work at play in the analysis of standard measuring vessel in ancient China (3rd—7th centuries)

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The presentation aims at highlighting and analyzing aspects of the scientific work that Chinese scholars active between the Wei and the Tang dynasties carried out in order to analyze systems of measuring units and material standards designed in the past to embody these measuring units. It is hoped that this investigation can help us approach the work involved in the actual design of systems of measuring units and the making of material standards associated to them.

To deal with this topic, the presentation will focus on measuring units for capacity and standard vessels attached to them. It will also mainly concentrate on the measurement of grains. In a first part, I shall suggest that mathematical documents provide in this respect a precious source of evidence and I shall offer arguments establishing authorship for some of the passages that they contain and that are contested. The deployment of these arguments will require that we rely on the “Monograph on pitch pipes and the calendar 律曆志” of the *History of the Jin dynasty* 晉書 and the *History of the Sui dynasty* 隋書. In a second part, I shall discuss which hypotheses these connections between the official histories and mathematical sources suggest with respect to the status and use of these mathematical books. These hypotheses in turn help us understand how we can use the evidence provided by the latter documents, in particular to investigate the history of the design of systems of measuring units and the material standards embodying them.

Different mathematical cultures in Tang time period as revealed by the treatment of measured quantities

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The Tang scholar Li Chunfeng 李淳風 (602 – 670) supervised a commentary composed on *Ten classical mathematical books* 算經十書 and some of their earlier commentaries. That newly composed commentary was presented to the throne in 656. Before that time, Li Chunfeng had also authored three monographs for inclusion in the *History of the Jin dynasty* Jin Shu 晉書 and the *History of the Sui dynasty* Sui Shu 隋書, which contained a historical treatment of measuring units. On the other hand, the Tang scholar Jia Gongyan 賈公彥 (7th century) wrote commentaries on *Rituals of the Zhou dynasty* (Zhou Li 周禮) and *Etiquettes and Rites* (Yi Li 儀禮.) In these two commentaries on Confucian classical books,

Jia Gongyan also developed mathematical computations on quantities expressed with respect to measuring units.

The talk aims to bring to light that these sources bear witness to different ways of putting measuring units and quantities expressed with respect to them into play. I shall examine the role played by measuring units in these different kinds of texts, the goal being to put forward the hypothesis that there existed different cultures of computation in Tang China.

Measuring units and quantities in Chinese ancient astronomic tables

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Chinese astronomic measuring unit systems, including the units of length, time and angle, varied in time. In ancient times, a set of length units (1 *zhang* 丈 = 10 *chi* 尺 = 100 *cun* 寸) was used in parallel with the units 1 *du* or degree 度 = 100 *fen* or minutes 分 = 10000 *miao* or seconds 秒 in order to describe the position of the different celestial bodies. After Islamic astronomy and European astronomy were transmitted into China in the early and late Ming Dynasty respectively, the angular unit system arc-degree began to be adopted and widely used. In order to integrate the different systems of *chi* and *du*, during the Ming Dynasty a definition of one *chi* equal to one *du* began to be proposed. The Chinese ancient *du* system was gradually replaced by the arc-degree system. This change can be clearly reflected in the changes of units and quantities in astronomical tables. The presentation will focus on the discussion of the measuring unit *du*. In Chinese ancient astronomy, its literal meaning was “degree”. However, it was actually more a linear division than an angular one. The presentation will show how its meaning was changed in early modern times in China. The way in which quantities of divisions developed from the usages of fractions and decimal system to sexagesimal system in astronomical tables will also be discussed.

Aspects of philosophy of numbers in relation to the lexicalized gramm of number words in pre-Buddhist and Classical Chinese

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In this paper I shall consider in some detail and with examples thirty-nine syntactically and/or semantically distinct functions of number words in classical Chinese.

Moreover, I shall try to argue that all these functions are probably best formally derived from one basic verbal grammatical function within the system of categorial grammar as laid out and systematically applied in Thesaurus Linguae Sericae (url: tls.uni-hd.de; see in particular http://tls.uni-hd.de/projectDescription/glossary/contents_syntacticCatGen.lasso)

Measuring the Body – Locating Acupuncture Loci during the Northern Song Dynasty (960-1127)

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When the topic of measurements comes up in the history of medicine it is often either associated with the amounts each drug that makes and ingredient on a medicinal formula or associated with measuring the body and locating the acupuncture loci on it. Surprisingly, at least from a Western perspective, the former received rather limited attention in Chinese medical literature. This is probably due to the fact that, unlike their contemporary Western counterparts, Chinese doctors focused more on the quality of the drugs making the formula than on their specific quantity. In contrast, measuring the body and thus precisely determining the location of the acupuncture points was a topic of interest in medical treatises. This was probably due to the fact that inserting a needle to an incorrect spot could cause a severe injury.

In this paper I would like to discuss the Tang to Song transition with regard to measuring the body and locating the acu-points on it. This shift, which brought back the prominence of acupuncture in comparison to moxibustion, was achieved by implementing new means of transmitting spatial knowledge of the body via drawings and even a bronze figure. The latter, on some level, may be compared to the golden meter in its usage. I will begin with the earliest concerns about measuring the body from the Han dynasty to the Tang dynasty. I will then present the solution brought forward by Song dynasty doctors and scholar officials.