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Mathematical Practices in relation to the Astral Sciences

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Progressions, motions and changes in the astral sciences of ancient China

Abstract - Numerical progressions (hereafter, progressions) are an important topic in mathematical writings. They also occur in relation to astral sciences, in particular in the official monographs of dynastic histories which presented some calendrical systems that were used in ancient China. In this talk, we focus on the progressions dealt with in these two types of documents. A first point we make is that in mathematical writings, one finds two key types of problems related to progressions. In a first type, knowing the sum, or some of the terms, the problem asks to determine the progression, on the basis of assumptions with respect to its nature. In a second type, knowing the initial term and the common difference of an arithmetical progression, one determines its sum. Our second point is to emphasize that both problems have parallels in the astral sciences. In some cases, astronomical systems provide progressions to handle variations of specific data along time, in ways that are reminiscent of problems of the first type. Different actors appear to have shaped progressions according to wholly different principles, especially with respect to symmetry assumptions. In other cases, actors compute planetary motions along a cycle in ways that are reminiscent of the second type of problems. In brief, in the contexts of the writings we have on astronomical systems, we encounter terms and procedures that are common with mathematical writings whereas in mathematical writings, we encounter procedures that evidence the influence of terms and modes of thinking coming from the astral sciences. In the conclusion, we discuss hypotheses about the relationships between these two types of documents to which the topic of progressions attests. Moreover, our talk discusses a third point, namely the evidence available about criteria some actors in the astral sciences used to assess the types of progressions used by their predecessors. These pieces of evidence could be important to understand how actors thought one should combine observation and mathematics in opting for a given progression.