On the curious historical coincidence of algebra and double-entry bookkeeping

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1 Introduction

The emergence of symbolic algebra is probably the most important methodological innovation in mathematics since the Euclidean axiomatic method in geometry. Symbolic algebra accomplished much more than the introduction of symbols in mathematics. It allowed for the abstraction and generalization of the concepts of number, quantity and magnitude. It led to the acceptance of negative numbers and imaginary numbers. It gave rise to new mathematical objects and concepts such as a symbolic equation and an aggregate of linear equations, and revealed the relation between coefficients and roots. It allowed for an algebraic approach to ancient geometrical construction problems and gave birth to analytical geometry. Why did this important methodological revolution happen? Why did it happen in Europe and not in Asia while Indian and Chinese algebra were more advanced before the fourteenth century? Why did it happen in the European Renaissance?

We can only touch the surface of possible answers to these fundamental questions within the scope of this paper. However, we would like to argue that the answers will involve multiple disciplines and will go beyond the boundaries of the history of mathematics. Most historians have taken for granted that symbolic algebra was an inevitable step within the logical development of mathematics. But can we speak of a logic of historical necessity? The history of mathematics at least teaches us that there have been developments within mathematics that were not in logical sequence. A full notion of the function concept was developed only after the calculus, while textbooks on calculus first