

# «*Omnia numerorum videntur ratione formata*».

## A 'Computable World' Theory in the Early Medieval Philosophy

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The digital philosophy is strictly speaking a new speculative theory, developed in recent decades by Edward Fredkin, Gregory Chaitin and Stephen Wolfram, who place the bit at the foundation of reality and explain the evolution of reality as a computational process. This theory actually reinterprets some previous philosophical intuitions, starting from the Pythagorean theory of numbers as the beginning of all things and as a criterion for the comprehension of reality.

Significant antecedents of this computational philosophical approach, however, can be found in the tradition of late antiquity and in the early Middle Ages too. In particular, in the Western thought, there is a path that goes from Augustine of Hippo (354–430) to the school of Chartres (twelfth century), passing through Cassiodorus (485–580) and Severinus Boethius (480–524), who defines the *quadriivium* and in particular the study of mathematics a means to get closer to perfection and to perceive the infinite (*De institutione arithmetica*).

One of the less investigated chapters of this 'pre-history' of the digital philosophy is placed in the so-called Ottonian Renaissance, when we can identify theorists of what has been called – in reference to modern authors as Leibniz – 'computa-

tional paradigm'. At the end of the tenth century, this paradigm becomes the theoretical background for the development of a concept that, although not in a systematic form, outlines the contours of an ordered vision of the world that updates the Pythagorean dream.

The paper focuses on the works of authors such as Abbo of Fleury (945–1004) and Gerbert of Aurillac (946–1003). Abbo, monk and abbot of Fleury Abbey (near Orléans), is the author of a comment on the *Calculus*, a manual of calculation wrote in the fifth century by Victorius of Aquitaine, according to which the arithmetic is the science of unity. The theoretical basis of the work of Abbo is the famous verse of *Wis* 11, 21 (*Omnia creata sunt in numero mensura et pondere*): Abbo believes that the man can, starting from the contemplation of the number, size and weight, go back to the knowledge of the principles of the cosmos.

Gerbert of Aurillac (Pope Sylvester II) is the author of many mathematical writings (*Libellus de numerorum divisione*, *De geometria*, *Regula de abaco computi*, *Liber abaci*) set in a logical and metaphysical framework. He, too, believes that the natural world is governed by mathematical relations, so the study of numbers is not for its own sake in itself but the best way to access to the

laws that govern the universe. His passion for arithmetic arises from the awareness that «the numbers contain within them, or originate, the beginnings of all things», according to a principle expressed in many of his writings, so the knowledge of numbers is set at the beginning of any further knowledge.

It would not be inappropriate to apply to these philosophers the modern concept of *mathesis universalis* (universal mathematical science), which is the project of a general science modeled on mathematics that leads to a certain knowledge (the term was employed by Leibniz to describe his combinatorial art, or *characteristica universalis*).

This amazing epistemological value of medieval mathematics is the result of an approach to the numbers, typical of these authors, in which the practical problems (the *computus*, the land surveying, the astrology) are based on theoretical issues of the first order. This speculative attitude is not unusual in the history of Western thought, but it is significant that it will occur again in this era – frequently considered among the darkest ones – through the double reference, on the one hand to the scientific tradition that is rooted in 'numeric Pythagorean exemplarism', the other side to the (neo)Platonic tradition.

## Sources

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