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## Book Review

### Reply to the Book Review<sup>1</sup> of *La Mathématisation du Temps:* *De La Science Hellénistique à La Science Moderne*

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We would like to thank João F. N. B. Cortese, Murtaza Chopra, and Philippe Debroise for the careful and substantial reading they devoted to *La mathématisation du temps: de la science hellénistique à la science moderne*, as well as for their positive assessments concerning the scope of the project, its didactic character, and the importance it assigns to the question of time in the history of physics. The stimulating nature of the debate they have initiated confirms, in our view, that the book fulfills one of its main objectives: reopening historiographical issues that were often considered settled. That said, several criticisms formulated in the review rest on substantial misunderstandings regarding our approach, the nature of our theses, and the level of analysis employed. We would therefore like to offer the following clarifications.

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#### On the Nature of the Project: Conceptual History Rather Than Micro-Historiography

The reviewers reproach our book for a supposed “lack of historiographical rigor” and for what they consider an overly free use of heterogeneous sources. This criticism implicitly assumes that our work aims to operate at the level of erudite micro-history, primarily based on the exhaustive exploitation of primary sources. This is not our project. *La mathématisation du temps* explicitly belongs to a long-term conceptual history, adopting an epistemological and comparative perspective. Sources are mobilized not in order to reconstruct local contexts exhaustively, but to shed light on conceptual structures, ruptures, and shifts in problems (time, motion, law, inertia, etc.) over a very long historical span. In this context, the combined use of classical texts, modern philosophical analyses, and contemporary synthetic works is neither a methodological weakness nor a confusion of genres, but rather a necessary condition of the inquiry itself. To demand from such a work the standards of a specialized monograph devoted to a narrowly delimited corpus is to misunderstand the legitimate plurality of historiographical practices.

<sup>1</sup> João F. N. B. Cortese, Murtaza Chopra, Philippe Debroise. Book review : “La Mathématisation Du Temps: De La Science Hellénistique à La Science Moderne”. 2025. *Transversal: International Journal for the Historiography of Science*, 2025. no. 19 (December), pp. 1-9. <https://doi.org/10.24117/2526-2270.2025.i19.17>

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## On Hellenistic Science and the Question of Non-Greek Traditions

The review regrets the absence of an in-depth discussion of non-Greek traditions<sup>4</sup> in our treatment of Hellenistic science. We do not in any way contest the importance of these contributions; however, this criticism overlooks the precise level of our analysis. Our thesis is the following: Hellenistic science constitutes the first systematic attempt at mathematizing physics, in the sense that it articulates mathematics, physics, and theoretical idealization. Because this first mathematization was interrupted shortly after the beginning of the Common Era, it is regularly neglected in historiographical studies, even though the protagonists of the Scientific Revolution merely pursued this work, as our book shows. In this respect, what matters is the result of Hellenistic science itself, not the various cultural streams that may have contributed to it.

## On the Middle Ages, Clocks, and the Measurement of Time

Several remarks in the review suggest that we oppose, in an overly simplistic way, an “irregular monastic time” to a “uniform mercantile time.” Our position is more nuanced. What we actually oppose is the need for the scansion of time in monastic contexts and the need for the measurement of time in medieval mercantile cities. That sophisticated instruments were designed in monastic milieus (such as the clock of Richard of Wallingford, explicitly mentioned in our study<sup>5</sup>) in no way contradicts this thesis. The decisive issue is not the existence of isolated artifacts, but their integration into a theoretical practice of motion capable of making time an independent and universal variable—something that is fully achieved only in the seventeenth century.

The same holds for Oresme’s work on the relation between distance and time. The reviewers state that we “do not seem to be aware of the fact that Nicole Oresme proved mathematically that, for a mobile accelerating or decelerating at a constant rate, the distance travelled is like the square of the time.” Not only do we study Oresme’s work in detail, but we explicitly mention this very result. We also recall its limitation: Oresme’s *velocitatio* remained purely theoretical and was never applied to nature.

Philoponus constitutes another analogous case. As the reviewers note, he “defended the conservation of movement in mobiles”, and, together with Augustine, paid attention to time and to its relation to motion. This is correct, and it would indeed have been a serious omission to ignore the concept of *impetus* in Philoponus, which Duhem and many others after him regarded as an anticipation of inertia. We examine this issue in detail and show why such an interpretation cannot be sustained.

## On Galileo, Inertia, and the Alleged “Excessive Centrality”

We are reproached for making Galileo too central a figure and for reducing the “modern scientific spirit” to the Galilean tradition. Our thesis is in fact more precise: the principle of inertia constitutes the conceptual key to the mathematization of time, and Galileo is the first to provide an operative, albeit incomplete, formulation of it. This does not imply that Galileo was the sole actor of the Scientific Revolution, nor that other traditions (Paracelsian, experimental, technological) were

<sup>4</sup> The review refers, among other things, to a so-called “cuneiform tradition” that we are said to have neglected, which is rather puzzling, since cuneiform is a type of writing, and this script had disappeared many centuries before the Hellenistic period. We think the reviewers meant the Babylonian tradition. If so, let us say that no historical civilization is unaware of regular temporal units such as the day or the year. As for the Babylonians, they did indeed treat time as an abstract arithmetic variable, but only for purely computational and predictive purposes, not for physical ones: in their view, time was never related to space, and a fortiori it was never conceptualized as a fundamental variable of motion.

<sup>5</sup> Our book recalls in this connection the amusing nickname given to this cleric by one commentator: “the quantifying abbot.”



negligible. However, none of them led to the decisive gesture: the dissociation of motion from any permanent cause, a necessary condition for conceiving time as an abstract magnitude.

## On the Thesis of the Christian Origin of Modern Science

We are reproached for not having exposed the precise genesis of the thesis of the Christian origin of modern science in each of the authors we cite, nor its place in their respective works, particularly in the case of Kojève. This was indeed not our aim. Our purpose was solely to evaluate the objective relevance of the arguments advanced, independently of the religious or philosophical motivations of their authors, or of the role this thesis plays in their respective works. Nor was it our intention to draw up an exhaustive panorama of the direct or indirect influences of Christian thought and institutions on the emergence of modern science, but exclusively to examine the claims of direct causal relations invoked by certain authors to account for it.

## On Kojève's Place in Contemporary Historiography

The review suggests that we exaggerated the actual influence of Kojève's thesis in contemporary historiography. We do not claim that the numerous authors mentioned endorse his position exactly, but we do maintain that the idea of a strong causal link between Christianity and modern science is widespread, often in attenuated or implicit forms. Our critique, therefore, does not target Kojève alone, but a recurrent argumentative configuration that conflates general cultural conditions, doctrinal compatibility, and historical causality. If we devote sustained attention to Kojève, it is because his text constitutes an exemplary conceptual crystallization of this confusion.

## On the Reviewers' Global Reformulation of Our Thesis

The reviewers suggest that the implicit argument of the book could be reformulated as follows: 3

- (i) contrary to Kojève,
- (ii) and to those who defend similar views,
- (iii) there is no Christian origin of modern science,
- (iv) nor a revolution based on a new mathematization of nature,
- (v) because the true revolution lies in a new conceptualization of time.

They judge that the book does not fully achieve results (ii), (iii), and (iv).

For our part, we maintain that the objective of the book was to bring to light the Hellenistic and mercantile origins of modern physics—rather than a Christian origin understood as the intrinsic necessity of a particular theological paradigm—and to show that its true novelty does not lie in the mathematization of “nature” (already largely undertaken in the Hellenistic period, particularly by Archimedes), but in the mathematization of time, initiated by Galileo and completed, in its classical framework, by Newton.

## Conclusion

The disagreements expressed in the review stem less, in our view, from factual errors than from a misunderstanding of the project of our essay, as well as from divergences concerning the type of history of science one considers legitimate and fruitful. Our aim was to propose a historically grounded genealogy of the resolution of the problem of motion—a physical problem that was resolved neither by metaphysical presuppositions nor by institutional or religious factors, but through the elaboration of new physical concepts and through the mathematization of time.



We fully assume a conceptual, synthetic, and critical approach, which neither seeks to replace specialized studies nor to submit to them; rather, our book aims to renew the debate by advancing new theses and by operating at a different level of analysis.

If this reply helps to clarify these differences and to open more clearly delineated paths concerning the nature of modern science and the place of time in its emergence, it will have achieved its purpose.