

## REVIEWS

*Edited by Catherine Goldstein and Paul R. Wolfson*

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Most reviews are solicited. However, colleagues wishing to review a book are invited to make their wishes known to the appropriate Book Review Editor. (Requests to review books written in the English language should be sent to Tom Archibald at the above address; requests to review books written in other languages should be sent to Prof. Catherine Goldstein at the above address.) We also welcome retrospective reviews of older books. Colleagues interested in writing such reviews should consult first with the appropriate Book Review Editor (as indicated above, according to the language in which the book is written) to avoid duplication.

**The Measure of Reality: Quantification and Western Society, 1250–1600.** By Alfred W. Crosby. Cambridge (Cambridge University Press). 1997. xii + 245 pp. with notes, illustrations and index.

*Reviewed by Frank Swetz*

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“By the sixteenth century more people were thinking quantitatively in Western Europe than in any other part of the world”—a strong Eurocentric claim and certainly one whose truth requires further substantiation. This statement greets the reader in the publisher’s prologue to *The Measure of Reality* and seems to suggest the direction for the intellectual inquiry that will follow: an examination of the “whys” and “hows” of European quantitative thinking. But Alfred Crosby, in his adjacent Preface, sets a more intriguing and complex objective for his work: that of identifying and examining the use of numbers and measure, quantification, as a major factor in the success of the European colonial imperialist movements. He has previously probed this theme, European conquest, from the aspects of biological determinism—the exchanges of disease for foodstuffs; but now he promises to venture into a more challenging level of inquiry. European superiority in transoceanic ship design, navigation, and armaments has readily been acknowledged as contributing to the scope of Western colonial domination. In assessing the imperialist impact of the West’s science and technology on the rest of the world, Crosby proposes that the real European advantage lay beyond the application of its inventions and was to be found in the existence of a *mentalité*, a unique mentality, a world view, that in large part was shaped by the recognition and

utilization of quantification. This mentality then affected Europeans' perception of reality and the way they related and interacted with the peoples and world around them. An enticing premise and one that, it seems, will be explored and developed in the text that follows.

The book is divided into three parts. The first part, comprising six chapters, sets a perspective: the world view, the Venerable Model, inherited from ancient Greece and modified in the early Middle Ages, is discussed; the scholastics' (termed Schoolmen by Crosby) efforts at organizing knowledge, relying on the use of formal logic and precise language, is held up as a precursor to mathematical thinking; a new view of time as a continuum divided into pockets of hours and minutes is considered; the redefinition of space from the refinement of portolano charts to the shattering of the crystalline sphere theory of cosmic constraint is surveyed; and, finally, the impact of the Hindu–Arabic numerals and their applications is considered. The second part focuses on the realization of a quantified world in the performance of music, painting, and bookkeeping. The final part, an epilogue, summarizes the New Model of European Reality, one firmly established on visualization and quantification.

Alfred Crosby's writing encompasses a broad and impressive sweep of scholarship. In order to color and provide background for his major ideas, he draws upon a variety of material from the history of arts, science, and literature. For example, in attempting to understand the impact of time quantification due to the introduction of the mechanical clock in the 14th century, the reader learns among other things that the word for "clock" is derived from the German *Glocke*, bell; that Charles V of France decreed that all French clocks be set in accord with his palace clock; and that the medieval French poet Jean Froissart used a clock as a poetic image for a lover's heart. Ample footnotes support these assertions. Such facts help "humanize" the discussion and emphasize the evolutionary nature of human achievements; they are certainly needed but given in multitude may obscure the main train of thought for some readers. In contrast to the abundance of prerequisite information, there often appears to be a lack of relevant consequential information. The clock discussion brought the reader to the quantification of time, an intellectual advance that helped organize human activities, including human labor; the concept of man-hour (woman-hour) came into being—how did this quantification of human worth alter the dignity of the individual? Human labor as a commodity became a driving force (and still is) in Western imperialism. In trying to understand the developing *mentalité*, such issues are important but remain ignored. In discussing the rise of a money economy and its stimulus for quantification, a 14th century observation is recalled, that "Every saleable item is at the same time a measured item" (p. 70). A very effective quote, but perhaps it leaves the reader wondering just how were these items measured, by what units? One 17th-century European traveler noted that in his experience the word for the weight measure "pound" specified 391 different units and that for the "foot" 282 different units. Some discussion of the complexities of measurement, the units employed, and the efforts to standardize them would seem warranted. Just how a society measures, in finger widths, microseconds, or megatons, tells us much about that society.

Included in the opening chapter of *The Measure of Reality* is an illustration of Pieter Bruegel the Elder's print *Temperance* (1560). It serves as an affective device, a visual database from which inferences about the contemporary climate of quantification can be drawn. Illustrations of several Medieval and early Renaissance paintings are employed in a

similar, appealing, manner in Chapter 10, which is entitled “Painting.” Within this collection of art, the spatial dynamics of some subjects are isolated and examined as reflections of the emerging reality taking place; evident use of perspective attests to a quantification of space. But it is in these same illustrations, particularly Raphael’s *Marriage of the Virgin* (1503), Crivelli’s *Annunciation* (1486), and della Francesca’s *Flagellation of Christ* (ca. 1450), that the truest sense of the new European *mentalité* emerges. Linear perspective with its vanishing point establishes depth—a sense of distance in a picture. Psychologically, that distance is unbounded. The European model of history that unfolded was linear and unbounded, unlike those of the other major cultures of the time, which were cyclic and constrained. European destiny went forward. It extended from “here” to “there,” from “us” to “them,” from “some” to “more,” and expressed itself in a boldness and aggression that both intellectually and physically lent themselves to geographical exploration and colonial conquest. But such an analysis is not rendered from these paintings by the author. Nor is any consideration given to the concept of infinity, an idea that plagued the natural scientists and thinkers of the time.

Ultimately, *The Measure of Reality* is a pleasant and informative book. It surveys some of the trends of quantification in European society during the period 1250–1600 as indicated in the full title and the publisher’s prologue. A reader learns much from this work—I was pleased to have called to my attention the premise that “the musical staff was Europe’s first graph” (p. 144). This book is certainly recommended as a library acquisition. However, many (myself included) will be disappointed that Alfred Crosby, an excellent reporter, did not pursue the theme hinted at in his Preface and confront and explore the issue of the European *mentalité* as shaped by the interaction of number and measurement.

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**Leonhardi Euleri opera omnia, secunda, vol. 31: Commentationes mechanicae et astronomicae ad physicam cosmicam pertinentes.** Edited by Eric J. Aiton, with an Appendix by Andreas Kleinert. Basel (Birkhäuser). 1996. 480 pp. DM 270. ISBN 3-7643-1459-1.

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Euler hat sich immer wieder mit wichtigen Problemen der kosmischen Physik beschäftigt und dazu zahlreiche Abhandlungen verfaßte, die nun alle in diesem Band seiner *Opera omnia* zusammengefaßt worden sind. Auch dieser Band beweist einmal mehr, wie sehr Newtons *Principia* die wissenschaftlichen Diskussionen im 18. Jahrhundert beherrschten, denn kein Autor ist von Euler (übrigens auch von den beiden Herausgebern) häufiger zitiert worden als Isaac Newton. Selbstverständlich war Euler kein Newtonianer, ganz im Gegenteil, mit viel Spott und Fleiß bekämpfte er sie, aber die in Newtons *Principia* formulierten Probleme und angegebenen Lösungen stellten auch für Euler die Weichen für seine eigenen Untersuchungen zur kosmischen Physik.

Eröffnet wird der Band mit dem *Tentamen explicationes phaenomenorum aeris* von 1727, in welchem der zwanzigjährige Euler den Aufbau der Erdatmosphäre, insbesondere die

