

operating to retain the several particles in their circles''; this must surely cast doubt on his ability to refute the vortex theory by sound dynamical arguments [6].

A question of fundamental importance relating to the *Principia* is whether Newton, as Westfall asserts (p. 413), succeeded in deriving Kepler's three laws. In the first edition of the *Principia* [7], having demonstrated the inverse-square law of force for a body moving in an ellipse, hyperbola, or parabola, he states the corollary (though without proof), that a body moving under a centripetal force varying inversely as the square of the distance must describe a conic section. Newton himself certainly regarded the result as established, and in the second edition he added an outline of a geometrical demonstration. Meanwhile, Johann Bernoulli and Jakob Hermann, no doubt assisted by Newton's proposition 41 of Book I, had arrived at independent analytical demonstrations of this fundamental result [8]. The absence of a demonstration in the first edition of the *Principia* of the answer that Newton presumably gave to Halley—namely that under an inverse-square law of centripetal force, a planet would move in an ellipse—is an intriguing problem.

NOTES

1. On page 4 Westfall gives an incorrect title of Kepler's *Harmonices mundi libri v*. He takes "Harmonices" to be a nominative instead of a genitive. The shortened title should be *Harmonice mundi* (*Harmony of the World*).

2. On page 537, footnote 239, Westfall describes the paper by P. E. Spargo and C. A. Pounds, "Newton's Derangement of the Intellect," as unpublished. It has been published in *Notes and Records of the Royal Society* 34 (1979), 11–32. The mercurial-poisoning theory is rejected by R. W. Ditchburn ("Newton's Illness of 1692–3," *Notes and Records of the Royal Society* 35 (1980), 1–16).

3. Peter Wallis and Ruth Wallis, *Newton and Newtoniana 1672–1975*, Folkstone: Dawson, 1977.

4. See E. J. Aiton, "Newton's Aether-Stream Hypothesis and the Inverse Square Law of Gravitation," *Annals of Science* 25 (1969), 255–260, p. 258; L. Rosenfeld, "Newton's Views on Aether and Gravitation," *Archive for History of Exact Sciences* 6 (1969), 29–37.

5. *Principia*, Book II, proposition 52. A. Koyré and I. B. Cohen, *Isaac Newton's Philosophiæ naturalis principia mathematica*, Vol. 1, pp. 537–541, Cambridge, 1972.

6. See E. J. Aiton, *The Vortex Theory of Planetary Motion*, pp. 110–113, London/New York, 1972.

7. Koyré and Cohen, 1972, Vol. 1, p. 125.

8. See E. J. Aiton, "The Inverse Problem of Central Forces," *Annals of Science* 20 (1964), 81–99.

A Calculating People: The Spread of Numeracy in Early America. By Patricia Cline Cohen. Chicago (University of Chicago Press). 1983. x + 271 pp. \$22.50

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In this fresh look at the American past, Patricia Cline Cohen focuses on how numbers attained a distinctive, even paramount, role in defining how reality was perceived, particularly during the Jacksonian era in the antebellum United States.

A large portion of her purpose is to indicate how the sense of numbers largely reinforced values. Perhaps more important, Cohen wants to show how values determined numerical data. This book is part of a considerable body of historical literature dedicated to proving the subjectivity of what is often conventionally viewed as objective—that is, value-free. An obvious parallel may be found, for example, in the writings of sociologists presumably demonstrating the social construction of knowledge.

“Numeracy” is not quite the analog of “literacy,” as Cohen carefully demonstrates in her introductory remarks. She starts with 17th-century England, episodically bringing the story to its climax in an excellent account of the Census of 1840. The method of attack is to give some idea of elementary instruction in arithmetic, often with examples of usages in commerce, the accumulation of diverse data by individuals with that passion, and (less commonly) examples from medicine and the sciences. Much of the treatment for the period before the last century is familiar from the existing secondary literature. *A Calculating People*, nevertheless, is a valuable contribution here because of the way it places the known in unfamiliar contexts. The author is invariably interesting, sprightly, and stimulating in her interpretations. Although brief, the early chapters provide a fine survey.

The heart of the book—the reason for going from William Petty to Benjamin Franklin—is what happened to numeracy after independence. Despite the undeniable triumph of the treatment of the 1840 Census, Cohen’s later chapters are somewhat of a letdown. I think the story of elementary instruction requires more than an account, however fine, of Warren Colburn’s influence as a text-book author.

Above all, two points lack the depth of treatment needed to sustain the author’s thesis. The first concerns the growing sway of number in so many areas in antebellum America—here much more evidence is needed than is given. This is also related to the second point that deserves more attention. Cohen is not very interested, apparently, in the implications of growing numeracy, even though it is a point commented on by European visitors. Why should Americans have become a “calculating people”? Surely there are social origins of this trend as well as social consequences. Cohen judges what happened in the light of a sophistication in statistics and not, I should note, in the increasing use of quantification by scientists and engineers. But her examples are mostly drawn from a different stratum of numerical competence. Numeracy at the popular level in the United States had egalitarian overtones—or as noted by the English traveler Thomas Hamilton—a leveling upward tendency threatening existing structures of deference. I was reminded at this point in Cohen’s text that the late literary critic and historian Edmund Wilson wrote something to the effect that the British social revolution, for better or worse, occurred in the United States.

None of these last comments should be construed to deny the value of Cohen’s book. It is well written, has excellent notes, and is a significant contribution. I suspect we will have much to learn from the future writings of this author.