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Caveing, Maurice
★**La constitution du type mathématique de l'idéalité dans la pensée grecque. Vol. I. Essai sur le savoir mathématique dans la Mésopotamie et l'Égypte anciennes. (French. French summary) [The constitution of the mathematical type of idealness in Greek thought. Vol. I. Essay on mathematical knowledge in ancient Mesopotamia and Egypt]**
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The reviewer apologizes for having received the present book for review more than two years after it was published, as a consequence of which he may seem to see it in an unjust perspective. On the other hand, it must be recognized that the perspective of the book itself is that of the 1970s, when the underlying thèse de doctorat d'état was produced (printed 1982)—largely indeed the perspective of the 1920s and 1930s. We shall return to the implications of this perspective below.

The purpose of the book—the first of three planned volumes—is to investigate the background to the creation of Greek mathematics through an epistemological analysis of the characteristic methods and modes of thought of the two preceding mathematical traditions of the Mediterranean area—"certainly neither origin nor model [for the Greeks], but perhaps, together with their own computational experience, the background on which unfolded the first effort at conceptualization and systematization of their mathematics" (p. 11). Perhaps as a consequence of the ultimate aim of a comparison with Greek mathematics, those intuitive justifications of procedures that can occasionally be found in the texts are not counted as justifications. However, the tendency to organize the texts with systematic progression is pointed to as evidence of coherent understanding and reflection; it is also recognized that the concrete dressing of problems does not mean that everything in Babylonian and Egyptian mathematics was concrete and aimed at practical use.

Apart from such very general considerations, (Old) Babylonian and (Middle Kingdom) Egyptian mathematics are dealt with separately—in both cases on the basis of the translations that were regarded as established in the 1970s. Even as regards the secondary literature, work that was recent in 1980 is rarely taken into account; it is symptomatic of the book that the possible origin of the Babylonian hexagesimal system is discussed (pp. 394–396) with reference to Thureau-Dangin's *Esquisse* from 1932, while Marvin Powell's fundamental investigation [M. A. Powell, Jr., Historia Math. **3** (1976), 417–439; MR0490665 (58 #9990)] is overlooked. In spite of what is claimed on p. 14, literature that has appeared since 1982 has left even fewer traces in the argument.

This is particularly regrettable as regards the Babylonian material, where everything builds on that numerical interpretation of Babylonian "algebra" which was established by O. Neugebauer and Thureau-Dangin in the 1930s, and which philological analysis of the original texts has shown to be untenable (the reviewer confesses to be perhaps unduly sensitive on this point, having started this work 15 years ago, with the first decent publication in English in 1986, and the first in French in 1992; but he finds the absence of any reference to Jöran Friberg's seminal works equally annoying).

Some good observations are made. Most important is the protest against the tendency to consider every seemingly unjustified procedure a scribal error; Caveing is doubtlessly right that at least some instances are instead to be understood as challenges—*Schimpfrechnungen*, a term used by the Renaissance Rechenmeister, similar in several ways to the Babylonian scribe school masters. Caveing's tendency to explain each and every unjustified solution in this way, however, is no more convincing than the automatic recourse to scribal errors and stupidity.

In general, Caveing has overlooked that the translations he uses are already intepretations of conceptualizations and procedures, for which reason they cannot be used for independent analysis of modes of thought. In 1937, Neugebauer made the observation that "wer terminologiegeschichtliche Studien an Hand einer Übersetzung machen will, dem ist doch nicht zu helfen" [*Mathematische Keilschrift-Texte. Vol. III*, Julius Springer, Berlin, 1937; Zbl 015.14703 (p. 5)]. For conceptual structures as different as those of modern and Babylonian mathematics, the same holds with even more force for epistemological studies. At best, we are presented with a critical confrontation between Neugebauer's and Thureau-Dangin's interpretations. Even for this purpose, however, the reliance on translations is not without problems—for instance, when the confrontation overlooks that Thureau-Dangin's translation presupposes an emendation which is indicated in a note to the original text (p. 200).

Egyptian mathematics is investigated on the basis of the Rhind Mathematical Papyrus, with some use of the leather roll BM 10250 and the Berlin Papyrus 6619. The translation used is that of Peet from 1923—the word-for-word translation in Vol. II of the Chace edition (1929) goes unmentioned and seems (since the free translation in Vol. I is mentioned) not to be known to Caveing, for whose particular purpose it might have been more adequate; however, since Caveing argues from the number schemes of the texts rather than their words and spatial organization, the difference is not decisive.

The proclaimed aim of this second part of the study is to find out what science "could be abstracted" from Egyptian arithmetic, e.g., by the Greeks when they encountered it (p. 242). What is really done, however, is rather to investigate the basic pattern of mature Egyptian arithmetical thought, and to point to a few details that may have inspired the Greek interest in, e.g., perfect numbers and divisibility.

In this second part, the interest in non-recent literature turns out to be an advantage; Caveing argues that Egyptian arithmetic is not only basically additive but also, and no less fundamentally, organized around proportionality; as he points out, aliquot fractions (and composite expressions) are not viewed so much as numbers but as fractions of some other magnitude. An important part of the argument for this is a resurrection of Léon Rodet's lucid but undeservedly forgotten article "Les prétendus problèmes d'algèbre du Manuel du Calculateur égyptien" [J. Asiatique (7) **18** (1881), 184–232, 390–459]; many computations involving the much-discussed "red auxiliaries" are shown to fit Rodet's analysis but not the various more modernizing alternative interpretations. Another publication whose conclusions are largely though not fully endorsed (after thorough argument and comparison with alternative views) is Kurt Vogel's dissertation from 1929 on the $2{:}n$-table.

As an analysis of the basis of Middle Kingdom arithmetical techniques and thought, Part II of the book is thus a well-argued return to, and elaboration of, hermeneutically sensitive readings of the texts, and in this report a welcome contribution to our understanding of the epistemology of Egyptian arithmetic. When it comes to the ideas that are expressed about the origin of the characteristic techniques (not central but present, e.g., p. 393*f*), some objections could be raised. Already in the late 1970s, comparison of the Old Kingdom Abu Sir papyri with later administrative papyri would have shown the canon concerning the use of the aliquot fraction system to be a Middle Kingdom invention (ongoing work by Jim Ritter confirms this amply). This automatic ascription of everything Egyptian to the Old Kingdom, however, is a familiar inclination even among Egyptologists.

In conclusion we may thus say that the volume can serve as inspiration—many observations are interesting and some are important—but it should be used with care and always with the original texts at hand against which its conclusions and interpretations can be checked.

Reviewed by *Jens Høyrup*