The Oxford Handbook of the History of Mathematics edited by Eleanor Robson and Jacqueline Stedall

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Reviewed by
Jens Høyrup
University of Roskilde
jensh@ruc.dk

The editors express in the introduction the 'hope that this book will not be what you expect' [1]. The reviewer's task being to make the reader aware of what should be expected, let it none the less be said straightaway that the book is very good but definitely no handbook. Indeed, as the editors adequately explain next, it is

> not a textbook, an encyclopedia, or a manual. If you are looking for a comprehensive account of the history of mathematics, divided in the usual way into periods and cultures, you will not find it here. Even a book of this size is too small for that, and in any case it is not what we want to offer. Instead, this book explores the history of mathematics under a series of themes which raise new questions about what mathematics has been and what it has meant to practice it. The book is not descriptive or didactic but investigative, comprising a variety of innovative and imaginative approaches to history.

It thus contains 36 paradigmatic examples of questions and approaches that can be applied to the topic—with one exception (on which below) all being good or very good. They are ordered (but after they were received by the editors) into nine groups with four in each, these nine groups being themselves grouped three by three. A complete list will give an adequate impression of the scope of the book, first of all, but not only, of its geographical and temporal reach:

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9.4 'The Historiography and History of Mathematics in the Third Reich'—Reinhard Siegmund-Schultze

The understanding of mathematics is very broad; almost anthropological, it encompasses the whole range of mathematical practices within a society or a professional group. The topics dealt with thus reach from Inca and late medieval Italian bookkeeping [ch. 1.2], from ancient Greek and Roman surveying and geometric planning of a racecourse in Corinth [ch. 3.2], from the algorithms of weaving patterns in the Andes [ch. 5.4], and from the teaching of basic arithmetic [chs 2.3, 3.1, 5.3] to the mathematics of astronomical observatories and computation [chs 3.4, 4.4], to Newton's and others' understanding of what was really important in his infinitesimal work [ch. 8.2], to the problems inherent in the concept of mathematical 'modernism' [ch. 7.4], to the Bourbaki project [ch. 6.4], and to how the theories of convex sets and non-linear programming are connected to the individual and institutional aims of workers [ch. 8.4].

Approaches are varied, as a natural consequence of the editors giving

> authors a broad remit to select topics and approaches from their own area of expertise, as long as they went beyond straight 'what-happened-when' historical accounts. [1]

Fortunately, (after all, the *sine qua non* of historiography is knowledge of what happened when), the actual chapters contain all the often unfamiliar factual information needed to support the argument and to undermine myths; and they are happily free of freewheeling proclamations of principle. They are indeed good paradigmatic examples, convincing by the quality of their reasoning.[1] For example, many of us may (in these or other words) know the description of Czar Peter the Great behaving like

[1] Explicit methodological reflections are certainly not absent, and sometimes extensive and profound [e.g., ch. 7.4, 9.4]; but when present, they are well integrated with the subject matter.

> a savage visiting a supermarket who, fascinated by the riches on display, shovels everything into his basket without knowing whether he needs it or not

when acquiring important Western European science [354, citing W. Berelowitch, in ch. 4.3]. This is shown by Irina and Dmitri Gouzévitch to be totally false, in a paper which combines a large amount of well-digested biographical information about Peter (as well as about the Western European mathematicians that were hired for his project) with information about the preceding state of mathematical knowledge in Russia, about Russian metrology and orthography old and new, about the difficulty of creating a lay publishing institution, and about the character of the books translated (a character that changes during the development of the project and in step with the changing military challenges), and about still more.

On other topics, the reader may be even less prepared. How many of us, for example, even among those with some familiarity with the mathematics of the Islamic world, know much about the *siyaq* number notation, developed from the Sassanian administrative numerical shorthand and used for administrative and accounting purposes from the Ottoman empire to India (and even further), from ᶜAbbasid times until the 20th century? After reading the chapter, we not only know about the script, its history, and its historical context; we also have material to reflect upon concerning the conditions of numeracy—conditions that are much more intricate than we believe, accustomed as we are to its being exclusively carried by the decimal place-value system.

Dependent rather on the selection of authors than on the task given to them is the opportunity to deal with the same historical situation from several different points of view—a perfect illustration of how different equally legitimate questions may be asked, and even of how different equally legitimate delimitations of 'mathematics' are possible. Classical Antiquity is thus dealt with in four chapters. In 1.1, Geoffrey Lloyd looks at the understanding of what mathematics meant within Greek elite culture (with an eye as well to Han and slightly later China). This necessarily restricts his discussion to the kinds of mathematics whose presentation makes up the bulk of Thomas Heath's *History of Greek Mathematics* [1921]—of extreme importance for later Islamic and European mathematics, but socially a fringe phenomenon in its own times.[2] Markus Asper [2.1] takes up the existence of 'several coexisting and partly overlapping fields of mathematical practices', and discusses the socially much more important (though culturally subliminal) practical traditions with their probable roots in the Near East, those which Netz [2002] refers to with the pun 'counter culture'. David Gilman Romano [3.2] analyses the archaeological remains of one of the practical traditions, namely, the surveying of land and the geometrical planning of a racecourse in Corinth. Ken Saito [9.2], finally, returns to the mathematics 'of theorems' but in particular to the problem of textual criticism of the manuscript tradition, emphasizing how both the material possibilities (the difficulty of traveling between manuscripts before the railway, the opportunity to travel between or to send manuscripts after their construction, the new opportunities for comparison offered by microfilming, and so on) and the questions asked by different epochs affect what is seen in the texts.

Other multiple coverages concern Pharaonic Egypt [5.1, 9.1] and China [1.1, 7.1 and, at some distance, 1.3], similarly offering complementary perspectives. A couple of a different kind is offered by chapters 9.1 and 9.3—respectively Annette Imhausen's analysis of how a number of unfounded myths have developed (e.g., from Moritz Cantor's suggestion of what might have been the case until the repetition of the same as a fact), and Carol Bier's production of such myths [going the whole way from suggestion to factual assertion]. Bier's aim is to connect the culture of geometric patterns (which in fact distinguishes the Islamic world from other cultures) directly to some particular spirituality. Alone among contributors to the volume, she claims that the questions which she raises are the only good questions to ask.[3] The creation of the myth can be seen on page 834:

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[2] Multiplying generously the total evidence by three, Reviel Netz [1999, 291] estimates that on the average at most one mathematician (active in this kind of mathematics) was born per year in the Greek, Hellenistic, and Roman world during the millennium under discussion.

Lloyd is well aware that there were other kinds of mathematical practice [see, e.g., 1992, 570f].

[3] 'However, the questions I think we should be asking are not about decoration and ornament, but about surfaces and the plane, about units and repeats, and about circles and the nature of two-dimensional space' [833]. Further on in the same paragraph, it is suggested that the apparently non-

> According to this line of thinking,[4] at some point between the eight and the eleventh century, Islamic ornament and its formal expression became connected to abstract ideas articulated in contemporary philosophy, mathematics, and religion.

Misleading use of evidence also abounds in the following pages.[5]

Fortunately, this unconvincing piece is the exception that puts the rest of the book in relief.

Until not very long ago, the historiography of mathematics was relatively untouched by what happened in the historiography of science at large. Obviously, this is no longer the case: the present volume presents perspectives as broad and as broadminded as what can be found in the best historiography of other sciences. There is strong interest in contexts of many kinds and in actors' aims, including their social aims. But the reduction of everything to image or career strategy in the style of 'Boyle being busy fashioning himself as a gentleman natural philosopher'—the new brand of externalism, unwillingly inviting the reader to ask himself what the author is busy doing—is as absent as the 'internalist' conviction that external conditions such as the social role of a mathematician or the very existence of a category 'mathematics' are perennial and, therefore, separable from the development of knowledge.

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representational patterns might be 'representational in the deepest meaning of the word: a visual metaphor of relationships, of existence, of the cosmos, an expression of realities beyond that which can be merely seen'. If anything, this sounds Platonic or Neoplatonic rather than broadly Islamic—but no evidence for the suggestion is offered.

[4] *Scil.* the author's own speculation, unsupported by any source evidence except contemporaneity of decorative patterns and theoretical mathematics dealing with wholly different topics.

[5] One example must suffice. A *Qurʾan*ic passage [59:21: God speaking to Muhammad],

> Had we sent down this *Qurʾan* on a mountain, verily thou would have seen it humble itself and cleave asunder for fear of God. Such are the similitudes that we propound to men that they reflect.

is inscribed on the 11th-century tomb towers of Kharraqan. Bier 'feels tempted' to see the demonstrative pronoun 'such' ('tilka') as pointing to 'the actual patterns depicted on the monuments'. But the reference is clearly to the preceding similitude: 'mathal' means 'likeness, metaphor, simile'.

All the way through, the exposition is transparent. Problems and concepts are well explained and only a minimum of background knowledge is presupposed. Not only historians of mathematics but anybody interested in the history of mathematics and in possession of academic training will enjoy and profit from reading the book.

Unfortunately, a final critical point needs to be made, imputable neither to the editors nor to the authors but to Oxford University Press. The technical quality of the book might be acceptable for a crime novel bought in the airport and meant to be discarded at arrival, but for a volume supposed to be read and consulted repeatedly it is a scandal. The reviewer's copy broke twice during the single reading and each time had to be glued together anew: the pages turned out to be neither sewn nor glued to some kind of linen. Libraries can only be advised to buy the paperback edition (according to a brief inspection of one specimen of better quality) and have it bound themselves. Others interested in possessing the book should definitely buy the paperback, at one third of the price of the hardback edition.

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