

Zbl 0908.01001

Gerdes, Paulus

Ethnomathematics — described by the example of Sona geometry. (Ethnomathematik — dargestellt am Beispiel der Sona Geometrie.) (German)
Heidelberg: Spektrum Akademischer Verlag. 433 p. DM 128.00 (1997).

An introductory chapter gives a perspicacious and much-needed overview of the various versions of the notion of “ethnomathematics” and of the variety of related ideas set forth during the last three decades (with precursors back to Ewald Fettiweis and Raymond Wilder). As used by the author, the term designates first of all an approach to the study of the uses of mathematics which comprises not only academic and derived mathematics but also all the kinds of embedded mathematical knowledge that thrives within the various cultural and social groups in any society, “modern”, in process of modernization (as Mozambique, in which the author teaches), or traditional. Its importance is primarily to permit mathematics teachers to enter in dialogue with the kinds of intuitive mathematical knowledge which members of such social groups already possess before teaching starts, or to present mathematical ideas to students in a context which they may tend to accept as legitimately their own. But the ethnomathematical approach is also meant to enrich the global picture of “world mathematics”, and to provide new insights in the history of mathematics. The rest of the book uses the sona – abstract sand drawings produced by the Chokwe of eastern Angola and neighbouring areas – for all three purposes.

The sona are drawn around points marked out in the sand, preferably in a single line, and preferably with some kind of symmetry. They represent specific objects, situations, proverbial sayings, or even stories, and they were an essential part of the teaching surrounding the adolescent circumcision. All adults would therefore be familiar with some of the simpler patterns, but the more complex ones would only be known by a restricted group of specialists who kept them jealously as secrets. In consequence, the tradition is almost lost today, and the first part of the book therefore aims both at presenting and analyzing a large number of sona documented in the literature, and at reconstructing the algorithms and composition principles which allowed the masters to perform them (as required) without the least hesitation. This is done without any attempt to use advanced notions from contemporary academic mathematics, which would only bar the pedagogical usefulness and would anyhow be irrelevant (the interest in geometric symmetry makes elementary topology misleading, the distinction between sharp and round corners falls outside graph theory, etc.; one of the ways in which study of the sona enriches the picture of mathematics is thus to show that there are other ways of going beyond Euclidean geometry than those that were invented in Western Europe and its transoceanic extensions since Euler).

The second part of the book is a “didactical and mathematical exploration”; it begins by showing how the sona can be used to introduce a number of simple arithmetical and geometrical ideas and serve as the basis for games of extension; its chapters 4-8, building on what the author has done in his seminar for future mathematics teachers, present in much detail genuine mathematical investigations of the properties of particular sona types and algorithms.

Part III consists of comparative studies. It is shown that the rather few specimens of sona-like patterns found in Ancient Egypt and Mesopotamia are not of a type that will have been able to carry a tradition or allow that kind of experimentation which they presuppose; in both areas, as is convincingly concluded, a similar technique of greater sophistication but using non-permanent material (e.g., sand) is therefore likely to have existed (even among the Chokwe, simple variants of sona patterns are found as decoration on textiles and wooden objects). In India, such a tradition is well documented, e.g., as magical doorstep drawings in Tamil areas. Often they are non monolineal, but some

of the polylineal ones carry names that tell them to be meant to be drawn in one trait; the author's successful attempt to reconstruct original forms therefore seems sound. The well-documented sand-drawings from the Malekula Island of Vanuatu is dealt with only briefly, together with Celtic and Navajo and other North American material. A final chapter returns to non-Chokwe cultures of sub-Saharan Africa.

The book is pleasant and easy to read, but full appropriation of the mathematics of the sona through redrawing and solution of the problems it raises will require (or offer the opportunity of) much work.

Jens Høyrup (Roskilde)

Keywords : sand drawings; Chokwe culture

Classification :

- *01A07 Ethnomathematics
- 01-02 Research monographs (history)
- 00A35 Methodology of mathematics, didactics