Paulus Gerdes

Awakening of Geometrical Thought in Early Culture

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Reviewed by Steven Fleming

As an historian of African geometry, Dr. Paulus Gerdes has a formidable record. Professor of mathematics at Universidade Pedagógica in Mozambique and the Eduardo Mondlane University, he has already published six books dealing with ethnomathematics and related themes. As the title suggests, Professor Gerdes's latest book, *Awakening of Geometrical Thought in Early Culture*, examines the prehistoric origins to his field of expertise. Through clear illustrations and exposition, Gerdes discusses the complex mathematics that underpin ancient quotidian activities outside of the Classical world. In so doing, the book challenges Eurocentric accounts of the origins of mathematical thinking, as well as those of creationists and religious historians.

Building on Engels's *Dialectics of Nature*, the author first argues that "[g]eometry emerged as an empirical, experimental science." The discussion is structured around mathematical principles, for example, the idea of perpendicular lines. Corresponding to each principle, he presents a range of humankind's innovative solutions to the problem of survival, giving mathematical names to all kinds of everyday activities, ranging from hewing hand axes, to throwing weapons, to supporting dams. All this might seem anachronistic—Gerdes's analysis relies on intellectual apparatus far more sophisticated than that of his ancient subjects—but his point is not that ancient craft *employed* mathematical thinking, but *led* to it.

Once mathematical thinking had been acquired, it gave rise to cultural developments. For example, in various parts of the world, three-strand braiding evolved from two-strand braiding, and the optimal angle of incidence of 45° was discovered. Soon after its development as a tool for survival, the 45° , three-strand, braiding pattern appeared as decorative motif on bronze objects in Benin and on wooden cups in Congo, while in Egypt it was used to decorate Pharaohs' beards.

Behind a plethora of similar examples lies Gerdes's central concern, which is to develop a methodology for the study of the awakening of geometrical thought. According to the conclusion to the book, scholars of this subject must ask what mathematical observations are key to the evolution of primitive society's utilitarian and cultural production. Clearly Gerdes anticipates that a substantial body of further scholarship will follow on from this apparently innocuous book, and indeed, *Awakening of Geometrical Thought in Early Culture* may well ignite a revolution in our understanding of the origins of mathematics.

The weakness of the book is that not all of Gerdes examples are equally convincing. He announces most of his explanations as *possible*, and on occasion, this is a necessary qualifier. His explanation for the universal popularity of pentagrams as symbols of protection, is a good example. The symbol is usually traced to natural phenomena (starfish), or geometrical entities (the diagonals drawn between the points of a pentagon). But Gerdes describes the symbol in terms of five-sided thimbles, woven from strands. And thimbles, of course, are worn for *protection*.

Though Gerdes' explanation makes for a compelling read, ultimately, it is unlikely to eclipse established empirical or rationalistic accounts.

Whether the pentagram can be traced to thimbles or not, Gerdes book will be a valuable resource to readers from various fields. To scholars of the relationship between architecture and mathematics, the book's building related examples, methodology and primary thesis stand to inform their discourse in a variety of meaningful ways. The book should also be read by practicing architects wishing to engage with timeless craft traditions. For architects, *Awakening of Geometrical Thought in Early Culture* clearly distils mathematical principles from ancient building practices and communicates these ideas such they could readily be absorbed into modern practice.

About the Reviewer

Steven Fleming received his Ph.D in 2003 from the Department of Architecture at The University of Newcastle, with a thesis on Classical Platonism with respect to Louis I. Kahn's concept of "form". He has worked as a practicing architect in Australia and in Singapore.