thinking among the hunting and gathering societies of the Inuit and Ojibway (Eskimos): counting, arithmetic operations, shape classification, and measurement. He concludes that for these peoples, mathematical thinking is a secondary cognitive activity supplemental and subordinate to more basic acts of information processing. His theories on the mathematical priorities of the Inuit and Ojibway seem equally relevant for other native American peoples.

Page copy for *Native American Mathematics* was photocopied directly from a typewritten manuscript, reducing production costs but increasing the bulk of the volume. The type is clear and easily readable. Photographic illustrations are of high quality. Line drawings which include some beautiful renderings of Mayan glyphs are well done. A brief reference bibliography is supplied but no index.

Not since Claudia Zaslavsky's *Africa Counts* (Prindle, Weber & Schmidt, 1973) has there been so profound a book on the mathematics of traditional peoples. This book on the accomplishments of native Americans is long overdue and much welcomed. It supplies both a valuable understanding of the place of mathematics in society and a strong stimulus for further research into this area. "What was the mathematical ability of the plains Indians?" "How much geometry did the mound builders of the Mississippian society know and utilize?" and other such questions are waiting to be answered. Michael Closs and his colleagues have shown us that answers can be found. This book will be of interest to a wide audience, not just students of mathematics and its history, and is highly recommended for personal reading and general library acquisition.

Mathematical Perspectives: Essays on Mathematics and Its Historical Development. Edited by Joseph W. Dauben. New York (Academic Press). 1981. 259 pp. $49.50.

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This volume is a collection of papers written in honor of Kurt-R. Biermann's 60th birthday. The overall quality of the 13 essays is an impressive testament to Biermann's influence. It is an unusually good and intellectually challenging collection. As its title suggests, a wide range of perspectives on mathematics and its history is represented.

Two of the articles, by A. P. Juschkewitsch and Wolfgang Eccarius, follow Biermann in drawing upon written evaluations of mathematicians for membership in academies. In his article "Deutsche Mathematiker—Auswärtige Mitglieder der Akademie der Wissenschaften der UdSSR," Juschkewitsch looks at the German membership in the Academy of Sciences of the Soviet Union. Juschkewitsch finds different cultural perceptions and uses of mathematics reflected both in the form of the membership lists and in the terms of the evaluations which were written proposing new members. Unfortunately he does not have space to elaborate some of the important suggestions he makes—to specify and elaborate on the social-historical and cultural conditions which led to the changes in patterns of membership he traces. In his article "August Leopold Crelle und die Berliner Akademie der Wissenschaften," Eccarius considers Crelle's influence on the Berlin Academy of Science. Because he confines himself to a particular case, Eccarius is able to spell out the kinds of cultural and social influences which affected 19th-century mathematical work. He uses Crelle's evaluations of candidates to get at Crelle's concerns and interests, illustrating firsthand the kinds of impact an organizer like Crelle could actually have on the development of science.

Eccarius's and Juschkewitsch's articles borrow from Biermann's lead on sources, but Biermann's spirit resounds in many of the other articles as well. E. A. Fellmann's article "Hermite-Weber-Neumann: Kleine Briefgeschichte eines grossen Irrtums" is a direct response to a correspondence with Biermann correcting an earlier article of Fellmann. It is a tribute to Biermann's attention to detail but one wonders whether the issue justifies an entire (albeit brief) article. On the other hand, Uta Merzbach's work, "An Early Version of Gauss's *Disquisitiones Arithmeticae,*" is a model of careful archival research and description enriched by an interpretation which sheds new light on the development of Gauss' *Disquisitiones Arithmeticae*. Although it is also brief it contains a variety of interesting suggestions about the intellectual development of one of the most towering mathematical intellects of all time.

Another aspect of Biermann's work is picked up by Ivo Schneider in his article, "Leibniz on the Probable." Schneider balances the merits of Biermann's interpretation that Leibniz was a solitary leader moving into probability, against Hacking's view that he acted primarily as a spokesman for an already existing group. Schneider's section on the correspondence between Leibniz and Bernoulli contains a subtle analysis of a changing relationship which might indicate ways to negotiate Biermann's and Hacking's different perspectives without having to accept either as definitive.

Schneider's treatment of Leibniz leads him naturally to considerations of 17th-century jurisprudence and other fields which lie outside of mathematics proper. Thus he embeds mathematical developments in the social and cultural history of the period. This historical embedding contrasts with the approach of Paul P. Bockstaele in his article "Adrianus Romanus and Giovanni Glorioso on Isoperimetric Figures" which considers 17th-century treatments of the areas of polygons with equal perimeters. In his analysis Bockstaele mentions issues like Ramus's "rather particular ideas on logic and mathematics" (p. 3) but gives little historical context within which to understand or evaluate these ideas. Perhaps this is an indication of at least a visceral agreement with the strong internalist position maintained by Ivor Grattan-Guinness in his ambitious article "Mathematical Physics in France 1800–1840: Knowledge, Activity and Historiography."

Grattan-Guinness's article, which is a quick overview of a larger project, pays somewhat in coherence for the goal of covering such a huge area in such a short span. In his focus on mathematical techniques as crucial to mathematical development, Grattan-Guinness is self-consciously espousing a primarily internalist orientation toward the history of mathematics, emphasizing that "*the historical figures were predominantly concerned with the scientific content;* hence the historians should be so concerned also . . ." (p. 119). This statement is well worth considering both with respect to the truth or meaning of the first clause and the conclusion drawn in the second clause, but unfortunately the article moves too quickly to pause over its ramifications. Similarly Grattan-Guinness offers some enticing ideas about modes of working in mathematics and physics in Sections 6 and 7, but aside from outlining his scheme, is able neither to elaborate nor to explore his classification with illustrative examples from the period of his primary focus. The paper presages an important work to follow which will undoubtedly be stimulating and controversial.

Another fundamental issue in the history of mathematics is raised in a different way by two additional articles, one by Pierre Dugac, the other by Eberhard Knobloch. Each of these men considers an episode in the history of mathematics centering on a changing relationship between symbols and mathematical meaning. In Dugac's article, "Des fonctions comme expressions analytiques aux fonctions représentables analytiquement," he traces a movement away from considering functions as equivalent to analytic expressions and toward interpreting them as mathematical entities transcending their symbolic descriptions. This development presents an interesting contrast to that traced in Knobloch's "Symbolik und Formalismus im mathematischen Denken des 19. und beginnenden 20. Jahrhunderts." In Knobloch's case symbolic developments are seen as leading away from a Platonism which would assume entities corresponding to symbolic forms and toward a formal view where the forms are the whole of the argument.

The list of articles continues including a new Byzantine text edited by Kurt Vogel, a study of a medieval manuscript by Menso Folkerts, and a treatment of complex numbers by Olaf Neumann. The sum total of these articles provides a heartening testament to the vitality of the history of mathematics. The book is excellently edited by Joseph Dauben. My only caution would be that despite its English title, only 4 of the 13 articles are in English. Of the rest, 8 are in German and 1 is in French. This polyglot approach can be taken as a tribute to Biermann and to the international importance of the history of science, but would make for rather frequent adjustments for those not totally fluent in all three languages.