BOOK REVIEWS

Correspondence concerning reviews should be addressed to the Book Review Editor, Professor Jack Kiefer, Department of Mathematics, Cornell University, Ithaca, New York 14850.

RICHARD VON MISES (edited and complemented by HILDA GEIRINGER), *Mathematical Theory of Probability and Statistics*. Academic Press, New York and London, 1964. $22.00, £7/17/0. xiv + 694 pp.

Review by D. V. LINDLEY

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This book is based on the author's earlier work on probability [5], on the notes of lectures that he gave at the universities of Harvard, Rome and Zurich up to 1952, and on material in his papers and notebooks. These have been put together, edited and complemented by Hilda Geiringer. As a result we have a reasonably complete account of von Mises's own work in probability and statistics and of his attitude toward the work of his contemporaries. As such it deserves the greatest attention from other workers in these two fields. The book has been written as an advanced textbook in the hope that both students and research workers will find it useful. Von Mises made many important contributions covering a great range of topics and it is scarcely within the competence of a single reviewer to do justice to everything in this large book that is so rich in stimulating ideas. I therefore propose reviewing the material a chapter or so at a time, the comments reflecting my own interests and therefore my own limited competence to judge.

Chapter 1 (49 pages) contains the material for which von Mises is best known; the basic ideas of a collective for a discrete label space. In any mathematical treatment of the physical world there is considerable arbitrariness about the starting point. Von Mises felt that the usual approaches to probability did not have enough contact with the physical reality. He preferred to start somewhat earlier in the chain and consider an axiomatic system that dealt directly with the indefinite repetitions upon which probability theory is usually held to be based, rather than to take the abstractions from these repetitions (the frequency limits) and use these to suggest, for example, the measure theory axioms. Of course, when he first put forward his ideas in 1919, the currently accepted measure theory approach did not exist. Consequently von Mises is concerned with infinite sequences. In the simplest case of a label space containing only two elements, 0 and 1, the sequence will consist of 0's and 1's and possesses the basic probability property that the proportion of 1's in the first n terms of the sequence tends to a limit as $n \to \infty$. But the sequence must have another property, it must in some sense be random and the idea of randomness has to be incorporated into the axioms. It is the difficulty in doing this that is the stumbling block of von Mises's approach.