himself conceived the problem and what he says in his discussion of it. The author has brought a discriminating intelligence to bear upon his task and has presented an analysis which is worthy of the careful attention of students of Aristotle. The principal interest of the essay is for those whose attention is centered mainly upon the philosophical aspects of the infinite; consequently this is not the place for a detailed review of it. But a fact frequently overlooked should be pointed out here, namely, that in his discussion of the infinite by way of addition, Aristotle makes manifest a clear understanding on his part of the essential elements involved in the notion of convergence of an infinite geometric series whose ratio is less than unity. See *The Physics*, Book 3, Chapter 6 (206b 3–33).

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Théorie des Probabilités. By P. Van Deuren. Paris, Gauthier-Villars, 1934. xvii+546 pp.

This treatise on probability, written by Professor Van Deuren after teaching the subject for thirty years at l'École Militaire de Belgique, is very well organized. It constitutes "Tome Premier," introductory to a volume dealing with applications. The style is formal; indeed, the author intended to make it "didactique." The material throughout the book is in general very well arranged and well chosen for the purpose in view.

To avoid the much criticized use of "equally likely" events to define probability, the author adopts a quasi-axiomatic method. He states (p. 4): "La probabilité est un notion première intuitive. Elle apparaît comme une grandeur qui mesure a l'aide des données (4), la vraisemblance actuelle, ou apparence de vérité de l'arrivée d'un événement." This second statement virtually leaves the "intuitive" notion undefined, except that probability is required to be a magnitude, "grandeur." Later the author associates such a magnitude with a real number. Certain properties of probability are then set forth as principles or theorems—many of which might well be regarded as axioms—collectively building up the notion of probability. These properties include the additive law for incompatible events, and laws for composite events—such as the law that the probability of a composite event cannot exceed that of any constituent. When a set of incompatible events exhausts all the possibilities, and the probabilities therefor are all equal, these events are called "chances," and are said to arrive "ou hasard."

The book deals primarily with the classical theory of probability. There are very few references to other writers. Modern topics, such as small samples, are not included. Nevertheless, the size of a sample is a matter of great concern. The author determines the minimum size of a sample—the least number of trials or observations—to make valid various approximations. An event, with a probability of at least 0.99, he defines as "pratiquement certain"—following artillery usage. Using this measure of practical certainty, he determines practical domains of certainty, practical moments, practical coefficients of concentration, and so on. It is difficult in a few words to give an adequate idea of the thoroughness with which these approximations are introduced and controlled; this is one of the outstanding and unique features of the book.

A liberal use is made of definitions. A variable "concentrates" when its standard deviation approaches zero, by reason of a change in a parameter, for instance, when the number of trials increases indefinitely; it "concentrates normally" when the standard deviation divided by the range approaches zero, as is the case with the ratio of occurrences to trials in Bernoulli's theorem. Unfortunately, however, the "coefficient" of concentration (p. 285) and the "index" of dependence (p. 177) exhibit inverse variation. Zero concentration, as registered by the coefficient, occurs when the concentration is the most complete or highest; and zero dependence implies (p. 181) a linear relation—that is, strict functionality. The general index of dependence (p. 185) is actually the Pearsonian determinant R, built with coefficients of correlation; but a different notation is used. "Le domaine pratiquement certain" is an interval centered at the mean such that the probability of falling outside this interval is not greater than 0.01. The author shows (p. 298) that if the deviation of a variable from its mean does not exceed 14 times the standard deviation, it will lie in this domain. With a slight modification of the proof there given, the upper bound can be cut down to 10 times the standard deviation—the Tchebychef inequality.

The book makes extensive use of transformations, with their Jacobians. Results are generalized to n variables. Preceding the method of least squares is the more general method of the least covariant—the exponent for generalized normal frequency. The notation and symbols are thoroughgoing; but in places seem a little cumbrous. There are numerous good figures and numerous good simple illustrations; but no problems are inserted for the reader. A seven-place table for the probability integral is given, with integrand $\exp(-t^2)$, and t at intervals of 0.01. Two appendices discuss some of the controversial topics of probability. There is no alphabetical index of topics, but the table of contents is decidedly informing. The book is sell arranged, and is pleasing to the eye. Presumably it was designed primarily for military or technical students, and it is an excellent exposition of the fundamentals needed by such students. But it should be of considerable interest to the general reader also, for it contains a great deal of material not commonly dealt with in books on probability.

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