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SCIENTIFIC BOOKS

Statistical Method. By TRUMAN L. KELLEY. New York, The Macmillan Company, 1924. xi + 390 pp. + 1 nomogram.

WE are living in a period of tremendous increase of interest in statistics—vital, educational, business, economic, and so on. When I was in college, only 25 years ago, it would have been difficult to find a course in statistical theory or even one in which statistical methods were widely used—perhaps least squares as a way of reducing astronomical observations and the kinetic theory of gases as a branch of the theory of heat were the only available courses. To-day an undergraduate might almost obtain a liberal education from statistical courses alone. It is natural that there should be an increasing text-book literature of statistics and of its special fields. Yule's introduction appeared in 1910, is now in its sixth edition, and remains unexcelled in its own way. We have simple books by King and Secrist directed chiefly toward the student of collegiate economics, special works on vital statistics by Whipple and Pearl for the student of public health, and an excellent general text by D. C. Jones. At the moment the latest addition is Kelley's "Statistical Method." Written by a professor of education, it is evidence of the seriousness with which such professors have come to take elaborate statistical investigations.

Kelley's book is not easy; although not primarily a mathematical treatment of its subject, a moderate use of calculus is not made the occasion for apology. The author believes that the elementary statistical needs of biologists, economists, educators and psychologists are about the same and that a book can be written to provide a common foundation for the needs of all. This is good pedagogy. If a mature investigator finds his training in some subject, such as statistics, inadequate for his needs it may be that he can fill the lacuna easiest by a special treatise in which problems in his field (and in no others) are subjected to analysis by that method; if a student of the public health must learn vital statistics it may be that a special treatment such as Whipple's or Pearl's may most easily and rapidly meet his necessities; but if the student is caught young enough he undoubtedly profits most by a general discussion of a subject with illustrations from a variety of its applications and with emphasis on the method rather than on the particular problem used as illustrative material.

The author especially requests critical analysis of his determinations of probable errors and states that he has pursued the policy that as shrewd an estimate as possible of the probable error of a statistical constant is better than no estimate at all. I desire to commend this policy; it is very important for the student of statistics to be mindful of the fact that his is not an exact science and to have constantly before him some estimate of his probable errors. And in this connection, being invited by the author to criticize, I should like to say that I do not approve of carrying numbers out to so many places as he occasionally and others habitually do. These places, when repeatedly used, give a psychological impression of exactness which has an opposing effect to that of the estimate of probable errors; any book which would be sound in practice on probable errors should give considerably more attention than Kelley's does to the matter of significant figures.

A list of titles of the chapters is the quickest way to show the scope of the book: "Tabulation and plotting of (statistical) series," "Graphic methods," "Measurement of central tendencies," "Measures of dispersion," "Normal probability distribution," "Comparable measures," "Fitting of curves to distributions," "Measures of relationship," "Functions involving correlated measures," "Further methods of measuring relationship," "Multiple correlation," "Statistical treatment of sundry special problems," "Index numbers." The method of treatment is essentially Pearsonian, small attention being given to the methods of Edgeworth and the Scandinavian School, but the author does not dismiss in a cavalier fashion the possibility and even probability that such methods may be very useful. On the whole, that shrewdness which he has shown in the estimation of probable errors pervades the whole book in its discussion and critical comment.

At times I have been doubtful about professional pedagogues and about standards of graduate study and of advanced degrees in education; it is a great encouragement to find a professor of education writing a seriously sustained book on statistical method in which the emphasis is not on an arithmetic system but on a mode of thinking.

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SPECIAL ARTICLES

A NEW FORM OF THE EXCLUSION PRINCIPLE IN OPTICAL SPECTRA

THE question which, among the numerous quantized energy-states of an atom, will "combine," by means of a transition associated with radiation, is answered by two well-known exclusion principles, according to