SHORTER NOTICES

Grundbegriffe und Grundprobleme der Korrelationstheorie. By A. A. Tschuprow. Leipzig-Berlin, Teubner, 1925. v+153 pp.

This book presents in extended form a series of lectures given in the insurance seminar of the University of Christiania. The main purpose of the book is to give a unified treatment of correlation theory with special reference to the fundamental conceptions and logical foundations of the theory. It seems to be very properly held that the treatment of the logical foundations of the method of correlation has not kept pace with the wide range of applications. The exposition does not proceed from the standpoint of the analysis of numerical data, but from the standpoint of a priori probability. The theory of correlation is regarded as an organic part of the theory of probability. The treatment seems fairly well described as an idealization of the somewhat empirical concepts of the English school of statisticians by a sharper formulation of definitions and underlying concepts.

Much is made of an expressive phraseology involving the concepts of chance variable and stochastic connection. A chance variable of order k is defined as a variable which takes any one of k values with assigned probabilities. For example, the number that will be thrown with a die in a single throw is a chance variable. When x is assigned, and y is a corresponding chance variable which takes values with definite probabilities, there is said to be a stochastic connection between x and y. For example, if in throwing two dice, the first gives a value $x=3$, then the corresponding total y for the two dice is $y=4$, 5, 6, 7, 8, or 9, and there is a stochastic connection between the chance variables x and y. Much is made of the conception of stochastic dependence as distinguished from the more familiar conception of the functional dependence of two variables. In fact, the recognition of a clear distinction between the conceptions of stochastic connection and functional dependence constitutes a first step in following the exposition in this book.

The explanation of the stochastic connection of y with x follows the regression method, and calls for a complete characterization of the theoretical array (das bedingte Verteilungsgesetz) of y's for any assigned x. While this conception is quite an advance over the early Pearson concept that y is correlated with x when the mean values of the theoretical arrays of y's are not constant but are functions of x, the author has hardly given adequate credit to Pearson for a much more general view of correlation given in DRAPERS' COMPANY RESEARCH MEMOIRS, Biometric Series II (1905), p. 9. In this more general view we may say that whenever any characteristic of the theoretical arrays of y's changes from one assigned value of x to another, there is a stochastic dependence.

For the characterization of arrays, it is assumed that moments and product moments will serve to determine the necessary parameters for a complete characterization of arrays.

One of the most important parts of the book is concerned with estimating the a priori values of correlation coefficients, correlation ratios, and other statistical constants from the corresponding empirical values. In this part of the work, there is given a careful treatment of the sampling problems involved.

Taken as a whole, the reviewer considers that the book is an important contribution to more critical and rigorous thinking on the methods and theory of correlation.

H. L. RIETZ

The Theory of Measurements. By Lucius Tuttle and John Satterly. London, Longmans, Green and Co., 1925. xii+333 pp. $4.50.

For readers who are acquainted with the book which has the same title as the one now under review and which was published by Tuttle in the year 1916, the following comments will doubtless be adequate. A page by page comparison showed that Chapters I to XX of the later volume are very nearly the same as the entire text of the original book. The changes consist chiefly in the addition of a few diagrams and articles, and in the correction of errors of statement. A new chapter, XXI, deals with applications to biology. It involves (A) frequency problems and (B) illustrations of the use of graphic analysis and mathematical equations in biological investigations. The last chapter, XXII, is devoted to the practical evaluation of plane areas. It includes interesting paragraphs on the hatchet planimeter. The value of the entire book is enhanced by the addition of nearly 500 examples for solution by the student. The appendix of useful numerical tables is preceded by answers to all the quantitative examples. Satterly's collaboration has improved the text very appreciably and the only adverse criticism worthy of note is that the number of typographical errors is sufficiently large to annoy a particular student.

To readers who have not seen the unrevised text the following supplementary statements may be addressed. The object of the book is to train students to criticise the instruments by which their readings are taken, the accuracy of their observations, and the methods on which their observations are planned and by which they are reduced. The first twenty chapters are devoted to weights and measures, angles and circular functions, significant figures, logarithms, small magnitudes, slide rule, graphic representation, graphic analysis, interpolation and extrapolation, coordinates in three dimensions, accuracy, the principle of coincidence, errors and statistical methods, deviation and dispersion, weighting of observations, rejection criteria, indirect measurements, least squares, systematic and constant errors. The book may be used in connection with courses of mathematics as well as for courses in physics, and for this reason the requirements of the mathematician have been especially kept in mind during the preparation of the text. No knowledge of trigonometry is presupposed