first volume, a substantial treatise covering the main body of the theory will be available.

The treatment is occasionally lacking in exactitude and rigor, though it compares favorably in this respect with many books on mathematics and mathematical physics, and is enormously above the general level of books on statistics. The volume is printed in England, with a rather luxuriously pleasing use of display formulae and wide margins on large pages. However there is no table of contents in this first volume, and typographical errors seem unusually numerous. A particularly troublesome one is the omission of the subscript n from v in the second integral in line 7 of p. 112; this should be remedied by each owner of a copy, since the meaning of the Helly-Shohat-Fréchet theorem is involved. The continued fraction for the normal probability integral is derived on p. 129 by Laplace's method instead of by the more satisfactory argument of Jacobi, and one of the useful series for this integral is not included at all. The advice on p. 336 not to use the standard error of the correlation coefficient unless n exceeds 500 is excessively conservative when ρ is small.

The author follows the practice of defining the variance of a sample as the simple mean of the squares of the deviations from the mean. This saves trouble for the author and the reader, in their capacities as such, but makes no end of trouble for them or anyone else who undertakes to substitute observations in the formula thus simply laid down. Use of a denominator less by unity than the sample number has distinct advantages.

Previous relevant writings are occasionally ignored—as often happens in a science built up from contributions scattered through multitudinous journals devoted largely to applications. The statement on p. 250 that no previous systematic account had been given of methods for deriving sampling distributions neglects a paper by B. H. Camp in the Annals of Mathematical Statistics for 1937.

With these qualifications, which can easily be taken care of by a competent teacher, or in later editions by the author and publishers, the book is an outstanding landmark and promises to be of the utmost value in advancing knowledge of the theory of statistics.

HAROLD HOTELLING

A handbook of perspective drawing. By James C. Morehead and James C. Morehead, Jr. Pittsburgh, J. C. Morehead, 1941. 3+166 pp. $4.50.

Perspective being a central projection, the *Handbook* denotes by *picture plane*, *station point*, and *station-point distance* the plane of

projection, the center of projection, and the distance between these, respectively. The perspective of a point P may be obtained by solving the two problems of geometry of position: (1) find the line l determined by P and the station point S; (2) find the point P' in which l pierces the picture plane π. The aggregate of the projections P' of the points P of an object constitutes the perspective of this object. An important point of a line is its *vanishing point* where a parallel to it through S pierces π, and an important line of a plane is its *vanishing line* where a plane through S parallel to it cuts π. In the *Handbook* this line is called a *horizon*. All lines of a two-parameter family of parallel lines have the same vanishing point V.

Let us now think of an architectural object like a house which contains lines (edges) belonging to one or another of three mutually perpendicular two-parameter families of parallel straight lines, those of one family being vertical. For a station point S of general position and a picture plane π of general orientation, there will, in general, be three finite vanishing points in π. Such a picture is called a three-point perspective. If π is vertical there will be only two finite vanishing points and these will be on the vanishing line (horizon) of the horizontal planes. The picture is then called a two-point perspective. Finally, if π is still vertical and contains a line of one of the other families, there will be only one finite vanishing point, and the resulting picture is called a one-point perspective.

Early in the book the notion of *measure line* is introduced. It is a line which lies in or is parallel to the picture plane and thus shows distances in their true size or magnified or diminished by a constant factor. The first method given for drawing perspectives is that called *direct projection*. This consists essentially in solving problems (1) and (2) stated above by the Mongean method of descriptive geometry with the vertical plane of that method taken as the picture plane. The *mixed method* is the next one described. Here the perspectives of the vertical edges are obtained as in the direct method. However, the perspectives of the corners on these edges are found with the aid of a measure line.

Chapter II concerns itself with what is called the *45°-line method*. The essential feature of this method is to find the vanishing points of the diagonals of the faces of a cube which are parallel to the floor and walls of a rectangular building.

In Chapter III the book describes various constructions and mechanical devices for drawing lines to distant vanishing points. In Chapter IV use is made in two-point perspective of the 45°-line method in floor planes. This method reduces to the use of a single

vanishing point the lay-out procedure for finding the perspectives of the horizontal dimensions of a rectangular building. Chapter V is devoted to three-point perspective. The picture plane π is here assumed to be *not* vertical. The orientation of this plane with respect to the rectangular building to be represented is determined by two (parametric) angles A and B.

Chapter VI concerns itself with the perspectives of curves such as circles, conics and helices. Application is made to such objects as loggias with circular arches, viaducts with parabolic arches, groined vaults, cylindrical bays with conical roofs and niches with domed ceilings, water wheels and helical stairways.

In Chapter VII some of the methods already described are applied to the determination of the perspectives of the shadows and reflections of the objects represented.

The reviewer has seldom seen a book on drawing in which the figures are executed more carefully and beautifully than they are in this book. For this reason as well as for the precise descriptions of the method involved, a copy of this book should be in the possession of everyone who is interested in perspective drawing.

WILLIAM H. ROEVER