

BOOK REVIEW

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J. ARTHUR GREENWOOD AND H. O. HARTLEY, *Guide to Tables in Mathematical Statistics*, Princeton University Press, Princeton, New Jersey, 1962. \$8.50
lxii + 1014 pp.

Review by H. A. DAVID

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This massive but manageable volume has been long in preparation and represents a staggering amount of work by the authors, with some help from graduate students and other statisticians. Throughout more than twenty years it has been sponsored by the National Academy of Sciences—National Research Council.

Descriptions of tables begin with those very broadly based on the standard distributions: Normal, χ^2 , Poisson, incomplete Γ and B functions, binomial, t , F , and various discrete distributions. There follow sections on likelihood and other statistics; on correlation, order statistics, non-parametric tests; on frequency curves, moments, fitting of curves, variate transformations, and control charts. Special features include a list of tables of random samples and a long index of tables for the design of experiments. A section referring to selected mathematical tables likely to be of value to statisticians completes the main body of the book. Appendix I is a supplement covering recent publications and some earlier omissions. Appendix II gives the contents of 16 books of tables, mainly statistical, including the sizeable collection of Vianelli (1959). Finally, there are extensive author and subject indexes. The only wholesale exclusions are tables relating to queueing theory and tables of the *results* of random sampling experiments.

The authors were to some extent influenced by the first edition of "An Index of Mathematical Tables" by Fletcher, Miller, and Rosenhead (FMR). In the section on mathematical tables the numbering allows easy reference to FMR for further details. When one-line descriptions are possible, Greenwood and Hartley, like FMR, give information about number of decimals or figures; the function tabled, if the article is slightly heterogeneous; interval and range of argument; facilities for interpolation, if any; author, date, etc. Of course, FMR even in its second much enlarged edition (1962, with Comrie as fourth co-author) deals only with the more basic statistical tables, and then very concisely. More important, FMR is an index, whereas the book under review is rightly called a guide. For easy use statistical tables often require much explanatory material, and this is provided in an unhurried style by abstracts of a large number of papers or by introductory matter at the beginning of each chapter. The abstracts are in the manner of *Mathematical Tables and Other Aids to Computation*

(MTAC) (now *Mathematics of Computation*) and in Appendix I a good many have been reproduced or abridged from MTAC.

Coverage is stated to be strongly dependent on date of publication: a comprehensive search was made up to 1948; the leading American and English statistical journals (but not only these) were covered up to 1954; more recent tables (up to 1961) have been selected more haphazardly, but still represent a large collection. Some unpublished technical reports are also included.

A number of bonuses have been provided by the authors. Most significant of these is that the *Guide* is not confined to tables of figures but covers also many tables of formulae. Section 15 gives a most valuable systematic listing of sources of designs, factorial and incomplete block, some 130 pages in all. Much illuminating advice is scattered throughout the volume, occasional warnings are sounded, many corrections are listed, and difficulties of terminology are discussed.

In the organization and layout of the book, there is much evidence of careful attention to detail. Thus, to help the reader locate an entry quickly, each pair of pages constituting an opening has captions giving first and last classification number or author's name, etc., in the manner of dictionaries. However, it would have been better to set off abstracts by underlining the author's rather than the journal's name. The author index of 160 pages has section and page references to the entries. It includes the item: Mozart, W. A. 1793, Instructions for the composition of waltzes with two dice, as many as desired, and without knowledge of music or composition.—The subject index is comprehensive.

There has in recent years been a welcome spate of bibliographical activity among statisticians. Often the lists prepared will merely give references without distinguishing those containing tables, and seldom do they have the detailed descriptions of the *Guide*. Of readily available publications, only *Mathematics of Computation*, which appears to have reduced its coverage of statistical tables, and the new *International Journal of Abstracts* of the International Statistical Institute carry comparable detail. Hopefully, the latter might be used by the reader to keep the *Guide* up to date.

No attempt has been made by the authors to include sources of computer programs. Publications doing this are beginning to appear and are bound to multiply. Of course, many computing routines dealing with the analysis of data in no sense replace tables. It would seem to be mainly in the generation of random numbers and in the preparation of new tables from existing ones that computer methods are seriously supplanting books of tables. The *Guide* is certain to retain a vast area of usefulness and the authors have undoubtedly assured themselves of the gratitude of all statisticians.

The book has been produced by a photographic process from the typed page in which formulae and occasional printed abstracts (from MTAC) have been inserted separately. Although, at times this makes for an uneven look, the result is always easy to read, and is well justified by the remarkably low price achieved.