

This Week's Citation Classic

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Anderson T W. *An introduction to multivariate statistical analysis*.
New York: John Wiley and Sons, Inc. 1958. 374 p.

This book is a unified treatment of procedures for analyzing statistical data consisting of several measurements or characteristics on each unit observed. The methodology, based mainly on the assumption of sampling from a multivariate normal distribution, is developed mathematically and applied to examples. [The SC[®] indicates that this paper has been cited 684 times since 1961.]

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"This book developed out of some fifteen years of research and teaching. My dissertation was in that area of mathematical statistics that deals with the analysis of several variables simultaneously. John Wiley and Sons, late in World War II, established a series in probability and mathematical statistics and offered a contract for a book on multivariate analysis. After a post-war year at the Cowles Commission for Research in Economics at the University of Chicago, developing multivariate methods in econometrics, I was appointed to a newly-formed Department of Mathematical Statistics at Columbia University. During my first year (1946-47) two students wrote notes of the lectures I gave in a one-year graduate course on multivariate statistical analysis. Teaching this course in various forms, adding material, experimenting with methods of exposition, and using lecture notes, I wrote and re-wrote my treatise. Interaction with students, colleagues, and other researchers gave me more insight into the uses and performances of various techniques.

"The book organized the field of multivariate analysis in a coherent way. A general principle (maximum likelihood) was followed in developing estimation and testing procedures. The treatment was mathematically rigorous and complete; enough details were given so that readers

with a modest mathematical background could follow the exposition. Many proofs as well as theorems were original. Worked-out examples illustrated the techniques. In the format of a text in an upper-level course (including many exercises), it was organized so that it would also serve as a reference work.

"Until quite recently no other book has attempted a fairly comprehensive mathematical treatment of the field. My book has served as the standard text and reference. A generation of students of statistics has learned the subject from it. In the twenty years since publication mathematical research in this area has burgeoned. (The number of papers cited in *A bibliography of multivariate statistical analysis* was 175 in 1958 and 446 in 1966, the last year covered by the bibliography.¹) The direction of this research has been influenced considerably by obvious questions opened up by my book. In fact, some authors have complained that I have had too much influence.

"There has been an even greater growth in the use of multivariate statistical methods in the analysis of data in all fields of study due to an increase in mathematical sophistication among social scientists, more comprehensive training of investigators in statistics, and collection of more data. Perhaps the most important factor is the availability of high-speed computers with packages of programs that permit calculation of procedures with hardly more than the effort of entering the data. (A disadvantage of the computer is that it may yield more output than the investigator can assimilate.) These many applications have been assisted by a plethora of books on how to apply multivariate methods. Some of these resemble my book with proofs omitted and examples added; others are derived from those books by using more words and intuition and less symbolism.

"The decision to write this book came at an opportune time. A body of basic theory and methodology had been established and was at the stage that it could be organized, extended, and rounded out. New problems could easily be identified. A balance between "nice" mathematics and usefulness in applications could be made."

1. Anderson T W, Das Gupta S & Styan G P H. *A bibliography of multivariate statistical analysis*.
Huntington, NY: Robert E. Krieger Publishing Co., 1972.