SHACHTER, R. D. (1986). Evaluating influence diagrams. Technical Report, Dept. Engineering-Economic Systems, Stanford Univ.

SHEPARD, R. N. (1962a). The analysis of proximities: Multidimensional scaling with an unknown distance function. I. *Psychometrika* **27** 125–140.

SHEPARD, R. N. (1962b). The analysis of proximities: Multidimensional scaling with an unknown distance function. II. *Psychometrika* **27** 219–246.

SMITH, A. F. M., SKENE, A. M., SHAW, J. E. H., NAYLOR, J. C. and DRANSFIELD, M. (1984). The implementation of the Bayesian paradigm. *Comm. Statist. A—Theory Methods* **14** 1079–1102.

SPIEGELHALTER, D. J. (1986). A statistical view of uncertainty in expert systems. In *Artificial Intelligence and Statistics* (W. Gale, ed.) 17–55. Addison-Wesley, Reading, Mass.

STEIN, C. (1956). Inadmissibility of the usual estimator for the mean of a multivariate normal distribution. *Proc. Third Berkeley Symp. Math. Statist. Probab.* **1** 197–206. Univ. California Press.

SUBRAMANIAM, K. and SUBRAMANIAM, K. (1973). *Multivariate Analysis: A Selected and Abstracted Bibliography, 1957–1972.* Dekker, New York.

TORGERSON, W. S. (1952). Multidimensional scaling: I. Theory and method. *Psychometrika* **17** 401–419.

TUFTE, E. (1983). *The Visual Display of Quantitative Information.* Graphics Press, Cheshire, Conn.

TUKEY, P. A. and TUKEY, J. W. (1981a). Preparation; prechosen sequences of views. In *Interpreting Multivariate Data* (V. Barnett, ed.) 189–213. Wiley, New York.

TUKEY, P. A. and TUKEY, J. W. (1981b). Data-driven view selection; agglomeration and sharpening. In *Interpreting Multivariate Data* (V. Barnett, ed.) 215–243. Wiley, New York.

TUKEY, P. A. and TUKEY, J. W. (1981c). Summarization; smoothing; supplemented views. In *Interpreting Multivariate Data* (V. Barnett, ed.) 245–275. Wiley, New York.

WIJSMAN, R. A. (1984). Two books on multivariate analysis. *Ann. Statist.* **12** 1145–1150.

Comment

T. W. Anderson

1. OBJECTIVES

I am pleased that *Statistical Science* has furnished the opportunity to review my second edition and stimulate a discussion of the development and future of multivariate statistical analysis. The reviewer makes clear that his paper is "a thoroughly biased and narrow look"; I look forward to an unbiased, broad and comprehensive view in the future.

This article contrasts two books on multivariate statistical analysis that are very different in content and objectives. I shall hold my discussion to Schervish's remarks concerning my book. Let me first elucidate my criteria for inclusion of material. Writing a book on multivariate statistical analysis originated as an idea some forty years ago. It was accomplished over a period of years in connection with teaching courses in the Department of Mathematical Statistics at Columbia University. I wanted to write about statistical analysis that I thought has a sound foundation, about methods that were widely accepted. When the first edition was published in 1958, I had no thought that a quarter of a century would pass before the second edition would appear. When I finally came to revise the book, I found that most of the contents had stood the test of time; there was little that I wanted to change or delete, although there was a good deal that could be added. It has been a great satisfaction to me that the book has stood up so well; the initial selection

of material has been justified. The objectives and organization of the first edition have been retained. In fact, the headings of the chapters and of most of the sections have been kept.

Although the book includes a considerable amount of mathematics, the primary objective is to provide and explain the methods and their properties. I think that the purpose of statistical theory is to initiate, develop, clarify and evaluate statistical methods. One criterion for inclusion of a topic is that it contributes to understanding useful procedures. Accordingly, there is not much theory in the book for its own sake, but I will admit that the relevance of some material is a matter of personal taste and some theory is to satisfy intellectual curiosity.

A second criterion, as the reviewer has surmised, is that a topic has a mathematical backing. For a confident and thorough understanding, the mathematical theory is necessary. This implies a rigorous treatment.

Thirdly, I wanted to organize the contents coherently. This desire is partly for the sake of clarity and efficiency of exposition and partly for personal satisfaction—aesthetics, if you will.

An outcome of following these criteria was that the inference treated here is based on normal distributions as models. There was not a place for ad hoc methods, valuable though they may be. Normal distributions serve as suitable models for generating many sets of data, but, of course, not for all sets.

Because the book is aimed at statistical practice, I included a number of examples, perhaps not enough. Beside the twelve examples mentioned by

T. W. Anderson is Professor of Statistics and Economics, Stanford University, Stanford, California 94305.