Book Reviews

Factor Analysis: An Introduction and Manual for the Psychologist and Social Scientist. Raymond B. Cattell. New York: Harper, 1952. 462 pp. $6.00.

Factor analysis can hardly be considered more than 25 years old. It concerns itself exclusively with the analytical study of matrices of correlations. It requires large populations of cases and a wide variety of measures on each of these cases for effective use. In recent years, several excellent books have appeared that discuss in rather comprehensive fashion the fundamental principles and procedures of this new method of analyzing and classifying relationships. These have included many derivations and formulas and have been found difficult to follow by those without substantial training in statistical methods.

Dr. Cattell in his preface indicates three needs which this book proposes to meet:

> First, it sets out to meet the need of the general student in science to gain some idea of what factor analysis is about and to understand how it integrates with scientific methods and concepts generally. . . .
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> Second, it is intended as a textbook for statistics courses which deal with factor analysis for the first time, either as an appreciable part or as the whole of the semester course. . . .
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> The third objective of this work is to supply a handbook for the research worker, the student, and the statistical clerk which will be a practical guide with respect to carrying out the processes most frequently in use.

The author has been an active user of factor analysis procedures for 12 years. He is one of the most enthusiastic proponents of these procedures, and his discussions of basic issues, computational procedures, and proposed uses of the techniques will be found informative by the novice and stimulating by experienced workers.

The approach of the book is in terms of factor analysis as a scientific method for gaining certain ends rather than in terms of its mathematical foundations. Also, the presentation is simplified by a number of selections on the part of the author. The most important of these are the selection of Thurstone's centroid method and rotation to simple structure. Only brief comparisons are given for the other principal methods of factor analysis. Similar selections are made with respect to other basic problems of the factor analyst. In most cases the relative advantages of the various possible choices are reviewed, and the reasons for the author's preference of a specific procedure are given.

In a field as new as this, it is to be expected that crucial evidence will be lacking on many points, leaving much room for argument as to the most appropriate procedures. The reviewer therefore expects to find points of disagreement. This is especially true when the reviewer, as in this case, was trained in a brand of factor analysis dismissed by Cattell after only perfunctory discussion. Such points of disagreement were found. These seemed minor when appearing with the wealth of information and ideas and the many sound suggestions and warnings to the less experienced workers in this field.

Dr. Cattell's book certainly does not represent the last word to be said on factor analysis. It does appear that he has made an important contribution in filling the three needs noted above. The book should be read with profit by all three of the groups for which it was planned. This reviewer is glad to recommend it to his students and colleagues who are interested in this new tool for working on the many problems with which psychologists and social scientists are at present confronted.

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Hyperconjugation. John William Baker. New York: Oxford Univ. Press, 1952. 158 pp. $3.50.

This book is an excellently written, concise summary of the hypothesis of hyperconjugation and its role in the theory of organic reactivity. Some 205 references to the original literature are cited, and it gives a well-balanced picture of physical organic research on this subject. In general the book is written in an objective manner, and the author carefully points out places where conflicting opinions occur and where the interpretation of experiments is in dispute.

This short monograph is written in the classical organic spirit. The emphasis is primarily empirical in character. There are brief references to the theoretical work of Coulson and to that of Mulliken, Rieke, and Brown. These appear to be added more for the purpose of tone and balance than for their intrinsic merits, and the descriptions are so brief that some sections will be intelligible only to the theoretical chemist. Some of the topics discussed are the physical evidence for hyperconjugation, hyperconjugation and aromatic substitution, and hyperconjugation in olefin chemistry.

There are some minor instances of incorrect theory. On page 115 mention is made of the stabilizing influence overlap between electrons assigned to different bonds. Actually such overlap should destablize the molecule, since it gives rise to exchange (steric) repulsions. There is also some confusion between the concepts of "activated" and excited electronic states of reacting systems. Generally reactions occur by means of an adiabatic-reversible process in which the reacting system remains in its ground electronic state.

Although these indiscriminate uses of theory are to be regretted, this tendency is so prevalent in physical organic chemistry that one can scarcely rebuke the author. On the whole, this is an extremely valuable contribution to the theory of organic chemistry and should be of interest to everyone in the field of physical organic chemistry.

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