Human cognitive abilities

A survey of factor-analytic studies

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Preface

This book is in a sense an outcome of work I started in 1939, when, as a graduate student at the University of Minnesota, I became aware of L.L. Thurstone's research on what he called "primary mental abilities" and undertook, in my doctoral dissertation, to apply his factor-analytic techniques to the study of abilities in the domain of language. Over the years of my career as a specialist in psychometrics, educational psychology, and the psychology of language I tried to keep abreast of both methodological and substantive developments in factor analysis, and from time to time I found it useful to conduct factor-analytic studies on topics of particular interest to me. Increasingly, however, I sensed the field's need for a thoroughgoing survey and critique of the voluminous results in the factor-analytic literature on cognitive abilities. It was not until 1974, when I came to the University of North Carolina at Chapel Hill as director of the L.L. Thurstone Psychometric Laboratory, that I felt that an appropriate use of my time would be to plan and execute such a survey.

A sabbatical year in 1979–80 supported by the Kenan Fund at the University of North Carolina and by the James McKeen Cattell Fund enabled me to start compiling materials systematically and make visits to prominent investigators in the U.S. and Europe. The major efforts starting in 1983, after I retired from the university, were supported chiefly by grant BNS-82-12486 from the National Science Foundation.

The book has three parts. Part I (Chapters 1–4) is introductory, historical, and methodological. Part II consists of chapters covering each of a number of domains of ability, ending with Chapter 15 on higher-order factors of ability, including *g* or general intelligence. In Part III, I consider more general issues about abilities. In Chapter 16 I propose a three-stratum theory of cognitive abilities. In Chapter 17 I outline the implications of such a theory for problems of nature and nurture, and more generally for cognitive psychology. In Chapter 18 I make recommendations for future research, for the application of

currently available cognitive ability tests, and for problems of public policy on testing.

The book has been planned mainly as a monograph for use by researchers and students of cognitive abilities. As such, it should serve as a reference work and as a textbook in advanced courses in individual differences. But it also contains considerable material addressed to psychologists in general, particularly those parts dealing with the structure of cognitive abilities and what is known about the measurement and interpretation of such abilities. The general reader may be interested in some portions, especially those treating the history of cognitive ability studies and the implications for public policy on uses of cognitive ability tests.

A feature of the work is that it contains reanalyses of more than 460 data sets found in the factor-analytic literature. The reanalyses use techniques of what is called exploratory factor analysis as developed progressively over the last 60 years or more, rather than the currently more fashionable methods of confirmatory factor analysis. As I explain in Chapter 3, it is my view that properly controlled exploratory techniques are more suitable than confirmatory techniques for initially identifying cognitive abilities and their structure. Students may find it of interest, however, to attempt to verify or revise my findings by using confirmatory techniques. The final results of my exploratory reanalyses are contained in a set of files on computer disks that are available as a companion publication.

Because of its emphasis on the reanalysis of previous studies, the work may seem to look backward more than it looks forward. Currently the field of individual differences in cognitive abilities is very active. Since finishing the final draft of my manuscript I have become aware of many recent studies and discussions that I wish I could have considered. My hope is that future investigators will be able to profit from my analyses, and in this sense the work looks toward the future.

A word is in order about the name and subject indexes. To save space in the text, data sets are often cited without mentioning the names of the author or authors of the source publications. A reader wishing to find citations of the work of a particular investigator, therefore, should consult not only the name of that investigator in the name index but also, in the subject index, the one or more data sets of that investigator as listed in the list of references (pp. 715–89).

I wish to express gratitude to the many people who have helped me in this project. First of all I must mention appreciation to the investigators whose studies I have reviewed or reanalyzed here. I trust that none of them—at least those still living and active in the field—will take umbrage at the ways in which I have reinterpreted or even possibly distorted their findings and conclusions. My intention has been simply to present what was in my opinion the most accurate, reasonable, and consistent picture of the total domain of cognitive abilities.

During the period of greatest activity in collecting and reanalyzing materials from previous studies, I was ably assisted by two people who were then graduate students in the Quantitative Psychology program at my university, Christina M. Gullion and Ann C. Meade. They helped develop special main-frame computer programs and algorithms for this work, and executed a large number of analyses. Also assisting in the project at various periods were James Staszewski, Brynda Holton, and Melanie Miller, who helped assemble bibliographical materials or performed analyses on microcomputers.

I want also to mention my indebtedness to colleagues at the university, Lyle V. Jones, Edward S. Johnson, and Marcy Lansman, for insightful discussions of problems or for reviews of drafts of my manuscript. Richard E. Snow of Stanford University was a most capable outside reviewer of the manuscript, and made many suggestions that I was able to use in revising it. Ledyard R Tucker of the University of Illinois was most gracious in making certain computer programs available to me. Richard Helwig and Kenneth Pauwels gave unfailing help in connection with the use of computers. Ruth A. Childs and Valerie S. Williams gave useful comments as students in a course at UNC in which a preliminary version of the manuscript was a text. None of these people, of course, is to be held responsible for any errors or questionable points of view that may be found in this book.

As always, I am grateful to my wife, Mary S. Carroll, not only for her active assistance in a great variety of ways but also for her patience and encouragement over more years than I like to count.

Chapel Hill J.B.C.
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