

PSYCHOLOGICAL

TESTING

FIFTH EDITION

ANNE ANASTASI

ANNE ANASTASI

Department of Psychology, Fordham University

Psychological Testing

F I F T H E D I T I O N

MACMILLAN PUBLISHING CO., INC.

New York

Collier Macmillan Publishers

London

COPYRIGHT © 1982, ANNE ANASTASI.

PRINTED IN THE UNITED STATES OF AMERICA.

All rights reserved. No part of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or any information storage and retrieval system, without permission in writing from the Publisher.

Earlier editions copyright © 1954 and 1961 by Macmillan Publishing Co., Inc., and copyright © 1968 and 1976 by Anne Anastasi.

MACMILLAN PUBLISHING CO., INC.
866 Third Avenue, New York, New York 10022

COLLIER MACMILLAN CANADA, INC.

Library of Congress Cataloging in Publication Data

Anastasi, Anne, (date)
Psychological testing.

Bibliography: p.
Includes indexes.

1. Psychological tests. I. Title.
BF176.A5 1982 150'.76 81-6018
ISBN 0-02-302960-9 (Hardbound) AACR2
ISBN 0-02-977510-8 (International Edition)

Printing: 9 Year: 6 7 8 9

ISBN 0-02-302960-9

Psychological Testing

P R E F A C E

WHILE preparing this fifth edition, I was frequently reminded that psychological testing today does not stand still long enough to have its picture taken. During the time required to review and update the content of twenty chapters, so much was happening in this area that I felt I was constantly running at top speed in order to snap a photograph of my galloping subject. More than a third of the tests discussed in this edition are either new or have been substantially revised since their inclusion in the 1976 edition. Of the approximately 250 tests listed in Appendix E, 11% have been revised since they were last reviewed in the *Mental Measurements Yearbooks*. Conspicuous examples include the WAIS-R, Otis-Lennon School Ability Test, Cognitive Abilities Test, Peabody Picture Vocabulary Test, SCAT-III, STEP-III, Iowa Tests of Basic Skills, and Metropolitan Achievement Tests. An additional 13% have not been included at all in the MMY series. Although a few of the latter may fall outside the scope of tests covered in these yearbooks, the large majority appeared too late for inclusion in the eighth MMY, published in 1978.

Of more general interest are the substantive developments that have occurred in the field as a whole and that are reflected in the present edition. Major theoretical and methodological advances include applications of item response theory (IRT) in test construction, especially in the development of individually tailored, adaptive testing; continuing research on test bias and the clarification of decision models for fair use of tests; Bayesian approaches to validity generalization; further applications of decision theory in personnel selection, including research on the relation of test validity to productivity; growing emphasis on construct validation in both ability and personality testing; contributions of cognitive psychology to an understanding of the constructs measured by intelligence tests; theoretical and methodological progress in the analysis of trait, state, and situational variables in the personality domain; and increasing recognition of the need for psychometrically sound assessment techniques in behavior modification programs.

Several developments concern chiefly test use and the interpretation of test results. Major topics in this area include the causes and treatment of test anxiety; the effects of coaching and other training programs; population changes in test performance, such as the widely publicized score decline on the College Board's SAT; and the testing implications of the 1978 *Uniform Guidelines on Employee Selection Procedures* and related court cases, of Public Law 94-142 on the education of all handicapped children, and of legislation pertaining to the disclosure of test content.

Another noteworthy trend is the application of psychometric procedures in new areas. Among the varied instruments developed for these purposes are tests of minimum competency in basic skills, standardized neuropsychological batteries, health-related inventories, career exploration programs and indices of career maturity, tests for assessing sex roles and androgyny, and measures of environmental or ecological attitudes.

In the present edition, every effort was made to incorporate new material into the framework of the previous edition. Accordingly, the chapter organization remains largely unchanged, and earlier chapter titles have been retained, with a single necessary exception (Ch. 18). The decision to follow this organization was based on two considerations. First, current users of the text find it inconvenient to adapt their courses to frequent changes in topical organization. Second, the chapter structure of the previous edition seems to fit the new material as well as any other I could devise. The changes begin to emerge in the organization and headings of the major sections within chapters and become more evident in the subsections.

At a more basic level, the objectives and general approach of the book are the same as those in all earlier editions. The primary goal of the text is to contribute toward the proper evaluation of psychological tests and the correct interpretation and use of test results. This goal calls for several kinds of information: (1) an understanding of the major principles of test construction, (2) psychological knowledge about the behavior being assessed, (3) sensitivity to the social and ethical implications of test use, and (4) broad familiarity with the types of available instruments and the sources of current information about tests. As heretofore, particular tests discussed in the text have been chosen either because they are outstanding examples of a major category of testing instruments or because they illustrate some special point of test construction or interpretation. The classified list in Appendix E contains not only all tests cited in the text but also others added to provide a more representative sample.

As the field of psychological testing expands at an increasing rate, it becomes necessary to rely more and more on direct contact with colleagues for current information. I am indebted to the many researchers, authors, and test publishers who provided reprints, unpublished manuscripts, specimen sets of tests, and answers to my innumerable inquiries by mail, telephone, or personal conferences. For contributions beyond the normal expectations, I owe special thanks to Lorraine D. Eyde, Frank L. Schmidt, and Vern W. Urry, U.S. Office of Personnel Management; Robert C. Droege, Employment and Training Administration, U.S. Department of Labor; Edith M. Huddleston, National Center for Educational Statistics; Gerry Ann Bogatz, Harold Gulliksen, and Barbara Lerner, Educational Testing Service; Michael D. Beck and David O. Herman, The Psychological Corporation; Esther E. Diamond, Science Research Associates; Leo A. Munday, Riverside Publishing Company; Gary J. Robertson, American Guidance Service; John D.

Black, Consulting Psychologists Press; Franklin Evans, Law School Admissions Services; Shanna Richman, Professional Examination Service; John W. Atkinson, University of Michigan; Marilyn Bergner, Department of Health Services, University of Washington; Charles J. Golden, University of Nebraska Medical Center; Robert M. Kaplan, Department of Community Medicine, University of California at San Diego; Douglas N. Jackson, University of Western Ontario; Paul McReynolds, University of Nevada; Theodore Millon, University of Miami; Melvin R. Novick, University of Iowa; Jerome M. Sattler, San Diego State University; Charles D. Spielberg, University of South Florida; Donald E. Super, Teachers College, Columbia University; and David J. Weiss, University of Minnesota.

To my colleagues in the Fordham University Department of Psychology, I am grateful for their continued interest, ready cooperation, and helpful suggestions. I am pleased to acknowledge the special bibliographic services rendered by members of the Fordham University libraries, particularly Mary F. Riley, Chief Reference Librarian, Lucy Valentino of the Circulation Staff, and Victoria Overton of the Periodicals Staff. Special thanks are due my husband, John Porter Foley, Jr., who participated in the solution of countless problems of both content and form throughout the preparation of the book.

A. A.

CONTENTS

PART ONE

CONTEXT OF PSYCHOLOGICAL TESTING

1. FUNCTIONS AND ORIGINS OF PSYCHOLOGICAL TESTING 3

Uses of psychological tests	3
Early interest in classification and training of the mentally retarded	5
The first experimental psychologists	6
Contributions of Francis Galton	7
Cattell and the early "mental tests"	8
Binet and the rise of intelligence tests	10
Group testing	11
Aptitude testing	12
Standardized achievement tests	15
Assessment of personality	17
Sources of information about tests	19

2. NATURE AND USE OF PSYCHOLOGICAL TESTS 22

What is a psychological test?	22
Reasons for controlling the use of psychological tests	28
Test administration	31
Rapport	34
Test anxiety	36
Examiner and situational variables	38
Effects of training on test performance	41

3. SOCIAL AND ETHICAL IMPLICATIONS OF TESTING 45

User qualifications	46
Testing instruments and procedures	48
Protection of privacy	49
Confidentiality	52
Communicating test results	55
Testing and the civil rights of minorities	56

PART TWO

TECHNICAL AND METHODOLOGICAL PRINCIPLES

4. NORMS AND THE INTERPRETATION OF TEST SCORES	65
Statistical concepts	66
Developmental norms	71
Within-group norms	75
Relativity of norms	85
Computer utilization in the interpretation of test scores	92
Criterion-referenced testing	94
5. RELIABILITY	102
The correlation coefficient	103
Types of reliability	109
Reliability of speeded tests	120
Dependence of reliability coefficients on the sample tested	123
Standard error of measurement	125
Reliability of criterion-referenced tests	129
6. VALIDITY: BASIC CONCEPTS	131
Content validation	131
Criterion-related validation	137
Construct validation	144
Overview	152
7. VALIDITY: MEASUREMENT AND INTERPRETATION	156
Validity coefficient and error of estimate	157
Test validity and decision theory	160
Combining information from different tests	173
Use of tests for classification decisions	179
Statistical analyses of test bias	183
8. ITEM ANALYSIS	192
Item difficulty	193
Item discrimination	200
Item response theory	210
Item analysis of speeded tests	215
Cross-validation	217
Item-by-group interaction	219

PART THREE

TESTS OF GENERAL INTELLECTUAL LEVEL

9. INDIVIDUAL TESTS	227
Stanford-Binet Intelligence Scale	228
Wechsler Adult Intelligence Scale	242
Wechsler Intelligence Scale for Children	251
Wechsler Preschool and Primary Scale of Intelligence	256
Assessment of Competence	260
10. TESTS FOR SPECIAL POPULATIONS	264
Infant and preschool testing	265
Comprehensive assessment of the mentally retarded	276
Testing the physically handicapped	280
Cross-cultural testing	286
11. GROUP TESTING	298
Group tests versus individual tests	298
Computer utilization and adaptive testing	301
Multilevel batteries	305
Tests for the college level and beyond	316
12. PSYCHOLOGICAL ISSUES IN INTELLIGENCE TESTING	323
Longitudinal studies of children's intelligence	323
Intelligence in early childhood	328
Problems in the testing of adult intelligence	333
Population changes in intelligence test performance	339
Problems in cross-cultural testing	341
Nature of intelligence	347

PART FOUR

TESTS OF SEPARATE ABILITIES

13. MEASURING MULTIPLE APTITUDES	357
Factor analysis	358
Theories of trait organization	365
Multiple aptitude batteries	373
Measurement of creativity	383

14. EDUCATIONAL TESTING	393
Achievement tests: Their nature and uses	393
General achievement batteries	400
Tests of minimum competency in basic skills	404
Standardized tests in separate content areas	408
Teacher-made classroom tests	410
Diagnostic and criterion-referenced tests	414
Specialized prognostic tests	420
Assessment in early childhood education	422
 15. OCCUPATIONAL TESTING	 431
Validation of industrial tests	432
The role of academic intelligence	438
Special aptitude tests	440
Career counseling	453
Testing in the professions	456
 16. CLINICAL TESTING	 462
Diagnostic use of intelligence tests	463
Neuropsychological tests	467
Identifying specific learning disabilities	477
Assessment techniques in behavior therapy programs	483
Clinical judgment	488
 PART FIVE	
PERSONALITY TESTS	
 17. SELF-REPORT INVENTORIES	 497
Content validation	498
Empirical criterion keying	499
Factor analysis in test development	511
Personality theory in test development	515
Test-taking attitudes and response biases	520
Traits, states, and situations	526
Current status of personality inventories	532
 18. MEASURES OF INTERESTS, VALUES, AND PERSONAL ORIENTATIONS	 534
Interest inventories	535
Assessment of values and related variables	549
Opinion surveys and attitude scales	552
Locus of control	555
Sex roles and androgyny	557
Health-related inventories	559

19. PROJECTIVE TECHNIQUES 564

Nature of projective techniques	564
Inkblot techniques	565
Thematic Apperception Test and related instruments	571
Other projective techniques	575
Evaluation of projective techniques	580

20. OTHER ASSESSMENT TECHNIQUES 592

"Objective" performance tests	592
Situational tests	598
Self-concepts and personal constructs	603
Observer reports	608
Biographical inventories	615
The assessment of environmental qualities and ecological attitudes	617

APPENDIXES

A. Ethical Principles of Psychologists	626
B. Uniform Guidelines on Employee Selection Procedures (1978)	637
C. A Suggested Outline for Test Evaluation	666
D. Test Publishers	668
E. Classified List of Representative Tests	669

REFERENCES 683

<i>Author Index</i>	753
---------------------	-----

<i>Subject Index</i>	769
----------------------	-----

PART ONE

Context of Psychological Testing

CHAPTER 1

Functions and Origins of Psychological Testing

ANYONE reading this book today could undoubtedly illustrate what is meant by a psychological test. It would be easy enough to recall a test the reader has taken in school, in college, in the armed services, in a counseling center, or in a personnel office. Or perhaps the reader has served as a participant in an experiment that used standardized tests. This would certainly not have been the case before the 1920s. Psychological testing is a relatively young branch of one of the youngest of the sciences.

USES OF PSYCHOLOGICAL TESTS

Traditionally, the function of psychological tests has been to measure differences between individuals or between the reactions of the same individual on different occasions. One of the first problems that stimulated the development of psychological tests was the identification of the mentally retarded. To this day, the detection of intellectual deficiencies remains an important application of certain types of psychological tests. Related clinical uses of tests include the examination of the emotionally disturbed, the delinquent, and other types of behavioral deviants. A strong impetus to the early development of tests was likewise provided by problems arising in education. At present, schools are among the largest test users. The classification of children with reference to their ability to profit from different types of school instruction, the identification of the intellectually retarded on the one hand and the gifted on the other, the diagnosis of academic failures, the educational and vocational counseling of high school and college students, and the selection of applicants for professional and other special schools are among the many educational uses of tests.

The selection and classification of industrial personnel represent another major application of psychological testing. From the assembly-line operator or filing clerk to top management, there is scarcely a type of job for which some kind of psychological test has not proved helpful in such matters as

hiring, job assignment, transfer, promotion, or termination. To be sure, the effective employment of tests in many of these situations, especially in connection with high-level jobs, usually requires that the tests be used as an adjunct to skillful interviewing, so that test scores may be properly interpreted in the light of other background information about the individual. Nevertheless, testing constitutes an important part of the total personnel program. A closely related application of psychological testing is to be found in the selection and classification of military personnel. From simple beginnings in World War I, the scope and variety of psychological tests employed in military situations underwent a phenomenal increase during World War II. Subsequently, research on test development has been continuing on a large scale in all branches of the armed services.

The use of tests in counseling has gradually broadened from a narrowly defined guidance regarding educational and vocational plans to an involvement with all aspects of the person's life. Emotional well-being and effective interpersonal relations have become increasingly prominent objectives of counseling. There is growing emphasis, too, on the use of tests to enhance self-understanding and personal development. Within this framework, test scores are part of the information given to the individual as aids to his or her own decision-making processes.

It is clearly evident that psychological tests are currently being employed in the solution of a wide range of practical problems. One should not, however, lose sight of the fact that such tests are also serving important functions in basic research. Nearly all problems in differential psychology, for example, require testing procedures as a means of gathering data. As illustrations, reference may be made to studies on the nature and extent of individual differences, the organization of psychological traits, the measurement of group differences, and the identification of biological and cultural factors associated with behavioral differences. For all such areas of research—and for many others—the precise measurement of individual differences made possible by well-constructed tests is an essential prerequisite. Similarly, psychological tests provide standardized tools for investigating such varied problems as life-span developmental changes within the individual, the relative effectiveness of different educational procedures, the outcomes of psychotherapy, the impact of community programs, and the influence of environmental variables on human performance.

From the many different uses of psychological tests, it follows that some knowledge of such tests is needed for an adequate understanding of most fields of contemporary psychology. It is primarily with this end in view that the present book has been prepared. The book is not designed to make the individual either a skilled examiner and test administrator or an expert on test construction. It is directed, not to the test specialist, but to the general student of psychology. Some acquaintance with the leading current tests is necessary in order to understand references to the use of such tests in the psychological literature. And a proper evaluation and interpretation of test

results must ultimately rest on a knowledge of how the tests were constructed, what they can be expected to accomplish, and what are their peculiar limitations. Today a familiarity with tests is required, not only by those who give or construct tests, but by the general psychologist as well.

A brief overview of the historical antecedents and origins of psychological testing will provide perspective and should aid in the understanding of present-day tests.¹ The direction in which contemporary psychological testing has been progressing can be clarified when considered in the light of the precursors of such tests. The special limitations as well as the advantages that characterize current tests likewise become more intelligible when viewed against the background in which they originated.

The roots of testing are lost in antiquity. DuBois (1966) gives a provocative and entertaining account of the system of civil service examinations prevailing in the Chinese empire for some three thousand years. Among the ancient Greeks, testing was an established adjunct to the educational process. Tests were used to assess the mastery of physical as well as intellectual skills. The Socratic method of teaching, with its interweaving of testing and teaching, has much in common with today's programmed learning. From their beginnings in the Middle Ages, European universities relied on formal examinations in awarding degrees and honors. To identify the major developments that shaped contemporary testing, however, we need go no farther than the nineteenth century. It is to these developments that we now turn.

EARLY INTEREST IN CLASSIFICATION AND TRAINING OF THE MENTALLY RETARDED

The nineteenth century witnessed a strong awakening of interest in the humane treatment of the mentally retarded and the insane. Prior to that time, neglect, ridicule, and even torture had been the common lot of these unfortunates. With the growing concern for the proper care of mental deviates came a realization that some uniform criteria for identifying and classifying these cases were required. The establishment of many special institutions for the care of the mentally retarded in both Europe and America made the need for setting up admission standards and an objective system of classification especially urgent. First it was necessary to differentiate between the insane and the mentally retarded. The former manifested emotional disorders that might or might not be accompanied by intellectual deterioration from an initially normal level; the latter were characterized essentially by intellectual defect that had been present from birth or early

¹ A more detailed account of the early origins of psychological tests can be found in Goodenough (1949) and J. Peterson (1926). See also Boring (1950) and Murphy and Kovach (1972) for more general background, DuBois (1970) for a brief but comprehensive history of psychological testing, and Anastasi (1965) for historical antecedents of the study of individual differences.