

## Item Response Theory In Scale Development Research

*This is a title in our Understanding Statistics series, which is designed to provide researchers with authoritative guides to understanding, presenting and critiquing analyses and associated inferences. Each volume in the series demonstrates how the relevant topic should be reported -- including detail surrounding what can be said, and how it should be said, as well as drawing boundaries around what cannot appropriately be claimed or inferred. This volume addresses an important issue for the design of survey instruments, which is rarely taught in graduate programs beyond those specifically for statisticians. Item Response Theory is used to describe the application of mathematical models to data from questionnaires and tests as a basis for measuring abilities, attitudes, or other variables. It is used for statistical analysis and development of assessments, often for high stakes tests such as the Graduate Record Examination. The author is known for her clear, accessible writing; like all books in this series, this volume includes examples of both good and bad write-ups for methods sections of journal articles.*

*Drawing on the work of 75 internationally acclaimed experts in the field, Handbook of Item Response Theory, Three-Volume Set presents all major item response models, classical and modern statistical tools used in item response theory (IRT), and major areas of applications of IRT in educational and psychological testing, medical diagnosis of patient-reported outcomes, and marketing research. It also covers CRAN packages, WinBUGS, Bilog MG, Multilog, Parscale, IRTPRO, Mplus, GLLAMM, Latent Gold, and numerous other software tools. A full update of editor Wim J. van der Linden and Ronald K. Hambleton's classic Handbook of Modern Item Response Theory, this handbook has been expanded from 28 chapters to 85 chapters in three volumes. The three volumes are thoroughly edited and cross-referenced with uniform notation, format, and pedagogical principles across all chapters. Each chapter is self-contained and deals with the latest developments in IRT. Test Scoring provides a summary of traditional true score test theory and modern item response theory related to scoring tests, as well as novel developments resulting from the integration of these approaches. The background material introduced in the first four chapters builds a foundation for the new developments covered in later chapters. These new methods offer alternative psychometric approaches to scoring complex assessments. Each of the book's contributors draws from the classic literature of traditional test theory, as well as psychometric developments of the past decade. The emphasis is on large-scale educational measurement but the topics and procedures may be applied broadly within many measurement contexts. Numerous graphs and illustrative examples based on real tests and actual data are integrated throughout. This multi-authored volume shows the reader how to combine the coded outcomes on individual test items into a numerical summary about the examinee's performance. This book is intended for researchers and students in education and other social sciences interested in educational assessment and policy, the design and development of tests, and the procedures for test administration and scoring. Prerequisites include an introduction to educational and psychological measurement and basic statistics. Knowledge of differential and integral calculus and matrix algebra is helpful but not required.*

*Several decades of psychometric research have led to the development of sophisticated models for multidimensional test data, and in recent years, multidimensional item response theory (MIRT) has become a burgeoning topic in psychological and educational measurement. Considered a cutting-edge statistical technique, the methodology underlying MIRT can be complex, and therefore doesn't receive much attention in introductory IRT courses. However author Wes Bonifay shows how MIRT can be understood and applied by anyone with a firm grounding in unidimensional IRT modeling. His volume includes practical examples and illustrations, along with numerous figures and diagrams. Multidimensional Item Response Theory includes snippets of R code interspersed throughout the text (with the complete R code included on an accompanying website) to guide readers in exploring MIRT models, estimating the model parameters, generating plots, and implementing the various procedures and applications discussed throughout the book.*

*Item Response Theory*

*Assessing Measurement Invariance for Applied Research*

*Handbook of Polytomous Item Response Theory Models*

*Item Response Theory for Psychologists*

*The Use of Item Response Theory (IRT) Models to Scale an English Proficiency Test*

This new handbook is the definitive resource on advanced topics related to multilevel analysis. The editors assembled the top minds in the field to address the latest applications of multilevel modeling as well as the specific difficulties and methodological problems that are becoming more common as more complicated models are developed. Each chapter features examples that use actual datasets. These datasets, as well as the code to run the models, are available on the book's website <http://www.hlm-online.com> . Each chapter includes an introduction that sets the stage for the material to come and a conclusion. Divided into five sections, the first provides a broad introduction to the field that serves as a framework for understanding the latter chapters. Part 2 focuses on multilevel latent variable modeling including item response theory and mixture modeling. Section 3 addresses models used for longitudinal data including growth curve and structural equation modeling. Special estimation problems are examined in section 4 including the difficulties involved in estimating survival analysis, Bayesian estimation, bootstrapping, multiple imputation, and complicated models, including generalized linear models, optimal design in multilevel models, and more. The book's concluding section focuses on statistical design issues encountered when doing multilevel modeling including nested designs, analyzing cross-classified models, and dyadic data analysis. Intended for methodologists, statisticians, and researchers in a variety of fields including psychology, education, and the social and health sciences, this handbook also serves as an excellent text for graduate and PhD level courses in multilevel modeling. A basic knowledge of multilevel modeling is assumed.

Over the past several decades, item response theory (IRT) and item response modeling (IRM) have become increasingly popular in the behavioral, educational, social, business, marketing, clinical, and health sciences. In this book, Raykov and Marcoulides begin with a nontraditional approach to classical test theory, (nonlinear) factor analysis, generalized linear modeling, and logistic regression.

Application-oriented discussions follow next. These cover the one-, two-, and three-parameter logistic models, polytomous item response models (with nominal or ordinal items), item and test information functions, instrument construction and development, hybrid models, differential item functioning, and an introduction to multidimensional IRT and IRM. The pertinent analytic and modeling capabilities of Stata are thoroughly discussed, highlighted, and illustrated on empirical examples from behavioral and social research.

By providing an introduction to test equating which both discusses the most frequently used equating methodologies and covering many of the practical issues involved, this volume expands upon the coverage of the first edition by providing a new chapter on test scaling and a second on test linking.

This comprehensive Handbook focuses on the most used polytomous item response theory (IRT) models. These models help us understand the interaction between examinees and test questions where the questions have various response categories. The book reviews all of the major models and includes discussions about how and where the models originated, conceptually and in practical terms. Diverse perspectives on how these models can best be evaluated are also provided. Practical applications provide a realistic account of the issues practitioners face using these models. Disparate elements of the book are linked through editorial sidebars that connect common ideas across chapters, compare and reconcile differences in terminology, and explain variations in mathematical notation. These sidebars help to demonstrate the commonalities that exist across the field. By assembling this critical information, the authors hope to inspire students in their own research so they too can achieve the type of improved measurement that such models can provide. Part 1 examines the most commonly used polytomous IRT models, major issues that cut across these models, and a common notation for calculating functions for each model. An introduction to IRT software is also provided. Part 2 features distinct approaches to evaluating the effectiveness of polytomous IRT models in various measurement contexts. These chapters appraise evaluation procedures and fit tests and demonstrate how to implement these procedures using IRT software. The final section features groundbreaking applications. Here the goal is to provide solutions to technical problems to allow for the most effective use of these models in measuring educational, psychological, and social science abilities and traits. This section also addresses the major issues encountered when using polytomous IRT models in computerized adaptive testing. Equating test scores across different testing contexts is the focus of the last chapter. The various contexts include personality research, motor performance, health and quality of life indicators, attitudes, and educational achievement. Featuring contributions from the leading authorities, this handbook will appeal to measurement researchers, practitioners, and students who want to apply polytomous IRT models to their own research. It will be of particular interest to education and psychology assessment specialists who develop and use tests and measures in their work, especially researchers in clinical, educational, personality, social, and health psychology. This book also serves as a supplementary text in graduate courses on educational measurement, psychometrics, or item response theory.

Applications of Item Response Theory to Analysis of Attitude Scale Translations

Advancing Human Assessment

Test Equating, Scaling, and Linking

Using R for Item Response Theory Model Applications

The Methodological, Psychological and Policy Contributions of ETS

This book develops an intuitive understanding of IRT principles through the use of graphical displays and analogies to familiar psychological principles. It surveys contemporary IRT models, estimation methods, and computer programs. Polytomous IRT models are given central coverage since many psychological tests use rating scales. Ideal for clinical, industrial, counseling, educational, and behavioral medicine professionals and students familiar with

classical testing principles, exposure to material covered in first-year graduate statistics courses is helpful. All symbols and equations are thoroughly explained verbally and graphically.

"Item Response Theory (IRT) is increasingly the psychometric method used for contemporary psychological tests. The goal of this book is to explain IRT. The book is especially useful to psychologists and social scientists familiar with small-scale cognitive and personality measures, of those who want to use IRT to analyze scales used in their own research. It is also useful for graduate students and practitioners who want to understand the contemporary, psychometric foundations of the tests they administer. Familiar psychological concepts are used to help explain various IRT principles. The book develops an intuitive understanding of IRT principles through its use of graphical displays and analysis of psychological principles."--Jacket

This graduate-level textbook is a tutorial for item response theory that covers both the basics of item response theory and the use of R for preparing graphical presentation in writings about the theory. Item response theory has become one of the most powerful tools used in test construction, yet one of the barriers to learning and applying it is the considerable amount of sophisticated computational effort required to illustrate even the simplest concepts. This text provides the reader access to the basic concepts of item response theory freed of the tedious underlying calculations. It is intended for those who possess limited knowledge of educational measurement and psychometrics. Rather than presenting the full scope of item response theory, this textbook is concise and practical and presents basic concepts without becoming entangled in underlying mathematical and computational complexities. Clearly written text and succinct R code allow anyone familiar with statistical concepts to explore and apply item response theory in a practical way. In addition to students of educational measurement, this text will be valuable to measurement specialists working in testing programs at any level and who need an understanding of item response theory in order to evaluate its potential in their settings.

First thorough treatment of multidimensional item response theory Description of methods is supported by numerous practical examples Describes procedures for multidimensional computerized adaptive testing

Theory and Applications

The Wiley Handbook of Psychometric Testing

Applications to Typical Performance Assessment

Handbook of Item Response Theory, Volume One

The Basics of Item Response Theory

This is a highly accessible, comprehensive introduction to item response theory (IRT) models and their use in various aspects of assessment/testing. The book employs a mixture of graphics and simulated data sets to ease the reader into the material and covers the basics required to obtain a solid grounding in IRT. Written in an easily accessible way that assumes little mathematical knowledge, Carlson presents detailed descriptions of several commonly used IRT models, including those for items scored on a two-point and those scored on multiple-point (polytomous) scales, such as degrees of correctness. One chapter describes a model in-depth and is followed by a chapter of instructions and illustrations showing how to apply the models to the readers' own work. This book is an essential text for instructors and higher level undergraduate and postgraduate students of statistics, psychometrics, and measurement theory across the behavioral and social sciences, as well as testing professionals.

The Wiley Handbook of Psychometric Testing: A Multidisciplinary Reference on Survey, Scale and Test Development John Wiley & Sons

In the decade of the 1970s, item response theory became the dominant topic for study by measurement specialists. But, the genesis of item response theory (IRT) can be traced back to the mid-thirties and early forties. In fact, the term "Item Characteristic Curve," which is one of the main IRT concepts, can be attributed to Leydard Tucker in 1946. Despite these early research efforts, interest in item response theory lay dormant until the late 1960s and took a backseat to the emerging development of strong true score theory and drew the attention of leading psychometricians, the problems and weaknesses inherent in its formulation began to raise concerns. Such problems as the lack of invariance of item parameters across examinee groups, and the inadequacy of classical test procedures to detect item bias or to provide a sound basis for measurement in "tailored testing," gave rise to a resurgence of interest in item response theory. Impetus for the development of item response theory as we now know it was provided by Frederic M. Lord in 1953a, 1953b). The progress in the fifties was painstakingly slow due to the mathematical complexity of the topic and the nonexistence of computer programs.

Item response theory (IRT) is widely used in education and psychology and is expanding its applications to other social science areas, medical research, and business as well. Using R for Item Response Theory Model Applications is a practical guide for students, instructors, practitioners, and applied researchers who want to learn how to properly use R IRT packages to perform IRT model calibrations with their own data. This book provides practical line-by-line descriptions of how to use R IRT packages for various IRT modeling in the book covers almost all models used in practice and in popular research, including: dichotomous response modeling polytomous response modeling mixed format data modeling concurrent multiple group modeling fixed item parameter calibration modelling with latent regression to include person-level covariate(s) simple structure, or between-item, multidimensional modeling cross-loading, or within-item, multidimensional modeling high-dimensional modeling bifactor modeling testlet modeling two-tier model straightforwaid guide to learn how to use R for IRT applications. For more intermediate learners of IRT or users of R, this book will serve as a great time-saving tool for learning how to create the proper syntax, fit the various models, evaluate the models, and interpret the output using popular R IRT packages.

Principles and Applications

Introduction to Item Response Theory Models and Applications

Ordinal Item Response Theory

Review of Literature

Implementation and Validation of an Item Response Theory Scale for Formative Assessment

Item response theory (IRT) has moved beyond the confines of educational measurement into assessment domains such as personality, psychopathology, and patient-reported outcomes. Classic and emerging IRT methods and applications that are revolutionizing psychological measurement, particularly for health assessments used to demonstrate treatment effectiveness, are reviewed in this new volume. World renowned contributors present the latest research and methodologies about these models along with their applications and related challenges. Examples using real data, some from NIH-PROMIS, show how to apply these models in actual research situations. Chapters review fundamental issues of IRT, modern estimation methods, testing assumptions, evaluating fit, item banking, scoring in multidimensional models, and advanced IRT methods. New multidimensional models are provided along with suggestions for deciding among the family of IRT models available. Each chapter provides an introduction, describes state-of-the art research methods, demonstrates an application, and provides a summary. The book addresses the most critical IRT conceptual and statistical issues confronting researchers and advanced students in psychology, education, and medicine today. Although the chapters highlight health outcomes data the issues addressed are relevant to any content domain. The book addresses: IRT models applied to non-educational data especially patient reported outcomes Differences between cognitive and non-cognitive constructs and the challenges these bring to modeling. The application of multidimensional IRT models designed to capture typical performance data. Cutting-edge methods for deriving a single latent dimension from multidimensional data A new model designed for the measurement of constructs that are defined on one end of a continuum such as substance abuse Scoring individuals under different multidimensional IRT models and item banking for patient-reported health outcomes How to evaluate measurement invariance, diagnose problems with response categories, and assess growth and change. Part 1 reviews fundamental topics such as assumption testing, parameter estimation, and the assessment of model and person fit. New, emerging, and classic IRT models including modeling multidimensional data and the use of new IRT models in typical performance measurement contexts are examined in Part 2. Part 3 reviews the major applications of IRT models such as scoring, item banking for patient-reported health outcomes, evaluating measurement invariance, linking scales to a common metric, and measuring growth and change. The book concludes with a look at future IRT applications in health outcomes measurement. The book summarizes the latest advances and critiques foundational topics such a multidimensionality, assessment of fit, handling non-normality, as well as applied topics such as differential item functioning and multidimensional linking. Intended for researchers, advanced students, and practitioners in psychology, education, and medicine interested in applying IRT methods, this book also serves as a text in advanced graduate courses on IRT or measurement. Familiarity with factor analysis, latent variables, IRT, and basic measurement theory is assumed.

This volume provides an introduction to the range of polytomous models available within item response theory. It begins by outlining the distinction between the two major types of polytomous IRT models, then goes on to describe them in detail.

This encyclopedia is the first major reference guide for students new to the field, covering traditional areas while pointing the way to future developments.

Item response theory has become an essential component in the toolkit of every researcher in the behavioral sciences. It provides a powerful means to study individual responses to a variety of stimuli, and the methodology has been extended and developed to cover many different models of interaction. This volume presents a wide-ranging handbook to item response theory - and its applications to educational and psychological testing. It will serve as both an introduction to the subject and also as a comprehensive reference volume for practitioners and researchers. It is organized into six major sections: the nominal categories model, models for response time or multiple attempts on items, models for multiple abilities or cognitive components, nonparametric models, models for nonmonotone items, and models with special assumptions. Each chapter in the book has been written by an expert of that particular topic, and the chapters have been carefully edited to ensure that a uniform style of notation and presentation is used throughout. As a result, all researchers whose work uses item response theory will find this an indispensable companion to their work and it will be the subject's reference volume for many years to come.

Handbook of Modern Item Response Theory

Polytomous Item Response Theory Models

Three Volume Set

Methods and Practices

A Comparison Between Factor Analysis and Item Response Theory Modeling in Scale Analysis

*Measurement in the social sciences often refers to standardized answers to close-ended questions, in which answers are analyzed as if they were measurements on an interval scale. This volume presents a measurement model that maintains the ordinal aspects of the data in order to establish how well the model fits and how it measures subjects and items. It relaxes the most stringent assumptions from parametric item response theory, while maintaining its advantages over classical measurement methods such as reliability and factor analysis. This volume is less technical than other books on the topic and is ideal for introductory courses in social science measurement.*

*By using familiar concepts from classical measurement methods and basic statistics, this book introduces the basics of item response theory (IRT) and explains the application of IRT methods to problems in test construction, identification of potentially biased test items, test equating and computerized-adaptive testing. The book also includes a thorough discussion of alternative procedures for estimating IRT parameters and concludes with an exploration of new directions in IRT research and development.*

*This book focuses on the practical application of statistical techniques for assessing measurement invariance with less emphasis on theoretical development or exposition. Instead, it describes the methods using a pedagogical framework followed by extensive illustrations that demonstrate how to use software to analyze real data. The chapters illustrate the practical methods to assess measurement invariance and shows how to apply them to a range of data. The computer syntax and data sets used in this book are available for download here: [people.umass.edu/cswells](http://people.umass.edu/cswells).*

*This volume introduces social science students and researchers to the theory and practice of the highly powerful methods of nonparametric item response theory (IRT).*

Application to Psychological Measurement

Differential Item Functioning

Models

Mokken Scale Analysis

A Multidisciplinary Reference on Survey, Scale and Test Development

A must-have resource for researchers, practitioners, and advanced students interested or involved in psychometric testing Over the past hundred years, psychometric testing has proved to be a valuable tool for measuring personality, mental ability, attitudes, and much more. The word 'psychometrics' can be translated as 'mental measurement'; however, the implication that psychometrics as a field is confined to psychology is highly misleading. Scientists and practitioners from virtually every conceivable discipline now use and analyze data collected from questionnaires, scales, and tests developed from psychometric principles, and the field is vibrant with new and useful methods and approaches. This handbook brings together contributions from leading psychometricians in a diverse array of fields around the globe. Each provides accessible and practical information about their specialist area in a three-step format covering historical and standard approaches, innovative issues and techniques, and practical guidance on how to apply the methods discussed. Throughout, real-world examples help to illustrate and clarify key aspects of the topics covered. The aim is to fill a gap for information about psychometric testing that is neither too basic nor too technical and specialized, and will enable researchers, practitioners, and graduate students to expand their knowledge and skills in the area. Provides comprehensive coverage of the field of psychometric testing, from designing a test through writing items to constructing and evaluating scales Takes a practical approach, addressing real issues faced by practitioners and researchers Provides basic and accessible mathematical and statistical foundations of all psychometric techniques discussed Provides example software code to help readers implement the analyses discussed Drawing on the work of internationally acclaimed experts in the field, Handbook of Item Response Theory, Volume One: Models presents all major item response models. This first volume in a three-volume set covers many model developments that have occurred in item response theory (IRT) during the last 20 years. It describes models for different response formats or response processes, the need of deeper parameterization due to a multilevel or hierarchical structure of the response data, and other extensions and insights. In Volume One, all chapters have a common format with each chapter focusing on one family of models or modeling approach. An introductory section in every chapter includes some history of the model and a motivation of its relevance. Subsequent sections present the model more formally, treat the estimation of its parameters, show how to evaluate its fit to empirical data, illustrate the use of the model through an empirical example, and discuss further applications and remaining research issues.

This book is open access under a CC BY-NC 2.5 license. This book describes the extensive contributions made toward the advancement of human assessment by scientists from one of the world's leading research institutions, Educational Testing Service. The book's four major sections detail research and development in measurement and statistics, education policy analysis and evaluation, scientific psychology, and validity. Many of the developments presented have become de-facto standards in educational and psychological measurement, including in item response theory (IRT), linking and equating, differential item functioning (DIF), and educational surveys like the National Assessment of Educational Progress (NAEP), the Programme of International Student Assessment (PISA), the Progress of International Reading Literacy Study (PIRLS) and the Trends in Mathematics and Science Study (TIMSS). In addition to its comprehensive coverage of contributions to the theory and methodology of educational and psychological measurement and statistics, the book gives significant attention to ETS work in cognitive, personality, developmental, and social psychology, and to education policy analysis and program evaluation. The chapter authors are long-standing experts who provide broad coverage and thoughtful insights that build upon decades of experience in research and best practices for measurement, evaluation, scientific psychology, and education policy analysis. Opening with a chapter on the genesis of ETS and closing with a synthesis of the enormously diverse set of contributions made over its 70-year history, the book is a useful resource for all interested in the improvement of human assessment.

Methods of detecting item bias developed from a logistic item response theory (IRT) are generalized to analyze the fidelity of foreign language translations of psychological scales. These IRT methods are considered as alternatives to traditional sample dependent methods. Transformed item characteristic curves generated in the original and target languages, rather than item parameters from two languages, are examined for significance of differences. Data from a Spanish translation of the Job Descriptive Index are used to illustrate the method. It is argued that equivalent item characteristic curves across the original and translated items of a scale produce equivalent instruments in both languages, and nonequivalent item characteristic curves pinpoint differences between the two versions of the scale. (Author).

Handbook of Advanced Multilevel Analysis

Introduction to Nonparametric Item Response Theory

Handbook of Item Response Theory

Handbook of Item Response Theory Modeling

*Published in 1980, Applications of Item Response Theory To Practical Testing Problems is a valuable contribution to the field of Education.*

*A complete discussion of fundamental and advanced topics in Item Response Theory written by pioneers in the field. In Item Response Theory, accomplished psychometricians Durrrell Bock and Robert Gibbons deliver a comprehensive and up-to-date exploration of the theoretical foundations and applications of Item Response Theory (IRT). Covering both unidimensional and multidimensional IRT, as well as related adaptive test administration of previously calibrated item banks, the book addresses the growing need for understanding of this topic as the use of IRT spreads to other fields. The first book on the topic that offers a complete and unified treatment of its subject, Item Response Theory prepares researchers and students to understand and apply IRT and multidimensional IRT to fields like education, mental health and marketing. Accessible to first-year-graduate students with a foundation in the behavioral or social sciences, basic statistics, and generalized linear models, the book walks readers through everything from the logic of IRT to cutting edge applications of the technique. Readers will also benefit from the inclusion of: • A thorough introduction to the foundations of Item Response Theory, including its logic and origins, model-based measurement, psychological scaling, and classical test theory • An exploration of selected mathematical and statistical results, including points, test set, and set operations, probability, sampling, and joint, conditional, and marginal probability • Discussions of unidimensional and multidimensional IRT models, including item parameter estimation with binary and polytomous data • Analysis of dimensionality, differential item functioning, and multiple group IRT Perfect for graduate students and researchers studying and working with psychometrics in psychology, quantitative psychology, educational measurement, marketing, and statistics. Item Response Theory will also benefit researchers interested in patient reported outcomes in health research.*

*The measurement theories considered in this book fall into a sub-area of psychometrics. These theories are concerned with the specifications of rules for transforming individuals' responses to items on a psychological test or scale into estimates of the trait assumed to underlie the observable responses. Discussed is a particular class of measurement theories generally called item response theory or latent trait theory. This book is designed for those individuals involved in programs of applied testing and measurement whose efforts occasionally bring them into contact with the law and public policy.*

*This new edition presents an up-to-date description of differential item functioning. It describes varying procedures for addressing DIF in practical testing contexts. The authors present useful examples and studies of DIF that readers may employ as a guide in their own work. They also cover major statistical packages that can be employed in DIF analysis (e.g., SPSS, SAS, M+, Minitab, and Systat). This text is ideal for the measurement professional or advanced student who deals with educational or psychological assessment. Learn more about "The Little Green Book" - QASS Series! Click Here*

*A Course in Item Response Theory and Modeling with Stata*

Applications of Item Response Theory To Practical Testing Problems

Fundamentals of Item Response Theory

The Basics of Item Response Theory Using R

Mixed Item Response Theory Models for Adjusting Response Styles in Cross-cultural Datasets

A best-seller in its First Edition, Scale Development: Theory and Applications, Second Edition has been extensively updated and revised to address changes in the field and topics that have grown in importance since the First Edition. Widely adopted for graduate courses in departments such as Psychology, Public Health, Marketing, Nursing, and Education, this book will prove beneficial to applied researchers across the social sciences. New to the Second Edition are figures and practical tips for students, a new section on face validity (Chapter 4), a substantially expanded presentation of factor analysis (Chapter 6), a new chapter (7) on item response theory (IRT), coverage of qualitative procedures, and issues related to differential item functioning (Chapter 8).

Test Scoring

The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation

Multidimensional Item Response Theory

Scale Development

Polytomous Item Response Theory (IRT) Models and Their Applications in Large-scale Testing Programs