What Are Plausible Values And Why Are They Useful

Winner of the 2016 De Groot Prize from the International Society for Bayesian Analysis Now in its third edition, this classic book is widely considered the leading text on Bayesian methods, lauded for its accessible, practical approach to analyzing data and solving research problems. Bayesian Data Analysis, Third Edition continues to take an applied approach to analysis using up-to-date Bayesian methods. The authors—all leaders in the statistics community—introduce basic concepts from a data-analytic perspective before presenting advanced methods. Throughout the text, numerous worked examples drawn from real applications and research emphasize the use of Bayesian inference in practice. New to the Third Edition Four new chapters on nonparametric modeling Coverage of weakly informative priors and boundary-avoiding priors Updated discussion of cross-validation and predictive information criteria Improved convergence monitoring and effective sample size calculations for iterative simulation Presentations of Hamiltonian Monte Carlo, variational Bayes, and expectation propagation New and revised software code The book can be used in three different ways. For undergraduate students, it introduces Bayesian inference starting from first principles. For graduate students, the text presents effective current approaches to Bayesian modeling and computation in statistics and related fields. For researchers, it provides an assortment of Bayesian methods in applied statistics. Additional materials, including data sets used in the examples, solutions to selected exercises, and software instructions, are available on the book's web page.

This publication provides all the information required to understand the PISA 2003 educational performance database and perform analyses in accordance with the complex methodologies used to collect and process the data. It includes worked examples providing full syntax in SPSS®.

This is the first book to introduce the new statistics - effect sizes, confidence intervals, and meta-analysis - in an accessible way. It is chock full of practical examples and tips on how to analyze and report research results using these techniques. The book is invaluable to readers interested in meeting the new APA Publication Manual guidelines by adopting the new statistics - which are more informative than null hypothesis significance testing, and becoming widely used in many disciplines. Accompanying the book is the Exploratory Software for Confidence Intervals (ESCI) package, free software that runs under Excel and is accessible at www.thenewstatistics.com. The book's exercises use ESCI's simulations, which are highly visual and interactive, to engage users and encourage exploration. Working with the simulations strengthens understanding of key statistical ideas. There are also many examples, and detailed guidance to show readers how to analyze their own data using the new statistics, and practical strategies for interpreting the results. A particular strength of the book is its explanation of meta-analysis, using simple diagrams and examples. Understanding meta-analysis is increasingly important, even at undergraduate levels, because medicine, psychology and many other disciplines now use meta-analysis to assemble the evidence needed for evidence-based practice. The book's pedagogical program, built on cognitive science principles, reinforces learning: Boxes provide "evidence-based" advice on the most effective statistical techniques. Numerous examples reinforce learning, and show that many disciplines are using the new statistics. Graphs are tied in with ESCI to make important concepts vividly clear and memorable. Opening overviews and end of chapter take-home messages summarize key points. Exercises encourage exploration, deep understanding, and practical applications. This highly accessible book is intended as the core text for any course that emphasizes the new statistics, or as a supplementary text for graduate and/or advanced undergraduate courses in statistics and research methods in departments of psychology, education, human development , nursing, and natural, social, and life sciences. Researchers

and practitioners interested in understanding the new statistics, and future published research, will also appreciate this book. A basic familiarity with introductory statistics is assumed.
The richness of art is manifested in contrast: contrast with other works of art, other features of human experience, other times and places, and other forms of judgment and understanding. The possibilities of contrast are inexhaustible. Every being shares this inexhaustibility of openness to novel possibilities, although inexhaustibility is most fully realized in art. The general theory of art and aesthetic value developed in this book is based on the notions of inexhaustibility and contrast and has important forebears in Kant, Coleridge, and Whitehead. The theory allows art to be located relative to otheR spheres of judgment—science, action, and philosophy. The theory allows a new perspective on interpretation and criticism. Ross presents and defines a new synthetic form of understanding works of art that offers an alternative to the skepticism that haunts so many theories of interpretation.
Increased attention is being paid to the need for statistically educated citizens: statistics is now included in the K-12 mathematics curriculum, increasing numbers of students are taking courses in high school, and introductory statistics courses are required in college. However, increasing the amount of instruction is not sufficient to prepare statistically literate citizens. A major change is needed in how statistics is taught. To bring about this change, three dimensions of teacher knowledge need to be addressed: their knowledge of statistical content, their pedagogical knowledge, and their statistical-pedagogical knowledge, i.e., their specific knowledge about how to teach statistics. This book is written for mathematics and statistics educators and researchers. It summarizes the research and highlights the important concepts for teachers to emphasize, and shows the interrelationships among concepts. It makes specific suggestions regarding how to build classroom activities, integrate technological tools, and assess students' learning. This is a unique book. While providing a wealth of examples through lessons and data sets, it is also the best attempt by members of our profession to integrate suggestions from research findings with statistics concepts and pedagogy. The book's message about the importance of listening to research is loud and clear, as is its message about alternative ways of teaching statistics. This book will impact instructors, giving them pause to consider: "Is what I'm doing now really the best thing for my students? What could I do better?" J. Michael Shaughnessy, Professor, Dept of Mathematical Sciences, Portland State University, USA This is a much-needed text for linking research and practice in teaching statistics. The authors have provided a comprehensive overview of the current state-of-the-art in statistics education research. The insights they have gleaned from the literature should be tremendously helpful for those involved in teaching and researching introductory courses. Randall E. Groth, Assistant Professor of Mathematics Education, Salisbury University, USA
The second edition of this popular guide demonstrates the process of entering and analyzing data using the latest version of SPSS (12.0), and is also appropriate for those using earlier versions of SPSS. The book is easy to follow because all procedures are outlined in a step-by-step format designed for the novice user. Students are introduced to the rationale of statistical tests and detailed explanations of results are given through clearly annotated examples of SPSS output. Topics covered range from descriptive statistics through multiple regression analysis. In addition, this guide includes topics not typically covered in other books such as probability theory, interaction effects in analysis of variance, factor analysis, and scale reliability. Chapter exercises reinforce the text examples and may be performed for further practice, for homework assignments, or in computer laboratory sessions. This book can be used in two ways: as a stand-alone manual for students wishing to learn data analysis techniques using SPSS for Windows, or in research and statistics courses to be used with a basic statistics text. The book provides hands-on experience with actual data sets, helps students choose appropriate statistical tests, illustrates the meaning of results, and provides

exercises to be completed for further practice or as homework assignments. Instructions are provided for using the World Wide Web to obtain the data sets to be analyzed. With this guide, students learn how to conduct reasonably sophisticated statistical analyses using SPSS while gaining insight into the nature and purpose of statistical investigation. Susan B. Gerber, Ph.D. is Assistant Professor of Education at State University of New York at Buffalo. She is director of the Educational Technology program and holds degrees in Statistics and Educational Psychology. Kristin Voelkl Finn, Ph.D. is Assistant Professor of Education at Canisius College. She teaches graduate courses in research methodology and conducts research on adolescent problem behavior.

This report supplies details of the design and data analysis of the 1986 National Assessment of Educational Progress (NAEP) to allow the reader to judge the utility of the design, data quality, reasonableness of assumptions, appropriateness of data analyses, and generalizability of inferences made from the data. After an introduction by A. E. Beaton, the following reports are included: (1) "Overview of Part I: The Design and Implementation of the 1986 NAEP" (A. E. Beaton); (2) "Developing the 1986 National Assessment Objectives, Items, and Background Questions" (I. V. S. Mullis, W. MacDonald, and N. A. Mead); (3) "Sample Design" (M. H. Hansen, K. Rust, and J. Burke); (4) "Instrument and Item Information" (J. R. Johnson); (5) "Field Administration" (N. Caldwell and R. Slobasky); (6) "Materials Processing and Database Creation" (J. L. Barone); (7) "Processing Assessment Materials" (A. M. Rogers and N. A. Norris); (8) "Professional Scoring" (A. Campbell); (9) "Data Transcription Systems" (A. M. Rogers); (10) "Editing Data" (A. M. Rogers); (11) "Quality Control of Data Entry" (J. J. Ferris); (12) "Database Creation" (A. M. Rogers); (13) "Public-Use Data Tape Construction" (A. M. Rogers); (14) "Overview of Part II: The Analysis of the 1986 NAEP" (A. E. Beaton); (15) "Scaling Procedures" (R. J. Mislevy); (16) "Reading Data Analysis" (R. Zwick); (17) "Mathematics Data Analysis" (E. G. Johnson); (18) "Science Data Analysis" (K. Yamamoto); (19) "Computer Competence Data Analysis" (N. A. Mead); (20) "History and Literature Data Analysis" (R. Zwick); (21) "Weighting Procedures and Variance Estimation" (E. G. Johnson, J. Burke, J. Braden, M. H. Hansen, J. A. Lago, and B. J. Tepping); and (22) "Statistical Summary of the 1986 NAEP Sample and Estimates of the Proficiencies of American Students" (A. E. Beaton, D. S. Freund, B. A. Kaplan, and M. A. Narcowich). A total of 169 tables and 8 figures illustrate the text. Six appendixes with 116 additional tables provide supplemental information about the research methodology. (Contains 60 references.) (SLD)

The LNAI series reports state-of-the-art results in artificial intelligence research, development, education, at a high level and in both printed and electronic form. Enjoying tight cooperation with the R&D community, with numerous individuals, as well as with prestigious organizations and societies, LNAI has grown into the most comprehensive artificial intelligence research forum available. The scope of LNAI spans the whole range of artificial intelligence and intelligent information processing including interdisciplinary topics in a variety of application fields.

PROBABILITY AND STATISTICS FOR ENGINEERS AND SCIENTISTS, Fourth

Edition, continues the student-oriented approach that has made previous editions successful. As a teacher and researcher at a premier engineering school, author Tony Hayter is in touch with engineers daily--and understands their vocabulary. The result of this familiarity with the professional community is a clear and readable writing style that students understand and appreciate, as well as high-interest, relevant examples and data sets that keep students' attention. A flexible approach to the use of computer tools, including tips for using various software packages, allows instructors to choose the program that best suits their needs. At the same time, substantial computer output (using MINITAB and other programs) gives students the necessary practice in interpreting output. Extensive use of examples and data sets illustrates the importance of statistical data collection and analysis for students in the fields of aerospace, biochemical, civil, electrical, environmental, industrial, mechanical, and textile engineering, as well as for students in physics, chemistry, computing, biology, management, and mathematics. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

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.

With the increased influence of national and international large-scale assessment on educational policy, more secondary data analysts use large-scale surveys to examine their research questions. Large-scale survey institutions employ plausible values methodology, which refers to multiple imputation methods, to

predict population and subpopulation achievement distribution without burdening students with a lengthy test. However, some researchers do not utilize plausible values as recommended by the survey institutions due to difficulties in handling plausible values. There are inconsistent research findings regarding the different short-cut treatments of plausible values, such as using the mean or only one of the plausible values. Specially, it is not completely clear under what conditions and what estimation results would be inaccurate. Therefore, more studies are needed to resolve the inconsistent findings regarding different treatments of plausible values. This study intends to examine the effects of misusing plausible values, and explore whether the effects vary depending on the role of plausible values in the model. Differences between each of the shortcut methods (average or one of the plausible values) and the recommended method were examined with respect to parameter estimates, standard error estimates, confidence intervals, and statistical significance test results by replicating models in two published studies while considering the role of plausible values in the analysis models. Moreover, changes in rank ordering of the PISA 2012 country means due to estimation with these different treatments of plausible values were investigated. Results showed that point estimates were quite robust to the misuses of plausible values when they were dependent variables but standard errors tended to be slightly underestimated even though statistical test results were not affected. When plausible values were used as independent variables, their misuse produced different statistical test result for a parameter. Rank orders for some of the 2012 PISA country means also changed depending on treatment of plausible values. The findings demonstrate that it is safer to use plausible values as recommended by the survey developers when one can. However using shortcut treatments of plausible values could be a viable option under certain conditions such as software limitations and difficulty in implementation given the minor differences in analysis results.

The results from PISA 2015 and TIMSS 2015 were published in November and December 2016. All the Nordic countries participated in PISA. Denmark, Finland, Norway and Sweden participated in TIMSS grade 4 and Norway and Sweden participated in TIMSS grade 8. The Nordic countries have similarities but also differences, which makes it interesting and valuable to carry out analyses in a Nordic perspective. In this report researchers from all the Nordic countries have done in-depth analyses on different policy relevant themes based on the results presented in 2016. The purpose of this report has been to present policy relevant analyses of TIMSS and PISA in a way that is accessible for policy makers on different levels in the Nordic countries, with the aim to contribute to further development in the education area.

Looking Into the Earth comprehensively describes the principles and applications of both 'global' and 'exploration' geophysics on all scales. It forms an introduction to geophysics suitable for those who do not necessarily intend to become professional geophysicists, including geologists, civil engineers, environmental

scientists, and field archaeologists. The book is organised into two parts: Part 1 describes the geophysical methods, while Part 2 illustrates their use in a number of extended case histories. Mathematical and physical principles are introduced at an elementary level, and then developed as necessary. Student questions and exercises are included at the end of each chapter. The book is aimed primarily at introductory and intermediate university students taking courses in geology, earth science, environmental science, and engineering. It will also form an excellent introductory textbook in geophysics departments, and will help practising geologists, archaeologists and engineers understand what geophysics can offer their work.

This first study of the legal history of sex offences in Mandate Palestine pioneers a new socio-cultural perspective on evidence.

The PISA 2000 Technical Report describes the complex methodology underlying PISA 2000, along with additional features related to the implementation of the project at a level of detail that allows researchers to understand and replicate its analyses. It presents information on the test and sample design, methodologies used to analyse the data, technical features of the project and quality control mechanisms.

Consumer Credit and the American Economy examines the economics, behavioral science, sociology, history, institutions, law, and regulation of consumer credit in the United States. After discussing the origins and various kinds of consumer credit available in today's marketplace, this book reviews at some length the long run growth of consumer credit to explore the widely held belief that somehow consumer credit has risen "too fast for too long." It then turns to demand and supply with chapters discussing neoclassical theories of demand, new behavioral economics, and evidence on production costs and why consumer credit might seem expensive compared to some other kinds of credit like government finance. This discussion includes review of the economics of risk management and funding sources, as well discussion of the economic theory of why some people might be limited in their credit search, the phenomenon of credit rationing. This examination includes review of issues of risk management through mathematical methods of borrower screening known as credit scoring and financial market sources of funding for offerings of consumer credit. The book then discusses technological change in credit granting. It examines how modern automated information systems called credit reporting agencies, or more popularly "credit bureaus," reduce the costs of information acquisition and permit greater credit availability at less cost. This discussion is followed by examination of the logical offspring of technology, the ubiquitous credit card that permits consumers access to both payments and credit services worldwide virtually instantly. After a chapter on institutions that have arisen to supply credit to individuals for whom mainstream credit is often unavailable, including "payday loans" and other small dollar sources of loans, discussion turns to legal structure and the regulation of consumer credit. There are separate chapters on the

theories behind the two main thrusts of federal regulation to this point, fairness for all and financial disclosure. Following these chapters, there is another on state regulation that has long focused on marketplace access and pricing. Before a final concluding chapter, another chapter focuses on two noncredit marketplace products that are closely related to credit. The first of them, debt protection including credit insurance and other forms of credit protection, is economically a complement. The second product, consumer leasing, is a substitute for credit use in many situations, especially involving acquisition of automobiles. This chapter is followed by a full review of consumer bankruptcy, what happens in the worst of cases when consumers find themselves unable to repay their loans. Because of the importance of consumer credit in consumers' financial affairs, the intended audience includes anyone interested in these issues, not only specialists who spend much of their time focused on them. For this reason, the authors have carefully avoided academic jargon and the mathematics that is the modern language of economics. It also examines the psychological, sociological, historical, and especially legal traditions that go into fully understanding what has led to the demand for consumer credit and to what the markets and institutions that provide these products have become today.

This first edition focuses on probability and the Bayesian viewpoint. It presents basic material on probability and then introduces inference by means of Bayes' rule. The emphasis is on statistical thinking and how one learns from data. The objective is to present the basic tenets of statistical inference. Unique in its format, the text allows students to discover statistical concepts, explore statistical principles, and apply statistical techniques. In addition to the numerous activities and exercises around which the text is built, the book includes a basic text exposition for each topic, and data appendices.

This publication includes detailed information on how to analyse the PISA data, enabling researchers to both reproduce the initial results and to undertake further analyses.

The Effect of Plausible Values on Large-scale Assessment Analysis when Used Incorrectly

This proceedings volume highlights the latest research and developments in psychometrics and statistics. This book compiles and expands on selected and peer reviewed presentations given at the 83rd Annual International Meeting of the Psychometric Society (IMPS), organized by Columbia University and held in New York, USA July 9th to 13th, 2018. The IMPS is one of the largest international meetings on quantitative measurement in education, psychology and the social sciences. The last couple of years it has attracted more than 500 participants and more than 250 paper presentations from researchers around the world. Leading experts in the world and promising young researchers have written the 38 chapters. The chapters address a large variety of topics including but not limited to item response theory, multistage adaptive testing, and cognitive diagnostic models. This volume is the 7th in a series of recent volumes to cover research presented at the IMPS.

Technological and statistical advances, along with a strong interest in gathering more

information about the state of our educational systems, have made it possible to assess more students, in more countries, more often, and in more subject domains. The Handbook of International Large-Scale Assessment: Background, Technical Issues, and Methods of Data Analysis brings together recognized scholars in the field of ILSA, behavioral statistics, and policy to develop a detailed guide that goes beyond database user manuals. After highlighting the importance of ILSA data to policy and research, the book reviews methodological aspects and features of the studies based on operational considerations, analytics, and reporting. The book then describes methods of interest to advanced graduate students, researchers, and policy analysts who have a good grounding in quantitative methods, but who are not necessarily quantitative methodologists. In addition, it provides a detailed exposition of the technical details behind these assessments, including the test design, the sampling framework, and estimation methods, with a focus on how these issues impact analysis choices.
Essential Statistics, Regression, and Econometrics, Second Edition, is innovative in its focus on preparing students for regression/econometrics, and in its extended emphasis on statistical reasoning, real data, pitfalls in data analysis, and modeling issues. This book is uncommonly approachable and easy to use, with extensive word problems that emphasize intuition and understanding. Too many students mistakenly believe that statistics courses are too abstract, mathematical, and tedious to be useful or interesting. To demonstrate the power, elegance, and even beauty of statistical reasoning, this book provides hundreds of new and updated interesting and relevant examples, and discusses not only the uses but also the abuses of statistics. The examples are drawn from many areas to show that statistical reasoning is not an irrelevant abstraction, but an important part of everyday life. Includes hundreds of updated and new, real-world examples to engage students in the meaning and impact of statistics Focuses on essential information to enable students to develop their own statistical reasoning Ideal for one-quarter or one-semester courses taught in economics, business, finance, politics, sociology, and psychology departments, as well as in law and medical schools Accompanied by an ancillary website with an instructors solutions manual, student solutions manual and supplementing chapters
This book is a valuable read for a diverse group of researchers and practitioners who analyze assessment data and construct test instruments. It focuses on the use of classical test theory (CTT) and item response theory (IRT), which are often required in the fields of psychology (e.g. for measuring psychological traits), health (e.g. for measuring the severity of disorders), and education (e.g. for measuring student performance), and makes these analytical tools accessible to a broader audience. Having taught assessment subjects to students from diverse backgrounds for a number of years, the three authors have a wealth of experience in presenting educational measurement topics, in-depth concepts and applications in an accessible format. As such, the book addresses the needs of readers who use CTT and IRT in their work but do not necessarily have an extensive mathematical background. The book also sheds light on common misconceptions in applying measurement models, and presents an integrated approach to different measurement methods, such as contrasting CTT with IRT and multidimensional IRT models with unidimensional IRT models. Wherever possible, comparisons between models are explicitly made. In addition, the book discusses concepts for test equating and differential item functioning, as well as

Bayesian IRT models and plausible values using simple examples. This book can serve as a textbook for introductory courses on educational measurement, as supplementary reading for advanced courses, or as a valuable reference guide for researchers interested in analyzing student assessment data.

The National Assessment of Educational Progress (NAEP), known as the nation's report card, has chronicled students' academic achievement in America for over a quarter of a century. It has been a valued source of information about students' performance, providing the best available trend data on the academic achievement of elementary, middle, and secondary school students in key subject areas. NAEP's prominence and the important need for stable and accurate measures of academic achievement call for evaluation of the program and an analysis of the extent to which its results are reasonable, valid, and informative to the public. This volume of papers considers the use and application of NAEP. It provides technical background to the recently published book, Grading the Nation's Report Card: Evaluating NAEP and Transforming the Assessment of Educational Progress (NRC, 1999), with papers on four key topics: NAEP's assessment development, content validity, design and use, and more broadly, the design of education indicator systems.

This book is a follow-up to the IChemE symposium on ?Neural Networks and Other Learning Technologies?, held at Imperial College, UK, in May 1999. The interest shown by the participants, especially those from the industry, has been instrumental in producing the book. The papers have been written by contributors of the symposium and experts in this field from around the world. They present all the important aspects of neural network utilisation as well as show the versatility of neural networks in various aspects of process engineering problems ? modelling, estimation, control, optimisation and industrial applications.

This book evolved from lectures, courses and workshops on missing data and small-area estimation that I presented during my tenure as the ?rst C- pion Fellow (2000–2002). For the Fellowship I proposed these two topics as areas in which the academic statistics could contribute to the development of government statistics, in exchange for access to the operational details and background that would inform the direction and sharpen the focus of a- demic research. After a few years of involvement, I have come to realise that the separation of ‘academic’ and ‘industrial’ statistics is not well suited to either party, and their integration is the key to progress in both branches. Most of the work on this monograph was done while I was a visiting l- turer at Massey University, Palmerston North, New Zealand. The hospitality and stimulating academic environment of their Institute of Information S- ence and Technology is gratefully acknowledged. I could not name all those who commented on my lecture notes and on the presentations themselves; apart from them, I want to thank the organisers and silent attendees of all the events, and, with a modicum of reluctance, the ‘grey ?gures’ who kept inquiring whether I was any nearer the completion of whatever stage I had been foolish enough to attach a date.

The book brings together experts working in public health and multi-disciplinary areas to present recent issues in statistical methodological development and their applications. This timely book will impact model development and data analyses of public health research across a wide spectrum of analysis. Data and software used in the studies are available for the reader to replicate the models and outcomes. The

fifteen chapters range in focus from techniques for dealing with missing data with Bayesian estimation, health surveillance and population definition and implications in applied latent class analysis, to multiple comparison and meta-analysis in public health data. Researchers in biomedical and public health research will find this book to be a useful reference and it can be used in graduate level classes.

This volume offers insights from modelling measures of parental involvement and their relationship with student reading literacy across countries, exploring and incorporating cultural differences. This is a significant contribution to a field where cross-cultural comparisons from a triangulated perspective are sparse. For readers interested in exploring the relationship between parental involvement and student attainment, the literature review provides a useful starting point. Meanwhile, for the more methodologically interested reader, this report presents state-of-the-art ways to identify and model cultural differential item functioning in international large-scale assessment (ILSA), illustrating the extent to which the parental involvement construct may be influenced by cultural differences and how this may affect the outcomes of cross-cultural comparisons. The framework is generic and should provide a solid foundation for future ILSA practices and secondary analyses. ILSA studies like the IEA’s Progress in International Reading Literacy Study (PIRLS) provide valuable data, containing both student achievement data and contextual background data from schools, teachers, students and parents for over 41 countries.

This paper examines three alternative approaches that have been proposed for analysing data that include substantial measurement error components in a dependent variable - in this case student ' abilities' that are derived from a set of item responses. given that many analytical contexts in educational research are hierarchical and require the use of multilevel regression models the authors consider the approaches in the contexts of both ordinary (or single level) regression and multilevel regression.

Missing data pose challenges to real-life data analysis. Simple ad-hoc fixes, like deletion or mean imputation, only work under highly restrictive conditions, which are often not met in practice. Multiple imputation replaces each missing value by multiple plausible values. The variability between these replacements reflects our ignorance of the true (but missing) value. Each of the completed data set is then analyzed by standard methods, and the results are pooled to obtain unbiased estimates with correct confidence intervals. Multiple imputation is a general approach that also inspires novel solutions to old problems by reformulating the task at hand as a missing-data problem.

This is the second edition of a popular book on multiple imputation, focused on explaining the application of methods through detailed worked examples using the MICE package as developed by the author. This new edition incorporates the recent developments in this fast-moving field. This class-tested book avoids mathematical and technical details as much as possible: formulas are accompanied by verbal statements that explain the formula in accessible terms. The book sharpens the reader’s intuition on how to think about missing data, and provides all the tools needed to execute a well-grounded quantitative analysis in the presence of missing data.