Bayesian Semiparametric Structural Equation Models With

This volume presents a collection of chapters focused on the study of multivariate change. As people develop and change, multivariate measurement of that change and analysis of those measures can illuminate the regularities in the trajectories of individual development, as well as time-dependent changes in population averages. As longitudinal data have recently become much more prevalent in psychology and the social sciences, models of change have become increasingly important. This collection focuses on methodological, statistical, and modeling aspects of multivariate change and applications of longitudinal models to the study of psychological processes. The volume is divided into three major sections: Extension of latent change models, Measurement and testing issues in longitudinal modeling, and Novel applications of multivariate longitudinal methodology. It is intended for advanced students and researchers interested in learning about state-of-the-art techniques for longitudinal data analysis, as well as understanding the history and development of such techniques.

This book unifies and extends latent variable models, including multilevel or generalized linear mixed models, longitudinal or panel models, item response or factor models, latent class or finite mixture models, and structural equation models. Following a gentle introduction to latent variable modeling, the authors clearly explain and contrast a wide range of estimation and prediction methods from biostatistics, psychometrics, econometrics, and statistics. They present exciting and realistic applications that demonstrate how researchers can use latent variable modeling to solve concrete problems in areas as diverse as medicine, economics, and psychology. The examples considered include many nonstandard response types, such as ordinal, nominal, count, and survival data. Joint modeling of mixed responses, such as survival and longitudinal data, is also illustrated. Numerous displays, figures, and graphs make the text vivid and easy to read. About the authors: Anders Skrondal is Professor and Chair in Social Statistics, Department of Statistics, London School of Economics, UK Sophia Rabe-Hesketh is a Professor of Educational Statistics at the Graduate School of Education and Graduate Group in Biostatistics, University of California, Berkeley, USA.

A comprehensive source on mixed data analysis, Analysis of Mixed Data: Methods & Applications summarizes the fundamental developments in the field. Case studies are used extensively throughout the book to illustrate interesting applications from economics, medicine and health, marketing, and genetics. Carefully edited for smooth readability and seamless transitions between chapters All chapters follow a common structure, with an introduction and a concluding summary, and include illustrative examples from real-life case studies in developmental toxicology, economics, medicine and health, marketing, and genetics An introductory chapter provides a "wide angle" introductory overview and comprehensive survey of mixed data analysis Blending theory and
methodology, this book illustrates concepts via data from different disciplines. Analysis of Mixed Data: Methods & Applications traces important developments, collates basic results, presents terminology and methodologies, and gives an overview of statistical research applications. It is a valuable resource to methodologically interested as well as subject matter-motivated researchers in many disciplines.

Bayesian methods combine the evidence from the data at hand with previous quantitative knowledge to analyse practical problems in a wide range of areas. The calculations were previously complex, but it is now possible to routinely apply Bayesian methods due to advances in computing technology and the use of new sampling methods for estimating parameters. Such developments together with the availability of freeware such as WINBUGS and R have facilitated a rapid growth in the use of Bayesian methods, allowing their application in many scientific disciplines, including applied statistics, public health research, medical science, the social sciences and economics. Following the success of the first edition, this reworked and updated book provides an accessible approach to Bayesian computing and analysis, with an emphasis on the principles of prior selection, identification and the interpretation of real data sets. The second edition: Provides an integrated presentation of theory, examples, applications and computer algorithms. Discusses the role of Markov Chain Monte Carlo methods in computing and estimation. Includes a wide range of interdisciplinary applications, and a large selection of worked examples from the health and social sciences. Features a comprehensive range of methodologies and modelling techniques, and examines model fitting in practice using Bayesian principles. Provides exercises designed to help reinforce the reader’s knowledge and a supplementary website containing data sets and relevant programs. Bayesian Statistical Modelling is ideal for researchers in applied statistics, medical science, public health and the social sciences, who will benefit greatly from the examples and applications featured. The book will also appeal to graduate students of applied statistics, data analysis and Bayesian methods, and will provide a great source of reference for both researchers and students. Praise for the First Edition: “It is a remarkable achievement to have carried out such a range of analysis on such a range of data sets. I found this book comprehensive and stimulating, and was thoroughly impressed with both the depth and the range of the discussions it contains.” – ISI - Short Book Reviews “This is an excellent introductory book on Bayesian modelling techniques and data analysis” – Biometrics “The book fills an important niche in the statistical literature and should be a very valuable resource for students and professionals who are utilizing Bayesian methods.” – Journal of Mathematical Psychology

The use of Markov chain Monte Carlo (MCMC) methods for estimating hierarchical models involves complex data structures and is often described as a revolutionary development. An intermediate-level treatment of Bayesian
hierarchical models and their applications, Applied Bayesian Hierarchical
Methods demonstrates the advantages of a Bayesian approach to data sets
involving inferences for collections of related units or variables and in methods
where parameters can be treated as random collections. Emphasizing
computational issues, the book provides examples of the following application
settings: meta-analysis, data structured in space or time, multilevel and
longitudinal data, multivariate data, nonlinear regression, and survival time data.
For the worked examples, the text mainly employs the WinBUGS package,
allowing readers to explore alternative likelihood assumptions, regression
structures, and assumptions on prior densities. It also incorporates BayesX code,
which is particularly useful in nonlinear regression. To demonstrate MCMC
sampling from first principles, the author includes worked examples using the R
package. Through illustrative data analysis and attention to statistical computing,
this book focuses on the practical implementation of Bayesian hierarchical
methods. It also discusses several issues that arise when applying Bayesian
techniques in hierarchical and random effects models.
Selected from the conference "S.Co.2009: Complex Data Modeling and
Computationally Intensive Methods for Estimation and Prediction," these 20
papers cover the latest in statistical methods and computational techniques for
complex and high dimensional datasets.
***Winner of the 2008 Ziegel Prize for outstanding new book of the year***
Structural equation modeling (SEM) is a powerful multivariate method allowing
the evaluation of a series of simultaneous hypotheses about the impacts of latent
and manifest variables on other variables, taking measurement errors into
account. As SEMs have grown in popularity in recent years, new models and
statistical methods have been developed for more accurate analysis of more
complex data. A Bayesian approach to SEMs allows the use of prior information
resulting in improved parameter estimates, latent variable estimates, and
statistics for model comparison, as well as offering more reliable results for
smaller samples. Structural Equation Modeling introduces the Bayesian approach
to SEMs, including the selection of prior distributions and data augmentation, and
offers an overview of the subject's recent advances. Demonstrates how to utilize
powerful statistical computing tools, including the Gibbs sampler, the Metropolis-
Hasting algorithm, bridge sampling and path sampling to obtain the Bayesian
results. Discusses the Bayes factor and Deviance Information Criterion (DIC) for
model comparison. Includes coverage of complex models, including SEMs with
ordered categorical variables, and dichotomous variables, nonlinear SEMs, two-
level SEMs, multisample SEMs, mixtures of SEMs, SEMs with missing data,
SEM with variables from an exponential family of distributions, and some of their
combinations. Illustrates the methodology through simulation studies and
examples with real data from business management, education, psychology,
public health and sociology. Demonstrates the application of the freely available
software WinBUGS via a supplementary website featuring computer code and
data sets. Structural Equation Modeling: A Bayesian Approach is a multi-
disciplinary text ideal for researchers and students in many areas, including:
statistics, biostatistics, business, education, medicine, psychology, public health
and social science.
Comprehensive and multidisciplinary coverage of fundamental and advanced
statistical tools and issues relevant to long-term ecological monitoring.
The Encyclopedia of Health Economics offers students, researchers and policymakers
objective and detailed empirical analysis and clear reviews of current theories and
policies. It helps practitioners such as health care managers and planners by providing
accessible overviews into the broad field of health economics, including the economics
of designing health service finance and delivery and the economics of public and
population health. This encyclopedia provides an organized overview of this diverse
field, providing one trusted source for up-to-date research and analysis of this highly
charged and fast-moving subject area. Features research-driven articles that are
objective, better-crafted, and more detailed than is currently available in journals and
handbooks Combines insights and scholarship across the breadth of health economics,
where theory and empirical work increasingly come from non-economists Provides
overviews of key policies, theories and programs in easy-to-understand language
This Handbook covers latent variable models, which are a flexible class of models for
modeling multivariate data to explore relationships among observed and latent
variables. - Covers a wide class of important models - Models and statistical methods
described provide tools for analyzing a wide spectrum of complicated data - Includes
illustrative examples with real data sets from business, education, medicine, public
health and sociology. - Demonstrates the use of a wide variety of statistical,
computational, and mathematical techniques.
Statistical power analysis has revolutionized the ways in which we conduct and
evaluate research. Similar developments in the statistical analysis of incomplete
(missing) data are gaining more widespread applications. This volume brings statistical
power and incomplete data together under a common framework, in a way that is
readily accessible to those with only an introductory familiarity with structural equation
modeling. It answers many practical questions such as: How missing data affects the
statistical power in a study How much power is likely with different amounts and types
of missing data How to increase the power of a design in the presence of missing data,
and How to identify the most powerful design in the presence of missing data. Points of
Reflection encourage readers to stop and test their understanding of the material. Try
Me sections test one’s ability to apply the material. Troubleshooting Tips help to
prevent commonly encountered problems. Exercises reinforce content and Additional
Readings provide sources for delving more deeply into selected topics. Numerous
eamples demonstrate the book’s application to a variety of disciplines. Each issue is
accompanied by its potential strengths and shortcomings and examples using a variety
of software packages (SAS, SPSS, Stata, LISREL, AMOS, and MPlus). Syntax is
provided using a single software program to promote continuity but in each case,
parallel syntax using the other packages is presented in appendixes. Routines, data
sets, syntax files, and links to student versions of software packages are found at
www.psypress.com/davey. The worked examples in Part 2 also provide results from a
wider set of estimated models. These tables, and accompanying syntax, can be used to
estimate statistical power or required sample size for similar problems under a wide range of conditions. Class-tested at Temple, Virginia Tech, and Miami University of Ohio, this brief text is an ideal supplement for graduate courses in applied statistics, statistics II, intermediate or advanced statistics, experimental design, structural equation modeling, power analysis, and research methods taught in departments of psychology, human development, education, sociology, nursing, social work, gerontology and other social and health sciences. The book’s applied approach will also appeal to researchers in these areas. Sections covering Fundamentals, Applications, and Extensions are designed to take readers from first steps to mastery. This book offers researchers a systematic and accessible introduction to using a Bayesian framework in structural equation modeling (SEM). Stand-alone chapters on each SEM model clearly explain the Bayesian form of the model and walk the reader through implementation. Engaging worked-through examples from diverse social science subfields illustrate the various modeling techniques, highlighting statistical or estimation problems that are likely to arise and describing potential solutions. For each model, instructions are provided for writing up findings for publication, including annotated sample data analysis plans and results sections. Other user-friendly features in every chapter include "Major Take-Home Points," notation glossaries, annotated suggestions for further reading, and sample code in both Mplus and R. The companion website (www.guilford.com/depaoli-materials) supplies datasets; annotated code for implementation in both Mplus and R, so that users can work within their preferred platform; and output for all of the book’s examples.

Basic and Advanced Bayesian Structural Equation ModelingWith Applications in the Medical and Behavioral SciencesJohn Wiley & Sons

Containing selected papers from the ICRESH-ARMS 2015 conference in Lulea, Sweden, collected by editors with years of experiences in Reliability and maintenance modeling, risk assessment, and asset management, this work maximizes reader insights into the current trends in Reliability, Availability, Maintainability and Safety (RAMS) and Risk Management. Featuring a comprehensive analysis of the significance of the role of RAMS and Risk Management in the decision making process during the various phases of design, operation, maintenance, asset management and productivity in Industrial domains, these proceedings discuss key issues and challenges in the operation, maintenance and risk management of complex engineering systems and will serve as a valuable resource for those in the field.

Provides an accessible foundation to Bayesian analysis using real world models This book aims to present an introduction to Bayesian modelling and computation, by considering real case studies drawn from diverse fields spanning ecology, health, genetics and finance. Each chapter comprises a description of the problem, the corresponding model, the computational method, results and inferences as well as the issues that arise in the implementation of these approaches. Case Studies in Bayesian Statistical Modelling and Analysis: Illustrates how to do Bayesian analysis in a clear and concise manner using real-world problems. Each chapter focuses on a real-world problem and describes the way in which the problem may be analysed using Bayesian methods. Features approaches that can be used in a wide area of application, such as, health, the environment, genetics, information science, medicine, biology, industry and remote sensing. Case Studies in Bayesian Statistical Modelling
and Analysis is aimed at statisticians, researchers and practitioners who have some expertise in statistical modeling and analysis, and some understanding of the basics of Bayesian statistics, but little experience in its application. Graduate students of statistics and biostatistics will also find this book beneficial.

High dimensional data are more common nowadays, because the collection of such data becomes larger and more complex due to the technology advance of the computer science, biology, etc. The analysis of high dimensional data is different from traditional data analysis, and variable selection for high dimensional data becomes very challenging. Structural equation modeling (SEM) analyzes the relationship between manifest variables and latent variables. The structural equation focuses on analyzing the relationship between latent variables. New proposed methods of these topics are discussed in the dissertation. In the first chapter, we review the basic concept of survival analysis, SEM, and current method of variable selection in those two scenarios. We also introduce the available software package for current methods and relevant data set. In the second chapter, we develop a Bayesian kernel machine model with incorporating existing information on pathways and gene networks in the analysis of DNA microarray data. Each pathway is modeled nonparametrically using reproducing kernel Hilbert space. The pathways and the genes are selected via assigning mixture priors on the pathway indicator variable and the gene indicator variable. This approach helped us in flexible modeling of the pathway effects, which can capture both linear and non-linear effect. Moreover, the model can also pinpoint the important pathways and the important active genes within each pathway. We have also developed an efficient Markov Chain Monte Carlo (MCMC) algorithm to fit our model. We used simulations and a real data analysis, [van ‘t Veer et al., 2002] breast cancer microarray data, to illustrate the proposed method. In the third chapter, we extend the idea of semiparametric structural equation model where the nonlinear functional relationships are approximated using basis expansions [Guo et al., 2012]. Many basis expansion methods, including cubic splines, are known to induce correlations. In this chapter we compare standard Lasso, Fused Lasso and Elastic Net to account for correlations in both the covariate and basis expansions. To illustrate the usefulness of the proposed methods, a simulation study and a real data study have been performed. The semiparametric structural equation models based on Bayesian fused Lasso and Bayesian elastic-net outperform the Bayesian Lasso model. In the fourth chapter, we apply Bayesian Graph Laplacian Model, developed by [Liu et al., 2014] and generalized the graph Laplacian allowing both positively and negatively correlated variable, to analyze gene expression data from Michigan prostate cancer study [Dhanasekaran et al., 2001]. We find out the underlying gene network and interaction related to prostate cancer and discuss the possible extensions for Bayesian Graph Laplacian Model, including analyzing multiple pathways simultaneously and pathways selection, right censored data as response variable and binomial or multinomial data as response variable.

This book is meant as a guide for implementing Bayesian methods for latent variable models. I have included thorough examples in each chapter, highlighting problems that can arise during estimation, potential solutions, and guides for how to write up findings for a journal article. This book is structured into 12 main chapters, beginning with introductory chapters comprising Part I. Part II is comprised of Chapters 3-5. Each of these chapters deals with various models and techniques related to measurement models within SEM. Part III contains Chapters 6-7, on
extending the structural model. Part IV contains Chapters 8-10, on longitudinal and mixture models. Finally, Part IV contains chapters that discuss special topics."

With the availability of software programs, such as LISREL, EQS, and AMOS, modeling (SEM) techniques have become a popular tool for formalized presentation of the hypothesized relationships underlying correlational research and test for the plausibility of hypothesizing for a particular data set. Through the use of careful narrative explanation, Maruyama's text describes the logic underlying SEM approaches, describes how SEM approaches relate to techniques like regression and factor analysis, analyzes the strengths and shortcomings of SEM as compared to alternative methodologies, and explores the various methodologies for analyzing structural equation data. In addition, Maruyama provides carefully constructed exercises both within and Drawing from the authors' own work and from the most recent developments in the field,

Missing Data in Longitudinal Studies: Strategies for Bayesian Modeling and Sensitivity Analysis describes a comprehensive Bayesian approach for drawing inference from incomplete data in longitudinal studies. To illustrate these methods, the authors employ several data sets throughout that cover a range of study designs, variable types, and missing data issues. The book first reviews modern approaches to formulate and interpret regression models for longitudinal data. It then discusses key ideas in Bayesian inference, including specifying prior distributions, computing posterior distribution, and assessing model fit. The book carefully describes the assumptions needed to make inferences about a full-data distribution from incompletely observed data. For settings with ignorable dropout, it emphasizes the importance of covariance models for inference about the mean while for nonignorable dropout, the book studies a variety of models in detail. It concludes with three case studies that highlight important features of the Bayesian approach for handling nonignorable missingness. With suggestions for further reading at the end of most chapters as well as many applications to the health sciences, this resource offers a unified Bayesian approach to handle missing data in longitudinal studies.

The first comprehensive structural equation modeling (SEM) handbook, this accessible volume presents both the mechanics of SEM and specific SEM strategies and applications. The editor, contributors, and editorial advisory board are leading methodologists who have organized the book to move from simpler material to more statistically complex modeling approaches. Sections cover the foundations of SEM; statistical underpinnings, from assumptions to model modifications; steps in implementation, from data preparation through writing the SEM report; and basic and advanced applications, including new and emerging topics in SEM. Each chapter provides conceptually oriented descriptions, fully explicated analyses, and engaging examples that reveal modeling possibilities for use with readers' data. Many of the chapters also include access to data and syntax files at the companion website, allowing readers to try their hands at reproducing the authors' results.

This book provides clear instructions to researchers on how to apply Structural Equation Models (SEMs) for analyzing the inter relationships between observed and latent variables. Basic and Advanced Bayesian Structural Equation Modeling introduces basic and advanced SEMs for analyzing various kinds of complex data, such as ordered and unordered categorical data, multilevel data, mixture data, longitudinal data, highly non-normal data, as well as some of their combinations. In addition, Bayesian semiparametric SEMs to capture the true distribution of explanatory latent variables are introduced, whilst SEM with a nonparametric structural equation to assess unspecified functional relationships among latent variables are also explored. Statistical methodologies are developed using the Bayesian approach giving reliable results for small samples and allowing the use of prior information leading to better statistical results. Estimates of the parameters and model comparison statistics are obtained via powerful Markov Chain Monte Carlo methods in statistical computing. Introduces the
Bayesian approach to SEMs, including discussion on the selection of prior distributions, and data augmentation. Demonstrates how to utilize the recent powerful tools in statistical computing including, but not limited to, the Gibbs sampler, the Metropolis-Hasting algorithm, and path sampling for producing various statistical results such as Bayesian estimates and Bayesian model comparison statistics in the analysis of basic and advanced SEMs. Discusses the Bayes factor, Deviance Information Criterion (DIC), and $L_\nu$-measure for Bayesian model comparison. Introduces a number of important generalizations of SEMs, including multilevel and mixture SEMs, latent curve models and longitudinal SEMs, semiparametric SEMs and those with various types of discrete data, and nonparametric structural equations. Illustrates how to use the freely available software WinBUGS to produce the results. Provides numerous real examples for illustrating the theoretical concepts and computational procedures that are presented throughout the book. Researchers and advanced level students in statistics, biostatistics, public health, business, education, psychology and social science will benefit from this book.

This book is an introduction to the mathematical analysis of Bayesian decision-making when the state of the problem is unknown but further data about it can be obtained. The objective of such analysis is to determine the optimal decision or solution that is logically consistent with the preferences of the decision-maker, that can be analyzed using numerical utilities or criteria with the probabilities assigned to the possible state of the problem, such that these probabilities are updated by gathering new information.

This book presents both theoretical contributions and empirical applications of advanced statistical techniques including geo-additive models that link individual measures with area variables to account for spatial correlation; multilevel models that address the issue of clustering within family and household; multi-process models that account for interdependencies over life-course events and non-random utilization of health services; and flexible parametric alternatives to existing intensity models. These analytical techniques are illustrated mainly through modeling maternal and child health in the African context, using data from demographic and health surveys. In the past, the estimation of levels, trends and differentials in demographic and health outcomes in developing countries was heavily reliant on indirect methods that were devised to suit limited or deficient data. In recent decades, worldwide surveys like the World Fertility Survey and its successor, the Demographic and Health Survey have played an important role in filling the gap in survey data from developing countries. Such modern demographic and health surveys enable investigators to make in-depth analyses that guide policy intervention strategies, and such analyses require the modern and advanced statistical techniques covered in this book. The text is ideally suited for academics, professionals, and decision makers in the social and health sciences, as well as others with an interest in statistical modelling, demographic and health surveys. Scientists and students in applied statistics, epidemiology, medicine, social and behavioural sciences will find it of value.

Issues in Psychology and Psychiatry Research and Practice: 2012 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Psychology. The editors have built Issues in Psychology and Psychiatry Research and Practice: 2012 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Psychology in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in Psychology and Psychiatry Research and Practice: 2012 Edition has been produced by the world’s leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is
A reference guide for applications of SEM using Mplus Structural Equation Modeling: Applications Using Mplus is intended as both a teaching resource and a reference guide. Written in non-mathematical terms, this book focuses on the conceptual and practical aspects of Structural Equation Modeling (SEM). Basic concepts and examples of various SEM models are demonstrated along with recently developed advanced methods, such as mixture modeling and model-based power analysis and sample size estimate for SEM. The statistical modeling program, Mplus, is also featured and provides researchers with a flexible tool to analyze their data with an easy-to-use interface and graphical displays of data and analysis results. Key features: Presents a useful reference guide for applications of SEM whilst systematically demonstrating various advanced SEM models, such as multi-group and mixture models using Mplus. Discusses and demonstrates various SEM models using both cross-sectional and longitudinal data with both continuous and categorical outcomes. Provides step-by-step instructions of model specification and estimation, as well as detail interpretation of Mplus results. Explores different methods for sample size estimate and statistical power analysis for SEM. By following the examples provided in this book, readers will be able to build their own SEM models using Mplus. Teachers, graduate students, and researchers in social sciences and health studies will also benefit from this book. This book outlines Bayesian statistical analysis in great detail, from the development of a model through the process of making statistical inference. The key feature of this book is that it covers models that are most commonly used in social science research - including the linear regression model, generalized linear models, hierarchical models, and multivariate regression models - and it thoroughly develops each real-data example in painstaking detail.

This comprehensive resource reviews structural equation modeling (SEM) strategies for longitudinal data to help readers see which modeling options are available for which hypotheses. The author demonstrates how SEM is related to other longitudinal data techniques throughout. By exploring connections between models, readers gain a better understanding of when to choose one analysis over another. The book explores basic models to sophisticated ones including the statistical and conceptual underpinnings that are the building blocks of the analyses. Accessibly written, research examples from the behavioral and social sciences and results interpretations are provided throughout. The emphasis is on concepts and practical guidance for applied research rather than on mathematical proofs. New terms are highlighted and defined in the glossary. Figures are included for every model along with detailed discussions of model specification and implementation issues. Each chapter also includes examples of each model type, comment sections that provide practical guidance, model extensions, and recommended readings. Highlights include: Covers the major SEM approaches to longitudinal analysis in one resource. Explores connections between longitudinal SEM models to enhance integration. Numerous examples that help readers match research questions to appropriate analyses and interpret results. Reviews practical issues related to model specification and estimation to reinforce connections. Analyzes continuous and discrete (binary and ordinal) variables throughout for breadth not found in other sources. Reviews key SEM concepts for those who need a refresher (Ch. 1). Emphasizes how to apply and interpret each model through realistic data examples.
Provides the book’s data sets at www.longitudinalsem.com along with the Mplus and R-lavaan syntax used to generate the results. Introduces the LISREL notation system used throughout (Appendix A). The chapters can be read out of order but it is best to read chapters 1 – 4 first because most of the later chapters refer back to them. The book opens with a review of latent variables and analysis of binary and ordinal variables. Chapter 2 applies this information to assessing longitudinal measurement invariance. SEM tests of dependent means and proportions over time points are explored in Chapter 3, and stability and change, difference scores, and lagged regression are covered in Chapter 4. The remaining chapters are each devoted to one major type of longitudinal SEM -- repeated measures analysis models, full cross-lagged panel models and simplex models, modeling stability with state-trait models, linear and nonlinear growth curve models, latent difference score models, latent transition analysis, time series analysis, survival analysis, and attrition. Missing data is discussed in the context of many of the preceding models in Chapter 13. Ideal for graduate courses on longitudinal (data) analysis, advanced SEM, longitudinal SEM, and/or advanced data (quantitative) analysis taught in the behavioral, social, and health sciences, this text also appeals to researchers in these fields. Intended for those without an extensive math background, prerequisites include familiarity with basic SEM. Matrix algebra is avoided in all but a few places.

Issues in Bioengineering and Bioinformatics: 2013 Edition is a ScholarlyEditions™ book that delivers timely, authoritative, and comprehensive information about Lifetime Data Analysis. The editors have built Issues in Bioengineering and Bioinformatics: 2013 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Lifetime Data Analysis in this book to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in Bioengineering and Bioinformatics: 2013 Edition has been produced by the world’s leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at http://www.ScholarlyEditions.com/.

This volume presents advanced techniques to modeling markets, with a wide spectrum of topics, including advanced individual demand models, time series analysis, state space models, spatial models, structural models, mediation, models that specify competition and diffusion models. It is intended as a follow-on and companion to Modeling Markets (2015), in which the authors presented the basics of modeling markets along the classical steps of the model building process: specification, data collection, estimation, validation and implementation. This volume builds on the concepts presented in Modeling Markets with an emphasis on advanced methods that are used to specify, estimate and validate marketing models, including structural equation models, partial least squares, mixture models, and hidden Markov models, as well as generalized methods of moments, Bayesian analysis, non/semi-parametric estimation and endogeneity issues. Specific attention is given to big data. The market environment is changing rapidly and constantly. Models that provide information about the sensitivity of market behavior to marketing activities such as advertising, pricing, promotions and distribution are now routinely used by managers for the identification of
changes in marketing programs that can improve brand performance. In today’s environment of information overload, the challenge is to make sense of the data that is being provided globally, in real time, from thousands of sources. Although marketing models are now widely accepted, the quality of the marketing decisions is critically dependent upon the quality of the models on which those decisions are based. This volume provides an authoritative and comprehensive review, with each chapter including: · an introduction to the method/methodology · a numerical example/application in marketing · references to other marketing applications · suggestions about software. Featuring contributions from top authors in the field, this volume will explore current and future aspects of modeling markets, providing relevant and timely research and techniques to scientists, researchers, students, academics and practitioners in marketing, management and economics.

A Single Cohesive Framework of Tools and Procedures for Psychometrics and Assessment Bayesian Psychometric Modeling presents a unified Bayesian approach across traditionally separate families of psychometric models. It shows that Bayesian techniques, as alternatives to conventional approaches, offer distinct and profound advantages in achieving many goals of psychometrics. Adopting a Bayesian approach can aid in unifying seemingly disparate—and sometimes conflicting—ideas and activities in psychometrics. This book explains both how to perform psychometrics using Bayesian methods and why many of the activities in psychometrics align with Bayesian thinking. The first part of the book introduces foundational principles and statistical models, including conceptual issues, normal distribution models, Markov chain Monte Carlo estimation, and regression. Focusing more directly on psychometrics, the second part covers popular psychometric models, including classical test theory, factor analysis, item response theory, latent class analysis, and Bayesian networks. Throughout the book, procedures are illustrated using examples primarily from educational assessments. A supplementary website provides the datasets, WinBUGS code, R code, and Netica files used in the examples.

This book unifies and extends latent variable models, including multilevel or generalized linear mixed models, longitudinal or panel models, item response or factor models, latent class or finite mixture models, and structural equation models. Following a gentle introduction to latent variable modeling, the authors clearly explain and contrast a wi

"Comprising more than 500 entries, the Encyclopedia of Research Design explains how to make decisions about research design, undertake research projects in an ethical manner, interpret and draw valid inferences from data, and evaluate experiment design strategies and results. Two additional features carry this encyclopedia far above other works in the field: bibliographic entries devoted to significant articles in the history of research design and reviews of contemporary tools, such as software and statistical procedures, used to analyze results. It covers the spectrum of research design strategies, from material presented in introductory classes to topics necessary in graduate research; it addresses cross- and multidisciplinary research needs, with many examples drawn from the social and behavioral sciences, neurosciences, and biomedical and life sciences; it provides summaries of advantages and disadvantages of often-used strategies; and it uses hundreds of sample tables, figures, and equations based on real-life cases."--Publisher's description.

An effective technique for data analysis in the social sciences The recent explosion in
longitudinal data in the social sciences highlights the need for this timely publication. Latent Curve Models: A Structural Equation Perspective provides an effective technique to analyze latent curve models (LCMs). This type of data features random intercepts and slopes that permit each case in a sample to have a different trajectory over time. Furthermore, researchers can include variables to predict the parameters governing these trajectories. The authors synthesize a vast amount of research and findings, at the same time, provide original results. The book analyzes LCMs from the perspective of structural equation models (SEMs) with latent variables. While the authors discuss simple regression-based procedures that are useful in the early stages of LCMs, most of the presentation uses SEMs as a driving tool. This cutting-edge work includes some of the authors’ recent work on the autoregressive latent trajectory model, suggests new models for method factors in multiple indicators, discusses repeated latent variable models, and establishes the identification of a variety of LCMs. This text has been thoroughly class-tested and makes extensive use of pedagogical tools to aid readers in mastering and applying LCMs quickly and easily to their own data sets. Key features include: Chapter introductions and summaries that provide a quick overview of highlights Empirical examples provided throughout that allow readers to test their newly found knowledge and discover practical applications Conclusions at the end of each chapter that stress the essential points that readers need to understand for advancement to more sophisticated topics Extensive footnoting that points the way to the primary literature for more information on particular topics With its emphasis on modeling and the use of numerous examples, this is an excellent book for graduate courses in latent trajectory models as well as a supplemental text for courses in structural modeling. This book is an excellent aid and reference for researchers in quantitative social and behavioral sciences who need to analyze longitudinal data. This textbook describes the broadening methodology spectrum of psychological measurement in order to meet the statistical needs of a modern psychologist. The way statistics is used, and maybe even perceived, in psychology has drastically changed over the last few years; computationally as well as methodologically. R has taken the field of psychology by storm, to the point that it can now safely be considered the lingua franca for statistical data analysis in psychology. The goal of this book is to give the reader a starting point when analyzing data using a particular method, including advanced versions, and to hopefully motivate him or her to delve deeper into additional literature on the method. Beginning with one of the oldest psychometric model formulations, the true score model, Mair devotes the early chapters to exploring confirmatory factor analysis, modern test theory, and a sequence of multivariate exploratory method. Subsequent chapters present special techniques useful for modern psychological applications including correlation networks, sophisticated parametric clustering techniques, longitudinal measurements on a single participant, and functional magnetic resonance imaging (fMRI) data. In addition to using real-life data sets to demonstrate each method, the book also reports each method in three parts—first describing when and why to apply it, then how to compute the method in R, and finally how to present, visualize, and interpret the results. Requiring a basic knowledge of statistical methods and R software, but written in a casual tone, this text is ideal for graduate students in psychology. Relevant courses include methods of scaling, latent variable modeling, psychometrics for graduate students in Psychology, and multivariate
methods in the social sciences.
Partial least squares structural equation modelling (PLS-SEM) is becoming a popular statistical framework in many fields and disciplines of the social sciences. The main reason for this popularity is that PLS-SEM can be used to estimate models including latent variables, observed variables, or a combination of these. The popularity of PLS-SEM is predicted to increase even more as a result of the development of new and more robust estimation approaches, such as consistent PLS-SEM. The traditional and modern estimation methods for PLS-SEM are now readily facilitated by both open-source and commercial software packages. This book presents PLS-SEM as a useful practical statistical toolbox that can be used for estimating many different types of research models. In so doing, the authors provide the necessary technical prerequisites and theoretical treatment of various aspects of PLS-SEM prior to practical applications. What makes the book unique is the fact that it thoroughly explains and extensively uses comprehensive Stata (plssem) and R (cSEM and plspm) packages for carrying out PLS-SEM analysis. The book aims to help the reader understand the mechanics behind PLS-SEM as well as performing it for publication purposes. Features: Intuitive and technical explanations of PLS-SEM methods Complete explanations of Stata and R packages Lots of example applications of the methodology Detailed interpretation of software output Reporting of a PLS-SEM study Github repository for supplementary book material The book is primarily aimed at researchers and graduate students from statistics, social science, psychology, and other disciplines. Technical details have been moved from the main body of the text into appendices, but it would be useful if the reader has a solid background in linear regression analysis.

The papers in this book cover issues related to the development of novel statistical models for the analysis of data. They offer solutions for relevant problems in statistical data analysis and contain the explicit derivation of the proposed models as well as their implementation. The book assembles the selected and refereed proceedings of the biannual conference of the Italian Classification and Data Analysis Group (CLADAG), a section of the Italian Statistical Society.

Although many books currently available describe statistical models and methods for analyzing longitudinal data, they do not highlight connections between various research threads in the statistical literature. Responding to this void, Longitudinal Data Analysis provides a clear, comprehensive, and unified overview of state-of-the-art theory and applications. It also focuses on the assorted challenges that arise in analyzing longitudinal data. After discussing historical aspects, leading researchers explore four broad themes: parametric modeling, nonparametric and semiparametric methods, joint models, and incomplete data. Each of these sections begins with an introductory chapter that provides useful background material and a broad outline to set the stage for subsequent chapters. Rather than focus on a narrowly defined topic, chapters integrate important research discussions from the statistical literature. They seamlessly blend theory with applications and include examples and case studies from various disciplines. Destined to become a landmark publication in the field, this carefully edited collection emphasizes statistical models and methods likely to endure in the future. Whether involved in the development of statistical methodology or the analysis of longitudinal data, readers will gain new perspectives on the field.

By focusing primarily on the application of structural equation modeling (SEM)
techniques in example cases and situations, this book provides an understanding and working knowledge of advanced SEM techniques with a minimum of mathematical derivations. The book was written for a broad audience crossing many disciplines, assumes an understanding of graduate level multivariate statistics, including an introduction to SEM.

This book reviews and develops Bayesian non-parametric and semi-parametric methods for applications in microeconometrics and quantitative marketing. Most econometric models used in microeconomics and marketing applications involve arbitrary distributional assumptions. As more data becomes available, a natural desire to provide methods that relax these assumptions arises. Peter Rossi advocates a Bayesian approach in which specific distributional assumptions are replaced with more flexible distributions based on mixtures of normals. The Bayesian approach can use either a large but fixed number of normal components in the mixture or an infinite number bounded only by the sample size. By using flexible distributional approximations instead of fixed parametric models, the Bayesian approach can reap the advantages of an efficient method that models all of the structure in the data while retaining desirable smoothing properties. Non-Bayesian non-parametric methods often require additional ad hoc rules to avoid "overfitting," in which resulting density approximates are nonsmooth. With proper priors, the Bayesian approach largely avoids overfitting, while retaining flexibility. This book provides methods for assessing informative priors that require only simple data normalizations. The book also applies the mixture of the normals approximation method to a number of important models in microeconometrics and marketing, including the non-parametric and semi-parametric regression models, instrumental variables problems, and models of heterogeneity. In addition, the author has written a free online software package in R, "bayesm," which implements all of the non-parametric models discussed in the book.

Sponsored by the American Educational Research Association’s Special Interest Group for Educational Statisticians This volume is the second edition of Hancock and Mueller’s highly-successful 2006 volume, with all of the original chapters updated as well as four new chapters. The second edition, like the first, is intended to serve as a didactically-oriented resource for graduate students and research professionals, covering a broad range of advanced topics often not discussed in introductory courses on structural equation modeling (SEM). Such topics are important in furthering the understanding of foundations and assumptions underlying SEM as well as in exploring SEM, as a potential tool to address new types of research questions that might not have arisen during a first course. Chapters focus on the clear explanation and application of topics, rather than on analytical derivations, and contain materials from popular SEM software.

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