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Don't let the title of this exceptional, accessible, and very practical volume mislead you- while it does use examples primarily from the field of education, it is for anyone in the behavioral and social sciences interested in modeling multi-level and clustered data, not just for those interested in educational contexts and settings.

Following an overall general sequence of modeling, interpretation and analysis, the thirteen chapters cover multi-level growth curve modeling; multi-level logistic regression with ordinal and dichotomous variables; multi-level cross classified random effects; multi-level meta-analysis; and multi-level measurement models for analyzing nested psychometric data. Multi-level models to estimate school effects and the use of national educational datasets in multi-level research and training are covered in detail as well.

#### About the Authors

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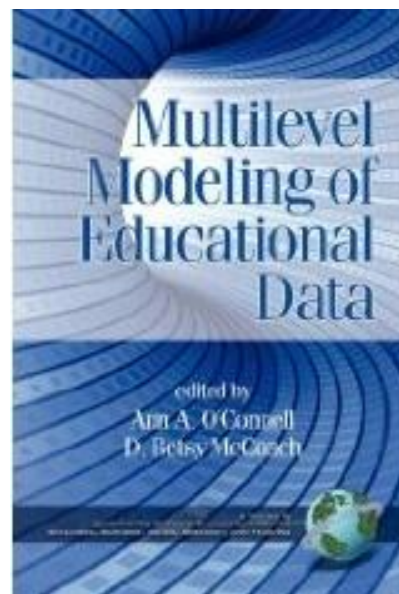
This book is a compendium of basic and advanced multi-level modeling techniques, and as such it should appeal to anyone interested in learning these techniques or teaching them, as well as those interested in mastering, extending or improving their current usage of multi-level analyses. The volume also delves into important but often under-emphasized areas of multi-level analysis: evaluating model fit and adequacy; determining the power, appropriate sample size and experimental design of a multi-level analysis; reporting results from multi-level analyses; using multi-level software options; and a very clear explanation of the estimation procedures used in hierarchical linear models.

The editors are passionate teachers (as a former student of both editors, I can attest to their zeal and skill in the classroom) and respected and meticulous researchers, all of which are reflected in this volume. It is eminently pragmatic and didactic, and the chapters make liberal use of checklists, diagrams, actual software program output, screen shots, and programming syntax from different multi-level modeling software programs. The individual chapter authors provide interpretations and explanations of the program output, and the chapters abound with examples, datasets, and appendices. The book also links to datasets on the publisher's website

([http://www.infoagepub.com/products/content/files/serlinfiles\\_multilevel](http://www.infoagepub.com/products/content/files/serlinfiles_multilevel)), further encouraging readers to reinforce their learning with practice and application. The overall result is a well integrated book, yet with each chapter able to stand on its own.

The volume would make a useful reference and how-to guide for current and aspiring multi-level analysts, and at the same time is well suited as a supplemental text for a graduate level multi-level modeling course. The book employs consistent and clearly defined mathematical notation throughout, and the chapters invariably begin with a brief introduction and overview to bring readers up to speed on the topic before plunging into greater detail on the practice and application of the particular chapter topic.

As the editors note in their introduction, "Hierarchies abound. Once you start to view the world through a multilevel lens, the importance of context or place ... becomes apparent in nearly every human setting." With this in mind, and in keeping with their stated goal "...to provide a comprehensive and



**Ann A. O'Connell**

instructional resource text...” the editors have assembled an impressive array of authors experienced in multi-level research and teaching to provide a comprehensive and understandable overview of multi-level modeling. A quick search on Google Scholar for the terms *hierarchical linear modeling* or *multi-level modeling* produced fewer than 200 citations for the year 1995, and more than 2,000 for the year 2008 on the topic. This rapid growth of multi-level analyses indicates how timely this book is and the extent to which the research community agrees with the editors’ views on the importance and applicability of multi-level modeling.

The volume has four sections: design context for multi-level models, planning and evaluating multi-level models, extending the multi-level framework, and mastering the technique. The first section has an overview of basic multi-level modeling issues. The initial chapter explains why multi-level data that is not statistically independent (e.g., grouped, clustered, nested, or hierarchical) can and should be modeled by multi-level analyses. Chapter 2 discusses the use of national survey databases from the National Center for Education Statistics and sampling frameworks, and goes into detail with three publicly available national datasets. Chapter 3 provides an example of multi-level modeling and school effects research situated within the larger context of general organizational effects research. Chapter 4 provides descriptions and contrasts of three classes of growth models: multi-level growth models, latent growth curve models, and growth mixture models. Chapter 5 covers cross-classified models, where data are contained within two or more linked hierarchies at the same time. Chapter 6 details how to deal with nested data where the outcome variable(s) is not continuous and normally distributed (e.g., binary and ordinal outcomes).

Chapter 7, in the planning and evaluating multi-level models section, explores the assessment of model adequacy, including model fit and the ability of predictors to explain outcome scores. Chapter 8 gives an overview of statistical power in a multi-level framework and discusses how to plan studies with adequate power to detect treatment effects using Optimal Design software. While the author uses experimental situations where the treatment is assigned at random to clusters as examples, the approach is applicable to observational and quasi-experimental designs.



**Betsy McCoach**

Chapter 9, in the section on extending the multi-level framework, conceptualizes meta-analytic data hierarchically, as subjects nested within the studies included in the meta-analysis. Chapter 10 expands the multi-level modeling framework to psychometric measurement modeling (e.g., classical or item response theory tests). Multi-level measurement modeling for continuous variables using hierarchical linear models, for dichotomously scored test variables using hierarchical generalized linear models, and incorporating covariates and interaction effects into measurement models are discussed. The authors include a demonstration of multi-level structural equation modeling, and a discussion of the limitations of the hierarchical linear and general linear models.

The final section, mastering the technique, has three chapters covering those areas that often receive too little attention: presenting multi-level results, the options for the essential software that makes multi-level modeling possible for the average researcher, and an explanation of the parameter estimation approaches used in multi-level modeling.

This book is a volume in the series *Quantitative Methods in Education and the Behavioral Sciences: Issues, Research, and Teaching*, series editor, Ronald C. Serlin, University of Wisconsin – Madison. The series is sponsored by the American Educational Research Association's Special Interest Group - Educational Statisticians (Ed-Stat SIG), and (according to the Information Age Publishing website) aims “to present selected topics in a technically sophisticated, yet didactically oriented format.” The volumes in the series are intended for the quantitative methods course sequences typically taught in graduate behavioral science programs, and are meant to encompass both teaching and applied research perspectives, with some of the royalties from the sale of series' volumes to be used to support graduate student participation in conference activities.

The editors and authors have succeeded in honoring the series' intention, producing a practical “how to book” that, at the same time, provides a solid grounding in the theory and research methodology of multi-level modeling. Anyone who uses this book should come away better able to teach about or perform

multi-level analysis. There is one recommendation for future editions: the inclusion of an overall book index, if at all possible. This would make this highly useable book even more helpful.

### **About the Reviewer**

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