

Quantitative Methods and Evaluation (QME)

James H. Steiger

Department of Psychology and Human Development
Vanderbilt University

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The Quantitative Methods and Evaluation (QME) Area

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Introduction

The Quantitative Methods and Evaluation (QME) Area at Vanderbilt is a dynamic, multifaceted area that supports a wide variety of teaching and research functions.

In what follows, I'll briefly describe the structure of our course offerings, our teaching philosophy, and several major areas of research that our members engage in.

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Most incoming students will take the following *required* basic sequence:

- Psychology 310 (Statistical Inference) in Fall 2011
- Psychology 311 (Experimental Design / ANOVA) in Spring 2012

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- There are huge differences in statistical background and sophistication within any incoming graduate student cohort
- The “finished product” is what counts
- Some students will/should exempt or delay Psychology 310 (and/or 311)
- Decision should be made in collaboration with Professor Steiger and your advisor/supervisor
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Advanced Courses

QME currently offers a wide variety of courses on a rotating basis, including:

- **Multivariate Analysis**
- Structural Equation Modeling
- Psychological Measurement
- Item Response Theory I
- Item Response Theory II
- Advanced Latent Variable Models
- Correlation and Regression
- Multilevel Regression Models
- Introductory Longitudinal Methods
- Advanced Longitudinal Models
- Factor Analysis
- Exploratory Data Analysis
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General Orientation

Which courses you take will depend, of course, on your particular needs and interests.

Our orientation is generally “open book and results-oriented.” In keeping with that point of view, we are now building many of our courses around the freeware statistical system R. For example, in Psychology 310 we have open-book, open-note exams and allow students to use R to perform computations, even during exams.

We even encourage students to develop their own software libraries and we allow students to use their libraries on exams. (Note: This policy is open to adjustment, depending on the course instructor’s preferences.)

Research in Quantitative Methods and Evaluation

- There are several distinct subareas within the QME Area
- Even well-defined subdivisions have considerable “cross-talk”
- Research is active and ongoing

Naturally Occurring Change

Emphasis is on longitudinal designs and statistical approaches to modeling developmental phenomena.

Example (Recent Research Topics)

- Application of hierarchical linear and nonlinear models to assess change in psychiatric and educational settings
- Identifying individual differences in patterns of change over time
- Precursors and predictors of antisocial behavior
- Studying the development of mathematical talent over time

Instigated Change

Our focus on the analysis of instigated change (e.g., the effects of policies, programs, interventions) highlights the development and use of state-of-the-art experimental and quasi-experimental field methods.

Example (Recent Research Topics)

- Experimental and quasi-experimental evaluations of changes in systems of mental health care children and adolescent
- Multi-site experimental evaluation of interventions to assist homeless substance abusers
- Policy-driven meta-analysis of welfare-to-work experiments, examining the relative effects of alternative models, context, and implementation levels

Research in Quantitative Methods

Our focus here is on the development of innovative new methods for analyzing change, as well as basic research on the effectiveness of methods that are already available. This research combines Monte Carlo simulation, meta-analysis, and new developments in statistical theory. Our goal is to foster a continuous improvement in social science methods.

Example (Recent Research Topics)

- Evaluation of specific structural equation models for analyzing change
- Confidence interval methods for evaluating the fit of structural equation models
- Confidence intervals as a replacement for traditional hypothesis tests in ANOVA
- Methods for testing complex hypotheses on correlations

Core Faculty

- On the next few slides, I'll briefly introduce our current full-time faculty in QME.
- My account of each individual will be selective and brief. Each faculty member has a web page, and you will discover that it would require an entire lecture to describe the accomplishments of some of these individuals.
- I should also mention that our ranks will grow again next year, when we will be joined by the very distinguished quantitative developmental psychologist, Professor Joe L. Rodgers.

Core Faculty



- *David Lubinski.* David is Co-Director of QME and also, with Dean Camilla Benbow, co-directs the very ambitious and important SMPY (Study of Mathematically Precocious Youth).
- This longitudinal study is tracking the progress of youths identified as mathematically gifted at a very early age, and is constantly in the news because of its important findings.
- David also teaches a highly-regarded course in measurement. Many students would consider this material a prerequisite for fully understanding the strengths and weaknesses of measures used in their research.

Core Faculty



- *Sun-Joo Cho.* Sun-Joo is a world-class expert in latent variable modeling and item response theory.
- Any student whose research might require them to develop their own measure(s) should plan on taking Sun-Joo's highly rated course sequence in item response theory.
- Sun-Joo recently received an award from the NCME (National Council of Measurement in Education) Award for an innovative Application of Educational Measurement Technology in her article on *Latent transition analysis with a mixture IRT measurement model.*

Core Faculty



- *Sonya Sterba*. Sonya is an expert on models and methods for analyzing longitudinal data. Students in developmental and clinical science will find her work especially useful and interesting. Sonya has also done some interesting recent research on item parceling in factor analysis.
- Sonya recently received the Tanaka award from the Society of Multivariate Experimental Psychology for having the best article in last year's *Multivariate Behavioral Research*.

Core Faculty



- *Andy Tomarken.* Besides serving as Chair of the Psychology Department, Andy has taught several important courses, including our first year course in experimental design and analysis of variance, and a course in categorical data analysis.
- Andy brings a very deep mathematical *perspective* and insight to his research and teaching, and has published influential work on practical and conceptual issues in ANOVA and structural equation modeling.

Core Faculty



- *David Cole.* David is a clinical psychologist with longstanding interests in the developmental progression of psychopathology, especially in adolescent populations.
- He is also a top-flight quantitative psychologist who has published a number of interesting articles on structural equation modeling.
- Besides being an outstanding researcher, David is much beloved as a teacher and advisor, and was recently presented a special award for his graduate teaching and mentorship.
- Oh — and, in his spare time, David is Chair of Psychology and Human Development.

Core Faculty



- *Len Bickman.* Len is a multiple award-winning scientist with primary interests in the evaluation of large scale mental health initiatives.
- Len's list of prizes and awards is longer than some CVs I've seen.
- Go to his faculty page and spend an hour or so reviewing his accomplishments. I couldn't begin to summarize them here.

Core Faculty



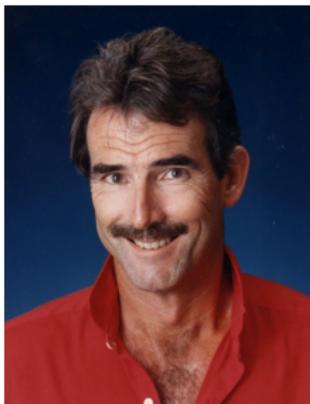
- *David Cordray.* David has performed an immense service in Peabody College by initiating the Expert Program, a large-scale training grant program that supports the education of a “next generation” of educational researchers with special skills in research methods.
- David also is involved in several research projects that investigate the evaluation of the effectiveness of experimental manipulations.

Core Faculty



- *Kris Preacher.* Kris is a multiple award-winning young researcher in quantitative methods who has just joined our faculty from the University of Kansas.
- He's been honored as the outstanding young researcher in his field by both APA Division 5 (Anastasi Award) *and* the Society of Multivariate Experimental Psychology (Cattell Award).
- Kris has very broad interests within the quantitative field, and has implemented a number of his methods in statistical software.

Core Faculty



- *Jim Steiger.* Jim started off in clinical and cognitive psychology. Early in his career, he switched over to “hard core” research in quantitative methods.
- In 2007, Jim received the Samuel J. Messick lifetime achievement award from APA Divison 5 for his work in statistics and measurement.
- A few years prior to that, he received the Killam Research Prize and the Cattell Award for his early career achievements in basic research on multivariate methods.

Summary

The QME area serves multiple functions in the department

- We offer service courses and a wide (and growing) range of advanced courses
- We consult and collaborate with our faculty
- We do research in a variety of areas

Welcome!

Welcome to Vanderbilt!!

We look forward to getting to know you and working with you
in the future!