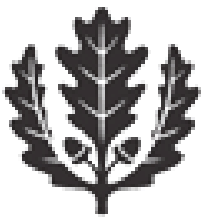
Modern Modeling Methods Conference

May 22 - 23, 2012



University of Connecticut

Neag School of Education

2012 Modern Modeling Methods Conference

University of Connecticut

Sponsored by the ***Educational Psychology Department*** and the ***Neag School of Education***, University of Connecticut

Special thanks to Dr. Del Siegle, the chair of the Educational Psychology department, and Dr. Thomas DeFranco, Dean of the Neag School of Education.

In addition, many thanks to Joanne Roberge, Cheryl Lowe, Sarah Newton, Kate Copeland, and conference services for providing administrative and logistical support for the conference.

Also, thank you to all of the keynote speakers and concurrent presenters for making this wonderful program possible.

Finally, thank you to all of the 2012 Modern Modeling Methods conference attendees for coming and being a part of the second annual M^3 conference! I hope to see you all back in Storrs on May 21-22, 2013 for the third annual Modern Modeling Methods conference. Proposals for concurrent sessions will be due January 25, 2013, and can be submitted online at our website, www.modeling.uconn.edu.

D. Betsy McCoach, Ph.D.
2012 Chair, Modern Modeling Methods Conference
Associate Professor, Measurement, Evaluation, and Assessment Program
Educational Psychology Department, Neag School of Education, UCONN

Monday, May 21st: Pre-conference Workshop

An Introduction to Multiple Imputation

Ofer Harel
University of Connecticut

8:00 - 9:00 am	Coffee and Registration	**CB - East Entrance**
9:00 - 10:30 am	Lecture	**CB 206**
10:30 - 10:45 am	Break	**CB - East Entrance**
10:45 - 12:15 pm	Lecture	**CB 206**
12:15 - 1:45 pm	Lunch (on your own)	
1:45 - 3:15 pm	Lecture	**CB 206**
3:15 - 3:30 pm	Break	**CB - East Entrance**
3:30 - 4:30 pm	Lecture	**CB 206**
4:30 – 5:00 pm	Questions and Answers	**CB206**

Ofer Harel, Ph.D., is an associate professor in the Department of Statistics, the Center for Public Health and Health Policy (CPHHP) and a Principal investigator (PI) at the Center for Health, Intervention, and Prevention (CHIP) at the University of Connecticut. Dr. Harel received his doctorate in statistics in 2003 from the Pennsylvania State University; where he developed his methodological expertise in the areas of missing data techniques, diagnostic tests, longitudinal studies, Bayesian methods, sampling techniques, mixture models, latent class analysis and statistical consulting. Dr. Harel received his post-doctoral training at the University of Washington, Department of Biostatistics, where he worked for the HSR&D Center of Excellence VA Puget Sound Healthcare System and the National Alzheimer's Coordinating Center (NACC). Dr. Harel has served as a biostatistical consultant nationally and internationally since 1997. Dr. Harel was part of numerous federal grants as PI, Co-PI and Biostatistician. Through his work, Dr. Harel has been involved with a variety of research fields including, but not limited to HIV prevention, Alzheimer's, diabetes, and alcohol and drug abuse prevention. As a part of Dr. Harel's consulting research as well as in his role of Associate Professor, he has supervised several undergraduate and graduate students.

Monday, May 21st: Pre-conference Workshop

Analysis of Longitudinal Social Network Data Using RSiena

Tom Snijders
University of Oxford

8:00 - 9:00 am	Coffee and Registration	**CB - East Entrance**
9:00 - 10:30 am	Lecture	**CB 102**
10:30 - 10:45 am	Break	**CB - East Entrance**
10:45 - 12:15 pm	Lecture	**CB 102**
12:15 - 1:30 pm	Lunch (on your own)	
1:30 - 3:15 pm	Lecture	**CB 102**
3:15 - 3:30 pm	Break	**CB - East Entrance**
3:30 - 5:00 pm	Lecture	**CB 102**

Tom A. B. Snijders, Ph. D., earned his doctorate in Mathematics in 1979 from the University of Groningen, where he remains a Professor of Methodology and Statistics, working in the Department of Sociology and in the Interuniversity Center for Social Science Theory and Methodology (ICS). He is also a Professor, with appointments in the in the Department of Statistics and the Department of Politics and International Relations at the University of Oxford. In 2005, Dr. Snijders received an honorary doctorate in the Social Sciences from the University of Stockholm. His main interests are in applied statistics for the social and behavioral sciences; and mathematical modeling in the social sciences, with a special focus on social networks and rational choice models, social network analysis, multi-level research, item response theory, and mathematical sociology; and the development of data analysis methods that reflect as much as possible the theoretical insights into the phenomenon under study. A major aspect of this work is the development of new statistical methods for social science applications, often in combination with the development of computer software to implement these methods. Dr. Snijders is the lead author of Multilevel Analysis: An Introduction to Basic and Advanced Multilevel Modeling, and he has developed several specialized statistical computer programs, including Siena, (Simulation Investigation for Empirical Network Analysis), a methodology for analyzing longitudinal social network data implemented in the R package RSiena.

Tuesday, May 22nd

8:00 – 9:00 am	Continental Breakfast and Registration	**CB - East Entrance**
9:00 – 10:15 am	Keynote Address: **Donald Rubin, Ph.D.**	**CB 102**
10:15 – 10:30 am	Break	**CB - East Entrance**
10:30 – 12:00 pm	**CONCURRENT SESSION #1**	
	Ofer Harel, Chantal Larose, Ashok Chaurasia, Valerie Pare, & Jen Boyko: New Developments in the Analysis of Incomplete Data	**CB 202**
	Combined Session A **David A. Kenny & Thomas Ledermann:** Hidden Distinguishability **Randi Garcia, David A. Kenny, & Thomas Ledermann:** Moderation in the Actor-Partner Interdependence Model **Thomas Ledermann & David A. Kenny:** The Common Fate Model for Dyadic Data: Variations of a Theoretically Important but Underutilized Model	**CB 205**
	Combined Session B **Arnond Sakworawich, Han Hui Por, David V. Budescu, & Alina Von Davier:** Improving Model Selection of Log-Linear Models for Fitting Discrete Distributions **Samuel Iddi & Geert Molenberghs:** A Marginalized Multilevel Model With Overdispersion **Shan Hu, Nalini Ravishanker, John N. Ivan, & James Mooradian:** Dynamic Generalized Linear Model with Application to Highway Crash Counts	**CB 206**
	Combined Session C **Anne M. Fairlie, Kristina M. Jackson, Theodore A. Walls, & Mark D. Wood:** Longitudinal Trajectories, Polynomial Functions, and Measurement Timing **Mariya Shiyko, Jack Burkhalter, Runze Li, & Bernard Park:** Modeling Time-Varying Effects of a Treatment: Applications of the Time-Varying Effect Model **Rafael R. Ramirez:** Hierarchical Cross-classified Linear Models and a Mechanism Based Approach to the Identification of Age-Period-Cohort Analysis Models	**CB 301**

	Combined Session D **Holmes Finch & Brian French:** Modeling of Nonrecursive Structural Equation Models with Categorical Indicators **Njal Folnes:** Choosing Product Indicators for Latent Interactions Under the Unconstrained Approach **Francois Gelineau & Pierre-Olivier Bedard:** Simulation-based Estimation of Conditional Probabilities and Counterfactuals in SEM: Programming in Mplus and Empirical Applications **Terrence D. Jorgensen:** Simulation Study of Posterior Predictive p Values in a Bayesian Confirmatory Factor Analysis	**CB 302**
	Combined Session T **Emil Coman, Itzhak Yanovitsky, Maria Coman, & Margaret R. Weeks:** Understanding Propensity Score Matching Through a More Flexible Causal Modeling Alternative: Mixture and Multilevel Causal Modeling of True Effects **Robert E. Larzelere, Ronald B. Cox, Jr., & Sada Knowles:** Robustness of Causally Relevant Evidence Across Residualized and Simple Gain Scores **Steven Kramer, Lorraine Bernotsky, Jeff Osgood, & Edward Wolff:** Prejudicial vs. Non-prejudicial Response Bias in Quasi-experiments: When is (and isn't) Non-ignorable Survey Response Bias a Threat to Internal Validity? **Walter L. Leite, Francisco Jimenez, Yasemin Kaya, Robert Sandbach, & Jann MacInnes:** A Comparison of Propensity Score Methods for the Estimation of Treatment Effects with Multilevel Observational Data	**CB 305**
12:00 – 1:30 pm	Lunch	**SU Ballroom**
1:30 – 3:00 pm	**CONCURRENT SESSION #2**	
	Combined Session E **Michael Hallquist:** MplusAutomation: An R package for Enhancing Latent Variable Modeling Using Mplus **Yves Rosseel:** Lavaan: An R Package for Structural Equation Modeling	**CB 202**
	Combined Session F **Christian Geiser & Ginger Lockhart:** Accounting for Method Effects in Latent State-Trait Analyses **Katherine E. Masyn, Holly Hatton, & Rand Conger:** Evaluating the Causal Effects of Time-varying Life Events on Life Course Trajectories: Propensity Risk Set Matching Meets Latent Difference Score Modeling	**CB 205**

	Combined Session G **Allison Ames, Soyeon Ahn, & Nick Myers:** Review of Published Meta-analyses: Methodological Strengths and Weaknesses **Blair T. Johnson, Tania B. Huedo-Medina, C. Michael White:** Meta-analytic Modeling in Standardized vs. Original Effect Size Metrics **Tania B. Huedo-Medina:** Modeling Aggregated vs. Individual Participant Meta-analysis: How Much Bias can Exist in our Conclusions?	**CB 206**
	Combined Session H **Alexander M. Schoemann, Todd D. Little, Mijke Rhemtulla, & Sunthud Pornprasertmanit:** From Discrete Conditions to Continuous Factors: Rethinking Methodological Simulations **Chris Rhoads:** A Method for Improving Power in Cluster Randomized Experiments by Using Prior Information About the Covariance Structure **Mijke Rhemtulla & Victoria Savalei:** Power in Planned Missingness Designs	**CB 301**
	Combined Session I **Patricia E. Brosseau-Liard, Victoria Savalei, & Libo Li:** A Comparison of Two Nonnormality Corrections for RMSEA **Aaron Boulton & Kristopher Preacher:** Level-specific Fit Index Sensitivity in Multilevel Structural Equation Modeling **Emil Coman, Maria Coman, Marlene Berg, Eugen Iordache:** Evaluating Group Differences by Comparing Alternative Models: Complementing Model Fit with Power to Detect the Effects	**CB 302**
	Combined Session J **Karen Rambo-Hernandez & D. Betsy McCoach:** Using Summer Growth Patterns in Reading to Assess the Impact of Schools on Gifted and High Achieving Students **Katherine Picho & Lauren Finnie:** Latent Profile Analysis of Stereotype Threat Susceptibility Among Students in the Physical Science Domains **Rebecca J. Bulotsky-Shearer, Debbie Hahs-Vaughn, Ann-Marie Faria, & Xiaoli Wen:** An Applied Example of Multilevel Latent Profile and Growth Modeling: Profiles of Family Involvement and Classroom Quality and Growth in Language and Social Skills for a Nationally Representative Head Start Sample	**CB 305**
3:00 – 3:15 pm	Break	**CB - East Entrance**

3:15 – 4:30 pm	Keynote Address: **Tom A. B. Snijders, Ph.D.** *New Developments in Actor-oriented Modeling of Dynamics of Networks and Behavior*	**CB 102**
4:30 – 7:00 pm	**POSTER SESSION & RECEPTION**	**SU Ballroom**

Mariola Moeyart, Maaike Ugille, Van den Noortgate Wim, Ferron John, & Tasha Beretvas: Three-level Analysis of Raw Single-Case Experimental Data: Empirical Validation

Christopher P. Cerasoli & Zheng Yan: AMOS Versus LISREL for Structural Equation Modeling: When "Default" is to Blame

Jonathan Schweig: Multilevel Construct Validity: An Empirical Investigation of the Assumption of Cross-Level Invariance

Glen Davenport & Jane Rogers: Comparing Information Provided by Various Modeling Methods on Conceptual Diagnostic Instruments

Sara K. Johnson: Choosing the Number of Classes in a Multi-level Latent Class Analysis: A Simulation Study Evaluating the Performance of Information Criteria

Yeonsoo Yoo: Missing Data Analysis in Latent Growth Models (LGM) Under the Assumption of Missing at Random

Lisa McCrink, Adele H. Marshall, & Karen J. Cairns: An Investigation into the Predictive Accuracy of Multilevel Modeling of Hemoglobin Levels

Hui Jiang: Linking Hierarchical Growth Model with Structural Equation Model

Bartosz Kondratek: Bias of IRT Observed Score Equating Under NEAT Design

Wednesday, May 23rd

8:00 – 9:00 am	Continental Breakfast and Registration	**CB - East Entrance**
9:00 – 10:15 am	Keynote Address: **Peter Bentler, Ph.D.** *Reinventing "Guttman Scaling" as a Statistical Model: Absolute Simplex Theory*	**CB 102**
10:15 – 10:30 am	Break	**CB - East Entrance**
10:30 – 12:00 pm	**CONCURRENT SESSION #3**	
	Combined Session K **Tom Loeys, Beatris Moerkerke, An Raes, Yves Rosseel, & Stijn Vansteelandt:** Estimation of Controlled Direct Effects in the Presence of Exposure-induced Confounding and Latent Variables **Ingrid Carlson Wurpts & Christian Geiser:** Testing the Limits of Latent Class Analysis	**CB 202**
	Combined Session L **Amanda N. Baraldi, Heining Cham, & Craig K. Enders:** Estimating Moderated Regression Models with Incomplete Predictor Variables **Damazo T. Kadengye, Eva Ceulemans, Wim Van den Noortgate:** Multiple Imputation: An Empirical Bayes Approach for Missing Item Scores in Multilevel Cross-classified Educational Data **Emil Coman, Gisela Rots, Suzanne Suggs, & Shai Fuxman:** Combining Missing-by-design and Mixture Modeling to Assess Impact of a Community-wide Interventions: A Social Marketing and Text Messaging Campaign to Reduce Alcohol Use Among High School Students	**CB 205**
	Combined Session M **Shonte Y. Stephenson & Katherine E. Masyn:** A Procedural Framework to Detect School-level Influences on Item Functioning Using Mimic Modeling **Yan Bibby & Siek Toon Khoo:** Measurement Scale and Growth Modeling **Karen Rambo-Hernandez:** Classifying Elementary Students' Reading Growth: An Application of Multilevel Growth Mixture Modeling	**CB 206**

	Combined Session N **Edgar Merkle & Achim Zeileis:** Tests of Measurement Invariance Without Subgroups **H. Jane Rogers, Hariharan Swaminathan, & Pei-Hsuan Chiu:** A Bayesian Approach for Examining Invariance **Holmes Finch & Maria Hernandez-Finch:** Differential Item Functioning Analysis Using a Multilevel Mixture Model **Ying Jin, Nicholas D. Myers, Soyeon Ahn, & Randall Penfield:** An Effect Size Estimator for Uniform DIF: A Comparison of the MIMIC and the Rasch Parameterization	**CB 301**
	Combined Session O **Artur Pokropek:** Estimation of Compositional Effects: Problems with Reliability and Intraclass Correlation **Davood Tofighi, Stephen G. West, & David P. MacKinnon:** The Effects of Omitted Variables in Multilevel Model Analysis **Elizabeth A. Sanders:** Approaches to Testing Treatment Effects for Partially Nested Cluster Randomized Trials **Francisco Gutierrez & Piedad Castro:** A Fuzzy Multilevel Regression with an Application	**CB 305**
	Combined Session P **Haiyi Xie, Jill Tao, Gregory J. McHugo, & Robert E. Drake:** Comparing a Class of Statistical Models in Analyzing Skewed Longitudinal Count Data with Many Zeros: An Application from Mental Health Services and Outcome Research **Shu Xu, Shelley A. Blozis, & Donna L. Coffman:** Modeling Longitudinal Continuous Variables with Many Zeros **William L. Roberts:** Application of a Hierarchical Generalized Linear Model to Cutscore Estimation of Clinical Skills Performance on a National Medical Licensure Examination **Xing Liu:** Fitting Ordinal Logistic Regression Models with Complex Survey Data Using Stata	**CB 302**
12:00 – 1:30 pm	Lunch	**SU Food Court**
1:30 – 2:40 pm	**CONCURRENT SESSION #2**	
	Frank Buckler: Universal Structure Modeling: Fulfilling Wolds Vision of a Path Modeling Without Unfounded Assumptions	**CB 202**
	Danielle Dean & Nisha Gottfredson: Novel Applications of Semi-Parametric Mixture Models to Psychological Data	**CB 205**

	Edoardo M. Airoldi: Statistical Analysis of Populations with Interacting and Interfering Units	**CB 206**
	Combined Session Q **Blair T. Johnson & Tania B. Huedo-Medina:** Depicting Estimates Using the Intercept in Meta-Regression Models: The Moving Constant Technique **Paul R. Hernandez, H. Jane Rogers, Hariharan Swaminathan, Tania B. Huedo-Medina, & Blair T. Johnson:** A Comparison of Statistical Models for Multiple Treatment-Groups Meta-Analysis	**CB 301**
	Combined Session R **David H. Barker, Alexandra L. Quittner, Ivette Cruz, John Niparko, & CDaCI Investigative Team:** Using Latent Difference Scores to Examine the Relationship between Visual Attention and Oral Language Development in Young Deaf Children following Cochlear Implantation **David H. Barker, Alexandra L. Quittner, Ivette Cruz, John Niparko, & CDaCI Investigative Team:** Predicting Oral Language Growth over Four Years in Deaf Children Using Cochlear Implants and Hearing Controls **Laurel M. Fisher, Dina Newman, Rick Friedman, & Robert Frisina:** Latent Variable Analysis of Hearing Measurements: Geno-Phenotype Relationships in an Older Adult Sample	**CB 302**
	Combined Session S **Paul K. Crane, Betsy J. Feldman, Laura E. Gibbons, Shubhabrata Mukherjee, Donald L. Patrick, J. A. C. Delaney, & Heidi M. Crane:** Comparative Effects of Initial HMG-Co-A-reductase Inhibitor ("statin") Choice on Depression Levels in People Living with HIV: An Illustration of Analytic Issues Raised by Using Patient Reported Outcomes (PROs) in a Comparative Effectiveness Framework **Betty Lai, Annette La Greca, & Maria Llabre:** Trajectories of Posttraumatic Stress Symptoms Among Children After a Natural Disaster (Hurricane Andrew) **Grace Chan, Victor Hasselbrock, Michie Hasselbrock:** Alcohol Use Behaviors from Adolescence to Young Adulthood: An Application of Structural Equation Modeling	**CB 305**
2:40 – 3:00 pm	Break	**CB - East Entrance**
3:00 – 4:15 pm	Keynote Address: **Jack McArdle, Ph.D.** *Cautiously Adding Dynamics to Longitudinal Models*	**CB 102**

Thursday, May 24th: Post-conference Workshop

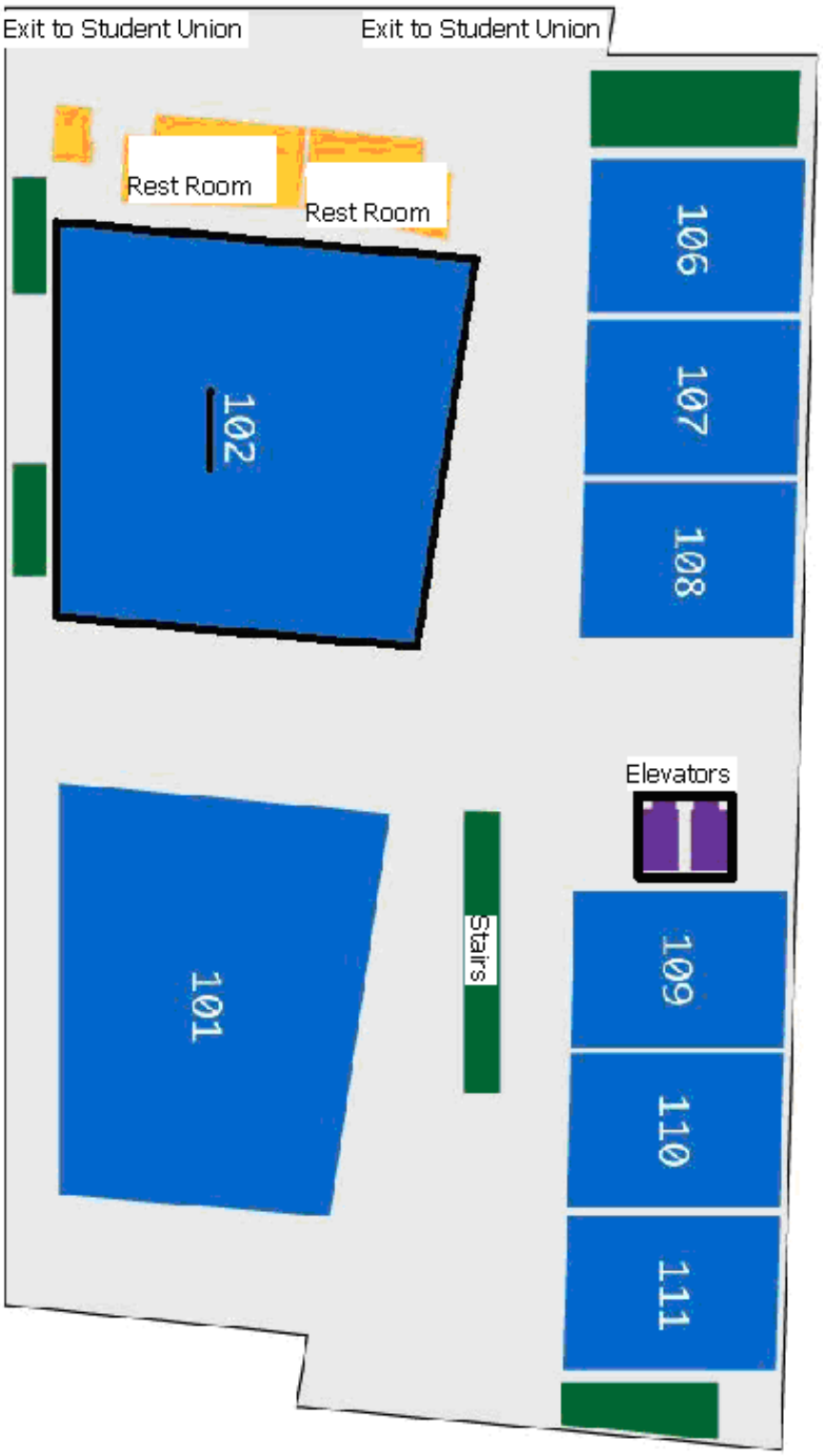
Cautiously Adding Dynamics to Longitudinal Analyses

Jack McArdle
University of Southern California

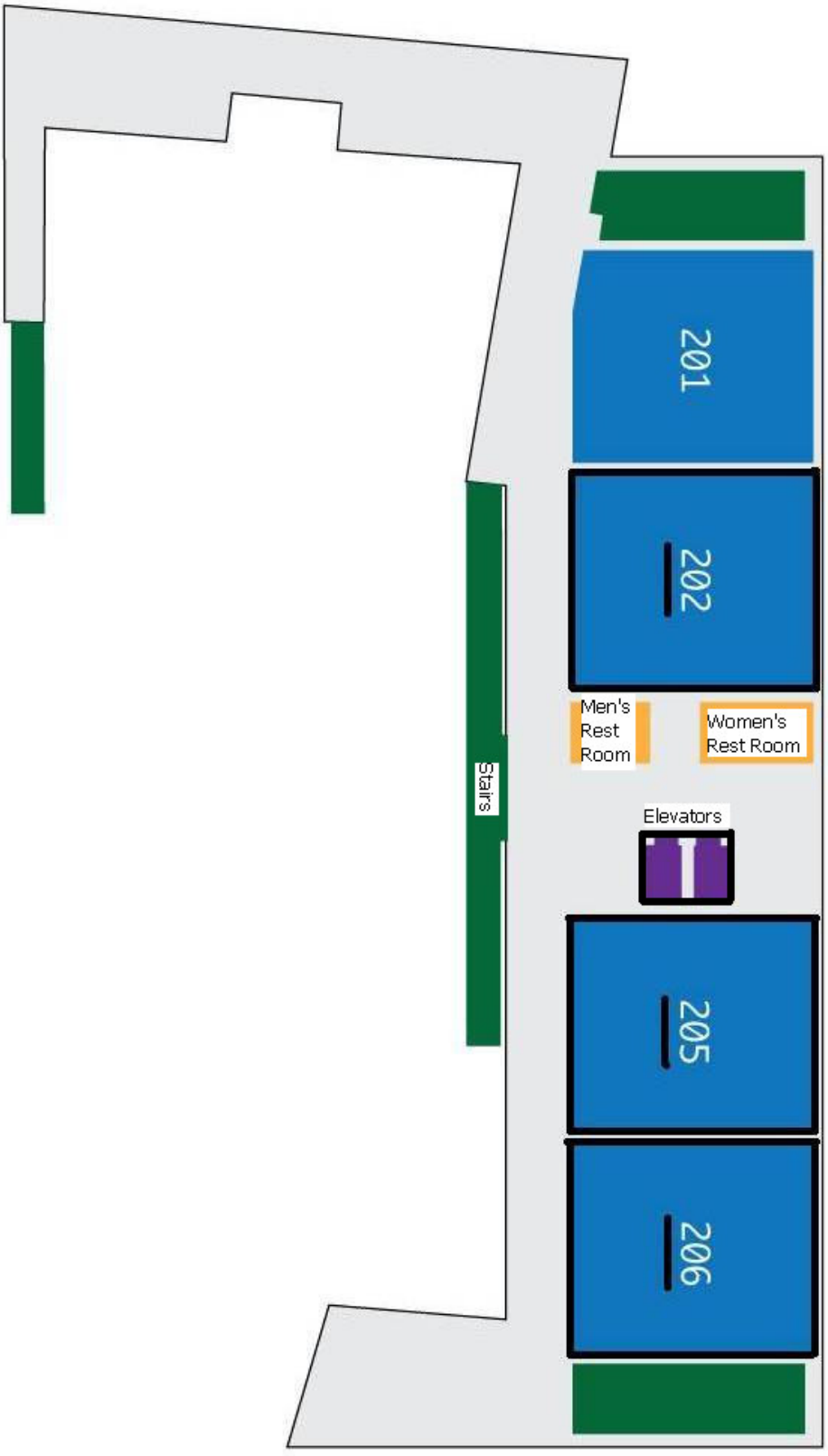
8:00 - 9:00 am	Coffee and Registration	**CB - East Entrance**
9:00 - 10:30 am	Lecture	**CB 102**
10:30 - 10:45 am	Break	**CB - East Entrance**
10:45 - 12:15 pm	Lecture	**CB 102**
12:15 - 1:30 pm	Lunch (on your own)	
1:30 - 3:15 pm	Lecture	**CB 102**
3:15 - 3:30 pm	Break	**CB - East Entrance**
3:30 - 5:00 pm	Lecture	**CB 102**

Jack McArdle, Ph.D., received his BA in Psychology and Mathematics at Franklin & Marshall College in Pennsylvania (1969-1973), his MA and the Ph.D. in Psychology and Computer Sciences at Hofstra University in New York (1973-1977); and his Post-Doctoral training in Psychometrics and Multivariate Analysis at the University of Denver in Colorado (1977-1983). From 1984-2005, he was a faculty member at University of Virginia where he taught Quantitative Methods from 1984-2005, and was director of the Jefferson Psychometric Laboratory. McArdle was a visiting fellow at the Institute of Human Development at Univ. of California at Berkeley, and is now an adjunct faculty member at the Department of Psychiatry at the Univ. of Hawaii. Dr. McArdle's research has focused on age-sensitive methods for psychological and educational measurement and longitudinal data analysis including published work has been in the area of factor analysis, growth curve analysis, and dynamic modeling of adult cognitive abilities. McArdle is the director of the ongoing National Growth and Change Study (NGCS), a longitudinal study of cognitive changes over age in the entire USA. Since 1989, McArdle has worked as an academic consultant to the National Collegiate Athletic Association (NCAA), where he has led the data analysis team for national research studies of college student-athletes. McArdle has won the R.B. Cattell Award for Distinguished Multivariate Research (1987), was elected President of the Society of Multivariate Experimental Psychology (1993-94), was elected President of the Federation of Behavioral, Psychological and Cognitive Sciences (1996-1999), and was elected as the Secretary of the Council of Scientific Society Presidents (CSSP, 2000-2002). McArdle has served on advisory boards for the U.S. National Institutes of Health (NIH), including the ACTIVE Collaborative Trials, the National Archive for Computerized Databases in Aging (NACDA), the Health and Retirement Survey (HRS), and the U.S. National Academy of Sciences panel on Institutional Review Boards. In 2002-2003 he was named Lansdowne Professor of the University of Victoria, Jacob Cohen Lecturer of Columbia University, and Best Academic Researcher, NCAA. In 2004 he was named a Co-PI of the Health and retirement Study (HRS), and in 2005 he was awarded an NIH-MERIT grant from the National Institute on Aging.

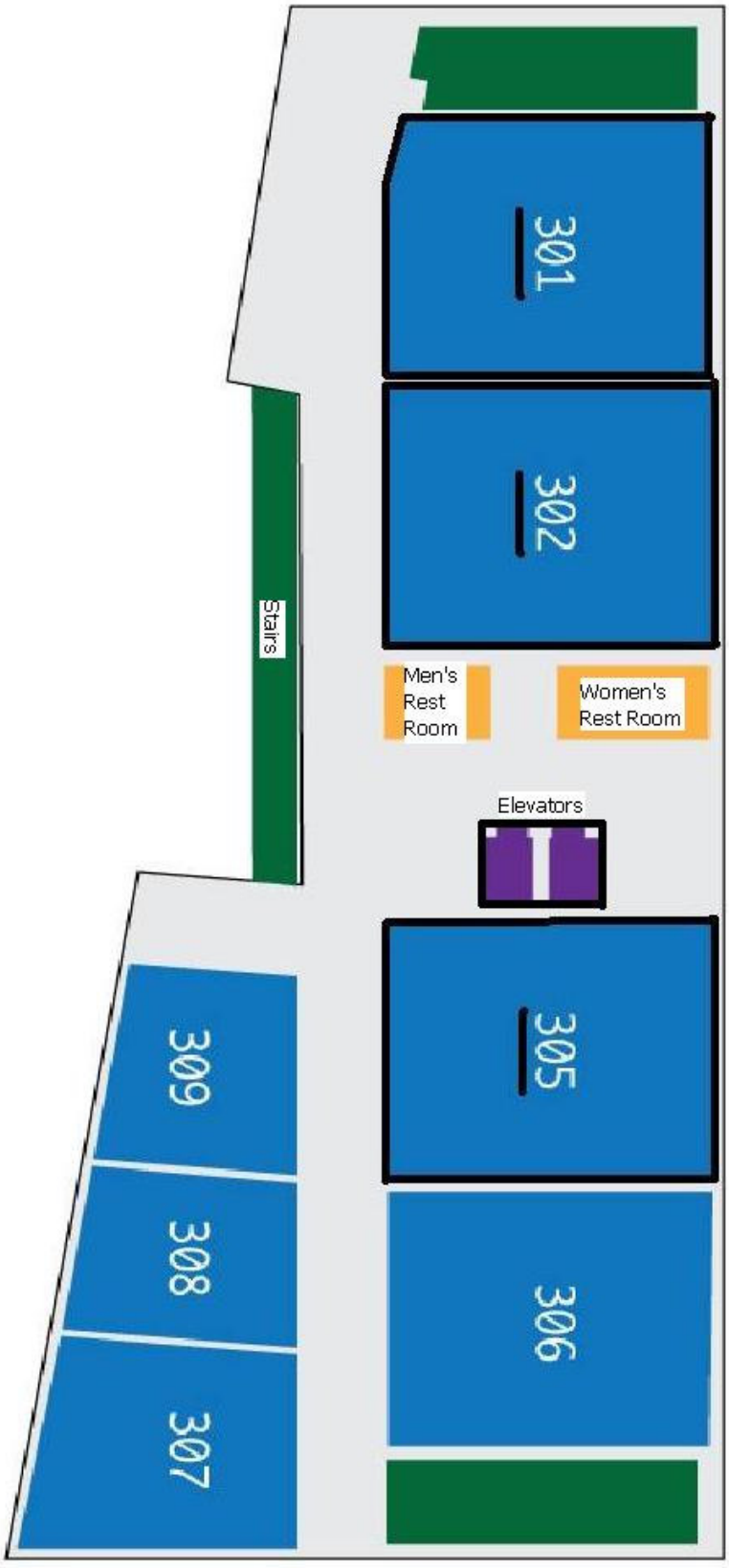
Classroom Building Floor Plans
1st Floor



2nd Floor


201
202
Men's Rest Room
Women's Rest Room
Stairs
Elevators
205
206

3rd Floor


301
302
Stairs
Men's Rest Room
Women's Rest Room
Elevators
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Research Presentation Abstracts

Concurrent Session 1

Tuesday, May 22, 2012 10:30 am – 12:00 pm

New Developments in the Analysis of Incomplete Data

Ofer Harel, Chantal Larose, Ashok Chaurasia, Valerie Pare, Jen Boyko
UConn

Location: Classroom Building – Room 202

Missing data is a common complication in medical, psychological, sociological and public health research. Most of the time researchers tend to ignore this obvious difficulty. In this session, we will touch on few missing data problems. The four presentations will include (1) Estimating Change in Regression Coefficients in Incomplete Data; (2) Model Selection in multiply imputed data when the imputation model is unknown but fixed; (3) Impact of Prior in Multiple Imputation Inference; and (4) : Combining Rules for Multiple Imputation with Three Types of Missing Values. A short discussion will follow.

Key Words: missing data, multiple imputation, model selection

COMBINED SESSION A:

Hidden Distinguishability

David A. Kenny, Thomas Ledermann
University of Connecticut

Location: Classroom Building – Room 205

Normally in dyadic research when dyad members are distinguishable (e.g., husband and wife or patient and caregiver), the variable that distinguishes them is measured. However, it is possible to conceptualize that there is a distinguishing variable, but that variable is unmeasured. For instance, one of the two members may have more influence and so the partner effect from that person to the other might be stronger than the partner effect that goes the other way. A method for estimating hidden distinguishability is presented as well as an example. Also discussed are ways of making theoretical sense of the hidden distinguishing variable.

Key Words: dyadic analysis, hidden distinguishability

Moderation in the Actor-Partner Interdependence Model

Randi Garcia, David Kenny, Thomas Ledermann
University of Connecticut

Location: Classroom Building – Room 205

Moderators of the Actor Partner Interdependence Model (APIM) include variables that are within-dyads, between-dyads, and mixed. Moreover, dyads can be indistinguishable as well as distinguishable. For each, we discuss the moderator effects that can be estimated (up to eight), their interpretation, and how they can be tested. We also present submodels, based on patterns of moderation of the actor and partner effects, which are simpler, more conceptually meaningful, and more powerful tests of moderator effects. Example analyses illustrate the recommended steps involved in an APIM moderation analysis.

Key Words: dyadic, dyads, APIM, moderation

The Common Fate Model for Dyadic Data: Variations of a Theoretically Important but Underutilized Model

Thomas Ledermann, David A. Kenny
University of Basel

Location: Classroom Building – Room 205

Studying dyads, very often there is a theoretical construct that has an effect on both members, such as relationship harmony or shared environment. To model such influences, the common fate model (CFM) is often the most appropriate approach. In this paper, we address conceptual and statistical issues in the use of the Standard CFM and present a series of variations, all of which are estimated by structural equation modeling (SEM) techniques. For indistinguishable dyad members (e.g., gay and lesbian couples), we elucidate the use of multilevel SEM. Throughout the paper, we draw connections to the Actor-Partner Interdependence Model (APIM). We also discuss the analysis of hybrid models that combines both the CFM and the APIM.

Key Words: dyadic data, interdependence, common fate, SEM, MSEM, APIM

COMBINED SESSION B:

Improving Model Selection of Log-Linear Models for Fitting Discrete Distributions

Arnond Sakworawich, Han Hui Por, David V. Budescu, Alina Von Davier
Fordham University

Location: Classroom Building – Room 206

This paper proposes the use of criticality analysis to improve the selection of a log-linear model for fitting discrete distributions. The work is predominantly methodological but we illustrate the use of the methodology with a specific example from test equating research. The goal is to determine how many, and which, moments and cross moments should be used for optimal fitting and smoothing of the scores' distribution. The procedure calls for (a) bootstrapping the data set; (b) fitting all possible models for all bootstrap re-samples ; (c) constructing a distribution of the best fitting models; and (d) calculating the criticality of each variable. This approach does not assume a particular distributional form and reduces the likelihood of capitalizing on chance. This approach outperforms the alternative methods that rely on simple measures of fit of the original data set as it provides a clearer and sharper differentiation between the competing models.

Key Words: model selection, log-linear model, criticality analysis, test equating

A Marginalized Multilevel Model with Overdispersion

Samuel Iddi, Geert Molenberghs
I-BIOSTAT, Katholieke Universiteit Leuven

Location: Classroom Building – Room 206

Overdispersion and correlation are two features often encountered when modeling non-Gaussian dependent data, usually as a function of known covariates. Methods that ignore these phenomena are often in jeopardy of leading to biased assessment of covariate effects. The beta-binomial and negative binomial models are well known for dealing with overdispersed data for binary and count data, respectively. Similarly, generalized estimating equations (GEE) and the generalized linear mixed models (GLMM) are popular choices when analyzing correlated data. A so-called combined model simultaneously acknowledges the presence of dependency and overdispersion by way of two separate sets of random effects. A marginally specified logistic-normal model for longitudinal binary data that combines the strength of the marginal and hierarchical models has been previously proposed. These two are brought together to produce a marginalized longitudinal model that groups the comfort of marginally meaningful parameters and the ease of allowing for overdispersion and correlation. Apart from model formulation, estimation methods are discussed. The proposed model is applied to two clinical studies and compared to the existing approach. It turns out that by explicitly allowing for overdispersion random effects, the model significantly improves.

Key Words: combined model; correlation; overdispersion; partial marginalization

Dynamic Generalized Linear Model with Application to Highway Crash Counts

Shan Hu, Nalini Ravishanker, John N. Ivan, James Mooradian
University of Connecticut

Location: Classroom Building – Room 206

This project will use generalized linear models (DGLM) to uncover temporal patterns in highway safety in Connecticut. Existing state sources provide data describing the time for each crash, demographic attributes of persons involved and their injury type over the time period from January 1995 to December 2009 as well as the traffic volumes and the characteristics of the roads on which these crashes occurred. The DGLM framework involves strongly dependent time-varying coefficients which require expensive computations to achieve convergence if Markov Chain Monte Carlo (MCMC) sampling method is applied. We will describe a novel fast Bayesian inference named Integrated Nested Laplace Approximation (INLA), which directly computes very accurate approximations of the posterior distributions using significantly less amount of time.

Key Words: dynamic generalized linear models, INLA, highway safety

COMBINED SESSION C:

Longitudinal Trajectories, Polynomial Functions, and Measurement Timing

Anne M. Fairlie, Kristina M. Jackson, Theodore A. Walls, Mark D. Wood
University of Rhode Island

Location: Classroom Building – Room 301

This paper will illustrate how decisions about polynomial functions and measurement timing may affect latent class estimation in growth mixture modeling (GMM). GMM can be used to discern commonly occurring drinking patterns through the estimation of latent classes. As described by Nagin and Tremblay (2005), GMM should be considered a useful heuristic device rather than a tool that identifies subgroups that truly exist in the population. It is important to determine whether or not the heuristic summary we obtain with GMM is sufficient and, to some degree, reliable and valid. Therefore, the current paper illustrates how: 1) the selection of the polynomial functions used to estimate the trajectories

and 2) the timing and spacing of the measurement occasions can affect the shape of the trajectory for each latent class. Demonstrations will be provided using 12 waves of alcohol data from the National Longitudinal Survey of Youth 1997 cohort.
Key Words: growth mixture, assessment timing, polynomials

Modeling Time-Varying Effects of a Treatment: Applications of the Time-Varying Effect Model
Mariya Shiyko, Jack Burkhalter, Runze Li, Bernard Park
Northeastern University
Location: Classroom Building – Room 301

This paper introduces a time-varying effect model (TVEM) for determining how the effect of an intervention changes with time, when the effect is the strongest, and how the pattern of the effect can be summarized as a curve. The method is presented in the context of empirical data from an ecological momentary assessment study designed to evaluate differences in health-related quality of life among early-stage lung-cancer patients undergoing two treatments. To demonstrate unique features of the model, TVEM is compared with the multilevel model (MLM), a commonly used approach for analysis of longitudinal data. MLM imposes a number of constraints on the developmental shape (e.g. linear), and group differences can be overlooked when development does not follow a simple pattern of change. In contrast, TVEM is a non-parametric approach that identifies between-group differences that manifested in a non-linear fashion. Extensions of the model, methodological and empirical implications are discussed.
Key Words: intensive longitudinal data, time-varying effects, non-parametric, ecological momentary assessments

Hierarchical Cross-Classified Linear Models and a Mechanism Based Approach to the Identification of Age-Period-Cohort Analysis Models
Rafael R. Ramirez
University of Puerto Rico
Location: Classroom Building – Room 301

Age-Period-cohort models (APC) have been one method used by scientists in attempting to understand change in human populations. Because of a well known identification issue for APC models most past research was based on models using a priori parameters restrictions to achieve identification. Two recent new methods for APC analysis will be discussed that provide two different alternative methods for dealing with the identification issue and allowing for a richer set of regression methods and hypothesis to be tested. One approach we will discuss is the application of Hierarchical Linear models for the analysis of APC models with repeated cross-section surveys data. The second approach discussed to achieve proper identification of APC models is a mechanism based approach which borrows heavily from theoretical models for APC effects and the method of path analysis and directed acyclic graphs.
Key Words: hierarchical, cohort, survey, causal

COMBINED SESSION D:
Modeling of Nonrecursive Structural Equation Models with Categorical Indicators
Holmes Finch, Brian French
Ball State University
Location: Classroom Building – Room 302

Nonrecursive structural equation models allow researchers to examine complex relationships, such as feedback loops, among latent variables. Prior research on such models has focused on continuous and normally distributed latent variable indicators. The two model estimation methods most favored in such a case are 2-stage least squares and maximum likelihood. However, often in social science research indicators are items from an instrument, typically measured on a likert scale. Given this, the current simulation study extends prior work by comparing a variety of estimation techniques in terms of parameter coverage and estimation bias when the observed indicators are categorical rather than continuous in nature. Specifically, the estimation techniques included in this research are 2-stage least squares, maximum likelihood, robust maximum likelihood, weighted least squares, robust weighted least squares and Bayesian. Results showed the robust weighted least squares and Bayesian methods providing the highest coverage rates and least parameter estimation bias.
Key Words: nonrecursive, structural equation modeling, robust weighted least squares, bayesian estimation

Choosing Product Indicators for Latent Interactions Under the Unconstrained Approach
Njål Foldnes
Norwegian School of Business
Location: Classroom Building – Room 302

Models with with nonlinear relationships among latent variables are often encountered in social and behavioral sciences. The researcher must choose from a variety of approaches when modeling such latent variable interacitions. In this presentation we examine the unconstrained approach (Marsh, Wen and Hau, 1984). This approach is easy to

implement for applied researchers since it has the practical advantage of not involving complicated nonlinear constraints. However, the researcher must still choose which products of indicator variables to include in the model as indicators of the latent interaction term. In published evaluations of latent variable interaction approaches, the number of product indicators have varied from one to all possible pairs. For instance, the researcher might choose the all-possible pairs strategy or the matched-pairs strategy. In this presentation we use simulations to investigate the choice of product indicators affects parameter estimates and chi-square statistics for some confirmatory factor models, as well as model convergence. The often neglected role of nonnormality and misspecification is also included in the study design.
Key Words: interaction, structural equation modeling, product indicators, non-normality

Simulation-Based Estimation of Conditional Probabilities and Counterfactuals in SEM: Programming in Mplus and Empirical Applications

François Gélineau, Pierre-Olivier Bédard
Université Laval (Québec, Canada), Dept. of Political Science
Location: Classroom Building – Room 302

The assessment of effects and their magnitude, in conventional regression as well as in SEM analyses, now appears to be an important step in communicating research results. In this paper, we propose a relatively simple method, loosely based on existing procedures, and its programming in Mplus to conduct post-estimation analysis in SEM to assess the magnitude of effects and their confidence intervals. We illustrate the applications of such methods by various analyses of electoral data coming from the 2008 provincial election in Québec (Canada).
Key Words: path analysis, post-estimation, magnitude, electoral studies

Simulation Study of Posterior Predictive p Values in a Bayesian Confirmatory Factor Analysis

Terrence D. Jorgensen
University of Kansas
Location: Classroom Building – Room 302

Muthén and Muthén's (2011) Bayesian estimation method for structural equation models in Mplus yields a posterior predictive p value (PPP) rather than the traditional goodness-of-fit statistic to test model fit. Based on initial simulations, Muthén and Asparouhov (2011) suggested that although there is no theoretical cutoff value for low PPP to indicate poor fit, "the usual approach of using p values of .05 or .01 appears reasonable" (p. 10). This suggestion is challenged by this simulation study of a 2-factor confirmatory factor analysis model that omits a population cross-loading of varying magnitude. Sample size and magnitude of informative priors were also manipulated. Results suggest that the vast majority of PPP variance (~ 85%) appears random, and that PPP is sensitive only to severe misspecification, and only when the prior variance is too small to include the true population value. Researchers are advised instead to investigate local sources of misfit.
Key Words: Bayesian SEM, model fit, PPP

COMBINED SESSION T:

Understanding Propensity Score Matching through a More Flexible Causal Modeling Alternative: Mixture and Multilevel Causal Modeling of True Effects

Emil Coman, Itzhak Yanovitzky, Maria Coman, Margaret R. Weeks
Institute for Community Research
Location: Classroom Building – Room 305

We propose to walk the audience through the steps of Propensity Score Matching (PSM) from a causal modeling perspective, and provide alternative modeling procedures for it. This proposal re-sets the focus of the PSM methodology of estimating unbiased effects in observational (non-RCT) designs unto the actual causal modeling involved in its stages. Causal (simultaneous) modeling with latent variables has some advantages to PSM modeling, like flexibility, simultaneous estimation of multiple regression equations, testing of various cross-equation parameters, and testing of alternative model fit to data. We provide SEM alternative models for: 1. Testing for endogeneity; 2. Estimation of propensity scores; 3. Stratification on propensity scores and checking the balance on confounders across exposure groups with multi(2)-group mixture modeling; 4. Estimation of the exposure effect by comparing the matched emergent blocks (strata) with multilevel modeling (with possibility of mediation tests). The causal alternative of PSM modeling promises to be a viable flexible alternative to regression-based PSM methods.
Key Words: propensity score matching, SEM, mixture model, multi-level model 3

Robustness of Causally Relevant Evidence Across Residualized and Simple Gain Scores

Robert E. Larzelere, Ronald B. Cox, Jr., Sada Knowles
Oklahoma State University
Location: Classroom Building – Room 305

This paper summarizes three implications from four studies that tested the robustness of causally relevant evidence across predictions of residualized and simple gain scores. Angrist and Pischke (2009) showed that these two types of analyses could provide upper and lower bounds on the actual causal effect under some assumptions, which include relaxing the perfect measurement requirement for pre-existing scores on the outcome variable. The first implication is that analyses often find opposite-signed significant effects over typical 2-year longitudinal intervals, thus failing to exclude the null hypothesis (no causal effect). The second implication is that causal evidence is more robust when the causally relevant coefficients replicate across these two types of analyses, which we have found more often for predicting gains over one month, perhaps because it approximates the actual causal lag more closely. Finally, we illustrate how to test interactions with simple gain scores as well as residualized gain scores.
Key Words: causal validity, selection bias, longitudinal analyses

Prejudicial vs. Non-Prejudicial Response Bias in Quasi-Experiments: When is (and isn't) Non-Ignorable Survey Response Bias a Threat to Internal Validity?

Steven Kramer, Lorraine Bernotsky, Jeff Osgood, Edward Wolff
Arcadia
Location: Classroom Building – Room 305

In quasi-experiments collecting data via surveys even non-ignorable missing data does not necessarily pose a threat to internal validity. Only if the non-response process for the Treatment group differs from the non-response process for the Comparison group will results be biased. This is not a new finding--but there is not even a term to describe the problematic type of non-ignorable missingness. We have been investigating methods of evaluating high school curriculum effects on college success--and in practical situations have found the missingness-process to be key in determining study validity. For example, in our study it was possible that Treatment students who failed a college math class got mad and wanted to respond to the survey, whereas Comparison students who failed a math class got embarrassed and became less likely to respond. We coined the term "prejudicial" non-response to describe the type of non-ignorable missingness that threatens internal validity.
Key Words: non-response bias, quasi-experiments, survey research, internal validity, ignorable missingness

A Comparison of Propensity Score Methods for the Estimation of Treatment Effects with Multilevel Observational Data

Walter L. Leite, Francisco Jimenez, Yasemin Kaya, Robert Sandbach, Jann MacInnes
University of Florida
Location: Classroom Building – Room 305

Observational studies of multilevel data to estimate treatment effects must consider both the non-random treatment assignment mechanism and the clustered structure of the data to obtain unbiased treatment effect estimates. We conducted a Monte Carlo simulation study to compare the performance of four propensity score methods to reduce selection bias in average treatment effect on the treated (ATT) estimates obtained using a multilevel model: one-to-one greedy matching, optimal full matching, stratification, and weighting. We also evaluated three models to estimate propensity scores accounting for cluster effects, and compared them with a logistic regression model ignoring clustering. We manipulated the group size, the intra-class correlation, and the size of the group effect on treatment assignment in the simulated data. We found that estimating propensity scores with a logistic regression model with fixed cluster effects and then weighting observations based on the propensity scores performed best among the methods evaluated.
Key Words: multilevel models, greedy matching, propensity score weighting, propensity score stratification, optimal full matching

Concurrent Session 2

Tuesday, May 22, 2012 1:30 pm – 3:00 pm

COMBINED SESSION E:

MplusAutomation: An R package for Enhancing Latent Variable Modeling Using Mplus

Michael Hallquist
University of Pittsburgh

Location: Classroom Building – Room 202

MplusAutomation is a package for R that seeks to optimize and streamline the use of Mplus for complex latent variable modeling projects such as Monte Carlo simulation studies or empirical research involving comparisons among many models and parameters. More specifically, MplusAutomation provides tools to accomplish three objectives: to create and manage syntax for groups of related models; to automate the estimation of many models; and to extract, aggregate, and compare fit statistics, parameter estimates, and ancillary model outputs. This presentation will demonstrate how MplusAutomation can be used to overcome a number of the practical limitations of Mplus (e.g., limited data visualization). No prior knowledge of R is required and two live demonstrations of MplusAutomation will be presented: an empirical example comparing latent structure models of psychopathology and a Monte Carlo simulation study demonstrating the effects of scatter on model selection criteria in finite mixture and factor analytic models.

Key Words: Mplus, R, latent variable modeling, Monte Carlo simulation

Lavaan: An R Package for Structural Equation Modeling

Yves Rosseel
Ghent University

Location: Classroom Building – Room 202

Structural equation modeling (SEM) is a vast field and widely used by many applied researchers in the social and behavioral sciences. Over the years, many software packages for structural equation modeling have been developed, both free and commercial. However, perhaps the best state-of-the-art software packages in this field are still closed-source and/or commercial. The R package lavaan has been developed to provide applied researchers, teachers, and statisticians, a free, fully open-source, but commercial-quality package for latent variable modeling. This presentation explains the aims behind the development of the package, gives an overview of its most important features, and provides some examples to illustrate how lavaan can help statisticians -working in the field of SEM- to implement their newest modern modeling methods.

Key Words: structural equation modeling, software

COMBINED SESSION F:

Accounting for Method Effects in Latent State-Trait Analyses

Christian Geiser, Ginger Lockhart
Utah State University

Location: Classroom Building – Room 205

The purpose of this study was to evaluate the strengths and weaknesses of four approaches to account for shared method variance in latent state-trait (LST) analyses (Steyer, Ferring, & Schmitt, 1992) and to determine the extent to which LST models are robust to small sample sizes. The results of our simulation study indicate that models that can be defined on the basis of the core theoretical concepts of Steyer et al.'s LST theory may be best suited to address the issue of shared method variance. In particular, the LST model with indicator-specific trait factors and the M – 1 approach showed the best performance in terms of model convergence, proper solutions, and unbiased parameter estimates. Furthermore, we found samples sizes of N = 100 to be sufficient for reliable results under most conditions.

Key Words: latent state-trait analysis, longitudinal modeling, method effects, indicator-specific effects, correlated uniqueness approach

Evaluating the Causal Effects of Time-Varying Life Events on Life Course Trajectories: Propensity Risk Set Matching Meets Latent Difference Score Modeling

Katherine Masyn, Holly Hatton, Rand Conger
Harvard University

Location: Classroom Building – Room 205

There are several challenges a researcher may face when attempting to estimate the potential causal effect of a transitional life event on a developmental outcome. This paper combines a useful extension of propensity score matching—risk-set matching—with latent differences score (LDS) modeling of longitudinal outcomes to address these

challenges. With risk-set matching, propensity scores are time-dependent; that is, each case has an estimated propensity score for each possible time of the transitional event. The time-dependent propensity scores are a function of the conditional hazard rate for the event across time as predicted by a set of plausible confounders. Once cases are matched, counterfactual "pseudo" post-event change scores can be constructed for each "control" case based on the specific pre-/post-event time scale of his/her "treatment" match. This paper presents the details for this approach and then illustrates with a real data example involving the transition to parenthood and relationship quality.
Key Words: propensity score, event history, latent difference score

COMBINED SESSION G:

Review of Published Meta-Analyses: Methodological Strengths and Weaknesses

Allison Ames, Soyeon Ahn, Nick Myers
University of Miami

Location: Classroom Building – Room 206

The current study addresses the validity of a sample of published meta-analyses in education and evaluates the generalizability of study findings using 45 meta-analyses published in Review of Educational Research in the 2000s. Meta-analytic procedures and reporting were evaluated based on 1) Cooper's evaluative checklist and 2) Meta-Analysis Reporting Standards by American Psychological Association. Statistical power of significance tests and between-study variation in study findings were also evaluated. A wide variation in reporting was found, which calls attention to the need to develop and employ more stringent standards. Moreover, insufficient information provided in the meta-analyses prevented us from judging the validity of study findings, which also raises questions on the inferences drawn from these meta-analyses. Practical recommendations for yielding more valid and reliable meta-analytic findings in education, social science, and other fields were discussed.
Key Words: meta-analysis, validity, generizability, power

Meta-Analytic Modeling in Standardized vs. Original Effect Size Metrics

Blair T. Johnson, Tania B. Huedo-Medina, C. Michael White
University of Connecticut

Location: Classroom Building – Room 206

Meta-analysis cannot proceed unless each study outcome is on the same metric. Currently, conventions conflict regarding whether to leave outcomes in the original, raw metric, if all studies use the same measures, or to standardize them. Monte Carlo simulations showed that leaving the effect size (ES) index in the original metric presents no bias or loss of efficiency under conditions of normality, when there is no heterogeneity, and when the variances of the experimental and control group means are equal, but to the extent that these conditions deviate, standardizing is better. When there is high skewness and kurtosis, neither metric has a significant advantage. Thus, the standardized metric presents the least bias under most conditions and is more efficient than the raw metric. ESs in the original metric have higher efficiency only when the smallest value for the within-study variance is used and when sample sizes are very small.
Key Words: effect size, raw metric, standardized effect, bias, efficiency

Modeling Aggregated vs. Individual Participant Meta-Analysis: How Much Bias can Exist in our Conclusions?

Tania B. Huedo-Medina
University of Connecticut

Location: Classroom Building – Room 206

This research compares a multilevel structural equation modeling approach to analyze individual participant data meta-analysis (IPD-MA) to standard aggregated data meta-analysis (AD-MA). AD-MA may introduce potential ecological bias by assuming that participant-level variables are the same within trials or by ignoring possible relevant subgroups that are hidden within the study-level data. The reanalysis of studies' individual-level data has been recognized as the gold standard for combining evidence from existing studies. IPD-MA makes it possible to use advanced modeling strategies to examine links and complexity among variables and across populations. However, currently, this approach has not been developed with IPD-MA to compare the efficiency and bias of the parametric estimations to the traditional AD-MA. A statistical development and a simulation study will allow us to identify the possible bias and differences between the two approaches and to develop guidelines under a series of conditions where they can be combined when IPD- MA data are not available.
Key Words: individual-level data, aggregated data, meta-analysis, multilevel, structural equation model

COMBINED SESSION H:

From Discrete Conditions to Continuous Factors: Rethinking Methodological Simulations

Alexander M. Schoemann, Todd D. Little, Mijke Rhemtulla, Sunthud Pornprasertmanit
University of Kansas

Location: Classroom Building – Room 301

Monte Carlo simulations are an important tool for methodologists. Simulations allow methodologists to determine the accuracy of new methods, compare different methods, and perform power analyses. Most Monte Carlo simulations done today involve a fixed set of design cells, or conditions, chosen by crossing many factors of interest; for example, each cell might represent a particular combination of a chosen sample size, model size, set of parameter values, amount of missing data, and analysis method. We propose a new method of designing simulations by randomly varying the factors of interest, rather than choosing fixed levels. Our proposed method results in continuous factors that can be analyzed using regression techniques and visually displayed. This new approach is more efficient, requiring less computing power, and more comprehensive than traditional approaches to simulation studies. We discuss the benefits of this new method for both methodological simulations and power analyses with structural equation modeling.

Key Words: Simulation, SEM, Monte Carlo

A Method for Improving Power in Cluster Randomized Experiments by Using Prior Information about the Covariance Structure

Chris Rhoads
University of Connecticut

Location: Classroom Building – Room 301

It is frequently difficult to design cluster randomized experiments (CREs) with a sufficient number of clusters to have adequate statistical power. The current paper presents a new method for utilizing prior information about the intracluster correlation coefficient as a means of increasing power in CREs.

Key Words: power, cluster randomized experiments

Power in Planned Missingness Designs

Mijke Rhemtulla, Victoria Savalei
University of Kansas

Location: Classroom Building – Room 301

In planned missingness (PM) designs, certain data are randomly determined a priori to be missing. PM designs can increase validity and reduce cost; however, little is known about the degree of power loss that accompanies these designs. We investigated the effects of model type and correlation strength on the relative efficiency of parameter estimates in PM designs vs. a complete data design with reduced sample size. PM designs may be most efficient for estimating parameters involving exogenous variables, and this efficiency increases as covariance strength increases. On the other hand, complete data designs more efficiently estimate parameters involving endogenous variables, such as regression coefficients. These findings suggest that planned missing designs may be least efficient at estimating parameters of greatest interest.

Key Words: missing data, planned missing, power

COMBINED SESSION I:

A Comparison of Two Nonnormality Corrections for RMSEA

Patricia E. Brosseau-Liard, Victoria Savalei, Libo Li
University of British Columbia

Location: Classroom Building – Room 302

Root-mean-square error of approximation (RMSEA) is a popular fit index in structural equation modeling (SEM). The goal of the present study was to examine the behavior of the uncorrected ML RMSEA and of two different nonnormality corrections to the RMSEA with nonnormal data. First, we demonstrate that a commonly-used nonnormality correction for RMSEA, implemented in software such as EQS and Mplus, is theoretically problematic and performs in a problematic way in our simulation study. Second, we demonstrate that a different nonnormality correction to the RMSEA, initially proposed by Li & Bentler (2006), is both theoretically and empirically superior, as well as easy to compute from the output of EQS and Mplus.

Key Words: structural equation modeling, RMSEA, nonnormality, fit indices

Level-Specific Fit Index Sensitivity in Multilevel Structural Equation Modeling

Aaron Boulton, Kristopher Preacher
University of Kansas

Location: Classroom Building – Room 302

A Monte Carlo simulation study was conducted to investigate the sensitivity of alternative fit indices to model misspecification in multilevel structural equation modeling (MSEM). Two methods of level-specific fit estimation have been proposed but little is known about the performance of each under various data conditions. Results suggest that (a) alternative fit indices are not sensitive to cluster-level misspecification when indicator ICCs and sample sizes are low, such as those routinely encountered in practice, and (b) the revised Goodness of Fit Index (GFI*) and the revised Adjusted Goodness of Fit Index (AGFI*) were more sensitive to cluster-level misspecification than other commonly-used indices. Level-specific methods of fit evaluation are recommended when ICCs and sample sizes are sufficiently high. Also, use of the GFI* and AGFI* is encouraged despite their limited use in the applied structural equation modeling literature.

Key Words: MSEM, multilevel, model fit

Evaluating Group Differences by Comparing Alternative Models: Complementing Model Fit with Power to Detect the Effects

Emil Coman, Maria Coman, Marlene Berg, Eugen Iordache
Institute for Community Research

Location: Classroom Building – Room 302

Comparisons of groups in intervention research require statistical tests relying on various model assumptions. We explore the impact of alternative modeling on the statistical power of the simplest two-group Structural Equation Models (SEM) specified with various between-group equality assumptions. We illustrate the approach with the Youth Action Research for Prevention (YARP) project, a risk prevention youth development program for low-income inner city youth implemented in Hartford, Connecticut. Well-fitting two group models assuming equality of baseline outcome means and variances were underpowered and failed to demonstrate positive intervention effects, while alternative well-fitting models assuming equal path coefficients had better power and indicated positive impact of the program. When measurement error is specifically modeled, all models have adequate power and indicate significant changes. We walk the audience through the practical aspects of testing alternative models relying on different assumptions, and demonstrate the advantages of models with measurement errors directly specified.

Key Words: SEM, alternative models, intervention effects, power, mispecification

COMBINED SESSION J:

Using Summer Growth Patterns in Reading to Assess the Impact of Schools on Gifted and High Achieving Students

Karen Rambo-Hernandez, Betsy McCoach
Colorado State University

Location: Classroom Building – Room 305

This study compared gifted and average students' growth in reading (in a cohort of 3rd grade students from 2000 school) over 3.5 years. Using a three-level longitudinal piecewise HLM model, we contrasted summer and school year growth rates to examine how much schools change gifted and average students' trajectories. We found that gifted students showed little change in their trajectory from school-year to summer. By contrast, average students grew steeply during the school year and gained nothing over the summer. In addition, the school year rate for gifted students was slower than average students. Gifted students grew more slowly than average students during school and maintained that same growth rate in the absence of school. Whatever these gifted students did in summer was as effective as their time spent in school. These findings support the use of alternative educational methods for gifted, such as acceleration and within class ability grouping.

Key Words: longitudinal studies, HLM, reading, gifted students

Latent Profile Analysis of Stereotype Threat Susceptibility Among Students in the Physical Science Domains

Katherine Picho, Lauren Finnie
University of Hartford

Location: Classroom Building – Room 305

The purpose of the present study was to investigate the theoretical ST-susceptibility groups proposed by Steele (1997). 211 undergraduate students majoring in various Science Technology Engineering and Math (STEM) disciplines completed a stereotype threat susceptibility measure-- the social identities and attitudes scale, SIAS (Picho & Brown, 2011). Results revealed the presence of three ST susceptibility profiles: low and high ST susceptibility classes and a disengaged class. 70.8% of students in the sample were classified as highly susceptible to ST. Being that this is the first study attempting to investigate latent profiles of ST susceptibility (STS), additional replication using different samples is

strongly recommended. An expansive investigation into latent profiles of ST susceptibility could provide the insight required to develop more targeted effective interventions for ST susceptible students in STEM.
Key Words: stereotype threat, mathematics, latent profile analysis

An Applied Example of Multilevel Latent Profile and Growth Modeling: Profiles of Family Involvement and Classroom Quality and Growth in Language and Social Skills for a Nationally Representative Head Start Sample

Rebecca J Bulotsky-Shearer, Debbie Hahs-Vaughn, Ann-Marie Faria, Xiaoli Wen
University of Miami

Location: Classroom Building – Room 305

The study extended previous research by examining longitudinal outcomes (language and social skills growth from preschool through first grade) associated with a multilevel typology of family involvement and Head Start classroom quality estimated using the nationally representative Head Start Family and Child Experiences Survey (FACES, 1997 longitudinal cohort; N = 1,870). Six multilevel latent profiles were estimated in the spring of children's first year of Head Start. The profiles were characterized by distinct patterns of parent school involvement, parent home involvement, and classroom quality. Preliminary findings suggest that initial positive associations with Head Start profile membership were seen for children comprising profiles characterized by high parent involvement and above average Head Start classroom quality. However, piecewise growth models suggest that children comprising higher quality profiles showed slower growth in language and social skills, relative to the lower quality profiles as they transitioned into kindergarten and first grade.
Key Words: multilevel latent profile analysis, piecewise growth, Head Start

Poster Session

Tuesday, May 22, 2012 4:30 pm – 7:00 pm

Three-Level Analysis of Raw Single-Case Experimental Data: Empirical Validation

Mariola Moeyaert, Maaike Ugille, Van den Noortgate Wim, Ferron John, Tasha Beretvas
KuLeuven

Location: Student Union Ballroom

The multilevel approach and its flexibility are appealing for combining single-case data within and across studies. In this article we want to investigate under which realistic conditions the three-level model works to synthesize single-case data. Therefore we use a Monte Carlo simulation study varying the value of the immediate treatment effect and the treatment effect on a time trend, the number of studies, the number of cases, the number of measurements per case and the between-case and between-study variance. The simulation study shows that the three-level approach results in unbiased estimates of both kinds of treatment effects. In order to have a reasonable power for testing the treatment effects (.80 or higher), we recommend researchers to use strict inclusion criteria, resulting in a homogeneous set of studies, and to involve a minimum of 30 studies in their three-level analysis of single-case results.
Key Words: single-case study, three-level analysis, Monte Carlo simulation study

AMOS Versus LISREL for Structural Equation Modeling: When "Default" is to Blame

Christopher P. Cerasoli, Zheng Yan
State University of New York, University at Albany

Location: Student Union Ballroom

Despite the extensive use of structural equation modeling (SEM) in the psychological and management sciences, its dependence on basic statistical assumptions is rarely explicitly tested (Breckler, 1990). This is problematic because failure to meet these assumptions can be a result of (or exacerbated by) over-reliance on default options of various SEM software packages. Using publicly available previously published data and the default options of two SEM programs (LISREL 8.80 and AMOS 18.0), we explore whether differing research conclusions are drawn using the same dataset. Our findings suggest that reliance on default software options and failure to check whether SEM assumptions are met can lead to non-trivial differences in fit indices, approximation error, and ultimately research conclusions. Implications are discussed.
Key Words: structural equation modeling

Multilevel Construct Validity: An Empirical Investigation of the Assumption of Cross-Level Invariance

Jonathan Schweig
University of California, Los Angeles

Location: Student Union Ballroom

As policymakers strive to create comprehensive programs to assess teacher effectiveness, survey-based measures of school and classroom environments are becoming increasingly important. Information is collected from individuals and aggregated to allow inferences to be made about environmental variables. A key assumption underlying this process is that there is cross-level invariance, and that the group-means refer to the same constructs as the individual responses. Using data from a widely administered survey of school working conditions, this study demonstrates the use of multilevel confirmatory factor analysis (MCFA) to test empirically the assumption of cross-level invariance. This study then explores the potential consequences of using conventionally employed approaches to factor analysis that ignore the multilevel structure of the constructs. Finally, a structural equation modeling (SEM) framework is used to show the potential consequences of ignoring the multilevel structure for inferences about relationships with external variables.

Key Words: MCFA, multilevel modeling

Comparing Information Provided by Various Modeling Methods on Conceptual Diagnostic Instruments

Glen Davenport, Jane Rogers
University of Connecticut

Location: Student Union Ballroom

Cognitive diagnostic assessments (CDA) must have alignment between a cognitive model, a testing model and a measurement model. Concept inventories are a popular type of CDA used in math and science education research. As pretest-posttests that identify student misconceptions, they are a valuable tool for measuring conceptual change. Unfortunately, no statistical modeling is used and all analyses consist of raw scores. In this study, we use several methods of scoring the Force and Motion Conceptual Evaluation to evaluate which measurement model aligns best with the cognitive model and provides the most useful inferences about student cognition.

Key Words: cognitive diagnostic assessment science education

Choosing the Number of Classes in a Multi-Level Latent Class Analysis: A Simulation Study Evaluating the Performance of Information Criteria

Sara K. Johnson
University of Connecticut

Location: Student Union Ballroom

The utility of techniques such as latent class analysis rests on the ability to identify the "correct" number of latent classes. Substantively, researchers should choose models that make the most sense from a theoretical perspective. Statistically, they must rely on comparing the results of several tests of model fit. Because so much of the decision about the number of classes rests on these statistical tests, analysts have devoted considerable attention to determining which are most accurate in determining the correct number of classes. Prior studies, however, have been conducted under the assumption that the sample was collected from non-nested or independent individuals. This study uses simulation methods to evaluate the performance of information criteria in identifying the correct number of classes, varying the number of clusters and individuals per cluster.

Key Words: multi-level mixture modeling

Missing Data Analysis in Latent Growth Models (LGM) Under the Assumption of Missing at Random

Yeonsoo Yoo
University of Connecticut

Location: Student Union Ballroom

Latent growth models implemented in structural equation models (SEM) may be used to analyze longitudinal data with an emphasis on individual changes over time. The main objective of this study is to compare methods of handling missing data under the assumption of missing at random. Listwise deletion (LD), full information maximum likelihood (FIML), and full information maximum likelihood (FIML) with an auxiliary variable are compared via a computer simulation study. The findings show that FIML and FIML with auxiliary variables generally perform best. The results of LD are generally acceptable overall when the percentage of missingness is large. Practical implications and directions for future research are discussed.

Key Words: missing data analysis, latent growth models

An Investigation into the Predictive Accuracy of Multilevel Modeling of Haemoglobin Levels

Lisa McCrink, Adele H. Marshall, Karen J. Cairns
Queen's University Belfast

Location: Student Union Ballroom

This research investigates the predictive accuracy of multilevel modelling of haemoglobin (Hb) levels for end stage renal disease patients. Repeated blood measurements were obtained from the Northern Ireland renal information service between 2002 and 2011. A multilevel modelling approach was found to be appropriate using the intra-class correlation coefficient with 68% of the variability of Hb levels accounted for due to the dependency between a patient's repeated measurements. The model considered accounts for both periodic population fluctuations in Hb and incorporates time-dependent clinical information. An investigation into improvements in the predictive power of the multilevel model was conducted. This compared the benefit of using one Hb observation from patients in order to determine their future predictions, compared to a model which excludes this information. Through the inclusion of this initial observation, a considerable gain in accuracy of the predictions was achieved, increasing from 41% to 73% of predictions within ±1g/dL.

Key Words: multilevel model, predictive accuracy, haemoglobin

Linking Hierarchical Growth Model with Structural Equation Model

Hui Jiang, Fei Bie
The Ohio State University

Location: Student Union Ballroom

This paper attempts to link the hierarchical growth model in HLM with the framework of structural equation model (SEM). It is shown that given certain constraints, there is fundamental mathematical equivalence between HLM and SEM in their formulations of the growth model. Specifically, the level-1 HLM can be reformulated as the SEM measurement model, whereas the level-2 HLM can be reformulated as the SEM structural model. Three sets of parallel models are then estimated using HLM7 and LISREL with the same data set. Model 1 assumes homogeneous variances and no level-2 predictor. Model 2 assumes heterogeneous variances and no level-2 predictor. Model 3 assumes heterogeneous variances and adds level-2 predictors. HLM and LISREL produce fairly consistent, if not identical, parameter estimates, lending support to the argument that HLM and SEM were parallel under certain constraints. In general, with a balanced design, SEM provides a more flexible framework to work with.

Key Words: HLM, SEM, growth model

Bias of IRT Observed Score Equating Under NEAT Design

Bartosz Kondratek
Educational Research Institute, Poland

Location: Student Union Ballroom

This paper investigates the relationship between properties of marginal maximum likelihood (MML) estimates of parameters of an IRT model fitted to data gathered under the NEAT design and the accuracy of subsequent equating of observed scores based on these estimates. Simulation study is presented with different levels of three variables crossed: (i) sample size, (ii) location of ability distribution in one population, (iii) dispersion of ability distribution in one population. In total 45 conditions are evaluated. Data were generated assuming 2plm and the IRT model was fitted in concurrent calibration using MIRT software. The study shows how patterns of bias in estimated parameters of IRT model transform into biases in estimates of observed score distributions. A shrinkage of estimated observed score distributions is noticed which, however, cancels out partially when actual equating function is built, because the patterns of bias are similar for each test form.

Key Words: observed score equating, item response theory, MML Bias, NEAT

Concurrent Session 3

Wednesday, May 23, 2012 10:30 am – 12:00 pm

COMBINED SESSION K:

Estimation of Controlled Direct Effects in the Presence of Exposure-Induced Confounding and Latent Variables

Tom Loeys, Beatrijs Moerkerke, An Raes, Yves Rosseel, Stijn Vansteelandt
Ghent University

Location: Classroom Building – Room 202

Estimation of the direct effect of an exposure on an outcome requires adjustment for confounders of the exposure-induced and mediator-outcome relationships. When some of these confounders are affected by the exposure,

standard regression adjustment is prone to possibly severe bias. The use of inverse probability weighting has recently been suggested as a solution in the psychological literature. In this presentation, we present G-estimation as an alternative. We show that this estimation method can be easily embedded within the structural equation modeling framework and may in particular be used for estimating direct effects in the presence of latent variables. By avoiding inverse probability weighting, it accommodates the problem of unstable weights. We illustrate the approach both by simulations and by the analysis of an empirical study on the basis of which we explore the effect of age on negativity that is not mediated by mindfulness.
Key Words: mediation, direct effect, exposure-induced confounding

Testing the Limits of Latent Class Analysis
Ingrid Carlson Wurpts, Christian Geiser
Arizona State University
Location: Classroom Building – Room 202

The purpose of this study was to examine under which conditions "good" data characteristics can compensate for "poor" characteristics in Latent Class Analysis (LCA), as well as to set forth guidelines regarding the minimum sample size and ideal number and quality of indicators. In particular, we studied to which extent including a larger number of high quality indicators can compensate for a small sample size in LCA. The results suggest that in general, larger sample size, more indicators, higher quality of indicators, and a larger covariate effect correspond to more converged and proper replications, as well as fewer boundary estimates and less parameter bias. Based on the results, it is not recommended to use LCA with sample sizes lower than N = 100, and to use many high quality indicators and at least one strong covariate when using sample sizes less than N = 500.
Key Words: latent class analysis, indicators, covariates, parameter bias, simulation study

COMBINED SESSION L:
Estimating Moderated Regression Models with Incomplete Predictor Variables
Amanda N. Baraldi, Heining Cham, Craig K. Enders
Arizona State University
Location: Classroom Building – Room 205

The last decade has seen a noticeable shift to missing data handling techniques that assume a missing at random (MAR) mechanism, notably maximum likelihood estimation and multiple imputation. Although these methods are ideally suited for many common statistical analyses, their application to moderated regression models with incomplete interaction terms is not straightforward. Maximum likelihood estimation is problematic because it necessarily excludes cases with incomplete predictor variables. To address this problem, we outline a latent variable interaction model that defines each predictor as a manifest indicator of a latent construct. The model uses a series of parameter constraints to produce estimates that are equivalent to those from a centered solution, and minor modifications to these constraints can accommodate simple slopes. In the context of multiple imputation, centering predictors prior to computing the product is unexpectedly difficult. To address this issue, we outline a novel post-imputation centering procedure that imputes variables on their raw score metrics and rescales the predictors and the product term following imputation. Importantly, the methods that we outline allow researchers to perform analyses that mirror those in Aiken and West (1991) while taking advantage of the MAR-based missing data handling approaches that are widely available in statistical software programs.
Key Words: missing data, moderated regression, interactions, multiple imputation

Multiple Imputation: An Empirical Bayes Approach for Missing Item Scores in Multilevel Cross-Classified Educational Data
Damazo T. Kadengye, Eva Ceulemans, Wim Van den Noortgate
Katholieke Universitiet Leuven, Belgium
Location: Classroom Building – Room 205

Previous research has shown that the multiple imputation (MI) approach faces challenges in giving plausible estimates of missing item scores in multilevel item-response data. The direct likelihood (DL) analysis approach on the other hand has been shown to give reliable estimates for statistics of interest in such clustered data. But MI can still have some practical advantages over the DL analysis. Through a simulation study, we propose an empirical Bayes MI approach that considers additional challenges resulting from a cross-classified multilevel data structure with substantial amounts of missing binary item scores. Results based on the proposed imputation model are compared to those obtained from the DL analysis.
Key Words: multiple imputation, direct likelihood analysis

Combining Missing-By-Design and Mixture Modelling to Assess Impact of a Community-Wide Interventions: A Social Marketing and Text Messaging Campaign to Reduce Alcohol Use Among High School Students

Emil Coman, Gisela Rots, Suzanne Suggs, Shai Fuxman, Maria Coman
Institute for Community Research

Location: Classroom Building – Room 205

We present the results of an innovative methodological approach to evaluating community-wide preventive interventions that combine individual and community levels components. It proposes the modeling of over time cross-sectional data collected from entire communities, in conjunction with post-intervention data from a small intervention group, using multiple group comparisons and mixture modeling. We illustrate a methodology to evaluate community wide preventive interventions based on a missing-by-design approach, whereby community-wide alcohol use data is gathered three times but cross-sectionally. We use mixture analyses with training data (which 'unmixes' heterogeneous populations) to uncover the potential intervention group from pre–intervention data. The multiple-group comparisons of same cohort over-time data and same-school year over time data showed significant changes in alcohol use. We were able to 'unmix' subgroups of students in the 2009 data that match (roughly) the actual number of intervention participants one year later, but we have little confidence that these subgroups are the actual intervention participants. There is a need to develop better models that predict participation into an intervention of this nature by youth.

Key Words: mixture model, missing-by-design, youth, development, alcohol use

COMBINED SESSION M:

A Procedural Framework to Detect School-Level Influences on Item Functioning Using Mimic Modeling

Shonte Y. Stephenson, Katherine E. Masyn
University of California, Berkeley

Location: Classroom Building – Room 206

Although there is much in the educational literature about school-level influences on student-level achievement, there is little to be found about school-level influences on the measurement of student achievement. Further, there are no prior published examples of the analysis steps for actually testing context differential item functioning (DIF) using a multilevel, multiple indicator and multiple causes (MIMIC) modeling approach. This paper strives to fill that gap by providing a clear and accessible approach to test for context-DIF using a two-level factor analytic model and illustrating the approach using achievement test data from a nationally-representative sample of students in schools. The presentation of the approach is intended to provide an audience of applied researchers within and outside of psychometrics with a straight-forward set of "user-friendly" analysis steps for building a multilevel context-DIF model with explanation for each step related to: 1) model specification, 2) model evaluation and 3) model interpretation.

Key Words: multilevel modeling, item response modeling, confirmatory factor analysis, differential item functioning

Measurement Scale and Growth Modeling

Yan Bibby, Siek Toon Khoo
Melbourne University

Location: Classroom Building – Room 206

This paper investigates student reading growth in three-level hierarchical models with repeated measurements within students and students within schools. The data analysed were data collected over time based on different assessments at different occasions in monitoring academic performance in the International Schools using the International Schools Assessment (ISA) instruments. The equating of tests across grades and across years made it possible to use the data for monitoring growth. The reading growths in the primary years and in the secondary years were modeled in a two-piece linear growth model to study the growths in the two stages of schooling. This was to compare the growth rates and the effects of covariates in the two periods.

Key Words: growth modeling, scale equating

Classifying Elementary Students' Reading Growth: An Application of Multilevel Growth Mixture Modeling

Karen Rambo-Hernandez
Colorado State University

Location: Classroom Building – Room 206

The purpose of this study was to use Multilevel Growth Mixture Modeling to determine empirically the number of latent classes necessary to capture the reading trajectories of approximately 180,000 students in 2000 schools. This study also separated school year and summer growth for a better picture of how schools contribute to reading growth. Latent classes were estimated at the student level but not at the school level. The model fit indices did not clearly identify the best fitting model. The six class model was selected as the best fitting model based on reasonable interpretability, entropy, class size, and latent class probabilities. The four largest classes were: 1) typical- characterized by steep school

year growth and no summer growth, 2) fast starters-very steep early growth in school, 3) reader- steady school year and summer growth, and 4) slow growth- less steep growth during the school year and no summer growth.
Key Words: multilevel modeling, growth mixture modeling, reading

COMBINED SESSION N:

Tests of Measurement Invariance Without Subgroups

Edgar Merkle, Achim Zeileis
University of Missouri

Location: Classroom Building – Room 301

The issue of measurement invariance commonly arises in factor-analytic contexts, with methods for assessment including likelihood ratio tests, Lagrange multiplier tests, and Wald tests. These tests all require advance definition of the number of groups, group membership, and offending model parameters. In this talk, we construct tests of measurement invariance based on stochastic processes of casewise derivatives of the likelihood function. These tests can be viewed as generalizations of the Lagrange multiplier test, and they are especially useful for: (1) isolating specific parameters affected by measurement invariance violations, and (2) identifying subgroups of individuals that violated measurement invariance based on a continuous auxiliary variable. The tests are presented and illustrated in detail, along with simulations examining the tests' abilities in controlled conditions.
Key Words: measurement invariance, parameter stability, factor analysis

A Bayesian Approach for Examining Invariance

H. Jane Rogers, Hariharan Swaminathan, Pei-Hsuan Chiu
University of Connecticut

Location: Classroom Building – Room 301

A structural equation model (SEM) approach for assessing differential item functioning (DIF) is presented in this paper. It is shown that assessing DIF is equivalent to assessing invariance of parameters across groups. Current procedures for examining invariance of parameters in SEM and DIF are based on asymptotic results that may not hold in some circumstances. A Bayesian approach avoids this problem. Hence a Bayesian approach for examining parameter invariance is developed and applied to assessing DIF. The complete posterior distribution of the difference in the parameters across groups is obtained using the Markov Chain Monte Carlo procedure and the invariance of parameters is examined by constructing credibility intervals for these differences. The procedure is illustrated using simulated data. The application of the Bayesian approach for examining structural invariance in SEM is described.
Key Words: SEM, DIF, bayesian procedures, MCMC

Differential Item Functioning Analysis Using a Multilevel Mixture Model

Holmes Finch, Maria Hernandez-Finch
Ball State University

Location: Classroom Building – Room 301

In many applications, differential item functioning (DIF) analysis is conducted in the context of multilevel data, where examinees are clustered within schools. Recent work has shown the importance of using multilevel models in such situations. Parallel to this work has been the use of mixture item response models to investigate DIF, which has demonstrated great promise for identifying items exhibiting DIF and for helping to explain the causes of such DIF. The current study combines these two strains of research by using a multilevel mixture item response theory model to investigate DIF. This proposed approach combines the explanatory power of mixture models with the appropriate handling of multilevel data. In addition, these models allow for inclusion of both examinee and school level variables in the identification and explanation of DIF. Analyses were conducted on a third grade language exam. Discussion focuses on advantages of the multilevel mixture item response model.
Key Words: DIF, multilevel mixture model, item response theory

An Effect Size Estimator for Uniform DIF: A Comparison of the MIMIC and the Rasch Parameterization

Ying Jin, Nicholas D. Myers, Soyeon Ahn, Randall Penfield
University of Miami

Location: Classroom Building – Room 301

The Rasch model, a member of a larger group of models within item response theory (IRT), is widely used in empirical studies. Detection of uniform differential item functioning (DIF) within the Rasch model typically employs null hypothesis testing with a concomitant consideration of effect size (e.g., signed area [SA]). Parametric equivalence between confirmatory factor analysis (CFA) under the multiple indicators, multiple causes (MIMIC) model and the Rasch model has been established. Unlike the Rasch approach to DIF, however, the parallel MIMIC approach to DIF detection has relied exclusively on null hypothesis testing. This study derived an effect size estimator for DIF under the MIMIC model (MIMIC-ES) and then investigated the ability of MIMIC-ES to correctly estimate the magnitude of DIF as compared

to the SA approach under the Rasch model (Rasch-ES) in a Monte Carlo study. Variables manipulated were sample size, mean ability difference, DIF size, and DIF contamination. Results indicated that MIMIC-ES performed as well as Rasch-ES across conditions when there was no mean ability difference. When mean ability difference was present, MIMIC-ES exhibited larger bias and mean squared error than Rasch-ES when the sample size was small for all DIF sizes regardless of DIF contamination.
Key Words: MIMIC, Rasch, DIF, effect size

COMBINED SESSION O:

Estimation of Compositional Effects: Problems with Reliability and Intraclass Correlation

Artur Pokropek
Educational Research Institute, Poland

Location: Classroom Building – Room 305

This paper introduce a problem of estimating compositional effects in multilevel framework in case of imperfect reliability of variables and existence of interclass correlation i.e. conditions which are almost always present but rarely taken into account in model specification. At first problem of bias estimation is briefly discussed. Then models for estimation compositional effect are presented (1) simple multilevel model; (2) multilevel model with analytical correction; (3) multilevel model with plausible values; (4) multilevel structural equation model with latent aggregation. Finally models are evaluated by simulation studies. Model (1) consistently produced excessive bias across all studied conditions, in some cases leading to artifictual results. Other models reduce bias significantly but each of them has some minor drawbacks.
Key Words: compositional effects, multilevel, plausible values, SEM

The Effects of Omitted Variables in Multilevel Model Analysis

Davood Tofighi, Stephen G. West, David P. MacKinnon
Georgia Institute of Technology

Location: Classroom Building – Room 305

Multilevel mediation analysis examines the effect of an independent variable on an outcome achieved by targeting and changing an intervening variable in clustered data. We study analytically and through simulation the effects of an omitted variable at Level 2 on a 1-1-1 mediation model for a randomized experiment conducted within clusters in which the treatment, mediator, and outcome are all measured at Level 1. When the residuals in the equations for the mediator and the outcome variables are fully orthogonal, the two methods of calculating the indirect effect (ab, c – c') are equivalent at the between- and within-cluster levels. Omitting a variable at Level 2 changes the interpretation of the mediated effect and will induce correlations between the random intercepts or random slopes. The equality of within-cluster ab and c – c' no longer holds. Correlation between random slopes implies that the within-cluster mediated effect is conditional, interpretable at the grand mean level of the omitted variable.
Key Words: multilevel mediation, centering, omitted variables, correlated residuals

Approaches to Testing Treatment Effects for Partially Nested Cluster Randomized Trials

Elizabeth A. Sanders
University of Washington

Location: Classroom Building – Room 305

The proposed talk explores the relative merits of four modeling approaches to testing the treatment effect in an experiment with treatment clusters being compared to ungrouped individual controls, otherwise known as partially nested cluster randomized designs. The four strategies examined include three ways of treating the control condition and two models. A Monte Carlo simulation program was constructed in SAS 9.2 to evaluate the strategies in terms of the treatment effect test performance using small samples (N=40 with n=20 in each experimental condition), across 96 conditions comprising six levels of treatment intraclass correlations, four levels of effect sizes, and four combinations of number of treatment clusters:cluster sizes. In brief, results from the study showed that, under most realistic conditions, treating controls as singleton clusters in a model that uses a random treatment slope (the fourth strategy), is preferred for controlling Type I error and achieving the greatest power.
Key Words: randomized trial, partial nesting, multilevel modeling

A Fuzzy Multilevel Regression with an Application

Francisco Gutierrez, Piedad Castro
Universidad Nacional de Colombia

Location: Classroom Building – Room 305

We present a fuzzy multilevel tool, discuss its scope of application, and apply it to a concrete dataset, comparing the results it yields with those obtained with a standard crisp multilevel model. The main contributions of the paper are the following:

a. The development of a fuzzy multilevel regression tool (from now on FMR), based on Hojati et. al. (2005)

b. The respective tool ready to use, programmed in Mathematica®

c. The development of a measure of goodness of fit for fuzzy regressions

d. A comparison of the results yielded by the application of our FMR, and of those produced by a crisp multilevel, to the labor data of Bliese and Halverson (1996)

Key Words: multilevel regression, goodness of fit

COMBINED SESSION P:

Comparing a Class of Statistical Models in Analyzing Skewed Longitudinal Count Data with Many Zeros: An Application from Mental Health Services and Outcome Research

Haiyi Xie, Jill Tao, Gregory J. McHugo, Robert E. Drake
Dartmouth Medical School

Location: Classroom Building – Room 306

Zero-adjusting models, especially zero-inflated models, have become increasingly popular in analyzing count data with extra zeros. In this paper, we compared five models commonly used to analyze count data by analyzing a longitudinal outcome: number of smoking quit attempts from the New Hampshire Dual Disorder Study. The results of our study indicated that count data with many zeros do not necessarily require zero-inflated or other zero-adjusting models. For rare event counts, or count data with small means, a simpler model such as the negative binomial model may provide a better fit.

Key Words: count data with extra zeros, Poisson model, negative binomial model, zero-inflated Poisson model, zero-inflated negative binomial model, hurdle model

Modeling Longitudinal Continuous Variables with Many Zeros

Shu Xu, Shelley A. Blozis, Donna L. Coffman
Pennsylvania State Univeristy

Location: Classroom Building – Room 306

Longitudinal data with a big proportion of zeros and a continuous positive distribution are getting prominent in social science research. Alternative models considered in this article are: a growth curve model, a Tobit latent growth model, and a two-part latent growth model. These methods have been applied in longitudinal continuous data with many zeros in literature. We explain assumptions of each model, model estimation, and interpretation of parameter estimates of each model.

Key Words: longitudinal data, many zeros, Tobit growth curve model, two-part growth curve model

Application of a Hierarchical Generalized Linear Model to Cutscore Estimation of Clinical Skills Performance on a National Medical Licensure Examination

William L. Roberts
National Board of Osteopathic Medical Examiners, Inc.

Location: Classroom Building – Room 306

Licensure examination performance standards ensure competency of students preparing to enter the medical profession. Cutscore validation is defended by the standard setting exercise and the method of estimation. The purpose of this study is to investigate the functional relationship between the score distribution of written clinical skills performance on a medical licensure examination and judgments of competency by standard setting panelists using the hierarchical generalized linear model (HGLM). It is hoped that these findings will not only provide useful information for the present testing program, but all high-stakes standard setting activities that involve judges from broad backgrounds and experiences.

Key Words: hierarchical generalized linear model, standard setting, validity, written communication, medical licensure examination

Fitting Ordinal Logistic Regression Models with Complex Survey Data Using Stata

Xing Liu
Eastern Connecticut State University

Location: Classroom Building – Room 306

The conventional proportional odds (PO) model assumes that the data are collected using simple random sampling by which each sampling unit has the equal probability of being selected from the population. However, since the complex survey sampling designs involve the use of different strata (e.g., geographic areas), clustered sampling techniques, and unequal selection probabilities, it is inappropriate to conduct ordinal logistic regression analyses without taking the survey sampling designs into account. Failing to do so may lead to biased estimates of parameters and incorrect variance estimates (Lee & Forthofer, 2006; Levy & Lemeshow, 2008). The purpose of this paper is to illustrate the use of ordinal logistic regression models with complex survey data to predict mathematics proficiency levels using Stata, and compare the results of PO models accommodating and not accommodating survey sampling features, such as

stratification, clustering and weights. The linearization method (Taylor series approximation), which is the default method in Stata, was used to estimate the sampling variance for the complex survey data.
Key Words: ordinal logistic regression, PO models, complex survey design, linearization, Stata

Concurrent Session 4

Wednesday, May 23, 2012 1:30 pm – 2:40 pm

Universal Structure Modeling: Fulfilling Wolds' Vision of a Path Modeling Without Unfounded Assumptions
Frank Buckler
University of Muenster
Location: Classroom Building – Room 202

Wold introduced PLS path modeling in order to minimize requirements for assumptions in composite-based path modeling as an alternative to covariance-based structure equation modeling. The assumptions that remained are those of homogeneous data, linear relationships and independency of paths. The author propose a procedure based on Neural Networks that make those assumptions obsolete. Monte Carlo simulations and real data application indicate major significance for social science as well as managerial practice.
Key Words: nonlinearity, interactions, PLS path modeling, neural networks, universal structure modeling

Novel Applications of Semi-Parametric Mixture Models to Psychological Data
Danielle Dean, Nisha Gottfredson
University of North Carolina at Chapel Hill
Location: Classroom Building – Room 205

The proposed two-talk symposium consists of two data analysis applications that utilize novel semi-parametric methodologies for analyzing longitudinal data. The first talk briefly describes a new approach for testing the sensitivity of growth model parameter estimates to non-ignorable missingness. Results from a simulation study will be touched on briefly, but the bulk of the talk will discuss an empirical analysis of longitudinal psychiatric symptoms from the Great Smoky Mountain Study, contrasting results from the Shared Parameter Mixture Model to results obtained using a traditional growth model. The second talk will introduce a new method for simultaneously analyzing multiple survival processes while avoiding parametric assumptions about the relations between these processes. The method will be illustrated using data on emerging adulthood from the National Longitudinal Study of Adolescent Health. We hope that the symposium will spark interest in applying mixture models indirectly / semi-parametrically across a broad range of analytic settings.
Key Words: semi-parametric, mixture, longitudinal, missing, survival

Statistical Analysis of Populations with Interacting and Interfering Units
Edoardo Airoldi
Harvard University
Location: Classroom Building – Room 206

A number of scientific endeavors of national and international interest today involve populations with interacting and/or interfering units. In these problems, a collection of partial measurements about patterns of interaction and interference (e.g., social structure and familial relations) is available, in addition to the more traditional measurements about unit-level outcomes and covariates. Formal statistical models for the analysis of this type of data have emerged as a major topic of interest in diverse areas of study. In this tutorial, I will review a few ideas and open areas of research that are central to this burgeoning literature, placing emphasis on inference and other core statistical issues. Topics include elements of sampling and inference from non-ignorable (network sampling) designs, parametric and nonparametric modeling, and estimation of latent processes on a network, with hints to the applications to social, biological and information networks that motivate these statistical problems.
Key Words: sampling, inference, non-ignorable designs, modeling

COMBINED SESSION Q:
Depicting Estimates Using the Intercept in Meta-Regression Models: The Moving Constant Technique
Blair T. Johnson, Tania B. Huedo-Medina
University of Connecticut
Location: Classroom Building – Room 301

This talk details how to move the constant in meta-regression models in order to illuminate the effect-size patterns across a range of complexities. Although commonly ignored in practice, the constant (or intercept) in such

models can be indispensable when it is not relegated to its usual static role. The moving constant technique makes possible estimates and confidence intervals at moderator levels of interest as well as continuous confidence bands around the meta-regression line itself. Such estimates can be crucial to interpret the nature of the phenomenon being studied in the meta-analysis, especially when a comparison to an absolute or a practical criterion is the goal or when the goal is to project results to hypothetical or idealized ranges (e.g., high methodological quality in the meta-analyzed studies). Examples ranging from simple to complex models illustrate these principles. Limitations and extensions of the strategy are discussed.
Key Words: meta-regression, meta-analysis regression, point estimates, confidence bands, confidence intervals

A Comparison of Statistical Models for Multiple Treatment-Groups Meta-Analysis
Paul R. Hernandez, H. Jane Rogers, H. Swaminathan, Tania B. Huedo-Medina, Blair T. Johnson
Colorado State University
Location: Classroom Building – Room 301

Multivariate meta-analytic regression (MMR) is the recommended approach for conducting fixed effects multiple treatment-groups meta-analysis; but is underutilized by substantive researchers. This study compared MMR and structural equation modeling (SEM) approaches to conducting multiple treatment-groups meta-analysis (MTMA). The critical difference between these methods concerned estimation of the within-study covariance between effect sizes. We conducted a Monte Carlo simulation study to compare estimates of the within-study correlation and hypothesis tests of the difference between treatment effects. Results for the correlation estimate indicated that MMR tended to underestimate; while SEM tended to (slightly) overestimate. Consequently, only the MMR Z test and SEM equality constraint approach exhibited acceptable error rates. Therefore, assuming conditions similar to the Monte Carlo study, we recommend MMR when the number of studies is small, but SEM when the number of studies is moderate and when the proportion of missingness is moderate.
Key Words: meta-analysis, multivariate, SEM, Monte Carlo

COMBINED SESSION R:
Using Latent Difference Scores to Examine the Relationship Between Visual Attention and Oral Language Development in Young Deaf Children Following Cochlear Implantation
David H. Barker, Alexandra L. Quittner, Ivette Cruz, John Niparko, CDaCI Investigative Team
Alpert Medical School, Brown University
Location: Classroom Building – Room 302

Early childhood deafness has been shown to result in poorer performance on visual attention tasks during childhood. Two distinct yet complimentary mechanisms have been proposed to account for this decreased performance. These two mechanisms lead to different predictions about the relationships between the development of language and visual attention. This study used latent difference score modeling to examine the relationships between oral language development following cochlear implantation and three attention tasks that were differentially influenced by these two mechanisms and should, therefore, result in different relationships with language.
Key Words: latent difference scores, child development, language

Predicting Oral Language Growth over Four Years in Deaf Children Using Cochlear Implants and Hearing Controls
David H. Barker, Alexandra L. Quittner, Ivette Cruz, John Niparko, CDaCI Investigative Team
Alpert Medical School, Brown University
Location: Classroom Building – Room 302

Modeling language for the Childhood Development after Cochlear Implantation study has been complicated by the large range of language performance of children enrolled in the study. Children receiving implantations showed significant variability in language ability following implantation, while their normal hearing peers showed typical language development. Additionally, age of enrollment was also variable, ranging from 5 to 60 months. Multiple language measures were used to assess the full range of language ability. After trying a number of approaches including latent difference score modeling and growth modeling of latent factors with changing indicators over time. We used the language age estimates based on normative samples to provide a common metric for each language measure and used multilevel modeling to address the questions of this study.
Key Words: child development, growth modeling

Latent Variable Analysis of Hearing Measurements: Geno-Phenotype Relationships in an Older Adult Sample

Laurel M. Fisher, Dina Newman, Rick Friedman, Robert Frisina
House Research Institute

Location: Classroom Building – Room 302

Purpose: To determine if latent variable phenotypes of hearing would show associations with genotype information.

Background: Age-related hearing impairment has been associated with several genes. Hearing loss studies have used transformations of pure-tone threshold data to define the phenotype. To improve understanding of genotype-phenotype relationships within ARHI, we propose to construct phenotype using multivariate techniques to model the auditory system. A latent variable analysis of a novel dataset, suggested 3 latent variables or phenotypes describe age-related hearing loss.

Methods: The subjects were community-dwelling older adults who took a hearing test battery. Mplus was used to model the data.

Significance: The analysis provides support for the use of multiple measures of hearing when selecting phenotypes for input to a genotype analysis. Hearing is not solely defined by pure-tone threshold measurements. Genotype information can be associated with specific forms of age-related hearing changes here the high frequency latent variable.

Key Words: hearing, genotype, phenotype, latent

COMBINED SESSION S:

Comparative Effects of Initial HMG-Co-A-Reductase Inhibitor ("Statin") Choice on Depression Levels in People Living with HIV: An Illustration of Analytic Issues Raised by Using Patient Reported Outcomes (PROs) in a Comparative Effectiveness Framework

Paul K. Crane, Betsy J. Feldman, Laura E. Gibbons, Shubhabrata Mukherjee, Donald L. Patrick, J.A.C Delaney, Heidi M. Crane
University of Washington

Location: Classroom Building – Room 305

Comparative effectiveness research (CER) is needed to inform evidence-based clinical decision-making. Typically, CER considers outcomes such as mortality, morbidity, or laboratory values, but a comprehensive evidence base requires that CER consider patient reported data or outcomes (PROs), as well. PROs can include data on psychological distress, substance use, and other unobserved outcomes. To demonstrate how CER might incorporate these outcomes, we studied the comparative effects of statins on depression in people living with HIV. We illustrated practical and analytic challenges that must be addressed when using use PROs in a CER framework. These challenges include the latent nature of depression and unequal measurement precision, non-random assignment to different statins, and unequal frequency of follow-up. We demonstrate the incorporation of these considerations in a single analysis, utilizing item response theory, plausible values, propensity weights, and weights based on the probability of followup visits.

Key Words: comparative effectiveness research, inverse probability weighting, plausible values, HIV, depression

Trajectories of Posttraumatic Stress Symptoms Among Children After a Natural Disaster (Hurricane Andrew)

Betty Lai, Annette La Greca, Maria Llabre
University of Miami

Location: Classroom Building – Room 305

This study utilized growth mixture modeling to examine patterns of risk and resilience in children's posttraumatic stress (PTS) trajectories after a natural disaster (Hurricane Andrew).

Disasters are associated with PTS reactions among children. However, it remains unclear how children's PTS symptoms change over time after a disaster and whether children exhibit different patterns of disaster response. Participants were 568 children (55% girls; grades 3 – 5) from South Florida, directly affected by Hurricane Andrew. Children were assessed at 3-, 7-, and 10-months postdisaster using standardized measures. Three latent trajectory classes were identified: resilient (42%), recovering (42%), and chronic PTS (16%). Risk factors significantly related to latent class membership included: perceived life threat, immediate loss and disruption, stressful life events, and anxiety. This is the first study to examine children's trajectories of PTS reactions following a natural disaster. Findings have important implications for researchers and for the delivery of postdisaster psychological services.

Key Words: growth mixture modeling, posttraumatic stress, disasters

Alcohol Use Behaviors from Adolescence to Young Adulthood: An Application of Structural Equation Modeling

Grace Chan, Victor Hesselbrock, Michie Hesselbrock
UCHC

Location: Classroom Building – Room 305

Objective: To identify pathways from adolescent behaviors to young adulthood pathological alcohol use.

Methods: A three-wave prospective study was conducted in the Greater Hartford Connecticut Area. Participants: (n = 338, 44% male) were recruited from high schools and youth organizations. Mean (SD) age at waves 1 to 3 were 16.5 (1.6), 21.2 (1.6), and 26.0 (1.7) years old, respectively. Subjects completed a battery of semi-structured interviews, tests, and self-reported questionnaires. Structural equation model (SEM) was employed to evaluate models under the deviance proneness/problem behavior framework.

Results: A number of pathways were identified. One of them was: Paternal substance dependence/antisocial personality disorder predicted adolescence sensation seeking behaviors, which predicted late-adolescence positive alcohol expectancy, which ultimately predicted young adulthood pathological alcohol involvement.

Conclusions: The pathways to young adulthood pathological alcohol involvement were influenced by family history, childhood/adolescence characteristics, peer-and-family environment as well as expectancy and early experience with substances.

Key Words: SEM, pathological alcohol use

Speaker Contact Information

Name	Email Address
Aaron Boulton	aboulton@ku.edu
Alexander M. Schoemann	schoemann@ku.edu
Allison Jennifer Ames	a.ames1@umiami.edu
Amanda Baraldi	Amanda.Baraldi@asu.edu
Anne M. Fairlie	afairlie@my.uri.edu
Arnond Sakworawich	arnond.s@gmail.com
Artur Pokropek	artur.pokropek@gmail.com
Bartosz Kondratek	b.kondratek@ibe.edu.pl
Beatrijs Moerkerke	Beatrijs.Moerkerke@UGent.be
Betsy J. Feldman	bjfeld@washington.edu
Betty Lai	bettylai10@yahoo.com
Blair T. Johnson	blair.t.johnson@uconn.edu
Chris Rhoads	Christopher.rhoads@uconn.edu
Christian Geiser	christian.geiser@usu.edu
Christopher P. Cerasoli	cerasolic@gmail.com
Damazo T. Kadengye	trevor.kadengye@kuleuven-kortrijk.be
Danielle Dean	deand@email.unc.edu
David H. Barker	david_barker@brown.edu
David Kenny	DAVID.KENNY@uconn.edu
Davood Tofighi	dtofighi@psych.gatech.edu
Edgar Merkle	merklee@missouri.edu
Edoardo M. Airoldi	airoldi@fas.harvard.edu
Elizabeth A. Sanders	lizz@uw.edu
Emil Coman	Emil.Coman@icrweb.org
Francisco Gutierrez	fgutiers2002@yahoo.com
Frank Buckler	buckler@neusrel.de
Glen Davenport	glen.davenport@uconn.edu
Grace Chan	gchan@uchc.edu
H. Jane Rogers	jane.rogers@uconn.edu
Haiyi Xie	haiyi.Xie@dartmouth.edu
Holmes Finch	whfinch@bsu.edu
Hui Jiang	jiang.200@buckeyemail.osu.edu
Ingrid Carlson Wurpts	ingrid.wurpts@asu.edu
Jonathan Schweig	jonschweig@ucla.edu
Karen E. Rambo-Hernandez	karen.rambo_hernandez@colostate.edu
Katherine E. Masyn	masynka@gse.harvard.edu
Katherine Picho	edpsychresearch@gmail.com
Laurel Fisher	lfisher@hei.org
Lisa McCrink	lmccrink01@qub.ac.uk
Mariola Moeyaert	Mariola.Moeyaert@ped.kuleuven.be
Mariya Shiyko	m.shiyko@neu.edu
Michael Hallquist	hallquistmn@upmc.edu

Mijke Rhemtulla	mijke@ku.edu
Njål Foldnes	njal.foldnes@bi.no
Ofer Harel	ofer.harel@uconn.edu
Patricia Brosseau-Liard	patricia@psych.ubc.ca
Paul R. Hernandez	paul.hernandez@colostate.edu
Pierre-Olivier	pierre-olivier.bedard.2@ulaval.ca
Rafael R. Ramirez Ph.D.	rafael.ramirez7@upr.edu
Randi Garcia	randigarcia@gmail.com
Rebecca J. Bulotsky-Shearer	rshearer@miami.edu
Robert E. Larzelere	robert.larzelere@okstate.edu
Samuel Iddi	samuel.iddi@med.kuleuven.be
Sara K. Johnson	sarakassiejohnson@gmail.com
Shan Hu	shan.hu@uconn.edu
Shonte Y. Stephenson	sstephenson@berkeley.edu
Shu Xu	szx1@psu.edu
Steven Kramer	skramer1958@verizon.net
Tania B. Huedo-Medina	tania.huedo-medina@uconn.edu
Terrence D. Jorgensen	tdj@ku.edu
Thomas Ledermann	thomas.ledermann@unibas.ch
Walter Leite	walter.leite@coe.ufl.edu
William L. Roberts	broberts@nbome.org
Xing Liu	liux@easternct.edu
Yan Bibby	bibby@acer.edu.au
Yeonsoo Yoo	yeonsoo.yoo@uconn.edu
Ying Jin	y.jin2@umiami.edu
Yves Rosseel	Yves.Rosseel@UGent.be

Modern Modeling Methods Conference

May 21-22, 2013

University of Connecticut

The Modern Modeling Methods (M_3) conference is an interdisciplinary conference designed to showcase the latest modeling methods and to present research related to these methodologies.

Call for Papers- Proposals due January 25, 2013

The Modern Modeling Methods Conference (M3) will be held at the University of Connecticut on May 21-22, 2013. We are currently soliciting both methodological research papers and papers that illustrate methodological techniques in the area of modeling, broadly defined. Papers related to multilevel modeling, structural equation modeling, mixture modeling, and longitudinal modeling are especially encouraged. The deadline for submissions is January 25, 2013. Methodological research proposals should be no longer than 1000 words and should include purpose, background, methods, results, discussion, and significance. Methodological illustration papers should be no longer than 1000 words and should include a description of the methodology to be illustrated as well as an outline of the paper/talk. Please include a 100-150 word abstract to be used for the conference program.

For more information about the conference, or to submit a proposal, go to www.modeling.uconn.edu. If you have questions, please email D. Betsy McCoach at betsy.mccoach@uconn.edu.

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Seats are still available for the following two workshops:

Modern Approaches to Missing Data — June 4-8, 2012

Instructors: Ofer Harel, Gregory Matthews
Web address: http://datic.uconn.edu/


Missing data is a common complication in applied research, however, many practitioners are still ignoring this problem. Numerous examples from missing data literature demonstrate that dealing with missing data correctly is very important. Failure to correctly account for missing data creates many potential problems, including biased results, reduced power and inefficient estimates. Multiple Imputation (MI) is a comprehensive method used to handle problems of analyzing incomplete data. This workshop will introduce the vocabulary and main assumptions in the missing data literature followed by the introduction of the main ideas of MI with an emphasis on practical implementation of both fully and semi-parametric procedures. R, an open source (free) statistical software, which has steadily gained in popularity, will be introduced and used as the main statistical software for implementing imputation.

Dyadic Analysis Using SEM — June 25-29, 2012

Instructors: David A. Kenny, Randi Garcia, & Tessa V. West
Web address: http://datic.uconn.edu/workshop-dyadic.cfm



The workshop on dyadic data analysis will focus on data where both members of a dyad are measured on the same set of variables. Among the topics to be covered are the measurement of nonindependence, the actor-partner interdependence and common fate models, mediation and moderation of dyadic effects, and growth curve models of dyadic data. Most of the focus is on distinguishable dyads (e.g., husbands and wives). The software package used in the workshop will be Amos, and it is presumed that participants have some familiarity with Structural Equation Modeling (e.g., model specification, chi square difference, and model fit).

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To register for any of these workshops, please go to http://www.datic.uconn.edu/

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