TWO MPLUS SHORT COURSES:

REGRESSION AND MEDIATION ANALYSIS USING MPLUS (AUGUST 16)

AND

DYNAMIC STRUCTURAL EQUATION MODELING OF INTENSIVE LONGITUDINAL DATA

USING MPLUS VERSION 8 (AUGUST 17-18)

Location and hours:

The courses take place at the Johns Hopkins University, Baltimore, Maryland. The room location for all three days is Sheldon Hall, which is on the first floor of the Bloomberg School of Public Health building at 615 N. Wolfe Street. Participants will need to enter the School of Public Health building via the Monument Street entrance which is located between Wolfe and Washington Streets. The courses will be held 8:30am – 5:30pm.

Fees:

Registration fees are as follows. Early bird rates: $25/day for students and postdocs, $75/day for others. Later registration: $50 for students and postdocs, $150 for others.

Participants can register for either or both courses. Registration information is forthcoming.

REGRESSION AND MEDIATION ANALYSIS USING MPLUS (AUGUST 16)

Presenters:

Bengt Muthen (Muthen & Muthen) and Marten Schultzberg (Uppsala University).

Description:

This course is based on the new book by Bengt Muthen, Linda Muthen, and Tihomir Asparouhov; see:

http://www.statmodel.com/Mplus_Book.shtml

The course covers the basic building blocks used in the general latent variable modeling framework of Mplus. The focus is on regression modeling which is part of many different types of analyses such as mediation analysis, factor analysis, Item Response Theory analysis, growth modeling, mixture modeling, and multilevel modeling. In addition to regression with a continuous dependent variable, this involves building blocks for binary, ordinal, nominal, count, and censored dependent variable using logistic, probit, multinomial logistic, Poisson, zero-inflated Poisson, negative binomial, censored-normal (Tobit), censored-inflated, Heckman, and two-part modeling.

The course covers the modern treatment of mediation analysis using counterfactually-defined causal effects. A unique feature is an emphasis on mediation with binary, ordinal, nominal, count, and censored mediators and outcomes, avoiding shortcomings of traditional effect definitions.

The course gives an introduction to Bayesian analysis as implemented in Mplus. Examples of Bayesian advantages over maximum-likelihood estimation are discussed. An introduction is also given to missing data analysis under MCAR, MAR, and NMAR assumptions using maximum-likelihood and Bayesian analysis. A particular emphasis is on missing data for covariates including covariates that are binary.

Mplus inputs and outputs are discussed for a multitude of real-data examples as well as for Monte Carlo simulations.

Course outline:

- Linear regression with an interaction (LOOP PLOT options; 95% confidence bands for moderation)
- Heteroscedasticity modeling using MODEL CONSTRAINT and random effects
- Censored variable modeling: Tobit, censored-inflated, Heckman, and two-part analysis
- Bayes: Advantages over ML. Missing data on covariates and mediators
- Moderated mediation with continuous mediator and outcome
- Monte Carlo simulation of moderated mediation
- Sensitivity analysis (mediator-outcome confounding)
- Mediation analysis using counterfactually-defined indirect and direct causal effects for binary, count, and two-part outcomes

Prerequisites:

Participants benefit the most from the course if they have background knowledge of linear, logistic, and probit regression corresponding to Chapters 1 and 5 of the Muthen, Muthen & Asparouhov book.

Computing:

Participants need not carry out any Mplus computer runs during this course.

DYNAMIC STRUCTURAL EQUATION MODELING OF INTENSIVE LONGITUDINAL DATA

USING MPLUS VERSION 8 (AUGUST 17-18)

Presenters:

Bengt Muthen (Muthen & Muthen), Tihomir Asparouhov (Muthen & Muthen), and Ellen Hamaker (Utrecht University)

Description:

Mplus Version 8 features new methods for analyzing intensive longitudinal data such as that obtained with ecological momentary assessments, experience sampling methods, daily diary methods, and ambulatory assessments. Typically, such data have a large number of time points, T = 20-150. Single-level (N=1) as well as multilevel (N > 1) models with random effects varying across subjects are discussed. The focus is on time series analyses with auto-regressive and moving-average components both for observed-variable models such as regression and cross-lagged analysis and for latent-variable models such as factor analysis, structural equation modeling, IRT, and mixture modeling. Applications to be discussed include:

- multilevel AR(1) model with random mean, random AR, and random variance
- multilevel ARMA(1,1) model
- latent multilevel AR(1) model with multiple indicators
- latent multilevel VAR(1) model and dynamical networks
- dynamic SEM
- dynamic latent class analysis using hidden Markov and Markov-switching AR models

The Dynamic Structural Equation Modeling (DSEM) framework that is implemented in Mplus Version 8 uses time series models for observed and latent variables to account for the dependencies between observations over time. Such models are applied extensively in engineering and econometrics. In most such applications however multivariate time series data of a single case (i.e., N=1) are analyzed. In contrast, the intensive longitudinal data that are currently gathered in the social sciences typically come from a relatively large sample of individuals, which gives rise to a need for statistical techniques that allow us to analyze the time series data from multiple independent individuals simultaneously. Such an approach is based on borrowing information from other cases, while keeping the model flexible enough to allow for subject-specific model parameters. The DSEM framework implemented in Mplus accommodates this more complex modeling need. The DSEM model is a two-level Bayesian extension of the dynamic factor model described in Molenaar (1985), Zhang and Nesselroade (2007) and Zhang et al. (2008). A further development is a time series extension of the existing multilevel mixture framework in Mplus. This makes it possible to analyze hidden Markov models with random transition probabilities and also multilevel regime-switching state-space models.

Course outline:

The August 17-18 workshop will discuss statistical background, applications, and Mplus input specifications. The two days are structured as follows.

- Introduction Part 1: The relationships between auto-regressive modeling, latent growth curve modeling, and multilevel time series modeling
- Introduction Part 2: Time series analysis and state-space modeling
- Statistical background: General model, assumptions, and Bayesian estimation
- Applications with observed variables: Regression and cross-lagged analysis
- Applications with latent variables: Measurement error, Dynamic SEM, IRT

- Applications of change across time: TVEM and intervention analysis
- Applications with latent class variables: Time series LCA and LTA

Prerequisites:

Participants benefit the most from the course if they have background knowledge of growth and multilevel modeling corresponding to Topics 3, 4, 7, and 8 of the Mplus Short Course videos and handouts at http://www.statmodel.com/course_materials.shtml It is also useful to have a basic understanding of Bayesian analysis corresponding to Chapter 9 of the Muthen, Muthen & Asparouhov book or Topic 9 of our Mplus Short Courses.

Computing:

Participants need not carry out any Mplus computer runs during this course.

Presenter bios:

Bengt Muthén obtained his Ph.D. in Statistics at the University of Uppsala, Sweden and is Professor Emeritus at UCLA. He was the 1988-89 President of the Psychometric Society and the 2011 recipient of the Psychometric Society's Lifetime Achievement Award. He has published extensively on latent variable modeling.

Tihomir Asparouhov obtained his Ph.D. in Mathematics at the California Institute of Technology and has been a part of the Mplus team for 16 years. His research interests are in the area of structural equation modeling, dynamic modeling, complex survey analysis, multilevel modeling, survival analysis, and Bayesian analysis. He has published in journals such as Psychological Methods and Structural Equation Modeling.

Ellen Hamaker obtained her Ph.D. in Psychology at the University of Amsterdam under the supervision of Peter Molenaar, and currently works as associate professor at the Department of Methodology and Statistics, Faculty of Social Sciences, Utrecht University. Her expertise covers time series analysis, state-space modeling, longitudinal multilevel modeling, panel modeling, and structural equation modeling. She has been collaborating with the Mplus team since early 2016 to develop and implement Dynamic Structural Equation Modeling (DSEM) in Mplus 8.

Marten Schultzberg is a graduate student in the Ph.D. program of the Statistics Department of Uppsala University, Sweden. His Master's Thesis developed methods for counterfactually-defined indirect and direct causal effects in mediation analysis using two-part modeling of mediators and/or outcomes with strong floor or ceiling effects.