

Workshop on Latent Variable Modeling with Mplus

by Bengt and Linda Muthén

September 10, 11 & 12, 2007 - School of Economics, Florence (Italy)

The courses will be taught from 8:30am to 6:00 pm each day (see [schedule](#) for details).
The official language of the workshop is English.

This three-day workshop discusses advances in latent variable modeling made possible by the general modeling framework of the [Mplus](#) program. The generality of the [Mplus](#) framework comes from the unique use of both continuous and categorical latent variables. While continuous latent variables have seen frequent use in factor analysis, structural equation modeling, and random effects growth modeling, modeling that includes categorical latent variables is less widespread. The workshop focuses on models that use categorical latent variables, either alone or together with continuous latent variables. The theme is the use of categorical latent variables to represent latent classes corresponding to different groups of individuals and latent trajectory classes corresponding to different types of development. An overview of conventional and new techniques is given. For each [topic](#), issues of model specification, identification, estimation, testing, and model modification are discussed. Several examples are examined. Modeling strategies are presented. [Mplus](#) input setups are provided and [Mplus](#) output is used for interpretation of analysis results. The presentation is in lecture format with no need for computer analyses. Prerequisites: Intermediate understanding of latent variable structural equation modeling or multilevel modeling. Familiarity with categorical data analysis, especially logistic regression.

Instructors:

[Bengt Muthén and Linda Muthén](#)

Topics:

Day 1 (September 10, 2007)

Observed And Latent Categorical Variable Modeling Using [Mplus](#)

- Overview of logit, multinomial logit, probit, censored-normal, Poisson, and zero-inflated Poisson regression
- Regression mixture analysis

- Non-compliance and Complier-average causal effect (CACE) estimation in randomized trials
- Latent class analysis
- Latent class analysis with covariates
- Confirmatory latent class analysis
- Twin modeling
- Violations of conditional independence
- Factor (IRT) mixture modeling

Day 2 (September 11, 2007)

Longitudinal Modeling Using [Mplus](#)

- Hidden Markov modeling, latent transition analysis
- Growth modeling with random effects
- Latent class growth analysis
- Growth mixture modeling with latent trajectory classes
- Randomized trials and treatment effects varying across latent trajectory classes
- Latent class growth analysis vs. growth mixture modeling
- Survival analysis

Day 3 (September 12, 2007)

Multilevel Modeling Using [Mplus](#)

- Complex survey data analysis
- Two-level regression analysis
- Two-level structural equation modeling
- Multivariate approach to multilevel modeling
- Two-level growth modeling (3-level analysis)
- Latent class variables on level 1 and level 2
- Two-level latent transition analysis
- Two-level growth mixture modeling

Background: suggested papers

to download the papers click here: http://www.statmodel.com/papers_date.shtml

Introductory:

Muthén, B. & Muthén, L. (2000). Integrating person-centered and variable-centered analyses: Growth mixture modeling with latent trajectory classes. *Alcoholism: Clinical and Experimental Research*, 24, 882-891.

Muthén, B. & Asparouhov, T. (2006). Item response mixture modeling: Application to tobacco dependence criteria. *Addictive Behaviors*, 31, 1050-1066.

Nylund, K. (2007). Latent transition analysis: Modeling extensions and an application to peer victimization. Doctoral dissertation, University of California, Los Angeles.

Muthén, B. (2001). Latent variable mixture modeling. In G. A. Marcoulides & R. E. Schumacker (eds.), *New Developments and Techniques in Structural Equation Modeling* (pp. 1-33). Lawrence Erlbaum Associates.

Kreuter, F. & Muthen, B. (2007). Analyzing criminal trajectory profiles: Bridging multilevel and group-based approaches using growth mixture modeling. Forthcoming in *Journal of Quantitative Criminology* (with commentary).

Intermediate:

Muthén, B. (2002). Beyond SEM: General latent variable modeling. *Behaviormetrika*, 29, 81-117.

Muthén, B. (2004). Latent variable analysis: Growth mixture modeling and related techniques for longitudinal data. In D. Kaplan (ed.), *Handbook of quantitative methodology for the social sciences* (pp. 345-368). Newbury Park, CA: Sage Publications.

Muthén, B. (2006). Latent variable hybrids: Overview of old and new models. Forthcoming in Hancock, G. R., & Samuelsen, K. M. (Eds.). (2007). *Advances in latent variable mixture models*. Charlotte, NC: Information Age Publishing, Inc.

Advanced:

Muthén, B. & Asparouhov, T. (2007). Growth mixture modeling: Analysis with non-Gaussian random effects. Forthcoming in Fitzmaurice, G., Davidian, M., Verbeke, G. & Molenberghs, G. (eds.), *Advances in Longitudinal Data Analysis*. Chapman & Hall/CRC Press.

Asparouhov, T. & Muthen, B. (2006). Multilevel mixture models. Forthcoming in Hancock, G. R., & Samuelsen, K. M. (Eds.). (2007). *Advances in latent variable mixture models*. Charlotte, NC: Information Age Publishing, Inc.