Multilevel Modeling Using Stata and HLM

Location: QICSS, 3535 Queen-Mary, Suite 420, Montréal
Dates: June 13-17, 2011

Financial support for this Data Training School is provided by the Population Change and Lifecourse Strategic Knowledge Cluster, the Fonds québécois de la recherche sur la société et la culture and QICSS' seven university members[1].

Course objectives and content

This course will cover one of a family of statistical methods for analyzing clustered data, multilevel modeling. This clustering may consist of individual cases grouped into units such as classrooms, cities, or countries in the cross-sectional case, or repeated observations clustered within individual cases, in the longitudinal case. The course will deal with a number of estimation methods for both continuous and categorical dependent variables within the multilevel framework. The approach taken in the course will emphasize logic of the methods and interpretation of results rather than the mathematical underpinnings of the models.

Trainer

The workshop will be taught by Dr. Richard Wanner, Professor of Sociology and Academic Director of the Prairie Regional Research Data Centre at the University of Calgary. He may be reached at wanner@ucalgary.ca.

General course information

All sessions will be in English. Lectures on the topics listed below will be held mornings from 9:00 to 12:00. Afternoons from 1:00 to 4:00 will be devoted to sessions on the software and a series of computer exercises using Stata and HLM.

Tentative Schedule

Day 1
- Basic concepts
- Contextual analysis
- The two-stage OLS multilevel model
- The linear variance-components multilevel model

Day 2
- Centering predictor variables
- Diagnostics for linear multilevel models
- Three-level models
- Crossed random-effects models
- Multilevel binary logistic regression

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[1] Université de Montréal, INRS-UCS, McGill University, Concordia University, Université Laval, Université du Québec à Montréal, Université de Sherbrooke.

Day 3
- Multilevel multinomial logistic regression
- Multilevel ordinal logistic regression
- Multilevel Poisson and negative binomial regression

Day 4
- The structure of panel data
- Multilevel event history (survival) analysis
- Longitudinal random intercepts models: fixed and random effects
- Multilevel models for longitudinal data: growth curve models

Day 5
- Growth curve models (continued)
- Assessing model fit: the deviance, BIC, and R^2
- Weights in multilevel models

Readings

Recommended Technical Readings
Carle, A. C. 2009. "Fitting Multilevel Models in Complex Survey Data with Design Weights: Recommendations." *BMC Medical Research Methodology* 9:49: 1-13.

J. Hox. 2010. *Multilevel Analysis: Techniques and Applications, Second Edition.* New York: Routledge.

*D. A. Luke. 2004. *Multilevel Modeling.* Thousand Oaks, California: Sage.

S. Rabe-Hesketh and A. Skrondal. 2008. *Multilevel and Longitudinal Modeling Using Stata.* College Station, Texas: Stata Press.

S.W. Raudenbush and A.S. Bryk. 2002. *Hierarchical Linear Models, Second Edition.* Thousand Oaks, CA: Sage.

Snijders, T. A. B. and Bosker, R. J. 1999. *Multilevel Analysis. An Introduction to Basic and Advanced Multilevel Modeling.* Thousand Oaks, CA: Sage.

*A very good brief introduction. The other books listed provide introductions, but also cover more advanced topics.

Recommended Software Manuals
S.W. Raudenbush, A.S. Bryk, Y.F. Cheong, and R.T. Congdon, Jr. 2004. *HLM 6: Hierarchical Linear and Nonlinear Modeling.* Lincolnwood, Illinois: Scientific Software International.

Stata Longitudinal-Data/Panel-Data Reference Manual, pp. 242-278 (entries for xtmelogit), pp. 279-305 (entries for xtmepoisson), pp. 306-355 (entries for xtmixed)*

*Available in hardcopy from Stata Press or under the Stata Help menu on any computer running Stata 11.

Recommended Substantive Readings
Lincoln Quillian. 1995. "Prejudice as a Response to Perceived Group Threat: Population Composition and Anti-Immigrant and Racial Prejudice in Europe." *American Sociological Review* 60: 586-611.

van Tubergen, F., I. Maas, and H. Flap. 2004. "The Economic Incorporation of Immigrants in 18 Western Societies: Origin, Destination, and Community Effects." *American Sociological Review* 69: 704-727.

Nicole Letourneau et al. 2007."Longitudinal Study of Social-environmental Predictors of Behavior: Children of Adolescent and Older Mothers Compared" *Canadian Studies in Population* 34(1): 1-27.

Software
Although there are many possible choices for software to estimate multilevel models, I will focus in this course on one specialized package, HLM, and one general package, Stata. HLM has been the most popular software dedicated to multilevel modeling among North American researchers, in part because of its straightforward graphic interface and the way it conceptualizes models by means of an equation for each level. Stata is rapidly becoming the standard for sociologists, economists, and other social scientists, as well as biomedical researchers, who are doing serious data analysis. Its main virtue is that, because it is programmable, much of it has been designed by users themselves. This means that state-of-the-art statistical procedures are generally available first in Stata. It also has extensive data management capabilities not available in specialized packages such as HLM.

Software Web Resources
The following are web pages that have substantial amounts of information about Stata and HLM. The UCLA page in particular is an important tool for learning to use Stata.
www.stata.com
www.ats.ucla.edu/stat/stata/
www.ssicentral.com/hlm/hlm.htm

Eligibility
The course is open to graduate students, postdoctoral fellows, faculty members, and practicing researchers in government or the private sector. Participants should have had some prior training in statistical inference and OLS and logistic regression, along with a familiarity with one of the main statistical packages. Familiarity with the basics of Stata would be an asset, but is not essential.

A maximum of 15 participants will be selected on the basis of the relevance of the course to their curriculum, research, or teaching.

Registration
The online registration period will run from **April 4 to May 1, 2011**. Selection results will be announced during the week of **May 2, 2011**.

Information
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