



Multilevel - Analyzing Comparative Longitudinal Survey Data Using Multilevel Models

Duration: 12 hours/3 days

July 1-3	14:00-16:00
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Course Description

Many surveys spanning multiple countries--or many regions within a single country--are now being fielded multiple times over the course of years or even decades. Examples include the European Social Survey, International Social Survey Programme, EU Statistics on Income and Living Conditions, and (across states) the U.S. and German General Social Surveys. The range of topics that can be studied using data from these surveys is extremely broad: from health to religiosity to social and political attitudes and behaviors. This course will show students how to analyze these comparative longitudinal survey data (CLSD) using multilevel models that exploit any or all of three different kinds of variation: differences between countries, change within countries over time, and variation across individuals.

We will begin by considering the structure of CLSD, and then what fixed effects and random effects (multilevel) models each reveal about the variation between and within groups in data characterized by clustering. We will see how CLSD can be understood as doubly hierarchical (or clustered), and therefore how we can analyze them with models partitioning between and within effects. We will also consider the capabilities of societal growth curves, and the insights that can be gained from models with random (country-specific) slopes. The course will emphasize the use of graphical analysis throughout, and note some risks that analysts of CLSD need to avoid.

Software

In the lab sessions we will use the open-source R software and environment for statistical computing, including some easily installable add-on packages (lme4, MCMCglmm, plm, WDI). Students are welcome to work on their own laptop. (R can be pre-installed from <https://cran.r-project.org/>.)

Prerequisites

Students will need a basic understanding of multilevel models, and some experience of designing and fitting them. Those unfamiliar with multilevel/random-effects models, but who are strongly familiar with other techniques for panel data analysis, are also welcome to join. Students unfamiliar with multilevel/random effects models are encouraged to enroll first in the course "Multilevel 1" taught by Leonardo Grilli and Carla Rampichini on week 2. Students are not required to have any prior familiarity with R.

Course Content

Day 1

Lecture

- Introduction to comparative longitudinal survey data (CLSD)
- Understanding and characterizing the structure of CLSD
- Examples of applications
- Introduction to fixed effects and random effects (multilevel) models
- The three-level multilevel model

Lab

- Merging survey and macro data
- Mean-centering variables
- Graphing CLSD
- Fitting basic two-level models
- Introduction to the lme4 package



Day 2

Lecture

- Between and within relationships
- The REWB (Random Effects Within-Between) specification
- What we can learn from panel data analysis
- Societal growth curves
- Cautionary notes when analyzing CLSD

Lab:

- Estimating fixed and random effects models
- Fitting growth curve models
- Applying multilevel models to two- and three-level CLSD
- Working with European Values Survey data
- Using the lme4 package (continued)

Day 3:

Lecture

- Exploiting the longitudinal dimension in CLSD
- Cross-sectional vs. longitudinal relationships
- Random slopes in multilevel models
- Generalized linear mixed models (GLMMs)

Lab

- Applying models that decompose within- and between-effects
- Estimating societal growth curve models
- Using the MCMCglmm package for advanced modeling

References

Course largely based on:

- Bell, Andrew, and Kelyvn Jones. 2015. "Explaining Fixed Effects: Random Effects Modeling of Time-Series Cross-Sectional and Panel Data." *Political Science Research and Methods* 3[1]: 133–153. doi:10.1017/psrm.2014.7.
- Bell, Andrew, Malcolm Fairbrother, and Kelyvn Jones. 2019. "Fixed and random effects models: making an informed choice." *Quality & Quantity* 53: 1051–1074. <https://doi.org/10.1007/s11135-018-0802-x>
- Enders, Craig K., and Davood Tofghi. 2007. "Centering Predictor Variables in Cross Sectional Multilevel Models: A New Look at an Old Issue." *Psychological Methods* 12(2): 121–138.
- Fairbrother, Malcolm. 2014. "Two Multilevel Modeling Techniques for Analyzing Comparative Longitudinal Survey Datasets." *Political Science Research and Methods* 2[1]: 119–140. doi: 10.1017/psrm.2013.24.
- Schmidt-Catran, Alexander W., and Malcolm Fairbrother. 2016. "The Random Effects in Multilevel Models: Getting Them Wrong and Getting Them Right." *European Sociological Review* 32[1]: 23–38. doi: 10.1093/esr/jcv090.
- Shor, Boris, Joseph Bafumi, Luke Keele, and David Park. 2007. "A Bayesian Multilevel Modeling Approach to Time-Series Cross-Sectional Data." *Political Analysis* 15: 165–181.