Multilevel Modeling

Students in classrooms, regions in countries, cross-national surveys are just a few examples of multilevel data structures. All of them have one problem in common. The observations are not independent of each other because of the clear clustering within the data causing potential problems with autocorrelation. Researchers need to do something about this and control for the potential heterogeneity across the clusters otherwise their regression results will certainly be biased. Multilevel modelling comes to the rescue, though it is not the best solution in all instances. Beyond it is not uncommon to have variables of interests spread across multiple levels of analysis we would like to bring together into a model, even interact with each other. Multilevel modelling is often a good solution in these instances. In this workshop, you will learn the most common solutions to the problem including an in-depth introduction to how multilevel models work.

Target Group
This course is targeting scientists from different disciplines and researchers at all levels of their career who have a solid foundation regression and who would like to extend their knowledge to include the basics and application of multilevel modelling.

(A solid foundation is one that goes beyond knowing what to click in the software and what numbers to copy from the output into the table. Let's say, if you know why heteroskedasticity and autocorrelation are problematic in the regression framework and you want to do something about it, you are ready for your first multilevel modelling course. If you have conducted regression before but you are unsure about this, an in-depth course in regression is what your trainer would recommend before this workshop.)

Objectives
- Participant will learn why unmodelled heterogeneity is a problem and go through multiple ways of modelling such heterogeneity.
- Models covered will include
  - fixed effects regression models, modelling variance of slopes and intercepts in regressions
  - hierarchical linear, mixed effects and multilevel models
  - modeling with continuous dependent variables with extensions to other general linear models.
- Finally, participants will explore modelling multiple sources of heterogeneity simultaneously.

Day 1.
- What are Multilevel Models
- Heterogeneity in the Regression Framework
- Building Blocks of Multilevel Models
- Navigation of the Jargon and Terminology
- Estimation
- Model Building Approaches
- Model Fit

Day 2.
- Centering and separating impact across the levels of analysis
- Quick intro to General Linear Mixed Models like logistic regression
- Cross-classification
- What else is out there (where you can go from this point forward)

Method
- Examples for the workshop will be in R. Very basic R knowledge (how to load data, how to run a regression) is recommended, though the examples will still make sense without it but will be hard to reproduce with one's own data.
- Stata code closely resembling the examples will be provided.
    - Note: Instructor does not use Stata. But past students passed on Stata code that I am happy to supply as well

Date and Time
December 7, 2021, 10.00 am - 11.40 am and 12.15 pm - 13.55 pm
December 16, 2021, 10.00 am - 11.40 am and 12.15 pm - 13.55 pm

Note on the course format: This course was designed for a pandemic friendly online delivery. Before the two sessions you will be asked to sign up to the workshop community on to our Slack group, read (and interact with each other about) readings on the Perusall platform and watch multiple video lectures and to read readings I will provide all necessary information about this by November 25. In addition, you will also be asked to record a video, i.e. with you mobile phone, introducing yourself and the kind of research problems you wish to apply multilevel modelling to (and share this video with others). While meetings are limited (as who wants to sit on Zoom all day) the workload with all the above matches a typical two full day workshop, so please plan your reading and video watching times accordingly.

About the instructor: *Levente (Levi) Littvay* is Professor of Political Science at Central European University where his teaching includes research design, applied statistics, voting behavior and is the inaugural recipient of CEU's Distinguished Teaching Award (2015) for methods teaching and CEU's 2021 Teaching Excellence Award for online education. Received his MA and PhD in Political Science and MS in Survey Research and Methodology from the University of Nebraska-Lincoln. As former Advisory Board Member (2013-2015) and Academic Convenor (2015-2021) of the European Consortium for Political Research Methods Schools and as the Academic Coordinator of MethodsNET.org (2021-) he taught numerous introductory and advanced research methods workshops including regression from intro to advanced levels, causal inference, program evaluation, measurement, missing data, multilevel modeling, introductory, advanced, and multilevel structural equation modeling. Member of the European Social Survey's Round 10 (2020-21) Democracy and COVID19 module questionnaire design teams and co-PI of the Comparative Study of Election Systems for Hungary and Tunisia. A former Fernand Braudel Fellow of the European University Institute. Has publications in *Social Justice Research* for which he received the Morton Deutsch Award for best article in 2017, *Political Analysis*, *The Journal of Politics*, *Political Research Quarterly*, *Political Psychology, BMC Medical Research Methodology,* and along with other medical journals, in Twin Research and Human Genetics where he is Associate Editor for Social Sciences. He is Specialty Chief Editor for Methods and Measurement at *Frontiers in Political Science.* His books include *Multilevel Structural Equation Modeling* with Bruno Castanho Silva and Constantin Manuel Bosancianu in SAGE QASS (little green book) series