

POS 5747
Special Topics in Advanced Quantitative Analysis:
Causality, Matching, and Multilevel Models
Mondays 11:45 AM to 2:15 PM
Spring 2012

Instructor: Dr. Jason Barabas [pronounced: bear-AH-bis]

Class Location: Pepper 263

Office: Pepper 238 or Bellamy 554

Office Hours: Mondays 3-4 PM in Pepper 238 or by Appt.

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Course Description and Objectives:

Demonstrating that one variable has a causal effect on another is often difficult but increasingly important in the social sciences. Another problem social scientists face is clustered data situations in which observations are nested within higher level structures, creating the potential for inaccurate statistical inferences. We will consider both topics, starting with the notion of causality embodied in the Neyman-Rubin Causal Model. From that point, we will review non-experimental research designs for selection on unobservables (e.g., difference-in-differences, regression discontinuity) before turning our attention to matching methods for selection on observables. The final part of the course shifts to multilevel (sometimes called “hierarchical”) models, providing an introduction to these methods as well as some of the latest developments.

This course assumes students have successfully completed the advanced research methods course in the Department of Political Science at Florida State University. In particular, students are assumed to have mastered ordinary least squares regression as well as common maximum likelihood models, especially probit and logit. At various points we will use statistical software programs like R and Stata, so it is important that students feel comfortable with those packages. It is also advantageous to take this course in addition to or along with the companion graduate-level class on experimentation being offered in the Department of Political Science.

Required Books:

Gelman, Andrew, and Jennifer Hill. 2007. *Data Analysis Using Regression and Multilevel/Hierarchical Models*. New York: Cambridge University Press. ISBN: 978-0-521-68689-1

Guo, Shenyang, and Mark W. Fraser. 2010. *Propensity Score Analysis: Statistical Methods and Applications*. Thousand Oaks, CA: Sage. ISBN: 978-1-4129-5356-6

Morgan, Stephen L., and Christopher Winship. 2007. *Counterfactuals and Causal Inference: Methods and Principles for Social Research*. New York: Cambridge University Press. ISBN: 978-0-521-67193-4

Shadish, William R, Thomas D. Cook, and Donald T. Campbell. 2001. *Experimental and Quasi-Experimental Designs for Generalized Causal Inference*. Boston: Houghton Mifflin. ISBN: 0395615569.

Recommended Books:

Angrist, Joshua D., and Jorn-Steffen Pischke. 2009. *Mostly Harmless Econometrics*. Princeton: Princeton University Press. ISBN: 978-0-691-12035-5

Hox, Joop. 2010. *Multilevel Analysis: Techniques and Applications*, 2nd ed. New York: Routledge. ISBN: 978-1-84872-846-2

Hox, Joop, and J. Kyle Roberts. 2010. *Handbook of Advanced Multilevel Analysis*. New York: Routledge. ISBN: 978-1-84169-722-2

Rabe-Hesketh, Sophia, and Anders Skrondal. 2008. *Multilevel and Longitudinal Models Using Stata*, 2nd ed. College Station, TX: Stata Press. ISBN: 978-1-59718-040-5

Raudenbush, Stephen, and Anthony S. Bryk. 2001. *Hierarchical Linear Models: Applications and Data Analysis Methods*. Thousand Oaks, CA: Sage. ISBN: 978-0761919049

Rosenbaum, Paul. 2009. *Design of Observational Studies*. New York: Springer. ISBN: 978-1441912121

Grading:	% of Final Grade
Homework 1	25%
Homework 2	25%
Empirical Paper	25%
Presentation	15%
Class Participation	10%

Homework Assignments: Toward the end of each major part of the course (i.e., the matching and multilevel segments), students will be responsible for completing a lengthy homework assignment. The assignments will be discussed at a pre-arranged lab time.

Empirical Paper: By the end of the semester you will be asked to write a paper in which you apply the techniques that you have learned. Hopefully your paper will have the potential to be published one day. Most of the grade will be based upon the methods used, but it helps if there is a clear presentation of the literature and theory as well.

Presentations: In a single semester we will not be able to cover some of the more advanced aspects of the techniques. As a way to gain some exposure to these models, students will select (or be assigned to) an advanced topic listed toward the end of the syllabus. Each student will be responsible for preparing a 15 minute presentation on the advanced topic (in PowerPoint, with data examples in R, Stata, or other software) to be given during the last two weeks of class.

Participation: Students are expected to attend class and participate in discussions. In particular, you are expected to read the required texts/readings *before class* and come to class with questions and/or comments. If you have an emergency situation and cannot fulfill these requirements, you must let me know immediately and before the scheduled date of the exam, homework assignment, or paper. In general, aim for high quality comments rather than high quantity.

Grading Scale: Barring any unforeseen changes, the grading scale for the course is as follows:

	B+ 89 – 87	C+ 79 – 77	D+ 69 – 67	
A 100 – 93	B 86 – 83	C 76 – 73	D 66 – 63	F 59 – 0
A- 92 – 90	B- 82 – 80	C- 72 – 70	D- 62 – 60	

Note: Final grade percentages ending in a decimal of “.5” or greater will be rounded up to the next whole number.

University Attendance Policy: Excused absences include documented illness, deaths in the family and other documented crises, call to active military duty or jury duty, religious holy days, and official University activities. These absences will be accommodated in a way that does not arbitrarily penalize students who have a valid excuse. Consideration will also be given to students whose dependent children experience serious illness.

Academic Honor Policy: The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to “...be honest and truthful and... [to] strive for personal and institutional integrity at Florida State University.” (Florida State University Academic Honor Policy, found at <http://dof.fsu.edu/honorpolicy.htm>.)

Americans with Disabilities Act: Students with disabilities needing academic accommodation should: (1) register with and provide documentation to the Student Disability Resource Center; and (2) bring a letter to the instructor indicating the need for accommodation and what type. This should be done during the first week of class. This syllabus and other class materials are available in alternative format upon request. For more information about services available to FSU students with disabilities, contact the:

Student Disability Resource Center
874 Traditions Way
108 Student Services Building
Florida State University
Tallahassee, FL 32306-4167
(850) 644-9566 (voice), (850) 644-8504 (TDD)
sdrc@admin.fsu.edu
<http://www.disabilitycenter.fsu.edu/>

Syllabus Change Policy: Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and is subject to change with advance notice. Please monitor the class webpage on the Blackboard system for the latest announcements and changes.

COURSE SCHEDULE

(ALL CLASSES TO BE HELD IN PEPPER 263 UNLESS TOLD OTHERWISE; CHECK BLACKBOARD)

Each week there are assigned readings (“Reading”) and recommended selections (“Recommended”) that you should read if you have finished the others. Whenever possible I will put copies (PDFs) of the assigned non-book readings on the class Blackboard website.

Week 1 (Jan. 9th) – Course Introduction, Forms of Validity, and Inferential Threats

Reading:

Shadish, Cook, and Campbell 2001, Chapters 1-5, 8, 14

Dunning, Thad. 2008. “Improving Causal Inference: Strengths and Limitations of Natural Experiments.” *Political Research Quarterly* 61 (June): 282-93.

Robinson, Gregory, John E. McNulty, and Jonathan S. Krasno. 2009. “Observing the Counterfactual? The Search for Political Experiments in Nature.” *Political Analysis* 17 (Autumn): 341-57.

Recommended

Adcock, Robert, and David Collier. 2001. "Measurement Validity: A Shared Standard for Qualitative and Quantitative Research." *American Political Science Review* 95 (3): 529-46.

Freedman, David A. 1991. “Statistical Models and Shoe Leather.” *Sociological Methodology* 21: 291-313.

Imai, Kosuke, Luke Keele, Dustin Tingley, and Teppei Yamamoto. 2011. “Unpacking the Black Box of Causality: Learning about Causal Mechanisms from Experimental and Observational Studies.” *American Political Science Review* 105 (November): 765-89.

Week 2 (Jan. 16th) – NO CLASS: Martin Luther King, Jr. Holiday and SPSA Conference

Week 3 (Jan. 23rd) – Causality and the Neyman-Rubin Causal Model

Reading:

Morgan and Winship 2007, Chapters 1-3

Gelman and Hill 2007, Chapter 9 (Review/Skim Chapters 1-8)

Guo and Fraser 2010, Chapters 1-3

Brady, Henry. 2009. "Causality and Explanation in Social Science" In *The Oxford Handbook of Political Methodology*, eds. J. Box-Steffensmeier, H. Brady and D. Collier. New York: Oxford University Press.

Sekhon, Jasjeet. 2009. "The Neyman-Rubin Model of Causal Inference." In *The Oxford Handbook of Political Methodology*, eds. J. Box-Steffensmeier, H. Brady and D. Collier. New York: Oxford University Press.

Recommended:

Cortina, Jeronimo. 2009. “The Potential-Outcomes Model of Causation,” in Andrew Gelman and Jeronimo Cortina, eds., *A Quantitative Tour of the Social Sciences*. New York: Cambridge University Press, pp. 303-8.

- Cortina, Jeronimo. 2009. "Some Statistical Tools for Causal Inference with Observational Data," in Andrew Gelman and Jeronimo Cortina, eds., *A Quantitative Tour of the Social Sciences*. New York: Cambridge University Press, pp. 309-18.
- Gerber, Alan S., Donald P. Green, and Edward H. Kaplan. 2004. "The Illusion of Learning from Observational Research," In Ian Shapiro, Rogers Smith, and Tarek Massoud, *Problems and Methods in the Study of Politics*. New York: Cambridge University Press. pp. 251-73.
- Pearl, Judea. 2009. *Causality: Models, Reasoning, and Inference*, 2nd ed. New York: Cambridge.
- Holland, Paul W. 1986. "Statistics and Causal Inference." *Journal of the American Statistical Association* 81 (396): 945-60.
- Imai, Kosuke, Gary King, and Elizabeth A. Stuart. 2008. "Misunderstandings between Experimentalists and Observationalists about Causal Inference." *Journal of the Royal Statistical Association A* 171 (Part 2): 481-502.

Week 4 (Jan. 30th) – Non-Matching Methods (Selection on Unobservables)

Reading:

- Shadish, Cook, and Campbell 2001, Chapters 6-7
- Morgan and Winship 2007, Chapters 5-10
- Guo and Fraser 2010, Chapter 4
- Card, David, and Alan B. Krueger. 1994. "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania." *American Economic Review* 84 (Sept.): 772-93.
- Imbens, Guido W., and Thomas Lemieux. 2008. "Regression Discontinuity Designs: A Guide to Practice." *Journal of Econometrics* 142: 615-35.
- Sovey, Allison J., and Donald P. Green. 2011. "Instrumental Variables Estimation in Political Science: A Reader's Guide." *American Journal of Political Science* 55 (Jan.): 188-200.
- Gelman and Hill 2007, Section 10.4-10.7, pp. 212-29.

Recommended:

- Angrist, Joshua D., Guido W. Imbens, and Donald B. Rubin. 1996. "Identification of Causal Effects using Instrumental Variables." *Journal of the American Statistical Association* 91 (June): 444-55.
- Angrist, Joshua D., and Jorn-Steffen Pischke. 2009. *Mostly Harmless Econometrics*. Princeton: Princeton University Press.
- Card, David. 1990. "The Impact of the Mariel Boatlift on the Miami Labor Market." *Industrial and Labor Relations Review* 43: 245-257.
- Kern, Holger Lutz, and Jens Hainmueller. 2009. "Opium for the Masses: How Foreign Media can Stabilize Authoritarian Regimes." *Political Analysis* 17:377-99.
- Green, Donald P., Terence Y. Leong, Holger L. Kern, Alan S. Gerber, and Christopher W. Lainer. 2009. "Testing the Accuracy of Regression Discontinuity Analysis using Experimental Benchmarks." *Political Analysis* 17 (Autumn): 400-17.
- Hahn, Jinyong, Petra Todd, and Wilbert van der Klaauw. 2001. "Identification and Estimation of Treatment Effects with a Regression-Discontinuity Design." *Econometrica* 69: 201-09.
- Lee, David S. 2008. "Randomized Experiments from Non-random Selection in U.S. House Elections." *Journal of Econometrics* 142 (2): 675-97.
- Sekhon, Jasjeet, and Devin Caughey. 2011. "Elections and the Regression-Discontinuity Design: Lessons from Close U.S. House Races, 1942-2008." *Political Analysis* 19 (4): 385-408.

- Sekhon, Jasjeet, and Rocio Titiunik. Forthcoming. "When Natural Experiments are Neither Natural Nor Experiments." *American Political Science Review*.
- Wooldridge, Jeffrey M. 2009. *Introductory Economics: A Modern Approach*. 4th ed. Mason, OH: South-Western Cengage Learning.

Week 5 (Feb. 6th) – Introduction to Matching (Selection on Observables)

Reading:

- Gelman and Hill 2007, Chapter 10, Section 10.1-10.3
- Guo and Fraser 2010, Chapters 5-7
- Morgan and Winship 2007, Chapter 4
- Sekhon, Jasjeet. 2009. "Opiates for the Matches: Matching Methods for Causal Inference." *Annual Review of Political Science* 12:487–508.
- Ho, Daniel, Kosuke, Imai, Gary King, and Elizabeth Stuart. 2007. "Matching as Nonparametric Preprocessing for Reducing Model Dependence in Parametric Causal Inference." *Political Analysis* 15: 199-236.

Recommended:

- Abadie, Alberto, David Drukker, Jane Leber Herr, and Guido W. Imbens. 2001. "Implementing Matching Estimators for Average Treatment Effects in Stata." *Stata Journal* 1: 1-18.
- Cochran, W. G. 1968. The Effectiveness of Adjustment by Subclassification in Removing Bias in Observational Studies. *Biometrics* 24: 295-313.
- Rosenbaum, Paul R. and Donald B. Rubin. 1983. "The Central Role of the Propensity Score in Observational Studies for Causal Effects." *Biometrika* 70 (1): 41–55.

Week 5 (Feb. 13th) – Matching Applications

Reading:

- Imai, Kosuke. 2005. "Do Get-Out-the-Vote Calls Reduce Turnout? The Importance of Statistical Methods for Field Experiments." *American Political Science Review* 99 (May): 283-300.
- Gerber, Alan S., and Donald P. Green. 2005. "Correction to Gerber and Green (2000), Replication of Disputed Findings, and Reply to Imai (2005)." *American Political Science Review* 99 (May): 301-13.
- King, Gary, and Langche Zeng. 2006. "The Dangers of Extreme Counterfactuals." *Political Analysis* 14 (2): 131-59.
- Barabas, Jason. 2004. "How Deliberation Affects Policy Opinions." *American Political Science Review* 98 (Nov.): 687-701.
- Dehejia, Rajeev H., and Sadek Wahba. 1999. "Causal Effects in Nonexperimental Studies: Re-evaluating the Evaluation of Training Programs." *Journal of the American Statistical Association* 94 (Dec.): 1053-1062.

Recommended:

- Barabas, Jason. 2009. "Not the Next IRA: How Health Savings Accounts Shape Public Opinion." *Journal of Health Politics, Policy and Law* 34 (April): 181-217.
- Gerber, Alan S., and Donald P. Green. 2000. "The Effects of Canvassing, Telephone Calls, and Direct Mail on Voter Turnout: A Field Experiment." *American Political Science Review* 94 (Sept.): 653-63.

- King, Gary, and Langche Zeng. 2007. "When Can History Be Our Guide?: The Pitfalls of Counterfactual Inference." *International Studies Quarterly* 51: 83-210.
- Ladd, Jonathan McDonald, and Gabriel S. Lenz. 2009. "Exploiting a Rare Communication Shift to Document the Persuasive Power of the News Media." *American Journal of Political Science* 53 (April): 394-410.
- Sekhon, Jasjeet S. 2011. "Multivariate and Propensity Score Matching Software with Automated Balance Optimization: The Matching Package for R." *Journal of Statistical Software* 42 (May): 1-52.

Week 6 (Feb. 20th) – Critiques of Matching and Diagnostics

Reading:

- Kam, Cindy D., and Carl L. Palmer. 2008. "Reconsidering the Effects of Education on Political Participation." *Journal of Politics* 70 (July): 612-31.
- Henderson, John, and Sara Chatfield. 2011. "Who Matches? Propensity Scores and Bias in the Causal Effects of Education on Participation." *Journal of Politics* 73 (July): 646-58.
- Mayer, Alexander K. 2011. "Does Education Increase Political Participation?" *Journal of Politics* 73 (July): 633-45.
- Kam, Cindy D., and Carl L. Palmer. 2011. "Rejoinder: Reinvestigating the Causal Relationship between Higher Education and Political Participation." *Journal of Politics* 73 (July): 659-63.
- Arceneaux, Kevin, Alan S. Gerber, and Donald P. Green. 2006. "Comparing Experimental and Matching Methods Using a Large-Scale Voter Mobilization Experiment." *Political Analysis* 14 (Winter): 37-62.
- Arceneaux, Kevin, Alan S. Gerber, and Donald P. Green. 2010. "A Cautionary Note on the Use of Matching to Estimate Causal Effects: An Empirical Example Comparing Matching Estimates to an Experimental Benchmark." *Sociological Methods and Research* 39 (Aug.): 256-82.

Guo and Fraser 2010, Chapters 8-9

Recommended:

- <http://cran.r-project.org/web/packages/rbounds/rbounds.pdf>
- <http://www.polisci.ohio-state.edu/faculty/lkeele/rbounds.html>
- Hollister, Matissa. 2009. "Is Optimal Matching Suboptimal?" *Sociological Methods and Research* 38 (2): 235-64.
- Smith, Jeffrey A., and Petra Todd. 2005. "Does Matching Overcome LaLonde's Critique of Nonexperimental Estimators?" *Journal of Econometrics* 125: 305-53.

Week 6 (Feb. 27th) – Innovations in Matching: Synthetic Controls and WS/WS

Reading:

- Abadie, Alberto, Alexis Diamond, and Jens Hainmueller. 2010. "Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program." *Journal of the American Statistical Association* 105 (490): 493-505.

- Abadie, Alberto, Alexis Diamond, and Jens Hainmueller. 2011. "Synth: An R Package for Synthetic Control Methods in Comparative Case Studies." *Journal of Statistical Software* 42 (13): 1-17.
- Keele, Luke. 2009. "An Observational Study of Ballot Initiatives and State Outcomes." Working Paper.
- Barabas, Jason, and Jennifer Jerit. 2009. "Estimating the Causal Effects of Media Coverage on Policy-Specific Knowledge." *American Journal of Political Science* 53 (Jan.): 73-89.

Recommended:

- Arceneaux, Kevin, and David W. Nickerson. 2009. "Who Is Mobilized to Vote? A Re-Analysis of 11 Field Experiments." *American Journal of Political Science* 53 (Jan.): 1-16.
- Barabas, Jason. 2008. "Presidential Policy Initiatives: How the Public Learns about State of the Union Proposals from the Mass Media." *Presidential Studies Quarterly* 38 (June): 195-222.
- Glynn, Adam N., and Kevin M. Quinn. "Why Process Matters for Causal Inference." *Political Analysis* 19: 273-86.
- King, Gary, Richard Nielsen, Carter Coberley, James E. Pope. 2011. "Comparative Effectiveness of Matching Methods for Causal Inference." Working Paper.

*******Lab 1 during late-February -- Date to be Announced*******

Week 7 (March 5th) – NO CLASS-SPRING BREAK

Week 8 (March 12th) – NO CLASS (Class Period Rescheduled to Lab Session)

Week 9 (March 19th) – Introduction to Multilevel Models

Reading:

- Gelman and Hill 2007, Chapter 11
- Steenbergen, Marco R., and Brad S. Jones. 2002. "Modeling Multilevel Data Structures." *American Journal of Political Science* 46 (Jan.): 218–37.
- Jones, Brad S. 2009. "Multilevel Models." In *The Oxford Handbook of Political Methodology*, eds. J. Box-Steffensmeier, H. Brady and D. Collier. New York: Oxford University Press.

Recommended:

- Beck, Nathaniel. 2005. "Multilevel Analyses of Comparative Data: A Comment." *Political Analysis* 13: 457-58.
- Bowers, Jake, and Katherine W. Drake. 2005. "EDA for HLM: Visualization when Probabilistic Inference Fails." *Political Analysis* 13: 301-26.
- Gelman, Andrew. 2006. "Multilevel (Hierarchical) Modeling: What It Can and Cannot Do?" *Technometrics* 48 (August): 432-35.
- Raudenbush, Stephen W. and Anthony Bryk. 2002. *Hierarchical Linear Models*. Thousand Oaks, CA: Sage.
- Shor, Boris, Joseph Bafumi, Luke Keele, and David Park. 2007. "A Bayesian Multilevel Modeling Approach to Time-Series Cross-Section Data." *Political Analysis* 15: 165-81.

Week 10 (March 26th) – Multilevel Models: Continuous Outcomes

Reading:

Gelman and Hill 2007, Chapters 12-13

Fridkin, Kim L., and Patrick J. Kenney. 2011. "The Role of Candidate Traits in Campaigns." *Journal of Politics* 73 (Jan.): 61-73.

Recommended:

Andersen, Robert, and Tina Fetner. 2008. "Economic Inequality and Intolerance toward Homosexuality in 35 Democracies." *American Journal of Political Science* 52 (Oct.): 942-58.

Keele, Luke, and Jennifer Wolak. 2008. "Contextual Sources of Ambivalence." *Political Psychology* 29 (5): 653-73.

Rohrschneider, Robert. 2002. "The Democracy Deficit and Mass Support for an EU-Wide Government." *American Journal of Political Science* 46 (Apr.): 463-75.

Rohrschneider, Robert, and Matthew Loveless. 2010. "Macro Salience: How Economic and Political Contexts Mediate Popular Evaluations of the Democracy Deficit in the European Union." *Journal of Politics* 72 (Oct.): 1029-45.

Rudolph, Thomas J., and Elizabeth Popp. 2009. "Race, Environment, and Interracial Trust." *Journal of Politics* 72 (Jan.): 74-89.

Wong, Cara J. 2007. "'Little' and 'Big' Pictures in Our Heads: Race, Local Context, and Innumeracy about Racial Groups in the United States." *Public Opinion Quarterly* 71 (Fall): 392-412.

Week 11 (April 2nd) – Multilevel Models: Discrete Outcomes

Reading:

Gelman and Hill 2007, Chapters 14-15, skim 16-19

Jerit, Jennifer, Jason Barabas, and Toby Bolsen. 2006. "Citizens, Knowledge, and the Information Environment." *American Journal of Political Science* 50 (April): 266-82.

Lax, Jeffrey R., and Justin H. Phillips. 2009. "How Should We Estimate Public Opinion in the States?" *American Journal of Political Science* 53 (Jan.): 107-21.

(Additional readings to be determined.)

Recommended:

Beazer, Quintin. Forthcoming. "Bureaucratic Discretion, Business Investment, and Uncertainty." *Journal of Politics*.

Jerit, Jennifer. 2009. "Understanding the Knowledge Gap: The Role of Experts and Journalists." *Journal of Politics* 71(2): 442-56.

Peffley, Mark, and Robert Rohrschneider. 2003. "Democratization and Political Tolerance in Seventeen Countries: A Multi-Level Model of Democratic Learning." *Political Research Quarterly* 56 (3): 243-57.

Solt, Frederick. 2011. "Diversionary Nationalism: Economic Inequality and the Formation of National Pride." *Journal of Politics* 73(3):821-830.

Solt, Fredrick. 2008. "Economic Inequality and Democratic Political Engagement." *American Journal of Political Science* 52 (Jan.): 48-60.

Week 12 (April 9th) – Lab 2 on Multilevel Models (or on a date to be announced in class)

Weeks 13 & 14 Student Presentations (April 16th and 23rd or rescheduled due to MPSA)

Possible Topics for Presentations Are Listed Below (Others Are Possible, Check with the Instructor):

Matching & Causality

Topic 1 – Ordinal & Multinomial Treatments¹

Topic 2 – Matching with Difference-in-Differences²

Topic 3 – Fuzzy Regression Discontinuity Designs & RD Applications in General³

Topic 4 – Instrumental Variables⁴

Topic 5 – Propensity Score Weighting⁵

Topic 6 – Coarsened Exact Matching⁶

Topic 7 – Matching Prior to an Experiment⁷

Topic 8 – Matching Simulations⁸

Multilevel

Topic 1 – Multilevel Meta Analyses⁹

Topic 2 – Model Selection, Assumptions, and Statistical Power in Multilevel Models¹⁰

Topic 3 – Multiple Imputation in Multilevel Data¹¹

Topic 4 – Cross-Classified and Multiple Membership Models¹²

Topic 5 – Dyadic Data Analysis Using Multilevel Models¹³

Topic 6 – Item Response Multilevel Modeling¹⁴

Topic 7 – Multilevel for Survival Data¹⁵

Topic 8 – Bayesian Estimation of Multilevel Models¹⁶

Topic 9 – Multilevel Experiments¹⁷

Topic 10 – Panel Multilevel Models and Growth Curves¹⁸

Topic 11 – Instrumental Variables in a Multilevel Model¹⁹

¹ Imai, Kosuke, and David A. van Dyk. 2004. "Causal Inference with General Treatment Regimes: Generalizing the Propensity Score." *Journal of the American Statistical Association* 99 (Sept.): 854-66.

² Heckman, J.J., Ichimura, H. and Todd, P.E. (1998), "Matching as an Econometric Evaluation Estimator", *Review of Economic Studies*, 65, 261-94; Heckman, James, Hidehiko Ichimura, and Petra Todd. 1997. "Characterizing Selection Bias Using Experimental Data." *Econometrica* 66: 1017-98.

³ See recommended readings for week on selection on unobservables.

⁴ Sovey, Allison J., and Donald P. Green. 2011. "Instrumental Variables Estimation in Political Science: A Reader's Guide." *American Journal of Political Science* 55 (Jan.): 188-200.

⁵ Brunell, Thomas L., and John Dinardo. 2004. "A Propensity Score Reweighting Approach to Estimating the Partisan Effects of Full Turnout in American Presidential Elections." *Political Analysis* 12 (1): 28-45; Freedman, David A., and Richard A. Berk. 2008. "Weighting Regressions by Propensity Scores." *Evaluation Review* 32 (Aug.): 392-409.

⁶ Iacus, Stefano M., Gary King, and Giuseppe Porro. 2011. "Causal Inference without Balance Checking: Coarsened Exact Matching." *Political Analysis*: 1-24.

⁷ Imai, Kosuke, Gary King, and Clayton Nall. 2009. "The Essential Role of Pair Matching in Cluster-Randomized Experiments, with Application to the Mexican Universal Health Insurance Evaluation." *Statistical Science* 24(1):29-53; King, Gary, et. al. 2007. "A 'Politically Robust' Experimental Design for Public Policy Evaluation, with Application to the Mexican Universal Health Insurance Program." *Journal of Policy Analysis and Management* 26 (3): 479-506.

⁸ Robert, Christian P., and George Casella. 2010. *Introducing Monte Carlo Methods with R*. New York: Springer.

⁹ Shadish, Cook, and Campbell 2001, Chapter 13

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- ¹⁰ Gelman and Hill 2007, Chapter 20; Hox and Roberts 2011, Chapter 9, 11, 13, 14; Mass and Hox 2004; Stoker, Laura, and Jake Bowers. 2002. "Designing Multi-level Studies: Sampling Voters and Electoral Contexts." *Electoral Studies* 21: 235-67.
- ¹¹ Gelman and Hill 2007, Chapter 25; Hox and Roberts 2011, Chapter 10
- ¹² Hox and Roberts 2011, Chapter 16; Rabe-Hesketh, Sophia, and Anders Skrondral. 2008. *Multilevel and Longitudinal Models Using Stata*, 2nd ed. College Station, TX: Stata Press.
- ¹³ Hox and Roberts 2011, Chapter 17
- ¹⁴ Hox and Roberts 2011, Chapter 3
- ¹⁵ Hox and Roberts 2011, Chapter 7
- ¹⁶ Hox and Roberts 2011, Chapter 8; Shor, Boris, Joseph Bafumi, Luke Keele, and David Park. 2007. "A Bayesian Multilevel Modeling Approach to Time-Series Cross-Section Data." *Political Analysis* 15: 165-81.
- ¹⁷ Hox and Roberts 2011, Chapter 14; Gelman and Hill, Chapter 23; Betsy Sinclair. "[Design and Analysis of Experiments in Multi-level Contexts.](#)" Experimental Handbook Ed. Jamie Druckman, Donald P. Green and Skip Lupia. Forthcoming.; Betsy Sinclair, Margaret McConnell and Donald P. Green. [Detecting Spillover in Social Networks: Design and Analysis of Multi-level Experiments.](#) Forthcoming, *American Journal of Political Science*.
- ¹⁸ Hox and Roberts 2011, Chapter 5, 6; Goldstein, Harvey, Michael J. R. Healy, and Jon Rasbash. 1994. "Multilevel Time Series Models with Applications to Repeated Measures Data." *Statistics in Medicine* 13: 1643-55; Rabe-Hesketh, Sophia, and Anders Skrondral. 2008. *Multilevel and Longitudinal Models Using Stata*, 2nd ed. College Station, TX: Stata Press.
- ¹⁹ Gelman and Hill 2007, Chapter 23