

PSY690: Developmental Methodology
Fall 2006
Department of Psychology

Prof. Theodore Walls
University of Rhode Island
Kingston Campus
Classroom: CPRC West Conf. Room
Mon. 2-4

September 25, 2006

1 Course Description

This course will cover three important areas in the analysis of longitudinal data: simulation and programming, longitudinal designs, and methods for the analysis of change. The objective of the course is to ensure that advanced graduate students working on research involving longitudinal data have both the baseline conceptual skills and hands-on experience needed to pursue development of applied models in their work. Modeling frameworks to be considered include analysis of difference and change scores, repeated measures ANOVA, cross-lagged regression, time series and the family of random coefficient models including hierarchical linear models, multi-level models, growth curve models, etc. Recently emerging models focused on intensive longitudinal data will also be considered. The course will utilize a range of software packages, such as SAS, SPlus, R, LISREL, MPlus and potentially other packages. The course will be taught as a seminar and will be project-based. Prerequisites include at least one semester of graduate multivariate statistics or the instructor's permission.

2 Textbook

The following texts will be used from time to time and serve as nice reference material. However, I will assign other readings from week to week.

- Singer, J.D., & Willett, J. (2003). *Applied Longitudinal Data Analysis*. Oxford University Press.
- Campbell, D.T. & Kenny, D.A. (1996). *A Primer on Regression Artifacts*. New York: Guilford.
- Weiss, R.E. (2005). *Modeling Longitudinal Data*. New York: Springer.

3 Other Recommended Materials

Developmental Methodology

NOTE: The first two are out of print, but are well worth the purchase of used copies if you can track them down. Several developmental psychologists are involved in trying to have publishers reprint them and similar new books on these topics are currently being written.

- Wohlwill, J.F. (1973). *The study of behavioral development*. New York: Academic Press.
- Baltes, P.B., Reese, H.W., & Nesselroade, J.R. (1988). *Lifespan developmental psychology: Introduction to research methods*. Hillsdale, NJ: Erlbaum.

Multilevel Models

NOTE: Multilevel Modeling is not expressly part of this course, however, we will cover some models toward the end of the course. Because many of you have heard of these models and are interested in learning more, I am including some worthwhile references. The Fitzmaurice, Laird and Ware text is very worthwhile.

- Fitzmaurice, G.M., Laird, N.M., & Ware, J.H. (2004). *Applied Longitudinal Analysis*. NJ: John Wiley and Sons.

- Goldstein, H. (2003). *Multilevel Statistical Models (3rd ed.)*. NY: Oxford University Press.
- Hox, J.J. (2002) *Multilevel Analysis: Techniques and Applications*. Mahwah, N.J.: Lawrence Erlbaum Associates.
- Snidjers, T.A.B. & Bosker, R.L. (1999). *Multilevel analysis: An introduction to basic and advanced multilevel modeling*. Thousand Oaks, CA: Sage.

Programming

- Littell, R. C., Milliken, G. A., Stroup, W. W. and Wolfinger, R. D. (1996). *SAS System for Mixed Models*. SAS Institute, Cary, NC.
- <http://gseacademic.harvard.edu/alda/> Web site that accompanies Singer and Willett text.
- <http://www.r-project.org/> R is an open source program for statistical computing that is similar to SPLUS. You can read about the two on this web site and download the program if you would like. The way it works is that you first download the program from the CRAN server, and then you go about selecting packages that you would like. A biased list of packages to start with would include: lmm, lme, lmesplines, nlme, vr, alr3, design, hmisc, and vr. I plan to to only make minimal use of this during the course. I do think that it is a good way to go if you can afford the time investment.
- <http://www.ctan.org/tex-archive/systems/win32/> Latex is a useful program for writing technical material. I will discuss it in class.

4 Guidelines

4.1 Computer Programs

I recommend that you have a copy of SAS installed on your system or that you arrange access to a terminal that has it. I will also be experimenting with delivery of some content in R, S-Plus, LISREL, and MPlus. Several faculty members are currently making efforts

to purchase MPlus. If you want to use SPSS, you may, however, my skills in this program are dated.

4.2 Readings

Each week, I will assign some readings and ask you to prepare a one page written synopsis of the material for distribution and delivery in class. Because the course enrollment is low, I will ask you to do this twice.

4.3 Short assignments

I will give you four short assignments aimed at reinforcing statistical concepts or at providing experience in key programming feats. I will not be certain of what form these should take until I become more familiar with your backgrounds and interests.

4.4 Project

Your one page project proposal is due by Oct 2. If you have proposed a dissertation, the project may not be a portion of your dissertation proposal or related analyses. It may, however, be a project associated with your dissertation proposal planning, or, with work in your capacity as an RA or other professional role. The final project is due at the end of the semester, the exact date will be announced later. The paper should be submitted for publication or, less desirably, deemed ready for pre-submission revision by the week of finals.

4.5 Grading

I will assign grades based on completion of two readings of synopses, class participation, and one project. I will comment on grading during the first class.

4.6 Office Hours

By appointment.

5 Contact Info

Prof. Walls: Telephone: 401-874-2105 Office email: walls@uri.edu
Office Location: 15 West CPRC

6 Topics and Readings

Week 1: Overview of Course and Developmental Ideas

Week 2: Developmental Designs and Concepts; SAS introduction

- Baltes, Reese & Nesselroade, Chapter 5 and 9.

Week 3: Developmental Designs; Further SAS exposure

- No assigned reading

Week 4: Scientific Method in Social Science

- Campbell and Kenny, Chapter 2.

Week 5: Regression and Regression to the Mean

- Campbell and Kenny.
- Cronbach L.J. & Furby, L. (1970). How should we measure change? –or should we? *Psychological Bulletin*, 74(1), 68-80.
- Hauser-Cram, P. & Wyngaarden Krauss, M. (1991). Measuring change in children and families. *Journal of Early Intervention*, 15(3), 288-297.

Week 6: Concepts of Change

- Campbell and Kenny, Chapter 8-9.
- Nunnally, J.C. (1983). The study of change in evaluation research: principles concerning measurement, experimental design, and analysis. In Struening, E. L. & Brewer, M. B. (Eds) *Handbook of evaluation research*. (pp. 231-272). Newbury Park: Sage
- Nunnally, J. C. (1982). The study of human change: Measurement, research strategies, and methods of analysis. In B. B. Wolman (Ed.). *Handbook of developmental psychology* (pp. 133-148). Englewood Cliffs, NY: Prentice Hall.
- Cook & Campbell, 1979. *Quasi-experimentation: Design and analysis issues for field settings*. New York: Rand McNally.

Week 7: Review of ANOVA and Comparison to Repeated Measures

- Review Keppel, Chapter 16; Tabachnik & Fidell (2000).
- SAS FAQ How can I perform repeated measures ANOVA with Proc Mixed.
- Rovine, M & von Eye, A. (1991). *Applied computational statistics in longitudinal research*. New York: Academic Press. Chapter 2.
- Neter, Kutner, Nachsheim and Wasserman Applied Linear Statistical Models (4th Edition) McGraw Hill.
- Diggle, Heagerty, Liang, and Zeger, 2002.

Week 8: Problems of Between-Person Change Assessments

- Campbell and Kenny, Chapter 8 and 9, on Cross Lagged Panel Correlation.

Week 9: Latent Variable Models

- Borsboom, D.; Mellenbergh, G.J. & van Heerden, J. The theoretical status of latent variables. *Psychological Review*, 110(2), 203-219.
- Vermunt, J.K. & Magidson, J. *Local Independence*. Web article.

Week 10: Missing Data Issues

- Schafer, J.L. & Graham, J.W. (2002). Missing data: Our view of the state of the art. *Psychological Methods*, 17(2), 147-177.
- Graham, J.W. Cumsille, P.E. & Elek-Fisk, E. Methods for handling missing data. In J.A. Schinka & W. F. Velicer (Eds.). *Research Methods in Psychology* (pp. 87-114). Volume 2 of *Handbook of Psychology* (I. B. Weiner, Editor-in-Chief). New York: John Wiley & Sons.

Week 11: Latent Growth Curve Modeling Conceptual Overview

- Singer & Willett, Chapter 1 & 2.

Week 12: Latent Growth Curve Modeling: Technical Overview

- Singer & Willett, Chapter 3.
- Slopes as outcome model demonstration

Week 13: Latent Growth Curve Modeling: Examples

- Singer & Willett, Chapter 4.
- Stoolmiller, M. (1995). Using latent growth curve models to study developmental processes. In J.M. Gottman (Ed.). *Analysis of developmental change*. Mahwah, NJ. Lawrence Erlbaum.

Week 14: Overview of Other Latent Growth Curve Models

- Collins, L.M. & Sayer, A. (2000). *New Methods for the Analysis of Change*. Washington D.C.: APA.
- Walls, T.A. & Schafer, J.S. (in press) *Models for Intensive Longitudinal Data*. New York: Oxford University Press.