Methods and Applications in Comparative Data Analysis

HS 2010
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The seminar will deal with methods and applications in comparative data analysis. Comparative analysis may be conducted across different countries, cultural or geographical groups, but also over different time points. For this purpose one may use different types of data sets, collected across the various groups, over time (in a panel or trend design) or a combination of both. Certain problems may be associated with such data, like different understanding of the questions, different response styles and different use of the scale. To cope with these problems, one needs to pay a special attention to the measurement properties of the theoretical constructs used.

In the seminar we will learn tools how to conduct a cross-cultural analysis using structural equation modelling techniques. We will see how a causal theory can be represented by a path diagram and translated into a structural equation model, and how the model can be estimated and tested with the AMOS 17.0 computer program. We will deal with the measurement models relating single or multiple indicators to latent variables. Different specifications of measurement models are tested via confirmatory factor analysis as a special case of a structural equation model. A special focus is given to the use of multiple group confirmatory factor analysis (MGCFA) to test the equivalence (invariance) of measurement instruments over different countries and time points. Further topics include the assessment of model fit and model modification. Our exercises will be based on survey data.

Preparation before the course:
Read the preparatory literature provided via the "course material" link. The course material is password protected. To get access drop a short e-mail to datler@soziologie.uzh.ch

Course work:
Each student is expected to (a) download SPSS and Amos 17.0 on his or her laptop (if a student does not have his or her own laptop we will find a solution); (b) participate and do all the exercises (c) bring his or her own data (to include at least two cultures like countries or language groups) and test his or her research question. Finally, (d) each participant will present the results and write at the end of the semester a short essay which presents the research question/s and how they were tested (lengths of the essay: ~50000 signs = 20-25 pages).

Detailed program:

Part 1: Confirmatory Factor Analysis (CFA)

Week 1) Overview of the whole course. Different model specifications, causality and empirical research. Process and strategy of theory testing. Notation for Structural Modelling. Use of SEMNET and AMOS manual. Description of the data-set and overview of the input files.

Week 2) Operating systematic of the software AMOS and the logic of its use. Preparation of data. Confirmatory Factor Analysis (CFA) with one measurement model with four indicators. Computation of exercise 1. Output interpretation.

Week 3) Foundation of Confirmatory Factor Analysis (CFA): Assumptions, model specification and identification. Types of restrictions. Typology of model testing: parallel, tau-equivalent and congeneric models.

Week 4) Preparation of exercise 2: congeneric, tau-equivalent and congeneric models; model modification; interpretation of modification indices; model evaluation.

Week 5) Estimation and identification in CFA. Model modification and the strategy of theory testing: New factors, new factor loadings or residual correlations. Global and detailed fit measures. Simultaneous Confirmatory Factor Analysis (SCFA) with multiple factors. Reliability and validity estimates in CFA. Variance decomposition. Multiple group comparison and interaction effects.

Week 6) Preparation of exercise 3: SCFA with several latent constructs. Examination of detailed and global model fit. Model modification and model comparison with a chi square difference test.

Week 7) Multiple group comparison and interaction effects. Conditions for comparability of theoretical concepts across cultures or over time. Higher-order factor models and MTMM-Models (Multi Trait Multi Method). Equivalent models.

Week 8) Preparation of exercise 4: Multiple group comparisons across two or more groups. Model formulation and estimation. Model evaluation and modification. Preparation of exercise 5: Multiple group comparisons with observed and latent means and intercepts. Tests of invariance. Model modification, evaluation and interpretation.

Part 2: Structural Equation Models (SEM)

Week 9) Structural Equation Models (SEM) with latent variables and multiple indicators: Specification, identification and estimation. Causality and equivalent models. Typology of model testing. The „two step strategy“.

Week 10) Exercise 6: Preparation of a SEM with a second-order factor a model without a second-order factor. Specification search. Output interpretation.

Week 11) Model testing and model modification. Detailed and global fit measures. Interpretation of parameters. Decomposition of effects. Multiple group comparison and interaction effects.

Week 12) Exercise 7: SEM with multiple groups. Output interpretation. Exercise 8: SEM with multiple groups including observed and latent means and intercepts. Model evaluation and interpretation. Decomposition of effects.

Week 13) MIMIC-models (Multiple Indicators Multiple Causes): Specification and test. Typology of model testing revised. The issue of missing values. Exercise 9: A MIMIC-model. Model formulation, evaluation, modification and interpretation.

Part 3) Participants' models

Week 14) Presentation of participants' models. Open questions.

Week 15) Presentation of participants' models. Open questions.

Preparatory Literature

-) Arbuckle, J. L. (2008). Amos 17.0 user's guide. Chicago: SPSS.
Brown, Timothy A. (2006) Confirmatory Factor Analysis for Applied Research. New York: The Guilford Press, Ch. 1, 1-11.
-) Davidov, E., P. Schmidt, and S. Schwartz (2008). Bringing values back in: The adequacy of the European Social Survey to measure values in 20 countries. Public Opinion Quarterly, 72(3), 420-445.
-) Davidov, E., P. Schmidt, and S. Schwartz (2008) Bringing Values Back In. The Adequacy of the European Social Survey to Measure Values in 20 Countries. Public Opinion Quarterly, 72, 3, 420–445.
-) Davidov, E., B. Meuleman, J. Billiet, and P. Schmidt (2008). Values and Support for Immigration. A cross-country comparison. European Sociological Review.
-) Steenkamp, J.-B. E. M., and H. Baumgartner (1998). Assessing measurement invariance in cross-national consumer research. Journal of consumer research, 25, 78-90.

Proposed Course Literature:

Books:
-) Brown, Timothy, A. (2006). Confirmatory factor analysis for applied research. New York: The Guilford Press.
-) Byrne, B. M. (2001 or 2009). Structural equation modeling with AMOS. Basic concepts, applications, and programming. London: Lawrence Erlbaum Associates

Papers:
-) Billiet, J. and E. Davidov (2008). Testing the stability of an acquiescence style factor behind two interrelated substantive variables in a panel design. Sociological Methods and Research, 36(4), 542-562.
-) Boomsma, A. (2000). Reporting analyses of covariance structures. Structural equation modeling, 7, 461-483.
-) Borsboom, D. (2006). When does measurement invariance matter? Medical Care, 44(11) Suppl. 3, 176-181.

-) Byrne, B. M. (2004). Testing for multigroup invariance using AMOS Graphics: A road less traveled. Structural equation modeling, 11, 272-300.
-) Byrne, B. M. and S. M. Stewart (2006). The MACS approach to testing for multigroup invariance of a second-order structure: A walk through the process. Structural equation modeling, 13, 287-321.
-) Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. Structural equation modeling, 14, 464-504.
-) Davidov, E. (2008). A cross-country and cross-time comparison of the human values measurements with the second round of the European Social Survey. Survey Research Methods, 2(1), 33-46.
-) Davidov, E. and P. Schmidt (2007). Are values in the Benelux countries comparable? Testing for equivalence with the European Social Survey 2004-2005. In: Loosveldt, G., M. Swyngedouw and B. Cambré (Eds.), Measuring meaningful data in social research, pp. 373-386. Leuven: Acco.
-) Diamantopoulos, Adamantios, Petra Riefler, and Katharina P. Roth (2008). Advancing formative measurement models. Journal of business research. Advance access, doi:10.1016/j.jbusres.2008.01.009
-) Hu, L.-t. and P. M. Bentler (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural equation modeling, 6, 1-55.
-) Marsh, H. W., K.-T. Hau, and Z. Wen (2004). In search of golden rules: comment on hypothesis-testing approaches to setting cutoff valuesfor fit indexes and dangers in overgeneralizing Hu and Benter's (1999) findings. Structural equation modeling, 11, 320-341.
-) Meredith, W. (1993). Measurement invariance, factor analysis and factorial invariance. Psychometrika, 58, 525-543.
-) Raijman, R., E. Davidov, P. Schmidt, and O. Hochman (2008). What does a nation owe non-citizens? National attachments, perception of threat and attitudes to granting citizenship rights in a comparative perspective. International Journal of Comparative Sociology, 49(2-3), 195-220.
-) Steinmetz, H., P. Schmidt, A. Tina-Booh, S. Wieczorek, and S. H. Schwartz (2007). Testing measurement invariance using multigroup CFA: differences between educational groups in human values measurement. Quality and Quantity.
-) Vandenberg, R. J., and C. E. Lance (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices and recommendations for organizational research. Organizational research methods, 3, 4-70.
-) Wilcox, J., Roy D. Howell, and Einar Breivik (2008). Questions about formative measurement. Journal of Business Research. Advance access, doi: 10.1016/j.jbusres.2008.01.010
-) Zick, A., C. Wolf, B. Küpper, E. Davidov, P. Schmidt, and W. Heitmeyer (2008). The syndrome of group-focused enmity: The interrelation of prejudices tested with multiple cross-sectional and panel data. Journal of social issues, 64(2), 363-383.

Internet websites:
-) Joining the SEMNET discussion group: http://www.gsu.edu/~mkteer/semnet.html