Network on Intrapersonal Research in Education (NIRE) proudly presents:

Preliminary program for the third seminar (Helsinki Thurs 8th October 10-4) Statistical methods for intrapersonal data

09:30-10:00 Registration and refreshments

10:00-10:10 Lars-Erik Malmberg & Katariina Salmela-Aro: Welcome and introduction

10:10-10:50 Asko Tolvanen (University of Jyväskylä, Finland), Autoregressive models in the context of structural equation and multilevel modelling

In the typical autoregressive model in social sciences value of the output variable at certain time point t depends linearly only on its own value at time t-1. In the structural equation context this model is called as simplex model. This model can be estimated in multilevel context by building one variable for time point t, i.e. y_t , and one variable for time point t-1, i.e. y_{t-1}, and regress y_t on y_{t-1}. Interpretation of this model is that the observed value y_t depends only on the previous value y_{t-1} and there is no longer history of y that predicts the value at time t. This interpretation is totally different than, for example, in growth curve models. By building autoregressive model for two variables simultaneously makes it possible to estimate cross-lagged effects. By using three variables, these models can further be extended to include, for example, mediator effects. Both methods have their own advantages as well as disadvantage related to, for example, the need of equal time interval between measurement points, test of model fit, etc.

10:50-11:30 Manuel Voelkle (Max Plank Institute, Berlin, Germany) Continuous time modeling

The goal of this presentation is to reconsider the design and analysis of longitudinal studies from a continuous time perspective. Special emphasis will be put on the handling of time, missing values, and the integration of between-person and within-person information. After distinguishing between static and dynamic models of change, I will first discuss problems in the analysis of dynamic processes related to unequal time intervals and will introduce continuous time modeling as a way to overcome these problems. Second, I will translate the problem of missing values in longitudinal studies into a problem of unequal time intervals and reconsider the problem from a continuous time perspective. I will end with discussing the advantages and limitations of continuous time modeling for the analysis of panel data in the presence of unobserved heterogeneity (*N* large, *T* small) as well as for time series analyses (*T* large, *N* small).

11:30-12:20 lunch

12:20-13:00 Ellen Hamaker (Utrecht University, The Netherlands), State-space modeling

State-space modeling is an extremely flexible approach for analyzing time series data, for instance of a single subject or multiple subjects, or for aggregate time series data (e.g., the annual average grade of a school on a final exam). In this presentation I will present several time series processes that may be of interest to educational researchers, including univariate and multivariate processes, processes with latent variables (e.g., dynamic factor models), processes with trends, intervention processes, regime-switching processes, and processes that

are characterized by changing dynamics. In particular, I will discuss when a process is considered stationary and when it is not. In addition I will briefly present the state-space model and the Kalman filter by which the parameters of the state-space model are estimated, and show how different time series models can be expressed within the state-space format using specialized software. I will end by discussing how the state-space modeling framework is related to the much better known framework of structural equation modeling.

13:00-13:40 Noona Kiuru (University of Jyväskylä, Finland), Mixture models for intrapersonal data

A mixture model is a probabilistic model for representing the presence of subpopulations within an overall population. In mixture modeling categorical latent variables are used to represent latent classes corresponding to, for example, homogeneous groups of individuals or latent trajectory classes corresponding to types of development in unobserved populations. Mixture modeling requires the choice of the 'overall' model (within class model) as well as the decision based on which parameters latent groups are allowed to differ (between class model). First, I will present possibilities of mixture modeling to analyze development in intrapersonal data. Second, I will present an empirical study in which multilevel regression mixture analysis is applied to examine the patterns of emotion transmission in the diary data of father-child dyads.

13:40-14:10 break

14:10-14:50 Jens B. Asendorpf (Humboldt University, Germany), Intrapersonal data within a multi-level perspective

Empirical psychology should study individual characteristics at both the person and the population level because both exclusively person-oriented analyses and exclusively population-oriented analyses are seriously limited. Multi-level regression models are well suited for this task because they simultaneously estimate within-person and between-person parameters, and do not require many assessments within persons, but can nevertheless easily model complex within-person relations. I illustrate application of such models with a three-level model of the intraindividual change of relationship-specific interpersonal conflict during an important life transition where time points are nested in relationships, and relationships are nested in individuals. This can be extended to a four-level model with individuals nested in classrooms.

14:50-15:30 Kou Murayama (University of Reading, UK) Time-specific random effect and Type-1 error inflation in longitudinal intraindividual data analysis: A mixed-effects model perspective

Intraindividual longitudinal data are typically analyzed using hierarchical linear modeling, considering that time points (or occasions) are nested within individuals. But researchers often apply the same model to the data which measure all individuals on the same occasions over time (i.e., time points are crossed with, rather than nested within, participants). I will present a set of simulations showing that the application of the standard hierarchical linear model to such data would produce an inflation of Type-1 error rates, sometimes to a considerable degree (theoretically it reaches 100%). To address the problem, I will recommend mixed-effects models that explicitly incorporate the random time effect in addition to the intraindividual and interindividual random effects.

15:30-16:00 Lars-Erik Malmberg: Where do we go from here? Synergies between methodology and educational research.