

#5 Topic: Disentangling complex relationships between social processes

Senior Scientist: Prof. dr. Ellen Hamaker

Abstract:

In the social sciences we are often interested in the way two processes affect each other. For instance, we want to know whether developing social skills during adolescence comes before developing self-esteem, or that developing more self-esteem leads to increases in social skills. Or we want to know whether the feminization of a profession leads to lower wages, or that lower wages lead to feminization of a profession. Or we are interested in whether increases in vocabulary trigger grammar development, or that grammar development spurs vocabulary.

Oftentimes, we cannot perform a randomized controlled experiment in which we randomly assign people (or families, or professions) to different conditions and determine the effect this has on the other variable. Instead, researchers use longitudinal data and study the cross-lagged effects between the two variables of interest; they investigate whether these cross-lagged effects differ from zero, and whether one is larger than the other.

The models that are being used to analyze such panel data are based on time series models and dynamic systems models. Two issues arise here. First, the data often come from many cases (e.g., multiple individuals, families, or professions), and often these cases differ from each other. Hence, the model needs to account for such differences (e.g., a difference in mean over time).

Second (and this is what we are going to focus on), the different models account for development in different ways. Roughly we can make a distinction between approaches that are based on detrending the data (which is the focus of the Wang and Maxwell paper), while other approaches are based on using the cross-lagged relationships to account for the developmental trajectories (which is the basis of the paper by Grimm et al.).

The question we are going to focus on is: If our interest is in the relationship between two developmental (i.e., non-stationary) processes, when should we use detrending (or include time as a covariate, which leads to the same results as shown by Wang and Maxwell), and when can we assume that the short-term dynamics and the long-term developmental trajectories are the result of the same underlying set of equations (which seems to be the basis of Grimm et al.)?