Modelling events within social networks

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This course deals with events happening within social networks. The events can be either changes in a person’s characteristics under the influence of the social network or changes in the social network itself because a person starts or stops relations.

Network effects on a person’s characteristics are generally known as *social contagion* or *peer influence*. The spread of epidemics due to contacts with people who are contaminated (unfortunately, a very topical phenomenon) and the diffusion of innovations are classic examples. Exposure to contaminated people or innovation adopters may make us sick or adopt. Our network contacts, however, may also change our opinions, ways of expressing ourselves, cultural choices, and so on.

If we assume that people initiate and end relationships, social network structure is the result of the choices that people make. These network choices are called *relational events*. This also applies to short-term interactions, such as saying something to someone else. We start and end relations partly because of our own characteristics or those of our contacts, but also because of our current network structure. For example, we may choose our friend’s friend to be our friend too. This is also known as *social selection*.

Acquiring a disease or adopting an innovation is an event taking place at a particular point in time. Starting or ending a relationship and human interactions also take place in time. This course presents methods for analyzing events within social networks for which we know (with more or less precision) when they happen. In other words, this course deals with longitudinal network data.

The models presented in this course are dynamic. Our network contacts may change our characteristics and our subsequent behaviour towards network contacts, which changes the network. As a result, our network contacts subsequently respond to a new network context, changing themselves and the network again. In essence, we are modelling individual change and network change.

Our example dataset consists of interactions among a set of children during a series of school breaks. Can we predict who plays with whom? Who says something to whom and how loud or nice (versus not so nice) the utterance is? Can we predict when a child starts using a new game app? The data are fake but created to highlight the different aspects of social contagion and social selection.

We can do this with the general statistical workhorse of the social sciences: regression analysis. The course starts with a basic regression model that tries to predict how loud children are during breaks. Do children adapt their voice volume to those of their playmates? This contagion model is step-by-step expanded to include time. The second part of the course deals with social selection, that is, network change. We first predict the content of interactions: Is a pupil saying something nice or not so nice to another pupil? Finally, we try to predict who plays with whom and who says something to whom: the lines in our network of children. All analyses are done in R.

The course takes into account that some participants may already be proficient in several types of regression analysis whereas other participants have hardly any experience. The course’s primary goal is to teach the different types of questions that can be answered with data on events in social networks and how to use regression results to answer these questions. As a secondary goal, the course offers hands-on practice with analysis, data preparation, and visualization. Not all participants are expected to complete all exercises during the course. The course materials will remain available to participants after the course, so participants can use the materials when they want to apply the models to their own data afterwards.

Preparation for the course:

* Install the latest version of R and RStudio on your computer (check out the links in the next bullet point for guidance).
* Refresh your knowledge of regression analysis and of R. Reading tips: Read more about installing and using R and RStudio in the (web) books [Modern Dive](https://moderndive.com/1-getting-started.html) and [Getting used to R, RStudio, and R Markdown](https://moderndive.com/1-getting-started.html). If you are an SPSS user, you may want to read the first three sections of [Help, My Collaborator Uses R! An Introduction to Reproducible Statistical Analyses in R](https://wdenooy.github.io/Switch2R/).
* For a short position paper, read: de Nooy, W. (2015). Structure from interaction events. *Big Data & Society*. <https://doi.org/10.1177/2053951715603732>.

## Schedule

Each course block lasts for 1.5 hours.

### Morning I, Part I - Peer influence with linear regression

### Morning I, Part II - Susceptibility to peer influence (multilevel regression)

### Afternoon I, Part I - Contagion with logistic regression

### Afternoon I, Part II - Diffusion (discrete time event history)

### Morning II, Part I - Network change: Predicting tie value

### Morning II, Part II - Network change: Predicting sender and/or recipient