Editorial

Introduction to the special issue on Network Dynamics (Part 2)

Recent years have seen quite an increase in research activity in the domain of longitudinal network analysis, including the collection of longitudinal data sets, development of methodology, and substantive results in various fields. In January 2010 a first part of the special issue on Dynamics of Social Networks appeared (Snijders and Doreian, 2010), and this is the second part. In this introduction we do not repeat the general remarks about network dynamics contained in the introduction to the first part, and limit ourselves to giving an overview of the papers presented in this issue.

All papers in this issue are related, in various ways, to the stochastic actor-oriented model for network dynamics presented in the first part of the special issue (Snijders et al., 2010). The first paper, by Brandes et al. (2012), is about visualization of changing networks. A central issue in finding a good layout (i.e., positioning of the nodes) for a longitudinal sequence of changing networks on a constant node set is the choice between stable or changing positions for the nodes. This paper treats the tension between the easy comprehension of a fixed node layout on the one hand, and the possibility of optimal layouts for any given time point with a freely varying layout on the other hand. Ways to obtain a sensible compromise are proposed. The authors apply these visualization methods to diagnose stochastic models for network dynamics, taking actor-oriented models as the example. The diagnostic visualizations are based on comparing predictions by the model (represented by multiple draws from the fitted probability distribution) with the observed data. Another, different and complementary, approach to visualizing network change was presented by Brandes and Nick (2011). This approach highlights the exploration of evolving dyadic relations and persistent group structure. These papers show how general approaches in network visualization can be applied to give better insights also in dynamics of social networks.

The second paper by Koskinen and Edling (2012) proposes an extension of the actor-oriented model to two-mode networks, a structure that allows the representation of affiliation of individuals (the first mode) to groups of many kinds (the second mode) and the duality between persons and groups (Breiger, 1974). They use this in a study of interlocks between boards of corporations traded at the Stockholm Stock Exchange. Their model permits to keep intact the longitudinal as well as the two-mode (directors by companies) structure of the data. One of their results is that peer referral is important for recruitment into boards; another result is that the strong increase in female directors in the early 2000s cannot be represented as a consequence of peer referral, nor of the seniority or experience of the women assigned to corporate boards, but must have been the outcome of other processes.

The next two papers are about dynamics of advice networks. Both papers, Lazega et al. (2012) and Agneessens and Wittek (2012), focus on the detailed combination of hierarchical and cohesive elements of advice networks (cf. Gould, 2002). The first of these papers considers how advice networks may evolve, driven by status-related mechanisms together with cohesion as resulting from shared values and norms, and tests hypotheses based on advice seeking networks in an old and venerable institution, the Commercial Court of Paris. The second also considers status-related mechanisms as drivers of the evolution of advice networks, but combined these with mechanisms of generalized exchange, interpreted as structural social capital, using data from a service organization. Both papers find support for the importance of status-related processes, and in doing so refine earlier results about status and advice seeking and point to further research possibilities. Effects of dyadic reciprocity and of formal position are established in both papers in similar ways; the importance of indegrees (expressing popularity as advisor, and thereby reflecting status) and outdegrees (activity in advice-seeking), on the other hand, is modeled differently. Agneessens and Wittek (2012) find support for negative outdegree–indegree assortativity (those receiving many advice questions are less likely to seek advice from those asking many others for advice), whereas Lazega et al. (2012) find that indegree differentials as well as outdegree differentials in the advice-seeking network are self-reinforcing and negatively related – but without considering assortativity patterns as a potential underlying pattern.

The last two papers apply newly developed methods for studying the interdependent dynamics of networks and individual behavior (see Snijders et al., 2010) to research paradigms of long standing. Friemel (2012) is a network study into the importance of interpersonal communication for the use of mass media, continuing the tradition started by the investigations by Lazarsfeld et al. (1968) [1944], and studying in detail the micro-mechanisms of this interdependence. In a population of adolescents, the paper studies how interpersonal conversations about TV programs influences, and is influenced by, individual habits of TV watching. It turns out that there is a homophilous choice of conversation partners based on quantity and type of TV viewing, but the hypothesis derived from an information flow theory, that conversations would be addressed more to those watching less TV, was refuted; a possible interpretation of this unexpected result is that this type of media use is oriented toward entertainment rather than information. Further, there was only quite weak support for hypotheses about social influence with respect to TV watching, in contrast with classical
theories about diffusion of media use tendencies – which have been tested in the past with insufficient distinction between processes of social influence on the one hand, and selection of interaction partners on the other hand.

The paper by Steglich et al. (2012) is part of a research programme aimed at developing and assessing network interventions to reduce smoking of adolescents, continuing the study of the interdependence between adolescent friendships and health- and lifestyle-related behaviors and of interventions to decrease harmful behaviors (Fisher and Bauman, 1988; Valente et al., 2003). Here also the distinction between social influence and behavior-dependent selection of friends is of basic importance. This paper focuses on a potential methodological pitfall in this approach: the dependence on the assumptions made in the statistical model about the way in which the network and the behavioral variables are changing. Two specific kinds of assumptions are considered: time homogeneity in a multi-wave study, and the effects of network structure on the patterns of change in the network. Such assumptions are of auxiliary importance to the main research question. A priori it is unknown to which extent the potential incorrectness, or approximate nature, of these assumptions might invalidate the main conclusions drawn from such a study. Dynamics of friendship networks and smoking is studied in a set of three schools. In the analysis, it appears, first, that there is indeed time heterogeneity, but the focal parameter, peer influence on smoking behavior, remains stable over time. Second, the results about peer influence, as well as those about effects of smoking behavior on friendship choice, appear to be sensitive to details of the model specification only to a quite minor degree. However, other aspects of network dynamics, such as the estimated strengths of reciprocity and of gender homophily, are clearly affected by the amount of detail of the model postulated for network dynamics. Although this was a study involving only three schools and generalizability is an issue here, the study provides some confidence in the methodological approach used.

The two last papers also share the feature of presenting results from a study involving several ‘parallel’ networks – 35 classrooms in 7 schools in Friemel (2012), 3 schools in Steglich et al. (2012), out of a larger group of 59 schools that will be analyzed in further studies. The study of network dynamics in multiple contexts, or settings, is critically important because this provides replicates of the studied phenomenon across these contexts. Equally important is having differences in settings, because the different characteristics of the settings provide information for assessing different emerging patterns when they occur. Understanding how context affects network dynamics goes beyond the estimation of models and, fortunately as these papers show, this broader strategy is becoming more and more common. The investigation of on the one hand what is common and generalizable, and on the other hand the magnitude and explanation of differences between such parallel networks, is one of the topics that will get more scholarly attention in the coming years.

References


Tom A.B. Snijders a, b
a University of Oxford, United Kingdom
b University of Groningen, Netherlands

Patrick Doreian c, d

c University of Pittsburgh, United States
d University of Ljubljana, Slovenia