



Social Network Analysis: Introduction to Special Edition

Nick Crossley^a, Christina Prell^b, and John Scott^c

^aDepartment of Sociology, University of Manchester

^bDepartment of Sociological Studies, University of Sheffield

^cDepartment of Sociology, University of Plymouth

Abstract

This special issue on social networks comes out of a National Research Methods Centre/ESRC funded seminar series, led by Nick Crossley, and co-led by John Scott and Christina Prell. The seminar series focused around various themes and issues pertaining to social networks. Part of this series' aim was to reinvigorate UK interest in a field that had, in the past, been significantly shaped by the contributions of UK scholars, but in more recent times had been eclipsed by the efforts of US and European scholars.

Key words: social networks, network analysis, network methodology

Introduction

This special issue brings together six papers, largely drawn from the series, which explore and exemplify different aspects of social network analysis, further developing network methodology whilst also hopefully offering an accessible and interesting way in for those unfamiliar with the approach(es). Before saying more about the issue and its contents, however, we would like to offer a brief history of social network analysis, and acquaint the reader with some of the field's basic terminology.

Interest in social network analysis has grown considerably in the last decade, following a long period of gradual expansion that began in the 1960s. There is a long history behind this growth of interest, with much of the key work in the second half of the twentieth century having been undertaken in the United States. Interest in continental Europe picked up somewhat earlier than in Britain and Ireland, reflecting the deep origins of social network analysis in German social theory, but it is now a world-wide specialism with a growing influence in many substantive research areas.

Social network analysis is based around the idea of seeing social relations in formal terms as patterns of points and lines in a mathematical space with formal properties that can be analysed with precision. This metaphor of the social network reflects an awareness of network ideas in electrical and transport engineering and in

geographical views of networks as landscape features. However, the specific origins of the idea are firmly rooted in sociology itself (See the historical overviews in Scott 1999: Chapter 2; Freeman 2004).

It was in classical German sociology that the idea of the social network was really established. In the various writings of Ferdinand Tönnies, Max Weber, and, above all, Georg Simmel there developed a sociological framework according to which large scale social structures had to be seen in terms of the social relations among individuals that resulted from their subjectively meaningful interactions. These theorists showed that interactions formed interweaving patterns of connection that comprise the warp and weft of social webs of connection. For many theorists, these webs of connection were to be analysed in formal terms, rather than in terms of their substantive contents. Social structures such as classes, states, and economies were envisaged as concatenations of these configurations.

This work was combined with the insights of Gestalt psychology and field theory in the early 'sociometry' of Jacob Moreno (1934). Studying school classroom friendship choices, Moreno charted the connections as graphical patterns of points and lines and invented the term 'sociogram' to refer to these graphs. These insights were central to the group dynamics studies sponsored by the Michigan Research Centre and the Tavistock Institute in the 1940s and 1950s (Cartwright and Zander 1953; and see Harary *et al.* 1965).

The first actual use of the term social network, however, had been in anthropology, and it was here that many early advances were made. Alfred Radcliffe Brown saw the social structure as a network of relations, while his student and colleague Lloyd Warner explored network cliques in his community studies. Some of Warner's ideas had been sharpened during his involvement in the famous Hawthorne studies, where the researchers had been struck by the similarities between the electrical wiring diagrams that littered the Hawthorne factory and the patterns of connection among the workers who produced this wiring.

The psychological and anthropological works came together in the early 1950s when researchers at Manchester University and its Rhodes-Livingstone Institute — especially Clyde Mitchell and John Barnes — cooperated with the social psychological work on families being undertaken by Elizabeth Bott (1957) in her studies in London. These writers forwarded the use of formal mathematical ideas to study community and family networks (Mitchell 1969).

The mathematics that lay behind all the early uses of social network analysis was graph theory. This branch of mathematics developed as a way of representing any structure as a configuration of points (or vertices) and lines (or edges). Theorems were constructed concerning the shapes or topologies produced by interconnections. Individual points could be described in terms of their local pattern of connections and their centrality in their networks, while whole networks could be described in terms of their overall density and their division into cliques. These mathematical ideas found a ready application in sociological work.

From the later 1960s, advances in computing began to make possible the investigation of large-scale social networks and an explosion in social network analysis took place. Initially at Harvard under the influence of Harrison White, researchers such as Mark Granovetter (1973) and Barry Wellman (1979) produced innovative work that influenced a generation of researchers. Influential early statements of the emerging position included Berkowitz (1982) and the edited collection by Berkowitz and Wellman (1983). Subsequent researchers added algebraic methods to the existing approach of graph theory and laid the basis for a much broader consideration of mathematical models. White (2008) has produced a powerful statement of the theoretical basis of this work. Later work has employed multidimensional scaling, statistical methods, and agent-based modelling to advance the toolbox for social network analysis. Useful texts on these methods include Freeman *et al.* (1989), Wasserman and Faust (1994), and Carrington *et al.* (2005) and the edited collection of sources in Scott (2002).

Whilst methodological and software developments have undoubtedly played a key role in stimulating the recent re-emergence of interest in network analysis, by making it both more sophisticated and more accessible, theoretical and substantive developments both within and outside of the social sciences have played a key role too. In particular, academic and policy debates on 'social capital', coupled with natural and 'pop' scientific interest in 'small worlds' (Barabási 2002, Watts 2004), have been important. This point merits brief elaboration.

Since the publication of Robert Putnam's influential study of social capital there has been a growing interest in the application of social network ideas to this topic, and a corresponding influx of interest from social capital researchers. The ideas of 'bridging' and 'bonding' relationships have very clear social network implementations that have encouraged the development of analysis in this area (Burt 2007).

Most recently, work in social network analysis has been influenced by physicists who have returned to earlier ideas on 'small worlds' pioneered by social psychologist Stanley Milgram and have proposed new directions for social network analysis (Barabási 2002; Watts 1999 and 2004). While much of this work was initially undertaken in ignorance of the earlier investigations in social network analysis and overstates the extent of its own originality and innovation, it has begun to reinforce a move amongst social network analysts to concern themselves with issues of structural change over time. The static orientation of much social network analysis has, in this work, been supplemented by more dynamic models.

The papers in this special issue exemplify the influence of all these diverse strands.

Christina Prell's paper, 'Linking social capital to small-worlds: a look at local and network-level processes and structure,' positions social capital as a sociological framework for explaining how small-worlds arise. In particular, Prell demonstrates how the processes by which actors invest in their ties and develop network strategies gives rise to a small-world network. In combining social capital and small-worlds, Prell shows these two perspectives gain from each other: small-worlds research lacks sociological depth, and social capital provides a rich account for how actors, networks, and resources interact with each other. In turn, by linking to small-worlds, social capital gains value as an explanatory theory in demonstrating how a social phenomenon outside the normal range of social capital discussion can be understood through a social capital lens. These propositions are then explored empirically through use of the p^* model, one of the Exponential Random Graph Modelling (ERGM) approaches developed by Wasserman, Pattison, and Robins (Wasserman and Pattison 1996; Pattison and Wasserman 1999; Robins, Pattison and Wasserman 1999). Her article thus acts as a theoretical innovation and as an introduction to and illustration of the ERGM approach.

Prell's paper is followed by Deirdre Kirke's paper on 'Gender clustering in friendship networks: some sociological implications'. Deirdre Kirke investigates a friendship network of Dublin teenagers in order to examine the extent of homophily and, in particular, the gender clustering of friendship choices. Homophily, as she describes, refers to the preference of actors to form ties with others who are similar to themselves, and it is a well-documented occurrence within the SNA literature (Blau 1977). The data relate to a working class district of Dublin, first studied in 1987, and Kirke is able to use more recently developed approaches to social network analysis to re-examine these data. Her theoretical starting point is the idea that 'social structures affect individual actions and that the individuals, in turn, form and change those structures when they form and change relationships'. Like Prell, Kirke makes use of an ERGM approach. Through this approach, she shows that initial friendship choices become the structural basis on which subsequent friendship choices and interaction patterns are based and that the result is a growing division of the network around the initial gender-based choices. Thus, homophily has an influence on the flow of influence through the network, as it creates barriers to the free flow of influences. The effects of this are demonstrated in further data on substance misuse among the teenagers.

Whereas Prell and Kirke both make use of more quantitative approaches to SNA, the next article in this issue seeks to integrate qualitative data alongside quantitative. In their article, Gemma Edwards and Nick Crossley discuss how recent developments in social network analysis have been mainly quantitative in nature. In their paper, focusing upon the personal network ('ego-net') of a single militant suffragette, Edwards and Crossley seek to bring some of these formal, mathematically based insights into dialogue with a more qualitative, content-focused and (in this case) archival approach. Each approach facilitates a deepening of the insights offered by the other, they demonstrate, and each begs questions for the other which drive analysis forward. As in social science more generally, we get the best out of both qualitative and quantitative approaches when we use them in combination. This paper also offers an introduction and contribution to one of the key substantive areas in which social network analysis has been developed: social movement studies.

Wouter de Nooy's paper also focused upon application and also focused, if not upon qualitative methods then upon a theoretical tradition most often associated with it. In a fascinating and provocative analysis and argument, de Nooy contends that the methods of social network analysis afford a rigorous way of operationalising key concepts and claims from within symbolic interactionism. Moreover, in what is essentially a self-critical and reflexive analysis, de Nooy retraces his own various attempts to offer a satisfactory analysis of network data pertaining to literary circles in the Netherlands, outlining the successive stages that have led him to his own current position. As this path reflects, in important ways, that of social network analysis more generally across the period referred to, the paper also offers interesting insights into the way network thinking has evolved in recent years and the rationale behind much current thinking.

Elisa Bellotti's paper, like Christina Prell's, seeks to bring together two important network concepts, in this case, Simmelian ties and brokerage roles. Like Prell, Bellotti focuses upon 'social capital'. At a methodological level, the aim of the paper is to explore ways of identifying the different types of brokerage role (or position) that actors might occupy between relatively cohesive sub-groups within a network. A synthesis of methods, Bellotti shows, takes us further than either method can achieve in isolation. At a more practical level the paper, which analyses data pertaining to local social services dealing with youth substance abuse in Milan, on behalf of one such service, demonstrates how network analysis might serve the practical ends of those tasked to navigate one or more of the complex webs that comprise the domains of the social world. The paper suggests that sociometric maps, like the more conventional (geographical) maps we are all familiar with, might help us in our capacity as everyday lay members of the social world to find our way around. By implication this perhaps also suggests a new cartographic role for social scientists.

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