

VISUALIZING SOCIAL STRUCTURE: BRIDGING THE GAP BETWEEN CONTEMPORARY SOCIAL THEORY AND SOCIAL NETWORK ANALYSIS

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ABSTRACT

Social network analysis (SNA) has much to offer sociology. However, there is little consideration of SNA in contemporary sociological theory (CST) although SNA developed in parallel with the consolidation of CST in the 1960s and 1970s. SNA championed its distinctiveness as 'structural analysis'. Nearly all current CST presents 'structure versus agency' as the crucial binary to differentiate mainstream theory, positivistic ontology and quantitative methodologies, on the one hand, from interactionist theories, qualitative methodologies and constructivist ontologies on the other. I argue that using structure as a simple binary means that the CST's notions of structure have become highly ambiguous and ill defined. Thus, for CST, 'structural analysis' has no purchase to describe the distinctiveness of SNA. I draw attention to the recent work of Lopez and Lopez and Scott that reclaims varied concepts of structure from previous literatures, including a concept of 'relational structure' that embraces SNA. The paper concludes that the work of Lopez is an important example of the 'visual' method of social theory practice advocated by Woodiwiss. Once we work with 'social-theoretical picturing' of structure, there is real potential to connect CST to the resources available in the visual, statistical and mathematical modeling developed by SNA.

1 INTRODUCTION

1.1 SOCIOLOGY AND SOCIAL NETWORK ANALYSIS (SNA)

Social Network Analysis (SNA) is not a recognized area of sociological training. However, many sociological researchers find themselves dealing with networks of some kind, particularly researchers involved in ethnographic studies. The need for sociology to develop its understanding of networks and 'social networks' has, however, become more urgent in recent years.

Recent public interest in social networks has taken many forms. Management and business books on 'networking' abound. Network concepts intrigue the public. They are part of everyone's experience. The maxim 'it's not what you know but who you know' points to a popular idea of informal networks and their importance. The claim of connectedness at 'six degrees of separation', although grounded in some social research and mathematical theory, took on a life of its own. It can now best be described as an urban myth. Widespread use of email and web-based communication technologies means there are thousands of computer analysts, information technologists and system administrators dealing with mountains of data about communication activity and becoming instant experts on the 'social networks' behind this activity. The recent expansion of web-based social interactions in forums such as MySpace and Facebook has created a new wave of popular involvement in 'social networking'. Such public interest cries out for sociological scrutiny and research on these Web-observable social networks.

The well-established field of social network analysis (SNA) would seem to offer a wealth of ideas and resources for sociologists to engage with this expanding public interest. Social network analysis (SNA) has maintained its distance from sociology and the reverse seems to be the case. SNA is not a sub-discipline of sociology, or of any of the other major disciplines. Its applications range from psychology and education, through many areas of sociology and into economics. Its major professional association is small but independent. The concepts of networks and social capital have generated enormous interest for sociology, but these and other ideas have been hard to integrate into general sociological theory. SNA has distinctive research methods and methodologies of great promise but they are simply not covered in the conventional social research books on quantitative and qualitative methodologies.

Secondly, there is virtually no discussion of social networks or network analysis in social theory texts. This is surprising as, intellectually, SNA and contemporary social theory (CST) seem close. Contemporary social theory can be seen as a response to the new public agendas of the 1960s and 1970s. It consolidated itself in subsequent decades through debates about modernization, postmodernity and globalization. SNA also dates its current intellectual origins from the 1970s, specifically the 'renaissance' of network ideas around Harrison C. White at Harvard, his graduate students and collaborators (Freeman 2004; Scott 2000). SNA championed its novelty under the banner of 'structural analysis'. In an era when C.W. Mills had defined the sociological imagination as a concern with social structure and its impact on private lives the promise of structural analysis should have been appealing.

There is a yawning gap between the theoretical vision of SNA and the main perspectives of sociological thought as mapped in most CST. In this paper I approach this gap as an active SNA researcher and methodologist but, as a sociologist, I look at it from the social theory side. I focus on concepts of social structure as presented in CST. I suggest that use of the structure versus agency binary as the starting point of most CST has created fuzzy and undifferentiated notions of social structure that hold back and obfuscate social theory. I champion the recent work of Lopez (2003) and Lopez and Scott (2000) as a real achievement in recapturing the variety of concepts and theoretical perspectives existing under the term 'social structure'. I argue that the method followed by Lopez is an outstanding example of social theorizing as language based, visualizing activity on 'social-theoretical pictures' as advocated by Woodiwiss (2005). I conclude that further social theory of the kind adumbrated by Woodiwiss and practiced by Lopez has real potential to connect social theory with ERGM modeling only recently developed in SNA. This practical connection from CST to the 'structural analysis' of SNA then opens social theory to the rapidly developing statistical and mathematical theories and techniques that underlie, inform and moderate the visual modeling of SNA. Through this pathway, it is possible, I believe, for sociological researchers to tap the potential of SNA for empirical, qualitative research on social networks.

2 DISCUSSION

2.1 STRUCTURE VERSUS AGENCY AS THE STANDARD ENTRY POINT TO CST

There is a surprising uniformity in the organization and presentation of books on social theory. There is a steady demand for books to serve a basic 'theory' course in sociology in both the US and the UK. As publishers and authors compete such demand produces a standardized product in the way that ice-cream vendors on the beach tend to cluster together. Teaching an honors course on contemporary social theory led me to scour these books for a suitable text. I have been seeking to find one that is valid, in that it gives an accurate overview of the field, but one that can convey the interest of social theory as an intellectual activity.

I examined a range of social or sociological theory texts for my course (Best 2003; Calhoun et al. 2002; Cuff 2006; Scott 2006; Smith 2001; Wallace and Wolf 1999) There are some interesting cross-Atlantic contrasts among them. US texts are more likely to identify the field as 'sociological theory' while British or 'European' ones are more likely to use the term 'social theory'. US texts are more likely to stick to a standardized account of schools of theory, presenting each one as an equally possible 'perspective' for a reader to select like packets of breakfast cereal in the supermarket. British texts are more likely to hint at preferences for certain perspectives over others. There is some variation in the way that these texts will differentiate contemporary from classical social theory but most present much the same basic road map of contemporary social theory for beginning sociologists.

There is a reasonable consensus that contemporary, as opposed to classical, social theory took shape within the public concerns of the 1960s and 1970s (Calhoun et al. "Introduction"). The previous generations of sociologists had consolidated a vision of sociology that drew on the heritage of 'classical' social theory and set Durkheim, Marx and Weber as iconic figures (Alexander 1987; Connell 1997). The place of symbolic interactionism in this vision of sociology was uncertain but could probably be well characterized as a 'loyal opposition' (Mullins 1973: Ch 4). CST expanded the range, vision and 'relevance' of sociology beyond these boundaries marked out by the earlier generation. It acknowledged interactionism as a major school of theory and opened itself to critical perspectives of various kinds portraying sociology as a broad church.

There is significant uniformity regarding the two main schools of theory given by most texts as the starting points for an outsider who wishes to begin mapping the field of CST. The first school of theory is functionalism, as it is most often named in preference to the older term of 'structural-functionalism'. Functionalism is usually linked to Durkheim but consolidated by the mainstream sociology of Talcott Parsons' generation. Functionalism, it is claimed, emphasizes value consensus as the basis of social integration and views social order as maintained by institutional structures, social control and regulation. The second school of theory is interactionism which, while it may have some precursor in Weber's concept of *verstehen*, is usually presented through its US origins in the work of Mead and Blumer and its fuller development by Goffman, ethnomethodologists and others.

In nearly every text these schools of thought are differentiated in substantive terms by an emphasis on 'structure' and 'agency' respectively. Agency thus signals the potential for deviance from or resistance to the structures of social order. Social structure as a concept is thus firmly associated with macro-level analysis and, by implication, with the normative, constraining view of social order suggested by functionalism.

Beyond this entry point there is diminishing consensus on how best to map the range of other perspectives within CST. For some writers, probably a slim majority, the term critical theory or Western Marxism is used to describe a third major group of perspectives that take Marx as a precursor and icon because of his supposed commitment to using theory for activism, progress and change – Thesis 11 of the *The German Ideology*. Some older texts retain a non-radical vision of Marxism under the rubric of conflict theory that tames Marx to be a descriptive theory of institutionalized structures – a secularized Durkheim or a radicalized functionalist. Most recent texts emphasize the critical impetus and take it through to feminism and other 'emancipatory' sociologies allied with much research on social movements. This mapping of the field then presents postmodernism and its associated school of 'post-structuralism' ambiguously. Sometimes it is seen as source of insights and ideas that have the critical impetus and can be compatible with critical theory. At other times it is presented as a distinct form of theorizing, an additional 'perspective', with uncertain relations to other perspectives.

A minority of texts present their third major group of perspectives as 'structuralism'. This is the mapping explicitly presented in Giddens' major textbook *Sociology* (1997 Ch 21)

and implicitly in Cuff et al. (2006) For a beginning reader, however, the term invites confusion with the concept of 'structure' associated with functionalism. The theoretical position it signifies is, however, quite distinct. Giddens, for instance, links 'structuralism' to his attempt to defuse the structure/agency binary by the invention of the term 'structuration'. He identifies this vision of sociological 'structuralism' with the structural linguistics of Saussure. In structural linguistics meaning is not the immediate object of the linguist's analysis. Meaning is an emergent property coming from certain juxtapositions of words. The analyst seeks to understand rules or principles that must be operating make some juxtapositions meaningful and others nonsense. This is a search for 'deep structure' or a generative grammar as propounded for instance by Levi-Strauss (Cf. Connell 1977: 5). I would argue that these ideas prefigure a concept of emergent structure. Structuralism of this specific kind is seldom presented as a continuing theoretical tradition however. Its theoretical impetus is seen as taken up, but superseded by post-structuralism and post-modernism. These later approaches take the methods of 1960s structuralism but reject the Levi-Straussian search for universal mental structures. In summary, the structure versus agency binary, presented as fundamental to CST, locks down the concept of social structure. It is associated with a macro-level, top down vision of society with social control and institutional regulation as the dominant forms of social relations. Ironically, interactionism is not so much an alternative vision of a society but, rather, the inverse positioning of the theorist as resistor rather than custodian. The third option, critical theory, challenges structures, not the concept of structure. It provides potential legitimations for the public positioning of oppositional theory. The irony, therefore, is that it is actually the perspectives labeled 'structuralism' that provide a distinctive concept of social structure as emergent structure. However, the confusion of terms makes it difficult to set up the concepts for a beginning reader. Also, it is actually impossible to decide on logical grounds which of these three schools of theory is doing 'structural analysis'. They could all lay claims to such activity within their own frameworks.

2.2 RESCUING VARIED CONCEPTS OF STRUCTURE

In a short text, Lopez and Scott (2000) map out a schema of three distinctive and different substantive concepts of social structure. The value of this text and the subsequent, much longer and deeper discussion by Lopez (2003) is a direct examination of a variety of substantive concepts associated with the term 'social structure'.

Lopez and Scott describe three quite separate concepts of social structure. The institutional concept of structure is the functionalist macro-level notion of social structure. However, in a shift from the agency-structure binary, they characterize interactionism, the second standard perspective, as implying a 'relational' concept of social structure. This is a significant innovation compared to standard social theory. Lopez and Scott also include SNA under relational structure, one of its rare appearances in social theory texts. The third concept of structure they identify is 'embodied' structure. The concept of institutional structure is so familiar that its diversity and variety is easily overlooked. The later book by Lopez (2003) explores the diverse images through which we can picture and model the concept. Lopez shows how social structure came into social theory through metaphors drawn from other fields until repeated usage made it meaningful independently of these originating metaphors. Social structure was visualized one way when it drew upon architectural metaphors and associations, as in the famous example of infrastructure and superstructure codified in Second International Marxism. It was visualized in quite a different way when it drew upon biological and organic metaphors of the body and its internal differentiation and functional coordination.

Lopez and Scott's (2000) description of relational structure has not, as yet, been explored and clarified in the same way. The short text covers the conceptual interest in relations and relationships generated by interactionism and notions of agency. It then formalizes this concept of structure through reference to SNA. SNA thus becomes a paradigmatic representation of relational structure.

Following the outline given by Lopez and Scott, I describe SNA as techniques to map relations amongst a population of entities through the ontological differentiation of entities and relationships and their visualization as points (nodes) and connecting lines respectively (Scott 2000). The precisely defined conceptual space created by these definitions is a particular type of topological construct that mathematicians call a graph. They study its inherent properties as graph theory. SNA summarizes ethnographic field data in generalized network diagrams that are, incidentally, also graphs. However network diagrams originated as descriptive tools such as Moreno's sociograms, the bank wiring room diagrams of the Hawthorne studies or the maps of cliques and community power structure generated by the social anthropologist W. Lloyd Warner and his collaborators. Cumulative mapping of pairwise relationships (ties) among an observed population (nodes) produces a map of connections that may be a network. As a social entity therefore 'the network' can be understood as emerging from the activity of people in forming relationships. Once formed, it can even be manipulated, reflexively, by the participants themselves (Knox et al. 2006)

'Social' networks imply a specific content for a network diagram and we then read the diagram with reference to real world setting. The nodes are people (social actors) and they are connected through social relationships of informal ties (kinship and friendship) or formal ties. Network diagrams in themselves are content free. They can be constructed at successive levels of analysis by changing the entities treated as nodes. This constructs the real world as a hierarchy of networks. This hierarchy of networks goes from social networks, with people as the nodes, through inter-organisational networks with organizations as nodes to world-system networks with nations as nodes. The last can be visualized with the same network diagrams as social networks with nations as the nodes and trade, diplomacy, migration flows etc as the lines of connection. Understanding SNA from a bottom-up perspective suggests that 'relational structure' (the network) emerges from the accumulation and patterning of the relationships at the lower (node) level. This incorporates the concept of spontaneous 'emergence' that is a key concern of current debates within SNA stimulated by the enthusiasm of physics trained newcomers to SNA for models of emergence derived directly from statistical mechanics and quantum physics (Barabasi 2002) but also has a strong appeal to advocates of community development (Gilchrist 2004). Another advantage of this bottom-up perspective on SNA is the ability to accommodate networks as collective entities constructed through conscious, or 'reflexive', networking activity (Knox et al. 2006).

Lopez and Scott's concept of relational structure rescues concepts of social structure from the exclusive identification with macro-level concepts embedded by the standard social theory binary of agency and structure. The concept of relational structure opens the way for us to speak about structure even within the social vision of interactionism. Relational structure can be seen in micro-level processes and events in a way the standard binary of structure v. agency excludes. The account of SNA presented above utilizes the concepts and emphases in SNA that parallel interactionist concepts and concerns. Nevertheless, the emergent 'networks', or structures, that result from the patterning of micro-level relations justify the term 'relational structure'.

The final category of embodied structure proposed by Lopez and Scott develops claims that social structures, whatever their origins and development, become embodied in habitual ways of thinking and acting. Bourdieu's concept of habitus is a key reference here as are Giddens and Foucault. There are important points of connection to the picture of SNA I have presented here but they are not germane to this paper.

2.3 THEORY BUILDING AS A VISUAL ACTIVITY

The second development in CST that connects to SNA is an emerging awareness of visualization and visual models as crucial aspects of social theory practice.

In his descriptions and analysis of social research practice Michael Crotty makes a telling observation. Talking of feminist theory he states:

How do feminists envisage the human world they inhabit? And what, as a consequence, are the assumptions feminist researchers bring to their various forms of human inquiry? These questions, formulated here to target feminism and feminist research, are questions we have already addressed to positivism, interpretivism and critical inquiry. [1998 p.160]

Crotty presents social research, and the communication of research claims, as a human activity. Communication of research claims is only possible if both presenter and listener see themselves as sharing a common (human) world. The researcher envisages the world they will research (ontology) but it has to be the same world in which they will communicate the truth of their researches (epistemology).

Anthony Woodiwiss presents a parallel description of social theory as a scientific activity that refines and hones language, metaphors and images (both linguistic and visual) in order to communicate validated findings of social research. He portrays the communicative outcome of social theory as visual communication. 'Social theory involves 'social-theoretical picturing' (Woodiwiss 2005: 31). His title; *Scoping the visual* has deliberate connotations of microscopes, telescopes and other visual metaphors.

It is worth noting that both Woodiwiss and Crotty both deal with the problems of social constructivism and relativity and their challenge to scientific observation in sociology. They both adopt the mediating stance of critical or scientific realism. For both 'naïve realism' stops thinking when it assumes that the pictures or models it constructs are given by the external world. Extreme constructivism, associated with certain, common interpretations of the significance of Kuhn's notions of paradigm, is a directly inverted position. Mediating these two extremes, Woodiwiss supports a position of scientific realism, as articulated in the work of Roy Bhaskar [p. 35] as the point of productive balance between them. He sums up the balance within such realism as follows:

There is, then, a tension at the heart of what from now on I will again refer to simply as realism – a tension between [firstly] its power as a visibility that from the very beginning of the research process can readily produce clear and quite detailed images of the nature of the world and [secondly] its most basic assumption concerning the independent existence of the world itself, which means that such images must be eternally fallible. [pp. 37-38]

In terms of visualization in social theory Woodiwiss describes the practice of social theory as a craft of one who works, in a tangible, spatial and kinetic way, on 'social-theoretical pictures'. As indicated in the last quotation they do so with reference to the empirical observations and reports of researchers. However they also work on them through development and discussion of the metaphors, concepts, categories and images the social-theoretical pictures utilize. This involves working with words as social-theoretical pictures are mostly built originally with words. The social theorist thus draws attention to the way we are using words as metaphors, the way we attempt to transfer meanings understood in one context of practical activity to other contexts of practical activity. The discussion of different concepts of social structure by Lopez (2003) is a working demonstration of exactly this process.

2.4 THE EVALUATION OF SOCIAL-THEORETICAL PICTURES IN SNA

Social network analysis is inherently visual (Freeman 2004). Network diagrams are ways of taking information about entities (nodes) and ontologically distinct information about relations between them (ties) and arranging this information into a defined, 2-(possibly 3) dimensional space. If we have data on entities (usually social actors) and their relations from a real world context, we project that limited aspect of our real world information onto the topographical space of a network diagram to see whether the data we have extracted has sufficient connectedness for a network structure to be visible.

What this mapping means about the real world 'networks' requires careful summary and investigation however.

In recent years SNA has made very significant advances in the statistical modeling of abstract network diagrams, and their underlying mathematical 'structures' ('graphs' as in 'graph theory'), using simulation techniques known as exponential random graph modeling – ERGM. Melbourne University's social networks laboratory is the leading site for this work (MelNet website). ERGM does for network diagrams what tests of significance and goodness of fit statistics have provided for many years for case-by-variable data matrices. The procedures are freely available in the computer program, PNet.

SNA envisages a world where people remain visible and central as the nodes of the network diagram. ERGM then allows us to take the summary information we get from a network diagram and place it against templates of what occurs 'by chance' or randomly. We can assess the statistical validity of our 'social-theoretical pictures' of social structure directly.

3 CONCLUSIONS

This paper argues that sociological research on real world social networks can be done using traditional (and emerging) ethnographic methods. Where these methods produce information about dyadic relationships, SNA network diagrams provide a standardized model that allows a researcher to construct a social-theoretical picture of these interpersonal connections. When mapped to the common space of a network diagram any chains of connection show up and a network, if there is one, is visible. But there are many questions that need to be asked at this point. Is the researcher merely seeing the connections associated with a given institutional structure that could be studied by other means? Is network connectivity to be expected given the volume of relationships maintained by people in the survey population (relational structure) or self-conscious (reflexive) network-building? Is there possibly an emergent structure here that indicates self-generating emergent structure?

If networks do emerge, however, they are indications of some form of 'social structure' in the context being studied. What sort of structure this is, how it originated and is sustained, how the observer can visualize and categorize it? These are the questions that make sociological research interesting.

These questions go to the heart of what meaning we can read into the network diagram to make it a 'social-theoretical' picture of the data rather than just a summary diagram. ERGM in SNA has made important advances in statistical modeling of network models. It fills in the missing space that statistical tests of significance give to numeric case-by-variable data. In essence, ERGM lets us determine when finding a 'network' in our data is an expected outcome given the basic parameters of our research setting. Like any good statistical analysis it allows us to avoid the mistake of thinking that we have found something unusual when, in fact, our observed network falls within the space of normal expectations. A byproduct of this technique is also that it also allows us to see what details, if any, of our observed network, are not predictable from the random model.

Statistical evaluation of our network models is only the starting point of sociological thinking however. The work of interpretation begins from this point and here the practice and discipline of social theory come into play. As we describe the networks we have investigated we use visual images or metaphors to import meaning to our context from other contexts.

The discussion of structure outlined in this paper warns how quickly terms can lose their conceptual meaning when they are used as simple binaries or labels. The original meaning can also be lost if the term we use gets embedded into a discourse different from the one we originally took it from. However, if sociologists understand social theory as the building, refining and maintenance of 'social-theoretical' pictures and think about

structure through these pictures there is enormous potential for productive interaction between qualitative sociology and SNA in the common investigation of social networks.

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