Networks and Complexity: Directions for Interactionist Research?

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In this article I consider the potential importance of social networks for symbolic interactionism. Specifically, I argue that symbolic interactionism operates with an underdeveloped and often tacit conception of networks; that network analysis offers us various tools for further developing and operationalizing this conception, empirically; and that doing so would be to our considerable advantage. In addition, I argue that a stronger focus on networks would give interactionism an inroad into important contemporary debates on “complexity,” building on an obvious but again underdeveloped affinity between these two academic domains. Moreover, tackling complexity raises important and central sociological concerns of structure/agency and micro/macro, with the additional payoff that interactionism can develop and demonstrate its strengths, as an approach, in addressing the problems often associated with these concerns.

Keywords: social network analysis, social worlds, brokerage, closure, symbolic interaction, George Herbert Mead

In this article I consider the potential importance of social networks for symbolic interactionism (SI) and suggest that the methodological toolbox of formal social network analysis (SNA) offers an important and useful way to operationalize this concept (on SNA see Scott 2000 and Wasserman and Faust 1994). There is a basic affinity between the claims and focus of SI and the concept of social networks, which some writers in the tradition have recognized and others have at least hinted at (see below), but which remains underdeveloped. Mostly, SI operates with a vague sense that societies and social worlds are, among other things, networks (of symbolic interaction) and that the networked character of social life make a difference, but we have not yet worked out what to do with those observations and how to advance and develop them. SNA offers us various tools for developing these insights and operationalizing them. This would be to our considerable advantage.
In addition, a stronger focus on networks would give SI an inroad into important contemporary debates on “complexity.” There is an obvious affinity between SI and complexity theory, as well as between SI and the literature on social networks. Complexity theory brings the concept of interaction to the foreground of academic debate, arguing and seeking to demonstrate that global patterns of order and organization can be explained by reference to finely tuned localized interaction. SI has argued much the same since its inception, but the connection between the local and the global (or micro and macro) has never been clearly mapped or explored, as opposed to complexity theory, within which the concept of networks has played a central role (Barabási 2003; Crossley 2005, 2008a; Newman, Barabási, and Watts 2006; Watts 1999, 2005). Networks are what link the millions of “actors” in a complex structure, constituting them as a system. And networks both organize or at least facilitate the self-organization of such systems. Interestingly, complexity theorists have drawn on SNA and sociological work on social networks in this context, and in particular on Granovetter’s (1973, 1982) central work on the strength of weak ties. By doing likewise SI can both develop the complexity claims inherent in its existing scholarship and open up new and exciting lines of investigation.

It will be apparent from the above that the role of networks in complexity theory revolves in some part around what sociologists have theorized as “social structure” and the micro-macro divide. Networks provide the link, conceptually, between small groups and large populations of actors, bridging micro and macro. At the same time their organization generates opportunities for, and constraints on, interaction, shaping what happens within them in the manner attributed to “social structure” in much sociology. My discussion centers on these issues, partly because of their salience for sociology in general but also because SI is often criticized from the outside for its failure to engage with them. Though I believe that SI’s critics, at the very least, overstate their case, it would be instructive to consider how a reflection on networks might enhance our ability to deal with these issues in a manner wholly consistent and indeed already embryonic within SI. This is the payoff of engaging with “networks” that I referred to above.

My purpose in making these claims is not to suggest that SI play “catch up” or follow the leads and fashions of others. On one level an engagement with networks is important because, as noted, the concept is already at least tacitly present within the SI literature, where it plays a key role, and it would be to our benefit to draw it out, thematize it, and develop it. But no less importantly, it is my belief that SI has much to offer in relation to debates on complexity and social networks. In particular, conceptions of social interaction and the interactor tend to be relatively limited and implausible in these debates and could benefit from the enrichment that SI would bring. Moreover, as I have argued elsewhere, the concept of social networks as developed with SNA (and related work on complexity) is relatively limited and could benefit from considering interactionist work on “social worlds” (Crossley 2010). However, the contribution of SI to these debates will be most effective and convincing if SI can engage more directly with the concept of networks, exploring and exploiting the
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potential for intellectual enrichment that it affords. We have something to learn, too, and my primary concern in this article is with that lesson. I want to consider what “networks” and SNA can contribute to SI, leaving for another time the reciprocal payoff (for a partial account, see Crossley 2010 and Fine and Kleinman 1983).

I begin with a reflection on the rather minimal presence that “networks” currently enjoy within the SI literature. In the sections that follow I then attempt to explore how reflections on networks within SNA might help SI address issues of social structure and the micro-macro divide. In both cases, and the latter in particular, this involves engagement with key “complexity” ideas.

NETWORKS OF SYMBOLIC INTERACTION

The key focus of SI is interaction and, by implication, the more durable relationships that evolve and take shape within it. Relationship formation is not addressed in detail in the classic literature, but Mead’s (1967) work contains important suggestions. For example, his discussion of the internalization of the perspectives of others (specific and generalized) points to one important aspect of relationship formation. Through interaction we develop an internalized representation of the other that shapes both our (future) interaction with them and, in some cases, our more private thoughts and interactions. Our relationships with one another are marked by how our present thoughts, actions, and interactions are shaped by the sedimented history of our interactions with them, as well as the prospect of further, future interaction.

There is a cognitive aspect to this, but even a cursory reading of Mead reveals that there is an affective aspect, too. To internalize the perspective of others is to form an emotional attachment to them, whether that is a relation of love, fear, or affective neutrality (which is still an affective attitude). In addition, Mead refers both to the exchange of goods (including services) in interaction and to the consequent emergence of interdependence (material, emotional, etc.) between actors. As others have argued, such interdependence effects a balance of power in social relations (e.g., Blau 1986; Elias 1979), and, as Mead appears to acknowledge, power thereby constitutes a central element of all relationships.

On Mead’s account then, social relations involve an empathic bond, both cognitive and affective, and also interdependence and power. But his focus is, for the most part, dyadic. The underlying image in his work, which seems to steer his reflections, is of interactions involving two parties. The much-cited example of the dog fight and boxing match that he uses to flesh out such notions as the “conversation of gestures” and “significant symbols” illustrates this. Even “generalized others,” internalized and engaged with in the processes of selfhood and thought, are treated as singular beings with whom actors enjoy a dyadic relation. The actor may internalize several generalized others, but the implication is that each speaks with a single voice and that the actor engages with them in a series of dyadic exchanges. Through the notion of the “generalized other” Mead effectively reduces the multiple others from within a given community in which the actor engages down to a single interlocutor. The
question thus arises: does SI extend beyond dyads to explore networks? My answer, in brief, is yes, but not as much as it should.

The only explicit engagement with SNA in the interactionist literature that I have been able to find is in the work of Fine and Kleinman (1979, 1983). In an early article they use the above-mentioned work of Granovetter (1973, 1982) to discuss the diffusion of subcultures (Fine and Kleinman 1979). Anticipating important developments in network theory, which I discuss later, they argue that subcultural norms and styles tend to cluster within tightly knit and geographically focused groups, but then sometimes “jump” across groups and thereby across larger geographic distances by virtue of the weak ties between members of different clusters. Distant relatives or even friends made on holidays, for example, may stay in touch and pass on ideas, innovations, tastes, and identities to one another.

In a later theoretical article Fine and Kleinman (1983) explore the possible interface of SNA and SI more directly, calling for rapprochement. There is much of value in this work, and I both draw from and intend to extend it here. My main criticism of it, however, is that it tends to focus on the various ways in which SI improves on and challenges certain assumptions of SNA. I agree with this as far as it goes, but there is much less attention to the various ways in which concepts and measures in SNA might challenge SI and afford an opportunity to advance the SI agenda. I believe that dialogue between the two traditions will be most fruitful when some of these challenges are brought to the fore and, as noted, focus on what SI can learn from SNA in this article.

The concept of networks also emerges in interactionist work on social worlds (Becker 1982; Hall 1987; Martin 2006a, 2006b; Shibutani 1955; Strauss 1973, 1993). Becker (1982:x), for example, refers repeatedly to networks in the various ad hoc definitions of art worlds that he offers in the book of that name:

I have used the term art world in a more technical way to denote the network of people whose cooperative activity organized via their joint knowledge of conventional means of doing things, produces the kind of art works the art world is noted for. (my emphasis)

Likewise Hall (1987:7), who singles out networks for specific attention in a discussion of “worlds,” defining them as “the set of linkages, representing transactions and relationships, between the actors of a population.” This definition is more or less identical to the definition offered by Wasserman and Faust (1994) in what has become the seminal text of the SNA tradition. They define a network as comprising two “sets” (in the mathematical sense of the term): a set of actors and set of links between them.

Shibutani (1955), too, though he does not explicitly use the term, clearly draws out the significance of networks in relation to social worlds. He puts great emphasis on the “common communication channels” that run between and connect actors (albeit sometimes in the mediated and “broadcast” form constituted by the mass media) within a social world. Not everybody in a social world is directly connected to everybody else, but they are at least indirectly connected, and this is important for Shibutani because it explains whatever degree of cultural homogeneity and
cohesion we find in a world. Members of a world share conventions, meanings, and identities, to the extent that they do, because they are in contact, direct or indirect, with one another; because they belong to a network of communication.

It follows that worlds are bounded by the reach of their communicative channels and consequent extension of their network. “Each social world,” Shibutani argues, is a cultural area, “the boundaries of which are set neither by territory nor by formal group membership but by the limits of effective communication.” These limits may be “technical”—for example, actors in locations that lack the physical infrastructure cannot partake in Internet communities—but Shibutani focuses in particular on “differential association,” underlining the point that his “channels” are above all relations of iterated interaction. The flow of communication about a particular issue stops at certain points, effectively bounding a social world, because actors for whatever reason do not communicate about that issue beyond the boundary. This notion, that a world begins and ends with the spread of communication channels, harks back to Mead (1967), who defined community in much the same way, and it clearly evokes a sense of networks: the world extends for as far as there are links (i.e., “communication channels”) between actors that allow ideas and information to travel and collective meanings to be constructed.

Networks also feature in the related (to social worlds) literature on “careers.” Paraphrasing Hall (1948), for example, Becker (1952:470) defines careers as “the patterned series of adjustments made by the individual to the ‘network of institutions, formal organizations and informal relationships’ in which the work of the occupation is performed.” Furthermore, anticipating important work on “vacancy chains” from within the network analytic tradition (see White 1970), he notes that a key contingency that can shape an individual’s career trajectory is the movement of others in their network, with the consequent opening up of positions that this generates. Actors enjoy an opportunity to move into certain positions in a social world as others vacate those positions. Without movement farther up the chain, opportunities are limited.

In a different vein, Hall (1948) notes another network-related career contingency when he discusses the role of the “inner fraternity” of an occupational network in allocating jobs. Career trajectories, he observes, depend at least as much on whom the actor knows within a network as what the actor knows. Contact with important others in a network constitutes an important advantage.

Of course there is more to a social world than its network structure. In Becker 1982, for example, we have a strong sense both of the resources that are distributed and exchanged within networks and also of the conventions that structure such exchanges and interactions. This is important. One weakness of the SNA literature is that it tends to abstract network structures from the ongoing flux of social life and analyze them in isolation (see Crossley 2010a, 2010b). The interactionist concept of worlds offers a useful corrective. But worlds, to reiterate, are networks.

Beyond the “worlds” literature, even within the classic work of Mead (1967), Blumer (1986), and Cooley (1902), there is a strong suggestion of networks. Society is never conceived as a structure over and above or separate from actors. It is always
conceived as existing between actors in their interactions, shared understandings, and conventions. Society, as Blumer famously put it, is symbolic interaction. In this respect, though the point is not spelled out, societies, like or perhaps as social worlds, are always relational configurations: networks. Although much of his discussion of interaction and relations is focused on dyads, for example, the implication of Mead’s work is that a society is a complex structure of links built up by way of such dyads and, more particularly, by the fact that every social actor is always involved in multiple relations with others, who in turn have multiple relations to others still and so on. Mead’s “society” comprises a set of actors and set(s) of relations between them and as such, like Hall’s (1987) “worlds,” coincides with the definition of networks employed in SNA.

In addition, Mead (1967) offers an interesting discussion of what, in a largely metaphorical vein, he calls “religious” and “economic” relations. Religious relations, as Mead defines them, are affectively strong ties around which collective identities are built. They cluster such that those with whom we enjoy these ties tend also to be tied to one another, that is, “religious relations,” as defined by Mead, are “transitive.” They are ties to our “tribe.” Economic ties, by contrast, are affectively weaker, reach beyond our “tribe,” and center on exchanges that provide us with resources not otherwise available to us. They are intransitive, such that we do not generally share alters with those to whom we are economically tied. This distinction is not without problems. It fails to account, for example, for the multiple circles in which modern actors tend to move. However, it anticipates a fundamental idea within SNA, regarding strong and weak ties (relating back to Granovetter’s [1973, 1982] central articles on that topic), which has found expression in theories of both social capital and small worlds.

In social capital theory the distinction is expressed through various conceptual couplets: bonding and bridging; brokerage and closure (see below); or simply strong and weak ties (Burt 2005; Lin 2001; Putnam 2000). Social capital theorists identify very different advantages with these two types of tie and, in some cases (Burt 2005), seek out hybrids that combine the advantages of both.

In small world theory, which I discuss in more detail below, this same basic idea is used to reconcile accounts of transitivity and closure in networks with the apparently short average path lengths that link any two individuals in a modern society (Watts 1999, 2004; for a comparison of the small world and social capital literatures, see Prell 2009). Watts’s small world theory, in particular, hinges on the notion that actors have two kinds of ties: those that are affectively strong and transitive, and therefore bind actors within closely knit “tribes,” and those that are weaker and that extend across and bind tribes.

More importantly, Mead does not only anticipate these ideas. His work and the interactionist canon generally have an important contribution to make in fleshing these ideas out and further exploring the nature of the ties involved. In particular, Mead’s reflections on “religious relations,” which build on his more general ideas about empathy and identity, afford insights into collective identity building and group solidarity, as do Blumer’s (1969) reflections on collective action. These are aspects of relations that are neither theorized nor understood in much work on networks.
These various references to networks in SI are important but, with the single exception of Fine and Kleinman (1979, 1983), do not lead to a sustained analytic engagement with the concept of networks or indeed with the SNA literature. Consequently, networks tend to be treated as self-evident and homogenous entities. There is no sense that networks can have different structures or that individuals can occupy different positions within them. And there is therefore no recognition that different structures and positions can advantage and disadvantage actors. SI seems to recognize that networks are necessary preconditions for certain types of action, at both the dyadic and the wider collective levels. This is one of the central arguments of Becker’s *Art Worlds*, for example. But the claim is never pushed to the next level, where the variable potential of different network structures and positions, or indeed the existence of such structures and positions, is recognized.

I believe that it is necessary to push to the next level. Doing so will advance claims about interaction and interdependence that SI has fought to establish within sociology. It will generate a space in which SI can contribute to debates on complexity. And it will allow SI to engage more meaningfully with critiques that point to its failure to deal adequately with both “structure” and the social “macro-cosm.” In this article I hope to make a preliminary case for some of these claims. I now move on to a discussion of network structure and social structure.

**INTERACTION AND STRUCTURE: BROKERAGE AND CLOSURE**

Analyzing networks and particularly “network structure” would allow SI to engage more directly and in greater detail with the concept of social structure. As noted above, SI acknowledges that actors belong to networks, that actors enjoy ties to others who enjoy ties to others still, and so on. As explored by SNA, these ties form patterns or structures that, in turn, constitute social structures. Network structures constitute social structures because they generate opportunities and constraints both in general, for all of those involved, and more specifically for those who occupy particular positions within them. I illustrate this by reference to ideas that resonate directly with Mead’s above-mentioned discussion of religious and economic relations: that is, closure and brokerage.

A closed network or subnetwork refers to a population of actors, each of whom tends to know most of the others, giving high network density, but who have very few if any ties outside that population, at least for the purposes of the analysis.³ It comprises relations akin to what Mead calls “religious relations.” Brokerage, by contrast, entails relations akin to those that Mead deems economic, that is, relations that reach beyond a particular social circle or group, connecting actors and circles that would otherwise be unconnected. Brokers bridge otherwise disconnected components of a network,⁴ thereby plugging what Burt (1992) calls “structural holes.” These properties are important, according to SNA, because they generate both opportunities and constraint for members of the network.

Many network analysts argue, for example, that closed (sub)networks tend to cultivate solidarity, trust, and cooperation between their members that, in turn,
enables those members to act in ways in which they could not otherwise act (Burt 2005; Coleman 1988, 1990). By trusting their alters, each can interact with and rely on them in ways that would not be possible if trust were low. Moreover, the solidarity of the network as a whole enables collective action and lends individual actors considerable support. The flip side of this, however, is that members of such networks are expected to cooperate, prove trustworthy, toe the line, and so forth, and may be punished by the group if they do not. So there is constraint, too.

These claims, which are empirically well supported, tend to be theorized in rational action terms. Because members have ties with most others in the group and few, if any, outside it, it is argued, they are strongly dependent on the group and therefore have an incentive to toe the line with respect to its emergent norms and values. Moreover, high density ensures that untrustworthy or uncooperative behavior in relation to any specific other within the group is likely to become known throughout the group, giving the individual a bad reputation that, given his or her dependence on the group, could have adverse consequences. Reputation is critical in closed networks and is at stake in most interactions in which actors engage, giving them a strong incentive to interact with others in ways that at least maintain if not enhance it. Hence cooperation, mutual support, and trustworthiness are more likely (Coleman 1990; Burt 2005).

SI eschews the worst excesses of rational action theory, as do some of the more sophisticated network analysts, but these basic claims are nevertheless consistent with SI’s conception of purposive action and with what Mead (1967) claims in respect of religious ties. The interactor, as conceived in SI, is not a narrowly instrumental utility maximizer, but neither are interactors oblivious to or unmoved by the rewards and punishments that attach to certain actions within their networks, and they are attributed the wit to anticipate likely responses to their actions. These insights about closure can be taken on board within the SI, therefore, without in any way violating key theoretical assumptions. Moreover, to reiterate an earlier point, Mead’s reflections on religious relations and Blumer’s (1969) reflections on collective action, among many others, have an important contribution to make exploring how moral commitments, esprit de corps, and collective identities might develop within closed networks.

There is an interesting overlap, moreover, between network closure and what Goffman (1961) argues in respect of total institutions. A total institution is, among other things, a closed network. One aspect of its totalness, according to Goffman, is the fact that interaction in any one setting, with a given set of alters, can be relayed into all other settings in the institution and to all other relevant alters. A total institution is totally connected, it is a closed network, and for Goffman that is why it is so controlling. Goffman’s discussion of the negotiation of selfhood in this context could clearly enrich and deepen our understanding of network closure. His understanding of selfhood, like that of Mead, marks a considerable advancement on basic rational action models of the actor as a utility-maximizing machine. Furthermore, the discussion of reputation in this context resonates strongly with and could be enriched by
his explorations of maintaining face, presenting the self, avoiding a spoiled identity, and so forth (Goffman 1959). However, the network aspect is extremely vague, imprecise, and focused on specific institutions in Goffman’s work. SNA allows us to focus in, in a very clear and precise way, on the specific patterns of relations involved in these situations and to analyze, describe, and measure them in various ways. Furthermore, the concept of closed networks suggests that at least this aspect of the total institution may be found in other, perhaps noninstitutionalized contexts, potentially affording Goffman’s observations a wider domain of application.

Before I discuss an empirical example of closure, a brief note on brokerage is necessary. One disadvantage of group closure, according to Burt, is the risk of stagnancy. Relations in closed (sub)networks are largely redundant, in the sense that the friends of one’s friends are already one’s friends, and there is no one to inject fresh ideas, information, or other resources. The same ideas, information, and resources circulate endlessly and repetitively. Brokers, who reach out to other groups, resolve this problem. They bridge between groups and facilitate a flow of new ideas, information, and resources. In the absence of relative closure this can be problematic. If everyone were a broker and friends of friends were never themselves friends, there would be little social basis for trust, solidarity, and the goods they provide, but if brokerage and closure are combined, then we have the best of both worlds (Burt 2005). Groups benefit from brokerage because they have access to resources that they would not otherwise have. Brokers benefit, so the story goes, because they control that access and, as a consequence, the balance of power is tipped in their favor. Moreover, they enjoy an elevated status and benefit from a halo effect in the respect that they can be (mis)perceived as the origin of ideas and innovations that, in fact, they are only passing on from one group to another (Burt 2005).

Ethnographic work that I conducted in a private health club in Manchester (UK), and more particularly within circuit-training classes within that club, both develops and also challenges some of these ideas. It suggests that closure, while beneficial to insiders, can have negative externalities. Furthermore, it suggests that brokerage-closure figurations can play out in different ways depending on local conditions and interagency. The structure of the network is important and creates both opportunities and constraints for those involved in it, but what interactors do within the context of those constraints and opportunities is not, as the thesis of brokerage and closure can seem to suggest, mechanically determined.

In what follows I briefly discuss this work. A full account of my ethnography can be found elsewhere (Crossley 2004, 2006, 2008b), as can a more detailed engagement with the brokerage-closure literature (Crossley 2008b, 2010b). My purpose here is simply to offer an illustration of how network figurations can constrain and enable interactors, shaping interaction, and how SNA allows us to explore such structures rigorously and in detail.

During my research I noted several interesting interactional dynamics involving actors to whom I was closely tied within a relatively closed subnetwork, described below. There was, as the closure literature would predict, a high level of trust, mutual
support, and solidarity between us. We generated social capital through our interactions, from which we all benefited (see Crossley 2008b). However, the solidarity within our group also seemed to be related to tensions with other groups. On the one hand, our group was focused, in Feld’s (1981, 1982) sense, around participation in both a twice-weekly circuit-training class and related out of class social events, but not everybody who attended the class attended the social events such that an established and outsiders figuration began to emerge. On the other hand, some members became attached to other groups, leading to low-level tribal conflict centered on, among other things, the loyalty of these brokers. The details of this have been explained elsewhere (Crossley 2008b). Here I simply want to show how SNA allowed me to explore the structures in play. I begin with the established-outsiders figuration.

**AN EMPIRICAL EXAMPLE OF CLOSURE: ESTABLISHED AND OUTSIDERS**

To sharpen up my sense of the group to which I belonged I employed a register, noting all actors present at a number of events over a given period of time. Specifically, I noted attendees at both the twice-weekly circuit classes and the follow-up meetings in the sauna afterward over a three-month period, and I noted attendance at the less-frequent curry night sessions in a local restaurant over a six-month period. Attendance was recorded in a matrix, and I both mapped the results, using multidimensional scaling (MDS), as shown in Figure 1, and performed a hierarchical

![Figure 1: Common Participation in Training and Social Events: A Two-Dimensional Plot](image)

Numbers on the plot indicate where more than one actor occupies the same position: e.g., 3 indicates that three actors occupy the point that this number labels.
cluster analysis on them. The cluster analysis confirmed what the MDS plot appears to show: namely, that the most significant clustering is between two relatively large and distinct “camps,” but that, at a more fine-grained level, we could further break each cluster down.

The results of this exercise are useful. They offer robust and systematic support to my hunch that two broad groupings (the established and the outsiders) exist within the circuit-training class, giving me confidence that this hunch has a foundation and also affording me a way to demonstrate it to others that is not overly reliant on my own vague impressions. At the same time, however, they qualify any grand claims I might want to make about bifurcation or polarization in the class, and do so in a relatively precise manner. Both MDS and cluster analysis reveal smaller clusters nested within the larger divides that invite further interpretation, reflection, and observation. The divide is not black and white. As always in quantitative sociology, it is shades of gray, a matter of degree.

MDS and cluster analysis only allow us to group individuals. They do not deal with relations between individuals. As a further step, therefore, I attempted to record relations between actors in the circuit-training class in an adjacency matrix. I deemed actors tied when and if I could find evidence (1) that they met (for any reason) outside the class, and (2) of relations, such as tie signs and a waiving of normal rules of civil inattention (Goffman 1971), in their interactions in the class. If both criteria were met, I deemed actors tied. On the basis of this matrix, using the Pajek network analysis software, I constructed a network graph (Figure 2).

It is again evident from this graph that members of the class can be roughly divided into two camps: those who belong to the main component at the top right of the map (the established) and everybody else (the outsiders). What this map also highlights, however, is the fact that the “outsiders” group is not really a group at all. Its members do not know one another. They are mainly isolates or dyads. This makes

Figure 2: The Social Structure of the Circuit Class
a difference. It suggests that they lack the group support or social capital that one would expect to find (and I found) within the main component. Everybody in the main component has multiple contacts to back them up and offer help and support, but those outside it have little or no such support. The number of contacts each actor has (his or her degree) is reflected in the size of the circle (vertex) used to represent them. The more connections the bigger the circle, and actors with no connections (isolates) have no circle, only a number.

We do not need to rely on visual impressions, useful and striking as they are, to draw these inferences. We can draw on a range of measures devised to interrogate and describe structural features of networks with precision. There are many such measures, but two of the simplest, density (of the network) and degree (of individual nodes), combined again with a hierarchical cluster analysis, this time focused on each node’s pattern of connection to others, will suffice. The cluster analysis suggested a basic split, identical to the earlier split discussed above, consisting of a group of twenty nodes (colored white on the graph [the established]) and a further group of twenty-three (either colored black or, where they are isolates, represented simply as a number [the outsiders]). The difference between these clusters is clear. Where the density of the graph as a whole is 0.182, for example, that of the outsiders is 0.051 and that of the established 0.75. In other words, 75 percent of all possible ties are realized within the established group, where the figure is only 5 percent for the outsiders. Likewise, while the (mean) average degree for the network as a whole is 7.63, the standard deviation is almost equal to that figure (7.455), and the reason for this is that average degree within the established group is 14.7 (SD = 4.67), while in the outsiders group it is 1.48 (SD = 1.504). I could push the analysis further, but enough has been said to indicate both that members of the two clusters are in very different positions within the network and that SNA offers useful and precise ways to identify properties of both networks and different positions within them.

SNA was important here because, like MDS and cluster analysis, but in a more advanced way, it afforded me a robust way to test impressions that emerged out of qualitative observation while begging questions that further qualitative observation was able to follow up. In this case I was intrigued to see whether I could find evidence of the power imbalance that I imagined this structural differentiation would produce and also of the conflict and resentment that I imagined this power differential would provoke. Or rather, I was able to better interpret events on the ground that I had already observed and begun to think about in this way. It was clear, for example, that members of the “established” took certain liberties in the class that outsiders resented and, in small ways, attempted to resist. Members of the “established” played with and bent the rules of the class, for example, subverting its order for their entertainment, provoking harsh but often whispered rebukes from outsiders. The former could take liberties because they enjoyed the backing of a group (the “established”). The latter enjoyed no such support. At the same time, however, members of the established were constrained to play along with and support others in their group, where the outsiders were largely left to their own devices.
In short, there was a structure in play; structure in a sense entirely compatible with SI but more easily, robustly, and precisely identified with the tools of SNA. Interaction across various sites had generated an established-outsider figuration, and that figuration, to the extent that it had become institutionalized, was now shaping interaction. Actors occupied different positions, in the “established” group or the “outsiders,” and this entailed different sets of opportunities and constraints for them. Structures of this sort are very relevant to the concerns of SI, and we should embrace them and also the tools of SNA that allow us to identify them.

Note that “structure effects” in this context entail, to reference complexity theory, “path dependence.” Network structure is not pregiven. It emerges in the context of interaction, but having emerged and achieved a degree of institutionalization it acquires a momentum that actors may be unaware of and, to the extent that they do become aware of it, may find difficult to change or resist. Early interactions, which become embodied and institutionalized in the form of a network structure, affect later interactions and steer them in a particular direction.

Moreover, network structure was only one focus of the analysis. Connecting more directly with the SI tradition, I examined both the interaction patterns and mechanisms that generated the network and also the processes of collective identity formation, recruitment, and solidarity building that constituted the established not only as a cluster within a network but as a self-identified group. These processes had structural preconditions. The density of ties that define the established generated an esprit de corps, a sense of groupness and of group boundaries, that occasioned and facilitated the more explicit process of group building that I observed. Had there been no pattern of dense ties, it is unlikely that a collective identity would have emerged because there would have been nothing to hang it on. Nevertheless, the dense network cluster only became a group by virtue of relatively autonomous processes of symbolic interaction that constructed it as such.

In effect, then, my use of SNA was sandwiched between two slices of more conventional, interactionist-type observation and analysis. The basic hunch that SNA was used to test grew out of participant observation. Then, when the technical aspects of the SNA were completed, I brought them to bear on a further ethnographic analysis of interactional dynamics and tensions. And my analysis combined concepts drawn from both SI and SNA.

**BROKERAGE AND CLOSURE**

I turned to the formal techniques of SNA again when I began to note tensions developing around what, drawing on network analytic ideas, I came to understand as a brokerage-closure figuration. I observed that certain key players in my “established” group had, through participation in other classes, become attached to other groups, whom they socialized with outside class in a way similar to that institutionalized among the “established.” This was becoming a source of contention. The different circles in which these brokers mixed appeared to be placing competing demands for
loyalty on them. Thus innocent comments about members of the other groups were met with unkind remarks in some cases; participation in the activities of one group was treated as a snub to members of the other, or at least as a sign of disloyalty. And when the brokers tried to resolve this tension by, for example, inviting members of one group to the events of the other, this was met initially with hostility, on the grounds that the broker had no right to invite “them” to “our” night out.

The tension between the groups was not a matter of personalities, not least as the two groups seldom met face-to-face, did not really know one another, and later, when they began to merge, got on well. The cause of the tension was structural, an effect of having two relatively closed network cores linked by brokers who made them aware of one another but under conditions where they remained separated. There was tension because actors and relations had begun to cluster in patterns that both encouraged group formation and allowed groups to become aware of one another under conditions where direct communication between them was highly constrained and channeled through a small number of brokers within their ranks. Structure was surfacing again in my qualitative observations, albeit somewhat vaguely.

I wanted a way to draw out this structure, verify its existence, and analyze it. To some extent I was able to do this only at a later point when the brokers’ efforts had led to a merging of the groups and the membership and history of the other group were more available to me. Using this information and the techniques of SNA, however, I was able to reconstruct the structure, taking as my criteria for a tie on this occasion coparticipation in selected classes at the health club and also in social events outside it (Figure 3). Figure 3 looks like a brokerage-closure figuration. It involves three relatively closed groups linked by way of a small number of brokers. However, we can again use network measures to verify and elaborate on this impression.

As a first step I performed a hierarchical cluster analysis on the adjacency matrix on which the graph is based. This distinguished four clusters that are identified in

![Figure 3: Brokerage and Closure in a Private Health Club](image-url)
the diagram by way of vertex color and whose details are given in Table 1. Note that each cluster’s internal density is much higher than the 0.420 density of the graph as a whole and also much higher than the density of ties across clusters, except for those to cluster 2. It seems reasonable to conclude on this basis that clusters 1, 3, and 4 manifest a high degree of closure, while cluster 2 is a broker’s cluster.

SNA offers several further measures that allow us to identify and verify the existence of brokers. Betweenness centrality is a measure, given for each node, of the number of times (normalized) that it falls along the (shortest) path connecting any two other nodes in the network. Being between in this way, as indicated by a high score, obviously creates a potential for brokerage. Aggregate constraint is a similar measure. It records, again for each node, the extent to which every pair of alters connected to that node are also connected to one another. A low (normalized) score on this measure indicates that most of one’s neighbors are not connected to one another and that one therefore has a higher opportunity for brokerage.

For the illustrative purposes of this article I also took measures of two further forms of centrality, less directly connected to brokerage but still relevant: degree centrality and closeness centrality. Degree centrality is a measure of the number of ties enjoyed by each node. Closeness centrality is a normalized measure of the path lengths connecting any one node in a network with every other.

The two nodes that appear to occupy a brokerage role in the graph in Figure 3, colored white, are clear outliers in the distribution for these various measures. Their scores are compared with mean scores in Table 2. They are in each case several standard deviations away from the mean, in a direction pointing toward brokerage potential: that is, high for centrality and low for constraint.

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Size</th>
<th>Color (on graph)</th>
<th>Internal Density</th>
<th>Density of Ties to Cluster 2</th>
<th>Density of Ties to Cluster 3</th>
<th>Density of Ties to Cluster 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16</td>
<td>Black</td>
<td>0.767</td>
<td>1</td>
<td>0</td>
<td>0.052</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>White</td>
<td>n/a</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>Dark Gray</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>Light Gray</td>
<td>0.97</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 2. Establishing Brokerage</th>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Degree Centrality</th>
<th>Closeness Centrality</th>
<th>Betweenness Centrality</th>
<th>Aggregate Constraint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>14.29</td>
<td>0.643</td>
<td>0.0176</td>
</tr>
<tr>
<td>S.D</td>
<td>6.2</td>
<td>0.098</td>
<td>0.054</td>
</tr>
<tr>
<td>Outlier/Broker 1</td>
<td>34</td>
<td>1</td>
<td>0.229</td>
</tr>
<tr>
<td>Outlier/Broker 2</td>
<td>34</td>
<td>1</td>
<td>0.229</td>
</tr>
</tbody>
</table>
These measures demonstrate that the network is a brokerage/closure figuration. Interestingly, however, my findings contradict Burt’s (2005) claims about brokerage and closure. To reiterate, he believes that the combination of brokerage and closure tends to be beneficial. As noted above, however, in the case I observed the situation was strained for all involved and especially the brokers. This should warn us against overly mechanical approaches to the issue of structure. How structure plays out in any situation is always dependent on a range of other factors including interactional particulars and the interagency of those involved. We cannot ignore the fact, however, that there is structure here and that it is important. As noted above, there is no need to believe that tension resulted from a clash of personalities. It was an effect of the fact that people had unintentionally formed minimally connected clusters, occasioning collective identity formation that led to conflict between the collectives involved.

Structure in this context, as in the previous example, is partly a matter of path dependence. The shape of the network did not preexist the activities of those who populated it. It was an effect of their interactions. But certain of the patterns that their interactions generated achieved a durability and traction that acted back on that interaction, structuring it by way of opportunities and constraints. What is also interesting about this example, however, is the fact that I was also able to observe the structure change. The efforts of the brokers (and structurally it could only have been the brokers) eventually brought the warring camps together,14 leading to the generation of further ties across groups and an effective merging of them. This should remind us that network structure is never fixed. It is always structure-in-process.

As with my discussion of the established and outsiders, the point here is that network analysis reveals structures that are both compatible with the theoretical and empirical prioritization of interaction within SI and that, in my view, allow us to develop our analysis and understanding further. The analysis simultaneously shows that Becker, Hall, and others, were right to identify networks as a crucial component in interactionist sociology, while considerably developing our sense of why this is so, how networks might vary, why those variations might matter, and how we can map and measure them.

MICRO-MACRO AND SMALL WORLDS

The above examples concern structure in the microcosm of a private health club. The concept of networks also allows us to begin to think about structures at the level of national and international populations, however. One way into this is to think about how smaller networks form “corporate actors” who are then connected to one another in larger networks (Coleman 1990). Thus we might reflect on networks of organizations, including governments. Even if we retain a sense that our nodes are individual human beings, however, networks provide a way to bridge the gap between micro and macro. The key concept in relation to this issue is the so-called small world effect.
First discussed in social science (e.g., Milgram 2004) and more recently in complexity science (Barabási 2003; Newman et al. 2006; Watts 1999, 2004), this effect is most commonly illustrated by the claim that any two individuals within a national population are connected by, on average, only six degrees of separation, that is, by six relationships or five intermediaries. The empirical support for this claim is weaker than is sometimes assumed (Crossley 2008b; Schnettler 2009a, 2009b), but that is less important for present purposes than the significance that complexity theorists have attached to it and the various solutions they have offered to the problem that it poses.

It is significant because problems of coordination in systems involving millions of parts appear much less considerable if the average path length connecting those parts is a mere six degrees. Intuitively one is inclined to imagine that individuals within populations comprising tens of millions must be so distant from one another that any thought that they might mutually influence and coordinate with one another is highly implausible. However, although a chain of six is still a long way, especially socially, it is a manageable magnitude that makes the notion that global order emerges from local interaction more conceivable and plausible.

This is important in relation to sociology’s micro-macro problem. It allows us to think of national and perhaps even international societies as networks of interaction that, irrespective of population size, nevertheless have a small diameter. We can easily imagine a chain of six interactions, and if this is the diameter of the social world, qua network, then it is much easier to imagine society as a web of interaction. Society really is, as Blumer claimed, symbolic interaction, or at least a web of symbolic and other forms of interaction. Claims that the macro order is an effect of localized interaction seem, as in the physical world analyzed by complexity science, much more credible, since large population sizes need no longer suggest chains of interaction too long to plausibly admit of coordination, order, diffusion, and so forth. The notion of a national and even international interaction order becomes conceivable. In moving from micro-macro we do not pass from one ontological domain to another, as some seem to suggest. We just trace the network out a few more degrees.

The problem that the small world thesis poses for complexity theorists is as to how this is possible. How can tens of millions of actors be joined up in such a way that the average path lengths between them are so small? Two answers have been proposed, both of which have been proven to work at a mathematical level: Watts’s (1999, 2004) small world network and Barabási’s (2003) scale-free network.

Watts takes as his point of departure work on random graphs by Erdös and Rényi (1960). They show that if nodes within a network are connected at random, then the small world effect emerges even when average degree represents only a tiny fraction of the overall population size. It is relatively easy to imagine how this might happen in a random network, where there is no tendency toward transitivity and friends are no more likely to be friends with their friends’ friends than with anybody else. If, as surveys indicate is plausible, each person “knows” about 500 others in the weak sense of knowing often presupposed in these accounts, and each of the people they...
know knows a further 500, then we are all connected to 250,000 people at a distance of two degrees. Add in the 500 that each of the 250,000 knows, and we are tied to 125,000,000 others at a distance of only three degrees. This is already double the population size of the United Kingdom.

The problem with this is that social relations are not random. In particular they tend, as Granovetter’s (1973, 1982) discussion of strong ties suggests, toward transitivity and redundancy. Many of my 500 contacts will know one another, such that the exponential growth in number of ties that we see in the random network will be considerably dampened. This is the key problem for Watts, but he finds a solution in Granovetter’s account of weak ties. If the clumps of structure that transitivity generates are linked by weak ties that behave in a relatively random way, he demonstrates, then a small world results in much the same way as in a random graph (this is partly because the difference between the two is less pronounced than he suggests [see Crossley 2008b]). Actors tend to be clumped in transitive groups, but those groups are linked by weak (intransitive) ties between some of their members, and these weak ties, which Watts treats as more or less random, link the clumps in a small world.

There are problems in suggesting that any type of social tie, weak or strong, is random, but if we allow that Watts’s reference to randomness is an attempt to capture the haphazard and contingent way in which some of our weak (and thus intransitive) ties are formed, then the model is credible. It is certainly a mathematical solution to the small world problem that has some, albeit perhaps limited, sociological credibility. There is something to work with.

In terms of my earlier discussion, moreover, note that Watts’s image of small world networks, as discrete clusters of strongly and transitively tied individuals that are themselves linked by weak and intransitive ties, resonates with Mead’s notion of religious and economic ties. Mead’s discussion of these ties effectively models the social world as a network of closely knit, transitive religious clusters linked to one another by weak and intransitive economic ties. In addition, as I elaborate below, there is an important resonance with Fine and Kleinman’s (1979) use of Granovetter in their discussion of the network structure of subcultural diffusion.

Watts’s model suggests that all nodes within a network have the same degree or at least that degree is normally distributed. Everybody is connected to (about) the same number of people. Barabási (2003) challenges this. Focusing on the Internet and the World Wide Web, among other examples, he argues that some networks are characterized by the existence of enormous hubs, to which many if not most other nodes within the network connect. He calls this a scale-free or “power law” network because the distribution of degree centrality within the network approximates what is sometimes called a “scale-free” or “power law” distribution. The details of such distributions are complex, and critics have challenged Barabási’s claim to have found genuinely scale-free distributions (Watts 2004). For my purposes, however, a scale-free distribution of degree centrality entails that the vast majority of nodes have a relatively small degree, while a relatively small number of hub nodes have enormous degrees. Pareto distributions, in which 80 percent of a population possesses only
20 percent of a good while 20 percent possesses 80 percent, are sometimes cited by way of an indication of order of magnitude. The key point for Barabási, however, is that these scale-free networks manifest the small world effect, too. Because most nodes connect to one or more of the hubs, these hubs connect them to one another by relatively small paths.

I have discussed a number of possible sociological applications of these models elsewhere, all compatible with SI (Crossley 2008a, 2010a). Here, I want to relate them specifically to the interactionist literature. One obvious example comes from Fine and Kleinman’s (1979) above-mentioned approach to subcultures (see also Crossley 2008a). They use Granovetter’s model of strong/transitive and weak/intransitive ties to explore the network structure of subcultures, arguing that subcultures effectively comprise clumps of transitively tied individuals that are then (qua clumps) connected by weak ties between one or more of their respective members. A clump member may, for example, have a distant relative in another city, with whom to exchange ideas, tastes, innovations, and so forth. These weak ties allow subcultural information to jump between clumps and between cities or even national societies. The model is actually identical to what Watts proposes, and it allows us to think about how subcultures might manifest within a national population. We can begin to think about how the small groups typically studied in SI ethnographies intersect and communicate so as to create the national and international subcultures referred to in self-styled macrocosmic forms of sociology.

These same ideas apply to any of the social worlds studied in SI, not least Beck-er’s art worlds, which of course overlap with subcultures. Worlds have local aspects and local network structures that are generally picked up in SI ethnographies. And these local network structures can be mapped, as I have shown in my own work on British punk and postpunk music scenes in the late 1970s (Crossley 2008c, 2009). But the localities are connected, giving rise to national and international worlds.

Fine and Kleinman suggest that connection and communication between clumps in subcultural (and art world) networks occur independently of the mass media. However, other interactionists, rightly in my view, put more emphasis on mediated communication (e.g., Shibutani 1955). Mediated communication is important in subcultures and other social worlds. Most established worlds have their “in” magazines and Web sites, for example. This is important if links are to be sustained across (geographic) distances, and it is interesting in the respect that it tends to generate hubs within networks, of the sort described by Barabási. To take an example from the British postpunk subcultural world that I have analyzed elsewhere (Crossley 2008c, 2009), the radio DJ John Peel was very well known in the United Kingdom as a man who was quick to identify, enthuse over, and promote new and interesting musical trends. He established the national reputation of many well-known postpunk bands and received hundreds of demo tapes every week from new bands hoping to be identified and sponsored by him. Thousands of young people (the present author included) listened to him, hoping to pick up on the latest, cutting-edge music. As such he was a hub within the network of the United Kingdom’s alternative music
scene (and beyond) from the late 1970s until his death in 2004. Millions of fans (and artists) were closely connected to one another through their common (mediated) link to John Peel. The postpunk network was therefore a composite of the network types described by Watts and Barabási. It involved clumps, weak ties, and hubs.

The point here is that the analysis of macrocosmic social forms does not entail a shift in ontological position, relative to micro sociology, and does not require that we abandon the concreteness definitive of much SI work in favor of working with the abstractions that so often populate macro sociology, obscuring its claims. It entails tracing out patterns of interaction and connection by a few more degrees to see the bigger (macro) picture. The concept of networks allows for macrocosmic reflections on interaction and relations. By tracing links across local sites of interaction and exploring the possibility that a social world might be a small world, we can explore the interaction infrastructure of the social macrocosm, and SI can rebuff those critics who bemoan its alleged inability to engage the macrocosm and rejoin the complexity agenda by showing how such macrocosmic phenomena as British punk, American jazz, or the global movement against global capitalism (see Crossley 2008a) emerge out of and consist in connections between local clumps of networked interaction.

If SI can incorporate and develop these ideas, then it will be in a much stronger position for advancing its own foundational claim, that society consists in human interaction, and thereby also for engaging with the recent versions of that claim propounded in complexity theory. It will be able to further realize both its sociological and its complexity potential.

CONCLUSION

The concept of networks has hovered on the margins of symbolic interactionist thinking since the very inception of the approach. Interactions and the relations they generate inevitably also generate networks, and attempts to think about what society or social worlds look like, from an interactionist perspective, are inevitably drawn to the notion of a network. In this article I have proposed that networks should be moved from the margins of the approach much closer to its center and that interactionists should embrace the tools of social network analysis as a way to operationalize this concept.

One reason to do this is that it extends and deepens insights about the significance of networks that already exist, in embryonic form, within symbolic interactionism. I have also suggested, however, that engaging with networks and with social network analysis affords a way to both tackle two very slippery sociological concerns, structure and the micro-macro divide, and also to engage with the emerging complexity agenda, an agenda to which interactionism so obviously speaks.

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NOTES

1. On my reading, religious communities are organized by way of religious ties, according to Mead, and economies comprise economic ties, and there is possibly a suggestion, paralleling that of Durkheim, that religious and economic social forms lie at the origin of wider forms as pure examples of them. It is clear, however, that many secular ties and forms of association count as religious for Mead, as he defines them, and likewise many nonmonetary forms of interaction and exchange are economic.

2. Technically transitivity entails that if $i$ knows $j$ and $j$ knows $k$ then $i$ knows $k$.

3. “Density,” as defined in SNA, is the total number of ties in a network expressed as a proportion of the total possible. If we assume that a relationship of $i$ to $j$ necessarily implies a relationship of $j$ to $i$ (we need not assume this), for example, then there are a possible 45 relations in a group of 10 people. If we discover 20 relations in our research on this network, then the network has a density of $20/45 = 0.44$. If we believe that a relation from $i$ to $j$ does not imply a relationship back in the same direction (perhaps we are interested in “liking,” such that $i$ may like $j$ without $j$ necessarily liking $i$), then there are a possible 90 relations in the network, and our 20 identified relations gives us a density of $20/90 = 0.22$. Density is always a figure between 0 (no density, nobody is related to anybody) and 1 (maximum density, everybody is related to everybody else).

4. A network component is a subset of nodes within a network, each of which can be reached from any of the others because they are all either directly or indirectly tied to one another. It is an “island” of (however circuitously) connected nodes.

5. That is, we were a network, but we were also part of a larger network of which we formed a subgroup, as the ensuing analysis demonstrates.

6. Feld argues that networks of like-minded individuals form because their like-mindedness draws them to common spaces where they are likely to meet and form bonds: for example, all of the smokers in an organization might know one another because they meet behind the bike sheds for a quick smoke.

7. I borrow Elias and Scotson’s (1994) expression, “established and outsiders” here. My own take on these relations does differ in some respects from theirs but it is similar (see Crossley 2008b).

8. An “adjacency matrix” is a square matrix in which each actor in a population is represented both down the first column and along the top row. Relations between actors are indicated (in the simple case) by way of a “1” at the intersection of the rows and columns. If there is no relation, this is indicated by way of a “0.”


10. Degree is defined above. Density was explained in note 4.

11. In an adjacency matrix each node has its own row and its own column. Its connections (or not) to other nodes are represented, along the row, by a series of ones and zeros that correspond to the columns of those nodes. This matrix is easily transformed into a distance matrix, which then allows for a hierarchical cluster analysis.

12. A core or k-core is a subgroup of members of a network, all of whom know a specified number (“k”) of the others: e.g., a 5-core of size $n = 10$ is a group of 10 people, all of whom know at least 5 of the others. The definition of a core is in some ways a relaxation of the definition of a clique, which entails that all members of a subgroup know one another.

13. That is, the number of ties that exist across clusters expressed as a proportion of the number that could exist.

14. Only the brokers were connected to the various parties involved and thus only they could bring these parties together. They occupied a unique and significant structural position.
15. Milgram (2004) claims, for example, that being six degrees away from “the president” is akin to being six social structures or social worlds away—the point being that it is a long way!

16. The network’s diameter is generally measured by identifying the shortest distance (in terms of links in a chain) between the two most distant nodes (again measured by reference to links in a chain).

REFERENCES


