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The Social World of the Network. Combining Qualitative and Quantitative Elements in Social Network Analysis

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Combining Qualitative and Quantitative Elements in Social Network Analysis

by Nick Crossley

Social network analysis (SNA) has progressed enormously in recent years [Carrington *et al.* 2005]. However, the advances have been primarily in what we might deem quantitative aspects of the approach: that is, in statistics, simulation models and specific network measures. There has been no comparable development on the qualitative side. Indeed, quantitative advances have served to push the qualitative aspect of SNA, once integral to the approach, not least on account of its anthropological root [Mitchell 1969], to the sidelines.

This has prompted calls from various authors for a "more qualitative" approach to SNA [Emirbayer and Goodwin 1994; Mische and White 1998; Mische 2003; Knox *et al.* 2006; Prell 2006; MacLean 2007]. I agree with much that these authors argue. It is not always obvious from their accounts, however, how and where the qualitative work that they call for engages with the concerns and concepts of SNA as currently practiced. Qualitative network analysis often appears to operate with a separate agenda.

My contention, by contrast, is that the potential contributions of qualitative and quantitative approaches to network analysis have complementary strengths and weaknesses such that they are best used, in most instances, in conjunction. Each brings something different and something important to the fore, adding strength where otherwise there would be weakness. We need an integrated approach.

To achieve this we need to take a careful look at both qualitative and quantitative approaches (in their various forms), identifying their respective strengths and

weaknesses and considering where and how each can contribute to the common goal of understanding social networks. In this paper I set that ball rolling [see also Edwards and Crossley 2009].

My basic argument is that the quantitative tools of SNA process the hurly burly of social life in such a way as to create a very abstract, formal and structural mapping of it. This constitutes the great strength of SNA. It affords a perspective and facilitates a type of investigation not otherwise possible; a perspective and type of investigation which are necessary if sociology is to be truly relational in approach. It is equally a weakness, however, because for many sociological purposes SNA's mapping is too abstract, overly formal and insufficiently attentive to inter-agency and process. It filters out important elements of social life, standardising observations in a way that sometimes obscures important concrete particulars.

Qualitative tools, whose limitations are that they are often overly sensitive to concrete particulars, fail to standardise and lack the means to identify structure, provide an important complement here. Their limitations mean that they can never replace quantitative approaches but when used in conjunction with quantitative approaches their weaknesses become strengths; necessary "checks" upon the limits of quantification and means of pursuing an analysis along important paths that quantitative analysis cannot follow.

In addition, the interaction which both generates and reproduces the "ties" that constitute a network also generates and reproduces various emergent properties, including shared meanings, conventions/norms and identities, which the quantitative tools of SNA are inclined to overlook but which qualitative analysis is well placed to identify and analyse, and which a proper analysis of networks cannot afford to ignore. Social networks are, to use an interactionist concept, "social worlds" [Becker 1982; Shibutani 1955; Hall 1987; Strauss 1973; Crossley 2009] and a thorough understanding of them demands that we treat them as such.

In making these claims it is incumbent upon me to define what I mean by "qualitative" and "quantitative." Theses could be written on this topic but my definitions are relatively simple. Quantitative tools of data gathering, on my account, are any means deployed to record observations about the social world in a numerical form. Quantitative tools of data analysis are any means used to manipulate the numbers derived in this way so as to explore and/or answer questions about the social world. In terms of network analysis quantitative data gathering and analysis usually involve matrices, graphs, measures and various means of manipulating them, as spelled out in the key texts in the area [Wasserman and Faust 1994; Scott 2000].

Qualitative tools of data gathering are those which generate and/or record non-numerical and most often discursive forms of data. In relation to network analysis

this might entail, amongst other things: the use of field notes to record and analyse observational data; examination and analysis of archival material (although, of course, that can be numerical in form); and both semi and unstructured interviews. Qualitative tools of data analysis are tools which facilitate the analysis of such materials. Examples include "discourse", "narrative," and "conversation" analysis, and I would also include the ability simply to describe what is going on in a network and to convey the meanings, identities and conventions at work.

Different research tools make different demands, intellectual as well as practical, upon their user. For example, quantitative tools typically require that observations are standardised, so as to make them comparable, which requires more closure in data gathering than is usual with qualitative tools. In addition, some tools come complete with an ethos or philosophy which, whilst not essential to their use, is treated as such within particular communities of practice. There are different schools of participant observation, for example, which theorise the process of looking, talking, note taking etc. in different ways. It is integral to my argument for a mixed methods approach, however, both that the same tools may be used by researchers holding different epistemological, ontological and more general theoretical assumptions, and that the same researcher may use a combination of quite different tools within the same project without necessarily risking theoretical inconsistency.

Research tools acquire a meaning and implications in virtue of the ways in which we use and think about them. They might be better or worse at achieving a given end and may have inbuilt limits but we decide the ends against which such limits and strengths/weaknesses can be identified for ourselves. Furthermore, most social theories and philosophies of science are sufficiently open and vague in their prescriptions as to allow, if not invite, considerable latitude in relation to our choice of tools.

The coherence of a project derives not from the tools that are used but rather from the questions addressed, the theoretical assumptions of the researcher and the way in which the tools are used and combined. To remain consistent the researcher must select and use methods in accordance with their questions and theories, making methods serve their analytic purposes and bestowing meaning upon the method in doing so, but there is no reason why a variety of methods, qualitative and quantitative, might not be combined and used in this way. To suggest otherwise is to let the tail wag the dog, as if a carpenter could elect to be a "screwdriver man" and eschew all use of saws and hammers. Different tools do different jobs and good craftsmen and women often need a wide range of different tools to complete complex jobs.

This position makes research more difficult. It implies that we have to think not only about what methods to use but also how we are using them and what significance

we are attributing to them. However, it opens up the possibility of mixed methods research which crosses what has become "the qualitative-quantitative divide" because it suggests that the (in)coherence of any such research derives not from the tools used but from our own capacity to find interesting and coherent ways of using and combing them.

I begin the paper by elaborating further my general argument. In the first section I consider certain of the ways in which quantitative tools advance our capacity to analyse networks, relative to what might be achieved from a purely qualitative approach. In the second I flip the argument and consider the limitations of quantification. The second half of the paper then reflects upon a series of examples, taken from own work, where qualitative and quantitative approaches have been combined and where I believe that each has complemented the other [see Edwards and Crossley 2009 for a further, extended example not discussed here]. My examples centre upon: 1) brokerage and closure; 2) centrality; 3) network dynamics; 4) diffusion/social influence.

Why Quantitative Tools Are Important

Why use quantitative methods at all in network analysis? Why not just describe and analyse networks qualitatively, in words. There are various reasons.

Firstly, relational data are difficult to store, retrieve and analyse by conventional qualitative means. Discursive accounts of relations within even a relatively small population of actors can easily become very lengthy and convoluted. Within a group of only ten actors, for example, there are a possible ninety directed or forty-five undirected relations; far more than one would want to describe discursively and far more than one could realistically expect to "get one's head around" in a long-hand, narrative form. Matrices are an obvious and effective solution to this problem. Furthermore, descriptions of relational chains involving as few as three degrees quickly become confusing and difficult to follow in longhand: e.g. John's friends, Peter's aunts cat. The data need to be reduced and systematised if we are to be able to gather and do anything with them. Numbers and graphs facilitate this. They reduce and summarise in a way that allows us to handle size and complexity.

This was one of the key motivational factors behind early anthropological innovations in SNA [Mitchell 1969]. Graphs and adjacency matrices provided relatively simple means of recording, storing and analysing relational data that were generated in the course of qualitative, ethnographic research. Moreover, graphs in particular

proved appealing and user friendly ways of describing and visualising such data for purposes of presentation and dissemination.

However, secondly, matrices and graphs do not simply translate qualitative observations about ties into numbers and pictures. They make additional demands upon the researcher and afford a different vantage point. Where qualitative observation is inevitably drawn to noticeable ties between certain actors within a population, adjacency matrices demand that researchers conduct a systematic survey of all possible relations within a population, deploying standard criteria for the measurement of relations. This brings to light ties which might be less immediately obvious and also absences of ties which may be equally significant (as the concept of "structural holes" suggests). The survey procedure necessary to construct an adjacency matrix imposes a discipline upon data gathering which, in turn, facilitates new and perhaps less obvious observations.

More importantly, a systematic survey, with the standardisation of observation procedures that it entails, is necessary if we wish to make explanatory claims about either ties or patterns of ties. We cannot make claims regarding the significance of ties if we have not systematically surveyed where they exist and where they do not. To give an example I will return to (because it is not entirely true), we cannot claim that "John got the job because he knows Jane" if other people know Jane too and they didn't get the job. We can only assess the significance of John's tie to Jane if we know who else each is and is not tied to and if we have a sense of the wider network(s) to which they each belong. Likewise, we cannot know who is "well connected" and thus what advantages or disadvantages this bestows unless we have enumerated the "connectedness" (degree) of actors in a population.

Thirdly, the survey, matrix and graph are tools which abstract from and thereby simplify the hurly burly of everyday interactions and relations in a way which affords the researcher an alternative viewpoint. They strip a network back to certain bare essentials, separating the wood of relational form from the trees of relational content by drawing actors and the fact (or not) of their connection to the foreground. More importantly, they allow us to see all of these connections simultaneously and thus to spot structures that would not otherwise be visible. We cannot do this qualitatively because explaining a set of relations in discourse requires that we describe them one at a time, thereby precluding simultaneous representation.

The glimpse of structure that the graph affords us can be deceptive, of course. And it is only ever a start. But the various measures and routines of SNA allow us to further improve upon this. From measures of density to block-modelling procedures we can further explore and specify structural properties that are not always apparent from the graph and *a fortiori* from any qualitative impression of a net-

work that we (might) begin with. Quantification and mathematical manipulation allow us to see things that are not visible to the naked eye. They are akin to microscopes or telescopes, extending our capacity to perceive and get a grip upon relational structures.

In addition, even where they only formalise what is obvious to the naked eye they lend precision and reliability, which are in turn integral to proper scientific explanation and understanding. They allow us to go beyond vague and potentially idiosyncratic claims that, for example, "most people seem to know one another" or "some are much better connected than others," putting figures to such claims so as to facilitate comparisons and standardising the procedure by which such properties are determined.

Statistical and simulation techniques extend this further and thereby afford yet more insights. They allow us, amongst other things, to: survey our network in others ways (e.g. triadic census); assess the likelihood that particular network patterns and properties could have emerged by chance; and explore the effects of particular mechanisms of relationship formation upon network structure. Again, they extend our observational and comprehension capacities.

These points could be elaborated considerably and there are many other advantages to quantification that I have not discussed. I have said enough, however, to indicate that there are good reasons to use quantitative tools when analysing networks. In what follows I turn to consider the limitations of these tools, which necessitate that they are complemented by qualitative tools.

Why Quantitative Tools Do Not Suffice

If quantitative methods are so good why bother with anything else? Why try to combine them with qualitative methods? My argument centres upon a number of overlapping limitations of the quantitative tools outlined briefly above (e.g. surveys, adjacency matrices, measures etc.). These limitations can be summarised in two points. Firstly, *the abstraction and simplification involved in an adjacency matrix, invaluable though it is, can for certain important purposes amount to over-abstraction and oversimplification.* Secondly, following on from this, *the process of abstraction brackets out important data which are essential to both a proper sociological understanding of social networks* and, as I show in the second part of this paper, *to a proper understanding of many key concepts, measures and mechanisms from the SNA literature*.

From a quantitative point of view a network consists of a set of actors or vertices and a set of edges. Expressed formally:

$$S = \langle N, L \rangle$$

Where S is a social network, N a set of vertices and L a set of relations defined on them [Wasserman and Faust 1994, 98].

Or building upon that:

$$\mathscr{S} = \langle S, \mathscr{G}_d, X, A \rangle$$

Where

$$\mathscr{S}$$

is our network,

$$S = \langle N, L \rangle$$

as above,

$$\mathscr{G}_d$$

is a (directed, in this case) graph,

$$X$$

is an adjacency matrix and

$$A$$

is an attribute matrix [*ibidem*, 90].

This definition is useful and has the advantage of lending mathematic precision to the process of concept definition. However, a social network is also a "social world" in the interactionist sense [Shibutani 1955; Strauss 1973; Becker 1982; Hall 1987]; that is, a world of shared meanings, purposes, knowledge, understandings, identities (collective and individual), conventions etc, all of which affect the way in which those within it act. And qua "world" it is also a repository of resources, some highly specific and some general, which are distributed unevenly throughout it. In focusing upon patterns of connection the quantitative approach brackets all of this out of consideration, to the considerable detriment, in many cases, of a proper sociological understanding. These points require elaboration.

The quantitative approach represents relationships as numbers. These numbers indicate either the absence/presence of a specified type of relationship (e.g. friend-

ship, business partnerships, acquaintance or aggression) or a quantifiable variation within such relations (e.g. strength, frequency of meeting etc.). In addition, as is proper to survey analysis, the approach standardizes relations. It establishes the existence or not of a particular relationship by reference to uniform criteria. Quantification and standardization are important and useful. They facilitate the use of various mathematical/analytic routines whose benefits are described above. However, there are costs.

Reducing relationships to numbers brackets out a great deal of potential empirical material, at least some of which could be analytically useful, and also distorts them. Relationships are not "things" that are either absent or present. Nor are they uniform. They are lived histories of iterated interaction which constantly evolve as a function of continued interaction between parties (or significant absences of interaction). To say that two actors are related is to say that they have a shared and sedimented history of interaction and/or an expectation of future interaction which shape any current interaction in which they are engaged. They have interacted before and this experience has created a footing upon which they build. Perhaps they have fallen in love or developed a mutual dislike. Certainly each now has knowledge of the other which informs their interactions. They have a shared history which they each draw upon in their interactions. At every fresh encounter they pick up where they left off. Likewise, if they expect to interact again in the future then that expectation, however tacit, also impinges on the present, since action now will have perceived implications "later."

Inter-actors are not passive in relation to this temporal influence. Their reflexive management of interactions and relations carves out a degree of autonomy within these processes. But past and projected future experiences necessarily constitute a context which frames the interactors interpretation and (inter)action. *Reducing relationships to numbers ignores this dynamic, evolving nature of the relationship.*

Furthermore, relations are not standard. Each involves a unique history of interactions and thereby of complex, nuanced meanings. Not only might "friendship" take on different meanings for different actors and even for the same actor in different situations, it might take on a different meaning for each friend an actor has. Or rather, actors do not always relate to their friends by means of such role typifications: e.g. "Rob" is my friend but I see him as "Rob" not "a friend." I have expectations and a typification of him but they are individualized, based upon what we have been through together and on his particular quirks, foibles and qualities as revealed to me in our various interactions. Likewise our affective bond, which might be highly nuanced and contextual, and also the "goods" exchanged in our relationship and its consequent balance of interdependence (and thus power). I might have recourse to

general "friendship norms" if I feel that Rob has in some ways transgressed them but the rules constitute a very broad framework within which a much more specific relational habitus[1] emerges.

In addition, even within a "stable relationship" interactions are highly variable, moved as they are in different instances by different purposes, events and both the "domains" of practice [Mische and White 1998; White 2008] and the spaces (real and virtual) in which they take place. The "doing" of the relationship, by means of interaction, is interwoven with and affected by these and other contingencies and, as such, can be quite unpredictable.

The same applies at the level of the network. Networks are structures-in-process, evolving as the relations within them actively evolve. Moreover, the interactions which give rise to them give rise equally to other, equally important and significant emergent properties. Conventions and symbolic distinctions/boundaries take shape within networks, not just in relation to dyads but in relation to broader groups, such as cliques and cores. Collective identities and institutionalized situational definitions emerge, shaping the way in which whole clusters of actors behave. Public goods emerge, adding to the other resources, material and symbolic, which have value for members of the network and circulate or concentrate at points within it. Moreover, things happen because the network is "about" something; its members have reasons for interacting. There is always a story to tell about a network and its participants.

From the point of view of a mapping of network structure these various emergent properties are so much "noise." But from the point of view of a sociologically adequate understanding of social networks and their effect they are fundamental. Having abstracted network structures from the hurly burly in order to better see them we must allow the hurly burly back in if we are to fully understand both those structures and the social world which they structure.

Another way of putting this is to say that SNA abstracts form from content and focuses exclusively upon the former, to the detriment of a proper consideration of the latter. This is an important part of the reason why SNA has such analytic power and produces such illuminating results. As noted above, it separates the wood from the trees. As such it is to be welcomed. But the form of a network never exists independently of specific contents, nor does form have an automatic and determinate meaning or effect. The significance and effect of specific network figurations, properties and positions, as I show below, is always mediated by concrete particulars.

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[1] I use the term "habitus" here simply to denote the shared and sedimented history of interaction between parties which constitutes an important aspect of their relationship.

Of course there are degrees of abstraction and formalisation within SNA. Block-modelling abstracts and formalises to a far greater degree than standard sociometric analysis, because it begins with and abstracts from sociometric data. Likewise, debates on small world and scale-free networks, whose proponents claim to have identified network effects that apply not only to social but also to a wide range of other types of networks, including neural and chemical networks, operate at a much higher level of abstraction than much SNA. A model that is supposed to apply both to human communities and the neural pathways of the nematode worm is clearly pitched at a level somewhat removed from the concrete particulars of both sociology and worm biology. Even within sociometric forms of SNA levels of abstraction can vary. There is a bottom line, however. The standard measures and routines of SNA require that relations are represented as numbers and are measured in a uniform manner across all possible pairs of vertices. And they analyse the formal patterns and properties of the network as constituted in this way. My claim is that the effects of relational form are mediated by relational content and vice versa such that, for many purposes, formal analysis alone will not suffice.

By way of illustration take the hypothetical case of John and Jane introduced above. I suggested that we can only make claims regarding the effect of their relationship upon his employment status if we know the wider pattern of ties of both of them. However, it might not be the pattern or existence of ties, as such, that is crucial here so much as what those ties entail. Perhaps Jane helps John get the job, rather than somebody else, because, knowing her friends as she does, she thinks that it will suit him rather than others or because she fears that his search for jobs will drive him away from her. Perhaps she feels guilty because she was involved in him having lost his last job or thinks that he needs this job more than anyone else she knows. It is not always sufficient to record a tie as existing or not. Ties have meaning or content. They are, as White [1992; White 2008] notes, "storied." And it is sometimes necessary to know and understand the story if we are to comprehend, explain or predict their effect. Relationships have content, rooted in a history of shared experience, and indeed to the wider network in which are involved. And this content makes a difference. Qualitative analysis is a means by which we can retrieve and analyse this content so as to add greater complexity and depth of understanding to our work.

The relative neglect of content and concrete particulars in SNA also sometimes becomes a relative neglect of agency. SNA is a structural form of analysis and it makes a strong case for the significance of structure. However, this structural analysis can become overly mechanistic if, as too often happens, it fails to give adequate attention to the way in which network structures are lived and "done" by actors who reflexively manage their own position within them. The beauty of the network conception of

social structure, relative to most others, is that it keeps actors very much at the foreground. Structure, in this conception, is not "above" actors and does not displace them. It exists between actors, as the pattern of their relations. Actors remain central as nodes within the structure. This beauty is lost, however, if we lose sight of the fact both that nodes are actors and, perhaps more importantly, that ties are histories of iterated interactions; that they are "done" by inter-actors and, as such, very much belong to the domain of agency too. Notwithstanding the "circuit board" analogies that sometimes help to make network analysis more accessible, social networks are very different to some of the more mechanical networks analysed elsewhere in network science, and the reason for that lies in the nature of the nodes and the consequent variations in the types of interaction and relationship possible between them (which is not to deny that that the identities, dispositions, competence, resources and knowledge that constitute effective agency are generated through interaction).

Actors are often factored into SNA, of course, both by way of rational-actor and agent-based models but again these offer highly simplified and abstract representations of agency. Moreover, they are models. They do not take account of what real, concrete, complex, embodied social actors do in social networks. They construct hypothetical agents who behave in more simple ways. There are many good reasons to do this but its key disadvantage is that we fail to analyse, empirically, how real actors behave in networks and, again, we screen out a great deal of complexity and detail which may prove invaluable to a properly sociological understanding of networks.

I do not mean to deny, in saying this, that network structures generate both opportunities and constraints for inter-actors irrespective of what they might be aware of or think. They do. But constraints and opportunities are not causes. They constitute a context with which actors negotiate and organise a line of (inter)action. Opportunities are important to the extent that actors exploit them, which depends upon the actor's perception and priorities. Likewise, although constraints, by definition, bite whether or not the actor recognises them as such, exactly how this plays out is dependent upon the whether the actor recognises them in advance. Anticipating negative sanctions and acting so as to avoid them has a very different consequence, for example, to failing to do so and stumbling into a conflict situation. Furthermore, even within the same context of objective constraints and opportunities multiple "definitions of the situation," negotiated by actors in interaction, might be possible and will play a considerable role in shaping action. In short, what happens in a network is an outcome both of structure, including the structural position an actor occupies, and the way in which actors interactively "make out" within that structure.

Agency also introduces the issue of temporality. SNA, by default, treats all relations within a network as simultaneously active. This is important because, as noted above, it makes it easier to identify and map structure. To visualize structure we need to observe all relevant relations at the same time. For many purposes, however, our relations are activated (in interaction) and then deactivated as we move between interactions and activities. This can make issues of timing, sequencing, rhythm etc. very important and *in extremis* suggests that the structure of a network is constantly changing as relations are turned on and off within it.

The example of John and Jane is again illuminating here. If John is the only one of her contacts that Jane happens to bump into during the limited window where her capacity to help someone secure a job is active, then this might explain why he specifically gets the job rather than one of her other contacts. Lest this sounds implausible note that many of the "weak ties" in Granovetter's classic study were latent ties who happened to meet [Granovetter 1973; Granovetter 1974]. The chance meeting which reactivated the weak tie was as important as the weak tie itself to the process of "getting a job." Note also that much of the data from this study was based upon qualitative research – and for the good reason that systematic sampling and standardised questioning are very unlikely to identify the some somewhat *ad hoc* and idiosyncratic meetings and contacts that Granovetter focuses upon.

We should also note here that the temporal dynamics of a network are affected by the content of ties. Who an actor interacts with, specifically, at any point of time is shaped in some part by what they are doing and seeking to do. Actors might avoid those for whom they have "bad news," for example, or seek out those in a position to help them with a specific issue. Specific events trigger the activation of specific ties.

A Qualitative Cure for All?

Qualitative analysis is not a cure-all for these various limitations but it can help us to counter-act them because it need not be bound by the same restrictions as quantitative methods and generally operates at a much lower level of abstraction. It can deal with content and gets much closer to concrete particulars. Qualitative *data gathering*, whether in the form of observation, archival analysis or interviewing, can begin in a relatively open-ended and unstructured manner. It can deal with unique occurrences and particularities. It can follow details and leads, as and where they emerge. And qualitative *data analysis* can pull these various strands together into the "story" of the network; a story which makes the network comprehensible in a different way to the mathematically driven aspects of SNA but in a way which is wholly

complementary with the maths. Moreover, qualitative tools can engage more directly and straightforwardly with meanings, identities, situational definitions and stories.

In what follows I demonstrate this, using examples from my own work and showing that qualitative detail can be essential to a proper understanding of quantitative materials. In each of the examples discussed I used what are commonly regarded as qualitative methods of data gathering (ethnography and archival analysis) and in each case I began data analysis in a qualitative vein: seeking to establish, through immersion, what exactly was going on. In each case, however, the importance of relations and networks was striking, prompting me, for the reasons documented earlier in the paper, to adopt the quantitative techniques of SNA to achieve a better grasp on these networks, their properties and dynamics. Doing this facilitated significant advances in my analysis but also brought to light some of the limitations of the quantitative approach, persuading me of the importance of maintaining a mixed method approach. I begin by discussing a "brokerage and closure" figuration that I encountered in an (ethnographically based) study of a private health club [Crossley 2008a]. This figuration did not conform to the well established findings regarding brokerage and closure that Ronald Burt [2005] has presented. And the reason, I believe, can be discerned by recourse to qualitative investigation.

Brokerage and Closure

Burt [*ibidem*] identifies two network properties which can advantage actors, both of which have been explored in detail in the SNA literature and which have considerable empirical support. Firstly, there is good evidence to suggest that "closed networks," that is dense networks or sub-networks whose members have few or no contacts outside of them, generate trust, cooperation and mutual support which are beneficial to those members [Coleman 1990; and Burt 2005 for a review]. Secondly, there is a lot of evidence pointing to the advantages of "brokerage"; that is, of having individuals who connect otherwise unconnected parts of a network, bridging "structural holes" [Burt 1992 and, for a review, Burt 2005]. This is advantageous for the groups involved because they get access to resources which they would otherwise lack. It is advantageous for the broker because they control the flow of those resources and can take advantage of this situation. Moreover, they may be mistaken as the source of new ideas and information which, in fact, they are only passing on, and on this basis enjoy an elevated status.

Both brokerage and closure involve potential problems, however. Closed networks can become stagnant, for example, since their closure entails that the same

ideas and resources circulate endlessly within them. Likewise, too much brokerage in a network as a whole equates to a lack of cohesion, which is an impediment to the development of trust and cooperation, which in turn disadvantages network members. These strengths and weaknesses are largely complementary, Burt notes, and he therefore conjectures that the optimum network figuration is one which combines both; a hypothesis which is supported by his data. My work suggested something different.

My empirical brokerage-closure figuration is mapped in Figure 1. The vertices are all members of a private health club who participated in one or more of a number of circuit training classes and/or also a running club over a six-month period [Crossley 2008a]. Ties are assigned on the basis of known friendships which extend to socialising outside of classes, as well as within them. Any vertex which didn't belong to the single component in Figure 1 has been removed for present purposes and all vertices are sized according to degree. The data was gathered by means of participant observation in classes and social events, and in the case of this particular graph there was also an element of historical reconstruction. My own position in the network initially obscured my view of other positions and actors but a subsequent change in network structure (detailed below) allowed me to identify them retrospectively.
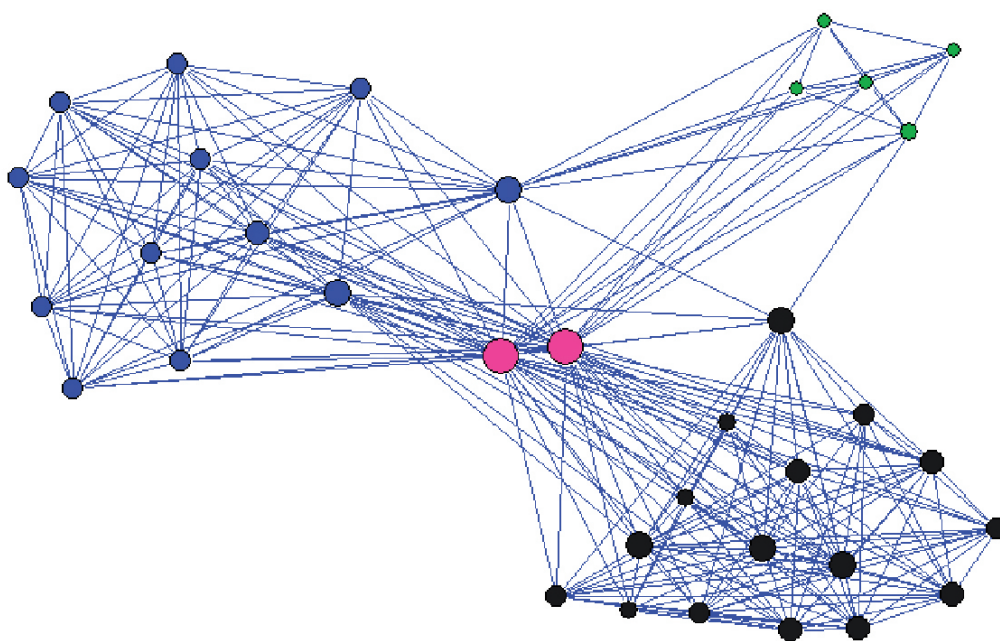

FIG. 1. Brokerage and Closure in a Private Health Club

In an effort to test my impression that Figure 1 was a brokerage-closure figuration I performed a hierarchical cluster analysis and then measured the density of ties

14

both within and between the identified clusters. The cluster analysis revealed four fairly clear cut clusters which are represented in the diagram by way of vertex colour. Their densities are given in Table 1. Note that the internal density of each cluster 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 two. It seems reasonable to conclude on this basis that clusters one, three and four manifest a high degree of closure and that cluster two is a broker's cluster.

To further verify the existence of brokers I took measures for the three key forms of centrality (degree, closeness and betweenness) and also "aggregate constraint," a *Pajek* measure, based on one of Burt's own innovations, which examines the extent to which every pair of ego's alters are connected to one another (a low score indicates that ego has a tendency to connect actors who are not directly tied and is thus in a position to broker between them). It is apparent from the histograms in Figure 2 that the distribution for these scores involves, in each case, two distant outliers. These are the vertices in cluster two. As Table 2 indicates, these two vertices are many standard deviations above the mean for the key measures of centrality and many below for "aggregate constraint." They are, as the measures of constraint and betweenness in particular indicate, in a strong position to broker between the relatively closed groups to which they are attached. The vertices in cluster two occupy a brokerage position.

TAB. 1. *Establishing Closure*

Cluster	Size	Colour (on graph)	Internal Density	Density of ties to cluster 2	Density of ties to cluster 3	Density of ties to cluster 4
1	16	Black	0.767	1	0	0.052
2	2	Pink	n/a		1	1
3	5	Green	1			0.1
4	12	Blue	0.97			

These measures demonstrate that the network visualised in Figure 1 is a brokerage/closure figuration. It did not generate the positive advantages predicted by Burt, however. Rather, brokerage between the identified clusters, and clusters one and four in particular, fuelled conflict and competition between them. In particular they competed over the loyalty of the brokers, taking offence when, for example, the broker was involved in social events with the "other group," which excluded them. Needless to add, this did not advantage the broker. They were subject to conflicting demands

and, to a degree, their relations with others in both camps suffered. They were shot by both sides.
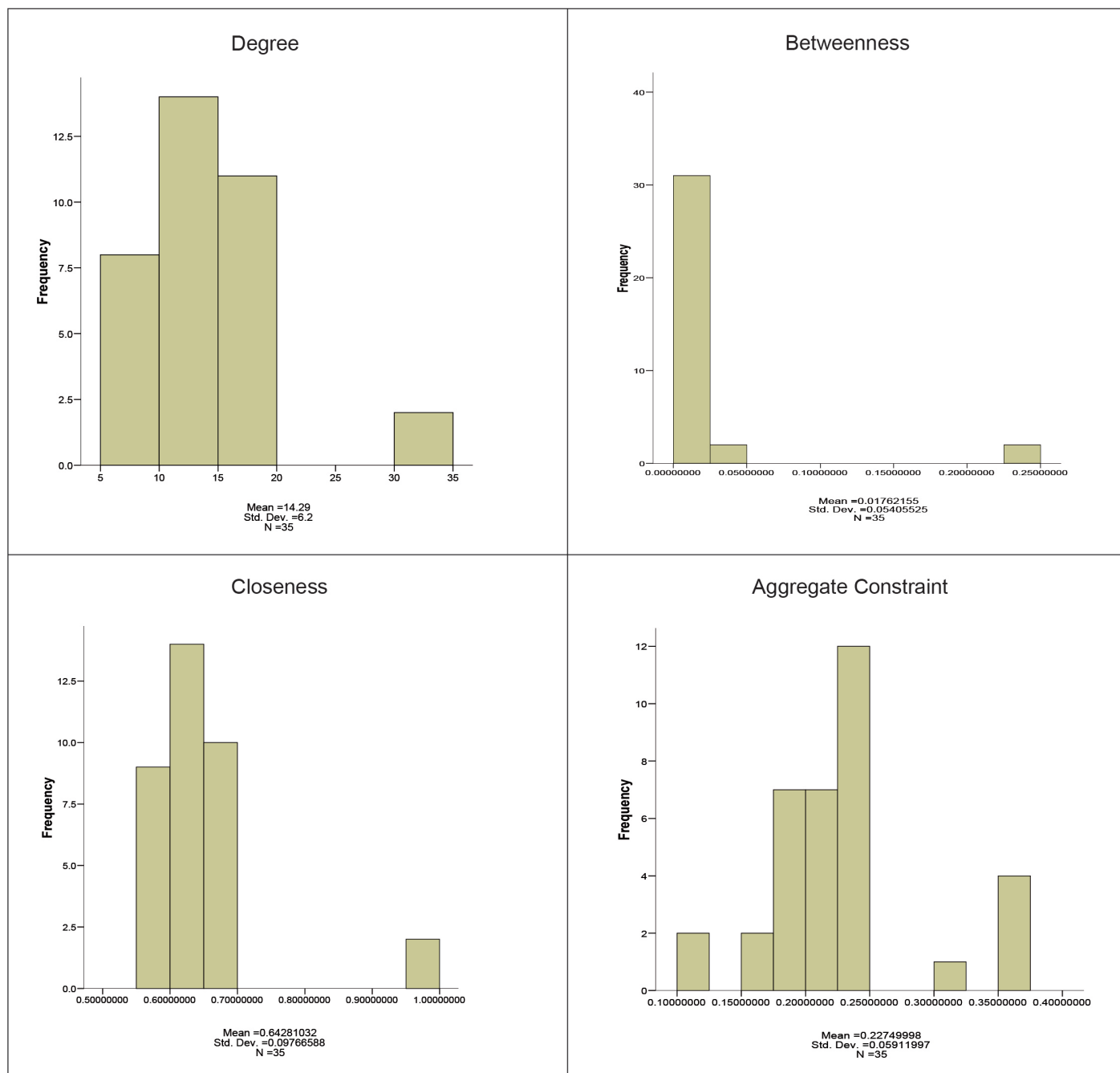

FIG. 2. Centrality Distributions for Graph One

The brokers responded to this by inviting members of one group to the social events of the other. Eventually this worked, changing the configuration of the net-

work by creating multiple bridges across the once closed groups to the point where they were no longer closed and ceased to be distinct groups. In the first instance, however, it provoked further anger as groups felt that "our" events were being invaded by "them" and resented the presumption of the broker in inviting "them" to "our" social events. As noted, this did eventually result in a more harmonious situation but that was simultaneous with a reshaping of the network away from a brokerage/closure figuration. The combination of closure and brokerage, for as long as it lasted, was a cause of conflict.

My purpose in introducing this example is not to deny that the combination of closure and brokerage can result in positive outcomes. Burt is very persuasive. My point, rather, is that the same basic structural figuration (brokerage and closure) can have different effects. This begs the question of why and how this is possible?

Before I answer this question note that Krackhardt [1999] too offers both a theory and evidence to suggest that brokerage and closure figurations, or rather brokerage between cliques (which amounts to much the same thing for our purposes), can work in a rather different way to that suggested by Burt. Clique membership (or membership of closed groups) tends to subject actors to binding norms, Krackhardt argues. The range of conduct open to them is thereby narrowed. If they belong to more than one clique, and the norms of each are not identical, it follows that the range is further narrowed. Therefore bridging cliques or closed groups is constraining for actors. Krackhardt supports this contention by reference to a detailed and complex analysis of workforce conflict.

TAB. 2. *Establishing Brokerage*

	Degree Centrality	Closeness Centrality	Betweenness Centrality	Aggregate Constraint
Mean	14.29	0.643	0.0176	0.227
S.D.	6.2	0.098	0.054	0.06
Key Outlier/Broker 1	34	1	0.229	0.113
Key Outlier/Broker 2	34	1	0.229	0.113

I am not entirely convinced by Krackhardt's analysis, not least because I believe that my own case points to a different dynamic again. My analysis arguably identifies aspects of what both Burt and Krackhardt point to. My agents are subject to efforts to control them, as Krackhardt's model suggests, but equally they demonstrate a degree of agency and "mediation" in the way suggested by Burt. Krackhardt's analysis is im-

portant, however, because, like my own, it suggests that the same basic configuration of relations[2] can lead to different outcomes, begging the question of why?

Krackhardt answers this question, in a very brief note, by reference to the public (or not) nature of behaviour. In his own example, he notes, brokers had to make their position (on union activities) known to the groups to which they belonged. Their views were public. This opened them to efforts by those groups to control their conduct. In Burt's scenario, he suggests, the broker is able to operate "behind the scenes," controlling information flow much more effectively. I cannot address the specificities of this argument here but note that it centres upon "content." What is going on in a network and how it is going on makes a difference. Moreover, it points to agency. Brokerage a lá Burt requires that actors take advantage of their situation and manage front and backstage areas of interaction. Network structure is not the whole story, even for "network effects" and mechanisms, and for that reason we need to supplement methods of formal network analysis with qualitative observations about what is "going on" within a network.

My own position is that the structure of a network does not have necessary, determinate effects in and of itself because the effects of structure are always mediated by the content of specific relations and interactions. Structural effects interact with the way in which structure is collectively done by members of the network in their interactions with one another. A network is not simply a set of actors plus a set of ties but a "world" in which identities, expectations, rituals, shared feelings and meanings emerge. That they emerge in the way that they do is no doubt influenced by network structure (see below) but they, in turn, influence network structure and mediate the effects which it has upon network members.

More importantly, it is my contention that the ethnographic research which allowed me to identify the above brokerage-closure figuration provided qualitative data which allowed me to access this emerging "world" and thereby to understand why, in this case, the combination of brokerage and closure resulted in antagonism, conflict and, for the brokers, stress, rather than the advantages identified by Burt. Indeed ethnography afforded much better data for these purposes than I could have gleaned using quantitative methods.

As a participant observer I was able to spot the tensions emerging around the broker when they first manifested. Indeed, it was only by means of these tensions that I became fully aware that certain actors were brokering between my own cluster and

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[2] It might be that a broker links cliques without actually belonging to either of them: e.g. if they have a single contact in each clique. In this case neither Krackhardt's argument nor the analysis I present would have much bite – although, again, I believe that the agency of the broker, what they decide to do, makes a difference to outcomes.

another. Minor arguments, meaningful silences, tittle-tattle and attempts to smooth these problems over alerted me to the fact that certain members of the group of friends to which I belonged were caught in a crossfire between groups and experiencing a problem of divided loyalties. In this respect, moreover, identification of conflict coincided with a preliminary understanding of its cause. It was obvious from what was said not only that there was tension in the group but also what it was about.

This struck me as interesting in relation to Burt's thesis, which I found quite persuasive (and still do), and inspired me to next ask the question of why things weren't playing out in the way that his model predicts. The answer to this question seemed to lie in the fact, again apparent through participant observation, that the properties of the cluster to which I belonged extended beyond those identifiable by means of SNA. Over time the cluster had developed rituals and an identity, an *esprit de corps* and basic culture. Its members had become, to some extent, subjectively aware of themselves as a group. And they had begun to draw boundaries around themselves and make demands for loyalty upon one another. Regular activities were organised in an effort to keep the group together, mobilising solidarity when it appeared to be waning.

Brokerage was generating conflict because it was interfering with this process of group formation. Brokers were blurring the group boundaries that others were erecting and challenging the demand for (exclusive) loyalty both through their attachment to another group and because they were inviting others across the group boundary.

The relative closure of clusters was an important pre-condition of this process of group formation. A closed sub-network is a relatively self-bounded entity, which eases if not invites the process of boundary drawing. And the combination of high density and relative segregation means that "in group" cultural innovations spread quickly and uniformly, reaching each network member from numerous sources in a manner which tends to reinforce them. It also minimises the possibility of dilution, competition or challenge from "outside" influences, except those introduced by brokers. However, the process of group formation is not identical to the structural property of closure. It is a process which may or may not occur in any given structural figuration. It belongs to the content of the network; to what network members are doing.

Furthermore, closure itself does not explain the emergence of a group, at least not in a way that I, following Hedström's discussion of explanation, would deem satisfactory [Hedström 2005]. To explain group formation we must identify the mechanisms which it involves, which in this case consisted of the aforementioned rituals, identities etc. A group emerged when members of a closed network core adopted

practices, variously linguistic, spatial and ritual, which generated a collective identity and both demands for and tests of group loyalty.

These mechanisms were plain to see and easy to record from the point of view of open-ended qualitative observation. They could not have been specified in advance, however, and, as such, would have been much more difficult to capture, at least in the first instance, by means of a closed, quantitative observation schedule. Moreover, it was important to tease out their significance and that was best achieved by locating them within a context and a "story;" working out what they meant to those who used them. Qualitative analysis was in this respect uniquely placed to identify mechanisms which mediated the effect of a brokerage and closure figuration.

Without qualitative analysis we could only speculate as to why this instance of brokerage and closure did not result in the benefits identified by Burt. With qualitative analysis we are able to advance our analysis of brokerage and closure by considering both a different, dynamic of conflict that they might induce and also the mechanisms (of group building) that can precipitate that outcome. This is important. The advance of science, according to Bachelard [2002], seldom involves the outright rejection of earlier findings. It tends rather to involve a respecification and identification of special cases. What was once deemed universal is found now to hold under some circumstances but not others. This is what my findings achieve in relation to brokerage and closure. A brokerage-closure figuration can be advantageous, as Burt suggests, but when members of closed sub-networks develop a strong group identity and demand exclusive loyalty from the broker (conditions best teased out by qualitative means) it can give rise to conflict. Thus we have a more nuanced understanding of brokerage and closure.

Before concluding this section is important to note qualitative and quantitative tools were combined in this analysis. It was the tensions surrounding the "brokers," observed (qualitatively) in participant observation, that first made me aware of their brokerage role and of the social structure in which they were brokering. This prompted me to map the network quantitatively and to seek to verify, by way of formal measures, that I was looking at a brokerage-closure figuration. In order to analyse and explain why this figuration wasn't behaving as it "should," however, I had to turn back to qualitative observation. Neither qualitative nor quantitative tools were sufficient in their own right for a comprehensive analysis. I needed both.

Centrality

Another observation regarding brokers arose in my work on the network of London's pioneer punk scene as it evolved during 1976 (visualised in Figure 3) [Crossley 2008b]. Vertices are all central players in the early London punk movement, as identified through an examination of secondary texts. They are sized according to degree centrality and coloured according to role: black vertices are musicians, grey are band members' friends, white are mangers and other non-musical players. Vertices are tied if they enjoyed any kind of professional relationship or were known to be good friends in or before late 1976 (as documented in the abovementioned secondary texts).

Although this is not a brokerage and closure figuration, it does involve three vertices whose centrality scores are higher than the mean by several standard deviations (see Table 3). One might infer from this, with the aid of sociometric measures and simple statistics, that the three actors involved (Malcom McClaren, Bernie Rhodes and Sid Vicious) were able to play a brokerage role and use their centrality to similar, self-advantageous effect. The reality, as revealed through a qualitative reading of the secondary and other archival sources, is more complex.

McClaren and Rhodes were managers of key groups and "movers and shakers" in the network who acquired a reputation for Machiavellian manipulation. Their centrality was both a sign and a basis of their advantage in the network. And it was achieved, in part, by a process of "preferential attachment" (see below). Others were attracted to them and sought to make contact with them because they were influential and important; and also because they held resources, chiefly money but also managerial expertise and wider influential contacts, which were valued in the field. Their centrality "behaves" in a way one would expect.

Sid Vicious' centrality, by contrast, derived from his drift across a number of bands and his failure, until a final and, as it turned out, fatal stint with the *Sex Pistols*, to find a place therein. Where others attempted to connect to McClaren and Rhodes, Vicious attempted to attach himself to others. The result, in terms of centrality measures, was the same but the process, meaning and practical import were very different. Moreover, there is very little reason to believe that Vicious was aware of his centrality, attempted to exploit it for his own advantage or indeed could have exploited it if he so wished. It is questionable whether his central position is a broker's position, given the way in which his ties were formed and their meaning, but even if it is he did not and arguably play a brokerage role. He lacked the competence.

Centrality, in the case of Vicious, has a different significance to that which it has in the case of McClaren and Rhodes; a significance which becomes apparent

when we address ourselves, qualitatively, to the narrative history of the network and its members. The narrative gives us a sense of how an actor's position is shaped by their individual career trajectory as it intersects with other such trajectories and the history of the ever-evolving network constituted by way of the relations formed as individual trajectories collide and bring actors into contact. It also reveals how position incumbents "play their hand," exercising inter-agency, and what effect such factors as resources, meanings, identities and conventions exert.
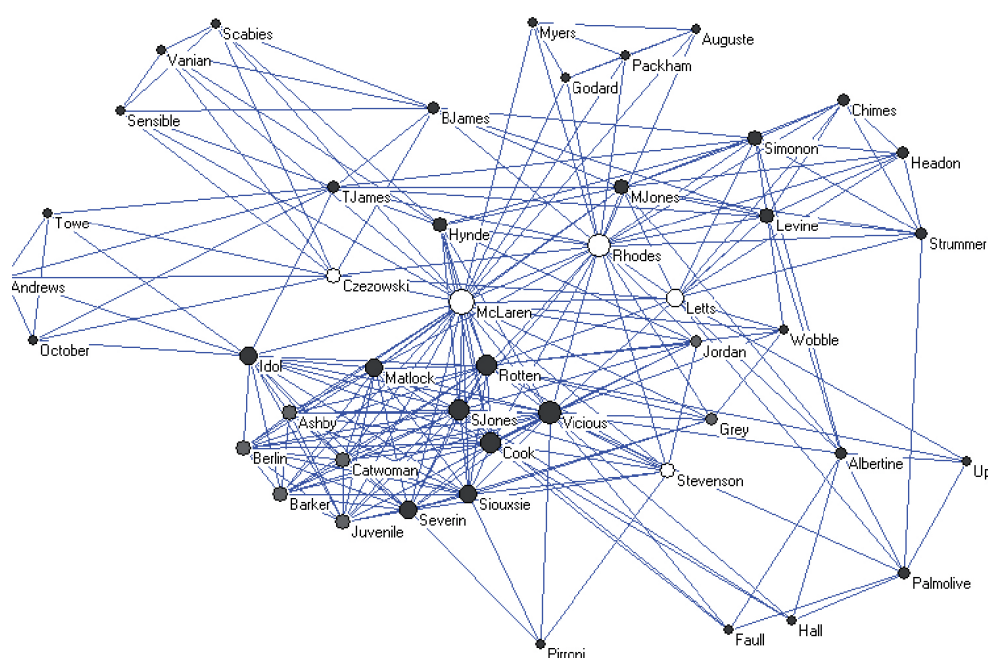

FIG. 3. The Early London Punk Scene

This is important for any attempt to explain centrality. One cannot explain the centrality of McClaren and Vicious in the same way because they are not the same thing. It is also important for exploring the effects of centrality. McClaren benefited from his centrality in a way that Vicious never could because their centrality was qualitatively different.

None of this diminishes the importance of the concept of centrality or the various measures that we have of it. These measures allowed me to verify and specify hunches about central players in the network. And as in my first example, the strength of qualitative research lies in its capacity to inspire, build upon, "deepen" and further explore quantitative research. But it suggests that there are "stories" to network centrality and that we cannot assume that all central actors, even in the same network, occupy their position in the same way or for the same reason. We need qualitative

methods to access these stories and put flesh upon the bones which our measures provide.

TAB. 3. *Centrality and Constraint*

	Degree	Closeness	Betweeness	Aggregate Constraint
McClaren	29	0.738	0.203	0.112
Rhodes	24	0.681	0.164	0.116
Vicious	25	0.692	0.116	0.131
Mean (for the whole network)	10.78	0.5927	0.02095	0.2665
S.D.	6.092	0.0741	0.041	0.104

The point applies beyond centrality measures of course. All network properties have a "story" behind them. They are dense or segregated or form n structurally equivalent blocs etc. as a consequence of a specific history which has shaped them, a history involving various contingencies, mechanisms and dynamics. Qualitative methods allow us to explore this history, identifying the contingencies, mechanisms and dynamics in play, and to tell the story of the network.

As a postscript to this point it is worth noting that the way in which McClaren and Rhodes played their respective hands generated both resentment towards and a bad reputation for them, at least amongst those who were initially close to them. Each became a focus of antagonism and conflict. Thus, although their position in the network, as quantitatively defined, remained similar and central, the nature of the relationships involved were transformed in such a way that their centrality was no longer advantageous. Transformations in the meaning and quality of ties – properties best captured by qualitative means – shifted the significance of the "vital statistics" of these key players.

Network Dynamics

The evolution of networks has become a focus of "quantitative" network analysis in recent years. Agent-based models have been used to analyse network evolution and dynamics. This development is exciting and interesting but it is much less useful and plausible when practiced independently of qualitative analysis. There is a lot more to the history of a network than is captured by any kind of model, as modellers are generally happy to accept. Models, like adjacency matrices, simplify.

Sometimes they oversimplify. Qualitative analysis allows detail and complexity back in and provides a necessary reality check.

Before I discuss an example it would be instructive to briefly consider the logic of the agent-based approach. At its simplest the approach takes snapshots of a network at different time points, observing differences. Next it hypothesises about the processes or "mechanisms" that have led from earlier to later configurations. Then it runs a simulation, based on the hypothesis, to see if the stipulated mechanisms do indeed reconfigure early snapshots in a way which resemble later ones.

Key mechanisms might include *homophily* (actors with similar traits are more likely to connect), *propinquity* (actors whose geography brings them into contact and who therefore meet with little effort are more likely to connect), *transitivity* (actors who share a common alter are more likely to connect) or *preferential attachment* (certain actors become particular targets for connection amongst others). For our purposes the *focus* mechanism, introduced by Feld [1981; Feld 1982], is also important. This states that actors with a shared interest will tend to converge on certain common spaces, where they are more likely to meet and therefore to make connections.

One difficulty with agent-based models is that, to quote a proponent, "the fact that a mechanism can explain an outcome does not mean that it actually explained it. Many different mechanisms can generate the same type of outcome, and somehow we must be able to identify the mechanisms that are most likely to generate them. This is where empirical research enters the picture" [Hedström 2005, 151]. The empirical analysis that Hedström recommends is quantitative. I believe that qualitative research is important too, however, and sometimes more so. Qualitative analysis allows us to observe what is going on in a network (through archives, interviews or participant observation), in an open-ended manner. And it allows us to both fine tune accounts by looking at how mechanisms manifest and operate in very specific circumstances and perhaps also to discover new mechanisms.

Moreover, qualitative observation allows us to consider the interaction of different mechanisms. Interaction between mechanisms is difficult to deal with in models because different mechanisms can cancel out one another's effects in such a way that it is difficult to assess whether or not they have been at play on the basis of an analysis of outputs alone.

In my analysis of the evolution of the network comprising the Manchester (UK) post-punk scene between 1976 and 1980, for example, I was able to consider a range of mechanisms which gave both life and shape to it [Crossley 2009]. The research was, like the London punk research, based upon a qualitative reading of secondary and archival sources. Three networks were constructed, one representing the full

population of key actors unearthed in my research, the other two representing relations between a subset of that population at two time points: June 4, 1976 (the eve of the *Sex Pistols* first visit to Manchester)[3] and May 18, 1980 (when *Joy Division* singer, Ian Curtis, committed suicide)[4]. These latter two networks are represented in Figure 4. The bulk of my research sought to explain the evolution of the network between these two dates.

Clearly this would have been impossible without the (quantitative) sociometric tools which allowed me to map the two networks and specify how their properties (e.g. density, number of components etc.) had changed across time. I explored the process of change by way of qualitative methods, however, and, for reasons discussed above (regarding the difficulty of spotting the impact of certain mechanisms of formation by means of network measures), found this approach to yield results that would not have been possible with a quantitative or simulation approach.

The research identified a number of mechanisms that appeared to be generating ties and thus shaping the evolving network. Many key players, for example, met at gigs, exemplifying the abovementioned "focus" mechanism. Their shared interest in punk music brought them to common spaces where they met and formed ties. Likewise, in many cases their meetings triggered further meetings between those connected to them, exemplifying transitivity. Lastly, there was clear evidence of "preferential attachment" (see below).

Much of this might be accounted for in an agent-based model but not all. For example, whilst it is evident that foci generate networks their effect is not always discernible in distinct network patterns and properties. It is not obvious from a snapshot of a network or even a comparison of two snapshots that links have been formed as an effect of foci. We can only ascertain whether new links were formed in this way if we attempt to observe the process of network formation itself. And we can only do that, in the first instance, qualitatively and by reference to archives.

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[3] This date was picked because this gig is widely identified as the trigger event that kick started the Manchester scene. See Crossley [2009].

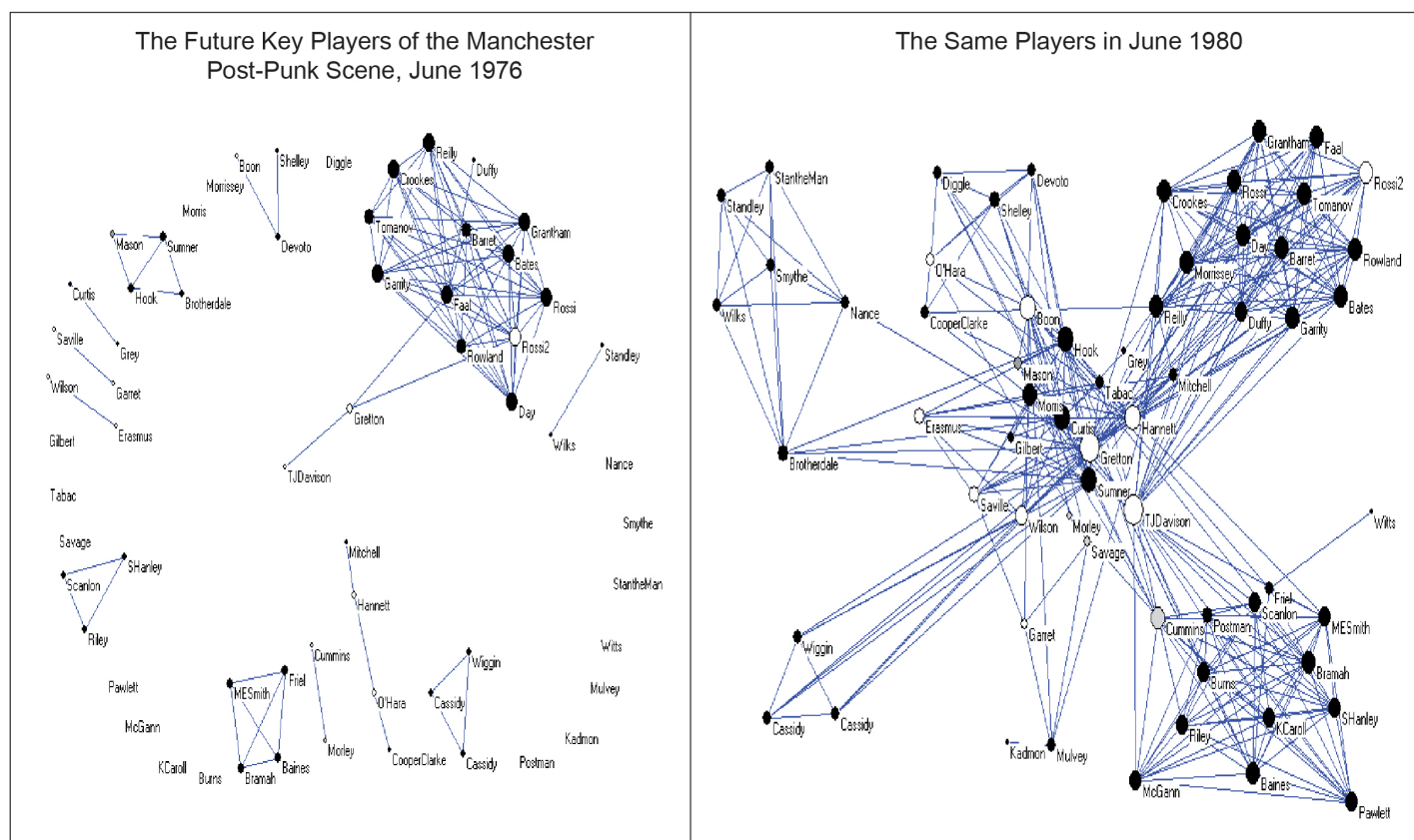[4] This date was picked because it effectively marked the end of an era within the scene.

FIG. 4. The evolution of the network of the Manchester (UK) post-punk scene

On a different level, qualitative analysis allowed me to explore interaction between mechanisms of network formation and, in particular, between foci, networks and reputation. It became evident, reading the history of the Mancunian punk scene, that foci were generated by the network as much as they were generative of it. Clubs and bars became foci as they acquired a (good) reputation within the emerging network as "the place to be." Of course actors had to be in the network and in the know to find this out, but being in the know and acting upon it by going to focal hangouts allowed them to change their network position by meeting other members of an evolving "in crowd." Such interactions might be simulated, after a fashion, but it is unlikely that their effect could be distinguished with static empirical snapshots of the network, certainly those likely to be available to a researcher. It is only by way of "narrative data" that one can identify their presence and effect.

Furthermore, there is a whole world of meaning in play here that simulations can neither capture nor help us to explore. We might, for example, want to explore what makes a place a "place to be" [see, for example, Thornton's reflections upon

"authenticity" in rave culture: Thornton 1995]. What gives it that meaning such that it becomes a focus of network formation?

Qualitative analysis also shed interesting light on "preferential attachment." Barabási [2003] defines "preferential attachment" as a process in which vertices which enjoy a high degree attract a disproportionate number of attempts at connection from new people joining a network. Their high level of degree centrality makes them attractive to others, so that others attempt to connect to them, which further increases their degree centrality and so on. The result, he maintains, is a hub-centred network with a scale-free degree distribution.

There was clear evidence of preferential attachment in my data. Degree distributions, though not technically "scale-free," were highly skewed (see Figure 5). The network involved a small number of highly central vertices. Moreover, a qualitative analysis of the archives revealed clear evidence that certain key actors were targeted for connection by others. However, exploring this process qualitatively led me to question Barabási's model in a number of respects.

In the first instance, it became apparent that it was not degree which made vertices targets for preferential attachment, but rather reputation (which can vary independently of degree). Moreover, it became evident that reputations were for something. Different actors were attractive to others for different reasons but mostly for reasons other than their high degree. Tony Wilson was a TV host who put punk and post-punk bands on his local television programme. That made him a man to know, at least if you wanted your band on television. In addition, he was a co-organiser of one of the most important club nights in the early Manchester scene (*The Factory*) and a co-owner of what was arguably one of the most influential independent record labels in the UK (*Factory*). This made him a man to know. Another star, T.J. Davidson, also ran a record label but his key attraction was the fact that he owned one of the few rehearsal spaces in Manchester. Most of the main Manchester bands of the time used Davidson's rehearsal space at some point or another, rubbing shoulders with Davidson and inflating his degree. Thus a rising band might want to make contact with both Wilson and Davidson but in each case it would be for a different reason. Or again, they might want to contact one but not the other of these figures because only one controls the resources which they want access to.
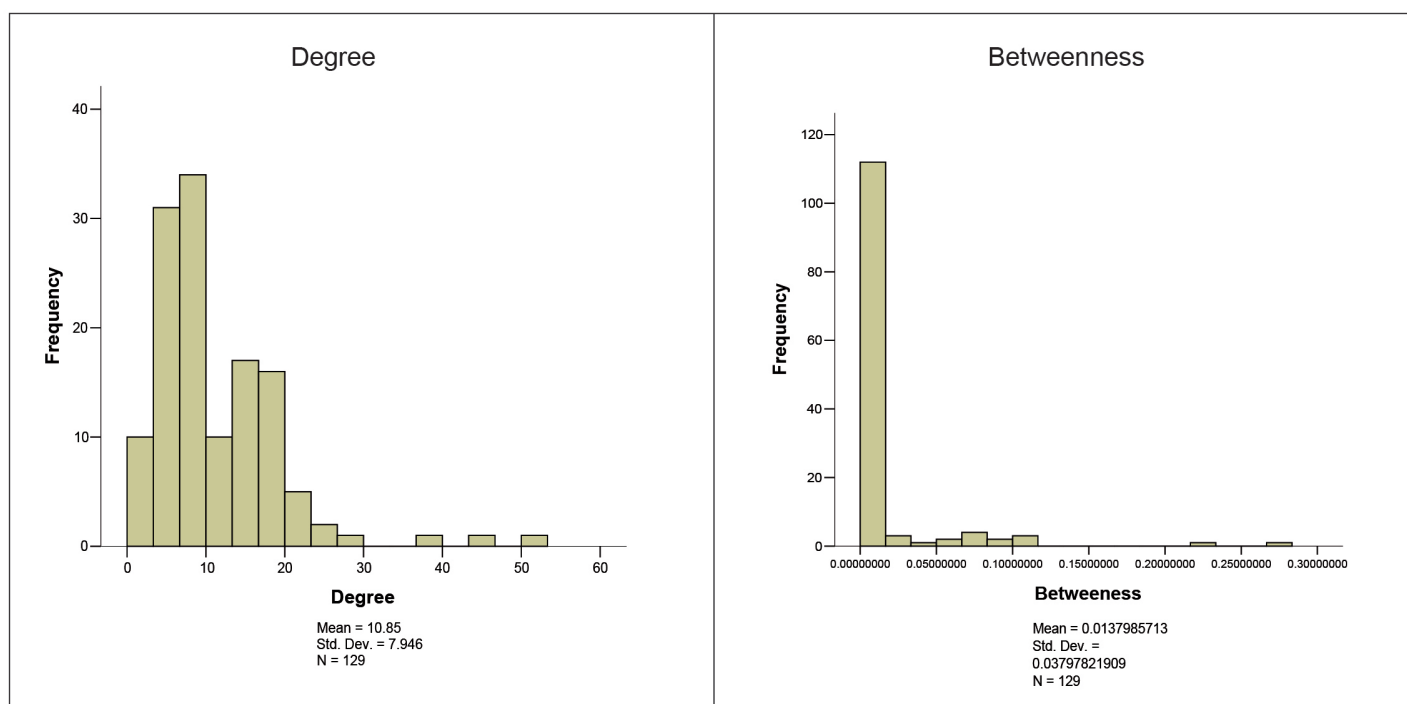
FIG. 5. Centrality Distributions for the Manchester Punk Scene

We might factor all of this into a simulation model of network formation, perhaps by allocating actors different resources and making attempted attachment dependent upon resources. However, we would never know what to factor in without the inductive, qualitative work that seeks establish what is and is not attractive in a particular social world. Moreover, simulation studies do not allow us to test the attractiveness of particular qualities. They only allow us to represent such qualities by way of numbers and to ascertain what effect they will have if, indeed, they are as important as we say they are and actors really do orient to them in the way our model assumes. This is important but it gets us no closer to understanding the factors that actually do trigger preferential attachment in a network. What is missing in models is meaning. Models can't explore the significance and value that objects have for social agents, only the impact of the fact that something has (quantifiable[5]) value.

Meaning was also important in my analysis, moreover, because it varied and changed. It became evident, for example, in a reversal of the Barabási hypothesis, that the centrality which Tony Wilson and his *Factory* colleagues enjoyed was perceived by some, even quite early in the story, as a reason not to become involved with them. The popularity of the *Factory* camp was attractive to some but repellent to others. The

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[5] Just how quantifiable, transitive etc. values really are is another fault line we could explore.

cluster of musicians around *The Fall*[6] appear to have studiously avoided involvement with Wilson and *Factory*, for example, often publicly criticising this camp within the network. And *the Smiths*, who became one of the UK's premier acts in the early 1980s, likewise avoided association. The fame and dominance of certain key players in the network was evaluated differently by differently players in the network such that it attracted some and repelled others. Again this could be factored into a model but to have any confidence that it is really happening in the network we want more evidence and that evidence will inevitably be qualitative. We have to look and listen.

To summarise this section, it is my contention that a proper understanding of network dynamics and the mechanisms of network formation, like a proper understanding of such network effects as "brokerage and closure" and such measures as "centrality," must incorporate qualitative observation and analysis. Qualitative analysis puts meat on the bare bones of quantification, adding a depth, detail and contextual sensitivity which advance our understanding and afford a more nuanced grasp of social life. Moreover, in this case they allow for an empirical check upon the many assumptions that we build into but cannot verify by way of simulations, simultaneously generating observations that might further inform such simulations.

Diffusion and Social Influence

To give one final example, qualitative analysis can also help us to add complexity to our understanding of diffusion and social influence in networks because what passes through a network is always mediated by the meaning which it has for the actors involved and, indeed, the meaning which they, respectively, have for one another. And because meaning is much more readily and obviously accessed by qualitative means.

A very simple example of this which I noted in the health club research introduced earlier centres upon flow of information. Different members of the specific network core to which I belonged had different shared interests. Some were interested in alternative music, some in sub-aqua diving, some in motorcycles etc. The interested parties both engaged in these activities together outside of the club (e.g. going to gigs) and passed around information regarding them (e.g. news of new record releases). It was noticeable, however, that this information seldom made its way through the whole network. Actors operated with typifications of their alters, passing on information only to others who they believed shared their interests. This process

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[6] A very long-standing and infamous UK post-punk band.

was tacit, only coming to light when, for example, a member of the network was not given information which they would have valued and spoke up.

This is a simple and obvious observation but it is important to understanding the way in which relationships and networks work. The meaning of a relationship, as noted at the start of this paper, is often very specific because shaped by a unique history of interaction. Ties that exist for some purposes do not exist for others and this is so in a way that defies simple categorisation or exhaustive survey access. Qualitative analysis becomes invaluable in this context. We cannot map all of the nuances of all relationships in a network, nor predict what those nuances might be in advance or which will prove important. What we can do, however, is supplement a conventional sociometric mapping of a network with a detailed qualitative account that seeks to bring the network to life by exploring the meanings etc. that animate it. We can identify "tricky," "interesting" and "significant" relations for close attention, and note the various issues that seem to animate particular sub-groupings of the network.

A somewhat different example, concerning social influence, was evident in my London punk data [Crossley 2008b]. There was a level of cultural homogeneity amongst the punks which can be explained by reference to mutual influence within networks. Pioneers within the first UK punk network (Figure 3) generated a similar sound and adopted a similar look because each was influenced by and influencing the others. There were also significant differences in both their sound and appearance, however. To some extent these differences too can be explained by reference to network structure. There was a clique based around *the Sex Pistols*, for example, who pioneered a look based around the trappings of sexual fetishism and, in some part, Nazism, whilst there was another clique centred upon *the Clash*, which developed a different look[7]. There was contact between these groups, however, and mutual influence, and it would be naïve to suppose that the differences between their music and image are simply based upon lower levels of contact between their members. Rather, the differences are explained by the fact that competing identities were emerging within the network. *The Clash* camp were different from *the Sex Pistols* camp (to the extent that they were) because both sought to distinguish themselves from the other.

Again this is a process, centred upon the meaning of interactions, which is best captured and analysed by way of qualitative research. It belongs to the "content" and quality of the interactions. It is affected by network structure, in the respect that different cultures and collective identities are more likely to emerge in cores or cliques

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[7] The Sex Pistols and The Clash were two of the central early UK punk bands.

which are relatively cut off from one another and, by definition, internally dense (i.e. closed networks). But it is not determined by structure. It constitutes a recognisable pattern of interaction (a mechanism) which deserves to be analysed both in its own right and also alongside those network structures where it is most commonly found and with which it interacts.

Conclusion

A *network* comprises a set of vertices and set of links between those vertices. A *social network*, however, is much more than that. It is an evolving social world; a world of meanings, conventions, resources, resource distributions and sedimented histories. Relations are "switched on" then "switched off" as actors move between activities and interactions, and are themselves both constantly evolving and highly particular as a consequence of the on-going history of interaction between the parties to them. The tools of SNA are invaluable to a proper analysis of such worlds. They allow us to identify structures that would not otherwise be apparent and to measure important properties of those structures in a precise and reliable manner. Like any set of tools, however, they are good for some things and not for others, and it is often the case that what sociologists will want to do, in exploring a social network/world, will require further tools, including the tools of qualitative analysis.

Qualitative input is not simply an "add on," however. It has been contention in this paper that qualitative analysis affords us a greater and more nuanced grasp upon issues which are of central importance to SNA. It affords us a better grasp upon the effects of such network figurations as brokerage and closure, for example; upon basic measures, such as those of centrality; upon network dynamics and mechanisms of network formation; and upon processes of diffusion and influence within networks. It is able to do this because it effectively puts back into analysis aspects of the social world which the formal methods of SNA necessarily bracket out. SNA abstracts form from content, structure from process, comparable categorical properties from concrete particulars. This is justified by the often very impressive insights achieved. It is, I suggest, a necessary stage of sociological analysis. But in the final analysis form never exists independently of content, nor structure from process, and particularity is ever present. A comprehensive and robust analysis demands that we allow these elements back in, therefore, and qualitative analysis is one important way of doing so.

This does not mean that every analysis must employ mixed methods. That is clearly not possible on every occasion and there is no reason why researchers shouldn't seek to explore one "side" rather than the other. It does suggest, however,

that mixing methods has a strong rationale, and it suggests that, in the final analysis, qualitative and quantitative forms of analysis belong together.

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The Social World of the Network

Combining Qualitative and Quantitative Elements in Social Network Analysis

Abstract: This paper reflects upon the value of mixing methods, and in particular of integrating qualitative and quantitative approaches, in social network analysis. It argues that each has different strengths and weaknesses but that these are broadly complimentary, thus supporting the argument for their combined use. It also seeks to rebuff any claim that they may presuppose different and incompatible epistemological standpoints. The author supports and explores his claims by way of examples from his own empirical work.

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