Abstract. This paper discusses the importance of content and context in social network analysis. Arguing against the commonly held view that content and context are ‘soft’, add-on details whose analysis might supplement social network analysis proper I suggest that they are integral complexities which are removed in the process of simplification whereby networks are constructed as objects of scientific investigation but which must be reintroduced in many cases if analysis is to be meaningful and robust. This will often entail a mixed-method approach to social network analysis.

Keywords: Social network analysis · Content · Context · Mixed methods · Qualitative analysis · Abstraction

1 Introduction

In this paper I discuss the importance of content and context in social network analysis (SNA). I begin by exploring their relation to networks. There is a relatively common way of treating content and context which assumes them to be separate, ontologically, from networks. Content is conceived as something which can be taken in and out of a network without in any way affecting the network, as objects can be taken in and out of a box without affecting the box. Context, conversely, is conceived as something akin to a box which a network can be put in or lifted out of, again without appreciable effect. Content, network and context are conceived as three separate entities, one nested in the other like a Russian doll.

This conception is problematic. Networks and their content and context are not separate in reality; only in our thought about and representations of reality. We separate them out in the process whereby we construct networks as objects of scientific investigation. This point requires elaboration.

2 Constructing Networks

It is common today to acknowledge that objects of scientific inquiry are ‘constructed’. This is as true of our object of enquiry, social networks, as of any scientific object. There is a real world which exists independently of our attempts to capture and analyse it and different measures and models are better or worse at doing so. However, reality, as it is
known to us empirically, through observation and experience, is complex and messy, and science, in the first instance, is a process of simplification and abstraction. We abstract certain aspects of the observed world, pulling them to the foreground of our thought and vision, and pushing others into the background; separating, in thought, qualities and properties which are inseparable in reality.

The concept of modelling to some extent captures this. Models are abstractions from and simplifications of the observed world, or some aspect of it. This is true of statistical models (e.g. exponential random graph models or stochastic actor-oriented models) and it belongs to the very rationale of blockmodeling; blocks being simplified representations of clusters of nodes occupying equivalent positions in a network, and identity matrices being simplified versions of adjacency matrices. However, even the ‘observed networks’ captured in our adjacency matrices are models: simplifications of a messy and complex reality.

We do not observe networks in the world as such. Rather, we employ coding schemata, algorithms and/or structured questionnaires in an effort to separate out and abstract a tiny fraction of detail from what is, in fact, a hurly burly of social activity; populating a matrix and thereby constructing a network. We reduce sophisticated social actors with varied biographies and dispositions to the status of nodes, with a standardised range of attributes. Likewise ties, which in reality are unique histories of interaction between social actors, carried forward and lived between them in the present, which we reduce to uniform ‘types’, corresponding to our own predetermined criteria, disregarding them when they fail to tick any of our boxes. We put boundaries around these sets of nodes and ties, making in/exclusion decisions which separate them from further potential ‘nodes’ and ‘ties’ which they are in other ways connected to, constituting them as discrete objects. And we abstract the patterns of connection that we observe by these means from the settings within which our nodes ‘do’ their relations, not separately but in the course of doing multiple other activities with varied goals, norms, dynamics and frameworks of meaning; activities which more often occupy the foreground of their thought and attention than the relations embedded in and embedding them, and which, in turn, are further shaped by actors’ understandings of and responses to ‘external events’, near and far, which impinge upon them and upon their activities.

There is nothing wrong with this. I do not make these claims with the intention of criticising SNA. Simplification and abstraction are what science does; necessarily so. However, it is important to be reflexively aware that this is what we are doing and also of the possibilities for error it engenders. We may fail to simplify sufficiently, rendering our object overly complex and ourselves unable to see the wood for the trees. More often, however, we oversimplify, reducing our object to a point where it is unable to tell us very much of use or interest about those aspects of the world we are interested in and indeed, to a point where it is no longer possible to make reasonable interpretations of our measures and models.

Debates about content and context, properly conceived, concern these processes of simplification and abstraction. Content and context are the details removed in the process of constructing a network, available to be ‘added’ to analysis because they were previously ‘subtracted’, and the question is how much we can ignore them before we
begin to undermine our efforts to understand and explain whatever aspects of the social world it is that we are seeking to understand and explain.

There is no single formula which will resolve such debates. The importance of details will always depend upon the nature of our projects and research questions. We use SNA to answer very different types of question and pursue very different types of research interest, and these variations affect the types and levels of detail which are important to us. The idiographic concerns of the anthropologist researching the social structure of a particular society are different to those of the nomothetically inclined social scientists interested in, for example, social capital or social influence. And the methodologist puzzling over the effectiveness of their algorithm will require different details again. However, the question is always relevant and must always be addressed anew in every project.

3 Qualitative Complexity

In what follows, I seek to expand upon these opening remarks in further detail. Before I do, however, it is necessary to make a brief note on mixed-method approaches and qualitative research in particular. Qualitative methods, which are often associated with ‘content’ and ‘context’ in our discussions, are typically belittled as ‘soft’ in these discussions. ‘Soft’ implies less rigour and in some cases that may be justified. However, the rigour of quantitative models and methods is often only achieved, in social science at least, at the cost of the oversimplification referred to above, and qualitative analysis is a means of capturing the detail and complexity which ‘harder’ models and methods are unable to accommodate and tend therefore to exclude. Mixing methods, in this sense, is a matter of quantifying that which can be plausibly and meaningfully quantified whilst simultaneously recognising that much that is analytically important in the social world studied by social network analysts, not least meaning itself, cannot always be satisfactorily reduced to a number such that qualitative data and analysis are necessary too, and such that dialogue and integration between quantitative and qualitative aspects of analysis are necessary. Qualitative analysis, soft or not, (re)captures some of the real-world complexity which the simplifying assumptions of quantitative research, because unable to process such complexities, screens out.

A full discussion of details and complexities typically excluded by quantitative approaches which qualitative research (re)admit would take far more space than I have. I will limit myself here to two illustrative points.

Firstly, we typically standardise in quantitative approaches; asking the same questions of all nodes/ties, recording them in a uniform fashion, as numbers in a matrix, and then processing all in a common procedure. This is good science and the reliability of measures and models depends upon it. However, any ethnographic or historical researcher knows that specific nodes, ties and relational events sometimes have important idiosyncrasies which influence events but which, as idiosyncrasies, cannot be uniformly measured across a network, or even if they can, are important in ways which defy such measurement. In my work on UK punk and London’s early punk network in particular, for example, I noted that the relational dynamic between two particular nodes, Malcolm McLaren and Bernard Rhodes, which involved a mix of competition and cooperation,
played a disproportionately important role in mobilising key events and developments [1]. For a time during the period I analysed (though, again adding complexity, only some and not all of the time), they competitively sought out bands to manage and promoted their key band (the Sex Pistols in McLaren’s case and the Clash in Rhodes’), in an effort to claim the top position in their music world. And in doing so they made a huge contribution to the generation of London’s emerging punk world and its constitutive network. This became apparent from my qualitative reading of archival and secondary sources and it is not clear that it could have come to light by quantitative means. Moreover, I could not further analyse it mathematically or statistically, beyond, for example, measuring the centrality of McLaren and Rhodes (it was high across several measures), because it was the dynamic of their particular relationship rather than, for example, their type of relation or relations between nodes of their type, that made the difference. It was crucial to an understanding of the network, however, as was amenable to qualitative analysis.

This is an example of details which are relevant to only a subset of nodes or ties within our network and in some cases only one, and which for this reason escape the standardising procedures of the quantitative approach. However, in other respects quantitative methods require difference. An attribute which all nodes share would not be much use for many, if any quantitative purposes. But it could be important. To take an example I will return to, much of what most of us are doing in our networks currently is affected by Covid-19, or rather by our knowledge and understanding of it, but we all have that knowledge and understanding, such that it would not make a particularly interesting or useful variable. We are all affected (in our behaviour) by our awareness of the virus; this needs to be taken into account if our current interactions and relations are to be properly understood; but the awareness is not easily rendered as a variable because, at a certain level at least, it is invariant, a constant. Everybody has it.

The list of important facets of social life squeezed out by the demands of SNA could go on but the above hopefully suffices to demonstrate the basic point. Our models and methods are powerful tools but they presuppose a reduction of our worldly observation to matrices, and not everything that is important, even about networks, let alone the hurly burly of social interaction from which our networks are selectively abstracted, can be reduced in this way. We need ‘content’ and ‘context’ and we need qualitative methods to capture and analyse them.

4 Vertices and Edges

I will begin my further elaboration of these remarks by considering an extreme example of decontextualisation (Fig. 1). We can derive a large number of measures for the network in Fig. 1. We can detect cliques and other such structures. We could block or statistically model it. But what would that tell us? What would we learn? How would we make sense of our measures and models? Learning that node nine is the most degree central node in the network or that the clustering co-efficient of the network is 0.77 tells us very little in and of itself, in the absence of information regarding vertices and edges. Who and what are the nodes in Fig. 1? And in what way are they connected? Does this graph represent nations bonded by trade agreements? Cities connected by flows of commuters? Children who play together in a school playground? Measures and models are evidence but what
they are evidence of is unclear in the absence of details about who is connected and how they are connected. That is to say, in the absence of context and content.

The measures and models of SNA are highly formal. We often make some assumptions about nodes and ties; for example, that each node is capable, in principle, of forming the tie we are observing with any of the others (unless we have a two-mode or multi-modal network). But the algorithms are otherwise largely indifferent to the attributes of either nodes or ties. Cities connected by migration flows and children connected through friendship are equivalent structures from the point of view of our algorithms. This is a strength. It makes SNA versatile. However, it also generates the potential for serious error and requires of us, the reflexive researchers who use its algorithms, that we do take account of the attributes of nodes and ties. The basic attributes of our nodes determine what they can do in the network and how they can be affected, and this is no less affected by tie attributes; the nature of the relations between them.

Borgatti offers a rigorous demonstration of this in relation to tie types and centrality. What different centrality measures can tell us, he shows, depends upon what, if anything, is flowing through the network, and more generally upon the type of tie involved [2]. The same is true of other measures and analytic routines, such as core-periphery and block models. What we can infer from the existence of, for example, a core-periphery divide and the location of particular nodes in one camp or the other depends upon the relation involved. The same, moreover, is true of basic node attributes. Whether a node is a human being or an organisation, for example, makes a difference to how it is likely to be affected by and respond to its location in a network. Organisations can, for some purposes and in some cases, be regarded as ‘social actors’ [3], as human beings typically are, but there are clear differences between these two types of actor. Organisations do not respond emotionally to their position in a network, for example.
Milgram touches upon this point in his celebrated work on small worlds [4]. Referring to the ‘six degree’ finding, which he renders as ‘five removes’, and reflecting upon the proximity it is often taken to signify, he warns:

… this is in large measure misleading, a confusion of two entirely different frames of reference. If two persons are five removes apart, they are far apart indeed. Almost anyone in the United States is but a few removes from the President …. But this is true only in terms of a particular mathematical point of view, and does not, in any practical sense, integrate our lives with that of […] the President… We should think of the two points as being not five persons apart but “five circles of acquaintances” apart – five “structures” apart. This helps us to set it in its proper perspective. [4: 67]

Milgram’s identification of ‘frames of reference’, ‘proper perspective’ and ‘a particular mathematical point of view’ is effectively a call for us to put graph theoretical measures in context; to recognise that in the human world or perhaps rather the human social world, six degrees can be (even if it is not always) a long way. A virus, such as Covid-19, which every country on earth is struggling with as I write, can traverse six degrees pretty quickly and easily, as our global pandemic testifies. Six degrees is not a long way for Covid-19, at least not initially. However, as responses to the pandemic show, human actors, in contrast to other potential hosts, can become reflexively aware of their vulnerability and potential for passing on the virus, and can adjust their behaviour by, for example, shifting to non-physical forms of contact and interaction, thereby slowing the movement of the virus through what is essentially the same network structure. We can interact at a two-metre distance or via technological devices, filtering potential virus flow out of our interactions and thereby making six degrees a much longer distance for the virus to travel.

What happens to a virus in a pandemic, when the human carriers of the virus become aware of the virus and their role in its transmission, happens all the time to other goods (and bads) flowing through human networks because, as writers such as Mead, Simmel and Goffman show [5–7], human actors almost always reflexively manage their interactions and relations, attempting to control the flow of information and other goods they might transmit. Moreover, because their alters and interactions have meaning for them and they orient to that meaning. A friend becomes a potential source of danger in the context of a pandemic and their stories of travel and meetings repel where previously they might have attracted. And many other such meanings regulate flows in human networks, including the circles of acquaintance to which Milgram refers. Personal information about the President can pass through six degrees with haste, as Bill Clinton learned to his cost, but much of it does not, not because his circle is structurally closed and potential channels of dissemination do not exist but rather because his confidants are aware of their status and code some of the information they receive and interactions they either participate in or observe as ‘classified’ – at least for the time being, all other things being equal. Channels which are open for some purposes are closed for others, and crypto-networks form within networks, demarcated not by an absence of relations and interactions but rather by meanings, identities and the reflexive awareness of their nodes; that is, by aspects of content and context which researchers need to be attuned to.
We might revise Milgram’s warning slightly, in light of this discussion. ‘Six degrees’
can be either a long or a short distance and, as the slowing (and unfortunately newly
accelerating) diffusion speed of Covid-19 suggests, its magnitude can vary over time,
depending upon indigenous meanings and the reflexive awareness of nodes. His basic
point remains, however; the significance of a measure, such as mean geodesic, depends
upon content and context.

Milgram’s contention pulls in the opposite direction to the claims of the small world
pioneers of network science who have built upon his work [8, 9]. One of their key claims
is that we observe small world networks and/or small world effects across a multitude
of very different complex systems: from the neural network of the nematode worm,
via birds in flight and swarming fireflies, to human transport infrastructures and the
internet. Network science explores structures which are common across very different
network domains, ‘owned’ by very different scientific disciplines. This is fascinating and
important, but Milgram reminds us that the similarities only exist at a very high level of
abstraction; a level which may sometimes be too high to be truly meaningful. That very
different networks share common structures is revealing and deserves the attention it
has generated but we should remember that they are very different networks
and that it is often necessary to drill down into their differences and detail, their context and content,
if we are to properly understand what is going on within and across them.

5 From Edges to Social Relations

All SNA worth its name stipulates node and tie types, using this information (often tac-
itly) to constrain and inform interpretation of measures, partitions and models. However,
there are different ways of approaching node and tie types which probe the questions
of content and context which they potentially beg to a greater and lesser extent and
which, in that respect, vary in their scientific rigour and adequacy. Social ties of any
particular type, for example, generally depend, for their existence, upon mutual recog-
nition, agreement and shared meanings between those party to them. To be ‘friends’, for
example, is to recognise and orient towards one another as friends, acknowledging and
adhering as far as possible to norms of friendship which stipulate what friends do for
one another and what they do not do to one another. Friends reflexively manage their
friendship in accordance with the meaning which friendship has for them and the norms
which attach to these meanings. Importantly, however, these norms and meanings may
vary between network neighbourhoods (corresponding, in turn, perhaps to age groups
or generational cohorts, ethnicity, sexuality and social class). If researchers are to make
valid inferences from tie type to network effects, it follows, they cannot rely upon ‘off
the peg’ definitions of those types but must rather investigate what ‘friendship’, ‘col-
legiality’, ‘romance’ or whatever type of relation they are interested in means in the
particular network or network neighbourhood they are investigating.

Cross-cultural and historical studies bring this point into sharp relief because
researchers are usually more aware that they cannot impose their own definitions of,
for example, friendship or business relations and because they may encounter relations
with which they are completely unfamiliar. Knowing where guanxi relations exist in a
particular Chinese community and between whom is of little value to a Western network
analyst, for example, unless they know what guanxi relations are; that is, unless they have researched the content and context of a tie type which, like all tie types, is defined by those party to it. This is only a dramatic illustration of a point which applies to all SNA, however, given both that all tie types are similarly subject to local, indigenous definition and that we can never presume to know of local variations in advance of some contextual and usually qualitative investigation of them. It may turn out that those we are researching define their relations pretty much as we would, orienting to similar norms, but we cannot know that in advance.

Certain key ideas which have informed the development of SNA have failed to take full account of context in this sense: Heider’s structural balance theory, for example, which stipulates that if $i$ has a positive tie with $j$ and a negative tie with $k$ then $j$ too should have a negative tie with $k$, in order for $j$ to maintain a sense of cognitive consistency [10]. This theory, at least as many network analysts use it, is posited in terms of abstract structural configurations which can be formally expressed and graphically illustrated. However, there is no compelling logic to it in purely formal terms. It only achieves any prima facie plausibility insofar as we assume, and assume that nodes assume, that positive ties entail an obligation to oppose one’s friends’ enemies; that is, if we assume a particular cultural content for ties, which is understood and reflexively observed by those party to them. Or perhaps if we assume conditions under which $i$, $j$ and $k$ meet simultaneously (in the same context), in circumstances where refereeing between conflicting partners is either not possible or undesirable. Clearly such conditions do not always hold and may, in fact, be relatively rare. In the contemporary Western context, where friendship is framed by norms of individualism and autonomy, the idea that it might entail an obligation to adopt alter’s likes and dislikes does not ring true; friends often relish their differences, reserve the right to make their own choices and experience no sense of inconsistency in doing so.

Social structures, formally defined, cannot be balanced or imbalanced in and of themselves because they do not exist in and of themselves, independently of content and context. Social structures are ‘made of’ relations and interactions which, in turn, involve meanings, norms etc. and it is only in virtue of these meanings and norms, which direct human activity, that structures can be balanced or imbalanced.

We could make a similar case for transitivity and Granovetter’s ‘forbidden triad’ [11]. There is a certain practical force pulling friends of friends together in some contexts. Their shared friend is akin to a network ‘focus’ [12], drawing them into a common orbit. As Simmel suggests, however, individual actors are sometimes the (only) point of intersection between the different social circles (e.g. family, neighbourhood, work, leisure-based groups) in which they are involved, and whether or not these social circles remain separate or merge via the ‘focus’ of their intersecting member depends in some part on the local cultures of the circles and, in particular, their orientation to outsiders [13]. In her classic kinship study, for example, Bott observed social class differences in the extent to which family and friendship relations were segregated [14]. Working class spouses typically observed a norm of segregation between spouse and friend relations, thereby discouraging transitivity. Open triads involving spouses and friends were encouraged and, if anything, closure was ‘forbidden’. Middle class couples, by contrast,
more often shared friends and considered it right to do so, thereby encouraging transitivity. What was ‘forbidden’ was dependent upon both local class culture (which was itself reproduced in networks of course (see below)) and the type of relation in question. Likewise covert networks, whose ties and nodes are kept secret from the other circles in which their participants are involved [15]. Or to give a different example, geographically distanced and/or technologically mediated relations, whose mediation presents an obstacle to the meeting of friends of friends: I am unlikely to ever befriend your pen pal because they live miles away and your interactions with them are closed to me by a sealed envelope. Like structural balance, the tendency towards closure hypothesised by Granovetter is not purely structural but rather depends upon culture, meaning and the mediation of relations; that is, upon context and content.

Three qualifications are important at this point. Firstly, norms, obligations and other cultural aspects of ties are actively (re)negotiated by those party to them, albeit drawing upon wider reference points and groups. We must be careful not to reify them or externalise them from the interactions they shape. Furthermore, they often diverge in practice from the official line that a less savvy researcher might be fed.

Secondly, the diffusion and effectiveness of the norms, meanings etc. which shape networks and mediate network effects are themselves affected by network structure. As Coleman argued, network neighbourhoods are more likely to be able to define and enforce norms and definitions where they are relatively dense and closed [3, 16]. Bott’s aforementioned work on kinship relations, for example, argued that working class communities held on to traditional patterns of spouse/friend segregation and were able to do so, within a wider context of change, because and to the extent that their networks were ‘tight-knit’ (i.e. dense) [14]; and Milroy made a similar case for traditional speech patterns [17].

Finally, an understanding of local norms and definitions does not absolve us of the need to test, in practice and using SNA, whether patterns of relations we might hypothesise to exist on the basis of identified norms and definitions actually exist. Particular norms might lead us to expect high levels of transitivity, for example, but that does not mean that we will find it, less still that we can assume it. In my experience qualitative understandings of context seldom line up neatly with SNA measures at first, prompting the researcher to return to the data (and perhaps to the field) to explore possible reasons for this. Perhaps the context was initially misunderstood? Perhaps a particular measure is being misinterpreted? Perhaps a survey of ties hasn’t captured a relation as it is practiced in context? In many cases it is possible to identify the causes of the discrepancy and, with reflection and further work, to bring our understanding of context and our measurement of structure into closer alignment – an important analytic step in its own right. But even where this does not happen the key point remains that structural and contextual data are two sides of a single coin which we must allow to be mutually constraining (in a positive way) in our analyses.

6 From Vertices to Social Actors

I have focused largely upon details of tie types in the above, but detail regarding nodes is similarly useful. In one respect this is a matter of simple categorical attributes which
we might expect to impact exogenously upon a network. We might expect to observe homophily effects, for example, or we might expect incumbents of a particular category to be more central or more marginal in a network. This might be an effect we are interested in or one we are hoping to discount as a potentially confounding factor in relation to something else that we are interested in. In either case, however, our thought and expectations arise from an understanding, perhaps tacit and potentially wrong, of the meaning which particular attributes take on in our network of interest. Newcomb makes an interesting claim in this respect in an early discussion of homophily:

> It is not a very useful notion … because it is indiscriminate. We have neither good reason nor good evidence for believing that persons of similar blood types, for example, or persons whose surnames have the same number of letters are especially attracted to one another. The answer to the question, Similarity with respect to what?, is enormously complex. [18: 577]

Newcomb is right. Homophily is often complex. But it is also contextual, relating to the categorical schemas which actors draw upon in their everyday lives, and the meanings and value which they attach to particular distinctions – which in themselves may vary between the activities and setting in which they are involved. Social science provides us with a standard battery of status distinctions to feed into our models (e.g. gender, social class and ethnicity) but these are often fairly generic and fail to capture niche distinctions (e.g. between migrants from different parts of what, to the researcher, is ‘the same country’) which may have profound effects within some networks. Furthermore, social actors often invent their own status distinctions: e.g. Elias and Scotson’s ‘established and outsiders’ [19], Willis’ ‘lads’ and ‘ear’oles’ [20], and street gang affinities. This is equally true of value homophily, which may hinge upon distinctions (e.g. ‘this’ style of jazz vs ‘that’) that the researcher is entirely oblivious to, unless they are themselves an insider to the social world they are studying and therefore familiar with its context.

Nodal attributes are not given. They are, as the word suggests, attributed to nodes or other objects within the very relations and interactions that we seek to capture in our adjacency matrices, and this process of attribution, which nodes apply both to self and other, draws upon lay categorical schemas devised and drawn upon by nodes, again in interaction, and their values: what matters to them. As Newcomb notes above there are multiple similarities and differences between nodes in a network which might potentially form a basis for homophily. Contextual investigation of lay schemata and values, and indeed of events (e.g. scandals) and gossip which might shape and/or activate them, is one way of exploring which are more likely to actually do so. And not only that; such analysis contributes to our understanding of homophily by illuminating the reasons which might underlie and motivate homophily: e.g. the beliefs that motivate avoidance of ‘the other’.

Not that homophily is always subjectively motivated in this way. Nodes in a network are typically doing far more than their relations and, indeed, more than the relational processes (e.g. ‘influence’) that we are interested in, and what else they are doing affects their doing of relations in various ways. In the unlikely event that a local blood transfusion service was to start a recruitment drive, asking members of different blood groups to attend on different days, for example, this would create a network focus, in Feld’s sense
[12], generating precisely the blood group homophily that Newcombe was sceptical about. Events may make blood group a salient selection variable – perhaps without nodes even being aware of the fact. The example is silly but the point more generally is that the ties which nodes form reflect the activities and events, both routine and exceptional, in which they are engaged, such that contextual knowledge of such activities and events is crucial to a proper understanding of networks.

Feld’s focus concept [12] begins to tease this out by allowing us to envisage how nodes with similar interests might, without any express desire to meet likeminded others, nevertheless cross paths and thereby enjoy an increased likelihood of forming and maintaining ties. This is but one way, however, in which the events, activities, practices and spaces in which nodes participate and mingle, that is to say, context, might impact upon their networks.

7 Conclusion

Social life comprises interactions and relations. The social world is a network, and SNA is invaluable because it enables us to capture and analyse it as such. It affords unique purchase upon the social structures that comprise a key focus of our studies. Like any other method, however, it abstracts and simplifies. Abstraction and simplification can be entirely justified and are unavoidable to some extent, but how far and in what ways it is justified to abstract and simplify depends upon our project and must always be open to discussion. The simplification required to run a sophisticated model may be a high price to pay; gain in statistical sophistication being outweighed by reduced purchase on the complexity of whatever is under investigation. However, this can be compensated if we supplement sophisticated modelling with qualitative investigation which drills into the real-life complexity bracketed out by quantification and modelling. Mixing methods combines the strengths of these two different approaches and provides a corrective for their respective weaknesses.

References

1. Crossley, N.: Networks of Sound, Style and Subversion: The Punk and Post-Punks Musical Worlds of Manchester, London, Liverpool and Sheffield 1976–1980. Manchester University Press, Manchester (2015)
2. Borgatti, S.: Centrality and network flow. Soc. Netw. 27, 55–71 (2005)
3. Coleman, J.: Foundations of Social Theory. Harvard, Belknap (1990)
4. Milgram, S.: The small world problem. Psychol. Today 1, 61–67 (1967)
5. Mead, G.H.: Mind, Self and Society. Chicago University Press, Chicago (1967)
6. Simmel, G.: The sociology of secrecy and secret societies. Am. J. Sociol. 11, 441–498 (1906)
7. Goffman, E.: The Presentation of Self in Everyday Life. Penguin, Harmondsworth (1959)
8. Watts, D.: Small Worlds. Princeton University Press, New Jersey (1999)
9. Newman, M., Barabási, L., Watts, D.: The Structure and Dynamics of Networks. Princeton University Press, New Jersey (2006)
10. Heider, F.: The Psychology of Interpersonal Relations. Wiley, London (1958)
11. Granovetter, M.: The strength of weak ties. Am. J. Sociol. 78, 1360–1380 (1973)
12. Feld, S.: The focused organisation of social ties. Am. J. Sociol. 86, 1015–1035 (1981)
13. Simmel, G.: Conflict and the Web of Group Affiliations. Free Press, New York (1955)
14. Bott, E.: Family and Social Networks. Free Press, New York (1957)
15. Crossley, N., Edwards, G., Harries, E., Stevenson, R.: Covert social movement networks and the secrecy-efficiency trade off: the case of the UK suffragettes (1906–1914). Soc. Netw. 34, 634–644 (2012)
16. Coleman, J.: Free riders and zealots: the role of social networks. Sociol. Theory 6, 52–57 (1988)
17. Milroy, L.: Language and Social Networks. Blackwell, Oxford (1980)
18. Newcomb, T.: Prediction of interpersonal attraction. Am. Psychol. 11, 575–587 (1956)
19. Elias, N., Scotson, J.: The Established and the Outsiders. Sage, London (1994)
20. Willis, P.: Learning to Labour. Routledge, London (1977)