Network Analysis: A Reappraisal[1]

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Since the network revival in anthropology in the late 1960s (Barnes 1968, 1969; Boissevain 1968; Mitchell 1969), there has been ever increasing interest in the field. There have been at least a dozen conferences and symposia, a flood of articles and discussion papers by anthropologists, sociologists, and political scientists, a computerized bibliography with almost 1,000 entries (Freeman 1975), the collection and consolidation of computer programmes, and, to crown this interdisciplinary activity, the establishment of the International Network for Social Network Analysis and the journal *Social Networks*. How is the enthusiasm for network analysis to be explained? Barnes (1954) and Bott (1957) planted the concepts in the mid-1950s, but they only sprouted into substantial growth 15 years later and now threaten to become an impenetrable jungle.

NETWORK AND THEORY

The enthusiasm for network analysis is related to and part of the theoretical shift in the social sciences away from the structural-functional analytical framework which dominated anthropology, sociology, and political science in Britain and the United States for the past 30 years. This is obviously not the place to explore the reasons and dimensions of this methodological and paradigmatic shift (cf. Boissevain 1974, 1975, among others). I can only discuss the appeal that network analysis has had for anthropology, although I suspect that similar considerations have also influenced sociologists and political scientists.

Network analysis opened a door to permit the entry of interacting people engaged in actions that could alter and manipulate the institutions in which they participated. This introduced a new dimension into the self-regulating structural-functional edifice of formal groups, systems, and moral order which was seen as impinging upon people, socializing them, moulding their character, and determining their behaviour. In anthropology the work of Firth (1951), Leach (1954), and some of Gluckman's students (Turner 1957, Van Velsen 1964) had led to a growing concern with people and their relations to the institutions which were supposed to dominate them. Network analysis provided an analytical framework for data at a lower level of abstraction than the institutional complex. It was more down-to-earth. Moreover, it also provided apparently "hard" data which could be plotted and even computerized. This last has particularly appealed to sociologists, who, more than anthropologists, seem to revel in data that can be quantified and fitted into elaborate formulae, thereby seeming to support their claim to being considered a hard science. Network analysis has also appealed to those who have sought to plot and analyze the manipulation of power brokers, leaders, and coalitions as they seek to further their interests and in so doing bring about or block development of the groups, institutions, and society of which they form part. Finally, and more recently, network analysis has provided social scientists working in cities with a tool which enables them to deal with the relation between face-to-face interaction and institutions in an extremely complex social field (Wellman 1976, Shulman 1976). In short, network analysis has promised to provide a release from some of the constraints of structural-functional analysis. It has consequently appealed to different social scientists for varying reasons.

Network analysis, while not a theory, has theoretical implications. It is an analytical instrument which views circles of relatives and friends, coalitions, groups and business houses, industrial complexes, and even nation-states as scatterings of points connected by lines that form networks. The points are of course the units of analysis, the lines social relations. Network analysis asks questions about who is linked to whom, the content of the linkages, the pattern they form, the relation between the pattern and behaviour, and the relation between the pattern and other societal factors. This has theoretical implications in that it forms part of a paradigmatic shift away from structural-functionalism. The failure to recognize these theoretical implications and to provide a consistent theoretical framework within which network analysis can be used has resulted in a sterile overelaboration of classification and definition, in short, a methodological involution (cf. Kapferer 1973: 167). By linking network analysis to theoretical assumptions, both Kapferer and Boissevain have attempted to move beyond the butterfly-collector's preoccupation with classification and technique, as represented, at least in anthropology, by Barnes's recent work (1968, 1969, 1972), into the realm of ideas (Kapferer 1969, 1972, 1973; Boissevain 1974; for further discussion of the relation of network analysis to theory, see Whitten and Wolfe 1974, Mitchell 1974). The most fruitful theoretical assumptions at present appear to be derived from exchange and (trans)action theory. Even without explicit consideration of basic theoretical assumptions, however, network analysis is a powerful tool for social scientists seeking to further their understanding of social behaviour and processes.

WHAT NETWORK ANALYSIS CAN AND CANNOT DO

As an adjunct or complement to other research techniques, network analysis has at least ten important virtues:

1. Network analysis focuses systematic attention on interlinkages between units of analysis. These interlinkages may be outward links between individuals and between groups; they may also be inward links, setting out the interrelations between members of a group or other unit of analysis.

2. By focusing systematically on the relations between units of analysis, network analysis highlights their interdependency. In fact, this interdependency and its consequences for social action are assumptions underlying the network approach. The configurations of interlinked, and therefore interdependent, persons and groups are thus taken into account in trying to predict behaviour. By systematically tracing all interlinkages between units of analysis, one eliminates prior assumptions and therefore biases in favour of particular types of relations. Kinsmen, neighbours, and friends are not singled out and viewed in isolation from other relations.

3. The focus on interlinkage and interdependency provides a framework within which it is very difficult to separate micro- from macro-analytical levels and part from whole. Among other things, the network approach develops the view of a social field or of a society as a network of networks. While this is metaphorical—for a city or nation-state is obviously more than simply a network of networks—network analysis does force upon the social investigator pathways that lead away from micro- units of analysis. These last are therefore placed in a wider field of social relations. It is only through focusing on such outward links that Wolf (1956), for example, developed the concepts necessary to understand the relation between different levels of integration in the same society, thus breaking down the artificial boundaries between part and whole that had hitherto impeded social analysis in complex societies.

[1] This paper was presented to the conference "Mathematical Approaches in Social Network Analysis," held at the Werner-Reimers-Stiftung, Bad Homburg, Federal Republic of Germany, March 17–19, 1977 (Hummel and Ziegler 1977). Earlier versions were presented to seminars at the universities of Toronto, York, and Amsterdam. I am grateful to them for their hospitality and discussion, to Hannie Hoekstra for converting word into print, and to Rod Aya, Norm Shulman, and Marilou Dreighton for commenting on the final version.

4. Network analysis focuses not only on interlinkage, but also on the content of the relations. In other words, the first plot of a network of relations provides a systematic blueprint for further investigation into their content.

5. Network analysis, by also focusing upon content, sensitizes the investigator to the inherent tension in social relations between persons who have differential access to resources which affect power chances. The way in which network analysis accents this inherent tension and asymmetry in social relations is an antidote to the structural-functional preoccupation with consensus, order, balanced opposition, and harmony.

6. Network analysis, thus, by providing a systematic framework for analyzing tension and asymmetry in social relations, sensitizes the investigator to the inherent dynamics in such relations. Since such relations are part of groups as well as institutional complexes, the social investigator is alerted to the dynamic nature of society and to the human dimension of such dynamism. Changes are thus perceived as inherent in personal relations and hence in society. This again is an antidote to the structural-functional assumption of equilibrium.

7. Network analysis also gets away from the piecemeal or institutional approach. By charting, for example, a person's network of intimates or the network activated by an action set or that of a politician mobilizing votes, network analysis moves beyond the tradition of limiting analysis to discrete institutional spheres such as economics, politics, or, especially for anthropologists, kinship. Network analysis cuts across the conceptual barriers of an institutional approach.

8. By its focus on interrelation, interdependency, and interaction, network analysis also makes it possible to deal with forms of social organization that emerge from interaction, such as patron-client chains, leader-follower coalitions, cliques, factions, cartels, and other temporary alliances at various social levels. These forms of social organization in the recent past were generally ignored or relegated to interstitial, peripheral, or residual categories of social analysis (Boissevain 1968). It will be obvious that there are forms of social organization the understanding of which is essential to the comprehension of many large and small events in the lives of persons and groups.

9. Network analysis provides a way of relating formal, abstract sociological analysis to everyday experience, for it links interpersonal relations to institutions. It thus humanizes social analysis by reintroducing "people," as opposed to "roles," and their choices and actions into the stream of events that constitutes history.

10. Finally, network analysis brings into sharp sociological focus the difficult analytical category of friends-of-friends, those persons who lie just beyond the researcher's horizon because they are not in direct contact with his informants.

These, then, are some of the things that network analysis can do. There are also things that it cannot do.

While network analysis can help plot the direction and concentration of immigrants and the location of industry, for example, used alone it cannot deal with the social processes that bring about immigration and industrialization. In other words, it cannot deal with the social forces underlying long-term processes. Nor can it deal adequately with the impact of educational reform, land distribution, more rights for women, etc., or with culture, cognition, or the social forces deriving from economic activity. These dimensions are essential for a complete understanding of social behaviour and developments. Network analysis alone cannot provide them. Used alongside other research methods and forms of conceptualization, however, it can provide important additional dimensions.

The Future of Network Analysis

Network analysis has an important future. Researchers have already demonstrated that it is useful for gaining insight into urban-rural contrasts, male-female relationships, the relative importance of kinship in complex societies, the ways in which leaders recruit and manipulate support, and the way in which gossip is circulated. It has been used to combat organized crime, to delineate the overlapping positions from which power is exercised through interlocking directorships, and to examine many other problems. Network analysis can also be used to learn more about class and interclass relations, interethnic relations, the ramification of multinationals, and the way in which social milieu affects mental health. Yet it has made little contribution to these fields.

Network analysis has not realized its potential for a number of reasons. Among these are an overelaboration of technique and data and an accumulation of trivial results. Basically, network analysis is very simple: it asks questions about who is linked to whom, the nature of that linkage, and how the nature of the linkage affects behaviour. These are relatively straightforward questions, the resolution of which is fairly simple. For various reasons, they have given rise to an arsenal of concepts, terms, and mathematical manipulations that terrifies potential users. Anthropologists, sociologists, and political scientists have borrowed heavily—far too heavily, in my opinion—from mathematical graph theory. As a result, they are in very real danger of suffocation by the jargon, theory, and techniques developed to resolve quite different problems in another discipline. To present the anthropologist interested in political mobilization with this arsenal is like giving a do-it-yourself programme for network analysis and a computer terminal to a fisherman who merely wishes to explain to his son how to unravel his tangled net.

The battery of techniques with which social scientists have equipped themselves to answer the limited questions that network analysis can resolve produces overkill. Flies are killed with dynamite. Certainly, the help of statistical and computer specialists is needed if the numbers of informants and variables make hand computation problematic. Most calculations, however, have to do with simple nose counting and cross-tabulation. Neither the questions asked nor the type and reliability of the data normally warrant the use of the techniques and concepts which have reached us from graph theory. As enthusiastic network practitioners strive towards ever greater rigour, network analysis risks becoming further removed from human life and bogged down ever deeper in the swamp of methodological involution (Hannerz 1975:27; Leeds 1972:5; Sanjek 1974:596; Ottenberg 1971:948; Kapferer 1973:167).

The second danger facing network analysis is that those who have chosen to use this method of research tend to trivialize its results. As Sanjek has remarked, "One does not study networks; one uses network methods to answer anthropological questions" (1974:589). Far too much of the research now being done on networks lacks any clear formulation of the problems it seeks to resolve. Networks are compared with regard to density, size, and even composition, much in the way butterfly-collectors compare the colouring, wingspread, and number of spots of their favourite species. Trivial but extremely costly results based on samples of thousands are put forward with great solemnity by sociologists. Thus we learn that if you ask several hundred persons to name a few persons outside their household with whom they have close relationships, these turn out typically to be kin and friends. Other studies have discovered that affective relations change over time. Is this news? What is the social or theoretical significance of these "scientific" discoveries? We are left, too often, to draw our own conclusions. My conclusion is that many of the studies presented by enthusiastic network analysts seem merely to confirm the popularly held view that sociology is the discipline which sets out the obvious at great cost in an unintelligible language. The concern with method, classification, and networks-as-things-in-themselves, rather than with the ideas and problems that the practitioners are attempting to solve, characterizes not only the results but also, alas, the way in which those results are reviewed. For example, Barnes's review (1974) of Boissevain and

Mitchell (1973) is exclusively concerned with terminology and technique, while Sanjek's (1974) also examines the problems with which the analysts attempted to deal.

It is becoming increasingly obvious that if anthropologists and sociologists continue to view network analysis as a special field of inquiry, and if those who use it continue to encourage this view, it will rapidly become overly technical and its results progressively trivial (Sanjek 1974:596). Network analysis is a research instrument which can help resolve certain social and theoretical problems. It must not become an esoteric end in itself whose practitioners can communicate only with each other about scientific puzzles of interest only to themselves. If those who have used network analysis consider that it can provide valuable insights, let them demonstrate this to their sceptical critics by making their results and methods relevant and understandable. Conferences of network "specialists," a journal, and a special society to cater to their needs are disturbing signs of an involution which will ultimately result in network analysis's joining the dodo, Neanderthal man, and sociometry as an extinct species.

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Continuities and Change in Tropical Savanna Environments

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Between the equatorial rain forests and the perennially dry deserts of the subtropical high-pressure belts lie the world's "savanna lands." They occupy about one-fourth of the world's land surface, support varied plant and animal communities, and encompass the greatest number and diversity of human societies within the tropics. Perhaps because of their great ecological and social diversity, they are seldom perceived as a geographical entity, and they have attracted less scholarly attention than either the deserts or the rain forests. It was to help redress this imbalance that a Wenner-Gren Foundation conference was held at Burg Wartenstein August 4–13, 1978, on the theme "Human Ecology in Savanna Environments."

The purpose of the conference was to examine in worldwide comparative perspective the ways in which past and present human populations have adapted to and made use of tropical savanna environments. Comparative examination of this theme would, it was hoped, yield improved understanding of the ecological and socioeconomic changes taking place in savanna nations today. Human occupation of the savannas reaches back many millennia in Africa, Asia, Australia, and the Americas, during which time diverse ways of life evolved in these environments; but today patterns of resource use are changing rapidly as established systems of pastoralism and cultivation are being modified and replaced by commercial ranching and by large-scale projects of agricultural and industrial development. Many of these changes are taking place in nation-states that are experiencing rapid population growth and urbanization while enduring persistent hazards of drought and endemic disease. Analysis of the capacity of savanna ecosystems to support more people and to sustain new modes of land use is a prerequisite for successful development.

The conference brought together a group whose experience spanned the tropical continents and whose expertise fell within the fields of archaeology, anthropology, botany, economics, epidemiology, geography, nutrition, physiology, and zoology. The first question addressed—and quickly disposed of—by participants was the definition of savanna environments. A necessarily arbitrary climatic definition proposed by the organizer in his preconference paper was accepted as setting broad limits within which gradients of environmental variation were recognized. Thus the Intermediate Tropical or Savanna Zone can be defined as that part of the tropical world that experiences a dry season of 2.5 to 7.5 months' duration. Its common climatic denominator is the occurrence of a winter dry season that checks plant