

OUTLINE OF A MULTILEVEL APPROACH OF THE NETWORK SOCIETY

1. Introduction: the Rise of Networks as the Nervous Systems of our Societies

In present times network structures are floating to the surface in every part and on all levels of modern high-tech societies. In the twentieth century economy we have been witnessing the growth of large-scale networks of investment companies, suppliers, subcontractors and customers. Internally some organizations have become network organizations of largely independent teams and projects (Powell, 1990, Fulk & DeSanctis, 1999, Tapscott, 1999). Using ICT's they have gone one step further creating so-called virtual organizations supposedly working without the constraints of time, place and physical circumstances. In politics one has observed the creation of a networked political system and a state circumvented by networks of citizens and semi-autonomous or privatised public institutions (Guéhenno, 1995, Van Dijk, 2000, Fountain, 2001). In the cultural sphere the internet created a vast hyperlink structure of sources and artefacts of human activity (de Kerckhove, 1998). Finally, the social sphere of interpersonal relationships has been intensified by the combination and interchange of social and telecommunication networks using e-mail and mobile or fixed telephones (Wellman, 2001, Wellman & Haythornthwaite, 2002, Katz & Rice, 2002).

Networks not only surface in every part of modern society but also at every level of it. What is more, they link the levels of interpersonal, organizational and mass communication. For the first time in history we have a medium called the internet directly linking these levels of communication. The traditional split of the mass media, telecommunications and data communication has dissolved in the well-known process of media convergence.

According to Manuel Castells (1996) networks have become so pervading and all-embracing that they may be called the basic *substantial units* of society. I would not go that far. According to me networks are becoming the prime *mode of organization* and among the most important *structures* of modern society shaping a 'network society' as one of its potential general classifications together with the 'information society'. This means that modern society still consists of individuals, groups and organizations, though more and more they are organized and linked in social and media networks. It is the combination of social and media networks, produced both by organizational and technological innovation, that forms the basis of the articulating and pervading network structures of modern societies. This combination justifies the use of the strong metaphor of networks shaping the nervous system of advanced high-tech societies.

The concept of the network society and the metaphor of a nervous system will be elaborated in detail below. Here it suffices to introduce the purpose of this paper: to

argue that the all-pervading network structures indicated give a cause for an interdisciplinary and multilevel social and communication theoretical approach. Until recently, social and communication science only studied social networks and social relationships or ties at the micro-and meso-level of small groups, communities, neighbourhoods and organizations. Media and communication science have investigated media networks as means of communication and social environments. Finally, sociologists like Castells have made studies of networks as macrostructures of society. However, the social and media development of modern society urges a multilevel network approach bridging interpersonal, organizational and mass communication to explain some conspicuous trends in contemporary society on the field of organization and communication.

A strong plea for the same cause has been made by Monge and Contractor (2003) defending a multi-theoretical and multilevel model for the network approach. They claim that none of the existing theories, on their own, provide definitive, exhaustive explanations of network phenomena. Their multi-theoretical model urges the combination of the mechanisms of a plurality of theories for full explanations and for model-building and testing activities. Additionally, they argue to investigate network properties at the "personal, dyad, triad, group, organization and inter-organizational level" simultaneously (Monge & Contractor, 2003: 46). However, the level they do not reach is the societal level: the level of the network society as a whole. This paper examines the possibility of adding this level to the network approach.

In the next section the nature of the required multilevel and multi-theoretical approach will be described. Here it will be defended that systems theory can serve as an embracing metatheory linking theories at a lower level of abstraction and social reality. The rise of networks is explained as a mode of organization supporting the adaptive capacity of complex systems.

In the third and largest section of this paper I will take a step down on the ladder of abstraction and present ten statements about trends in contemporary society amplified by the rise of social and media networks. Here I will argue that many popular views about networks are either wrong or one-sided. One popular view is that networks are not a hierarchic but a 'flat' mode of organization. Most often, horizontal and flexible networks are opposed to vertical and ponderous columns of organizations. Some people even suggest that networks are democratic by nature. Or they suppose that they are more transparent than the institutions they partly replace. Another popular view is that networks are open and accessible to all, contrary to fixed and closed organizations with their memberships. A less positive popular connotation is that networks are breaking the social cohesion of modern societies. They cut right through existing institutions and every one appears to communicate alongside each other in ones own sub-cultural network. A final popular view is that computer networks are no longer tied to place, time and physical conditions and that they are offering us more freedom in this way. In section 3 it will be argued that these popular views are one-sided, to say the least. Networks are not necessarily more 'flat', democratic, open, free, accessible, physically unconditional or less socially coherent than other modes of organization and communication.

2. Inspirations of a Multilevel Network Approach

Every network theory is built within the general confines of the network approach as it is practiced in the natural, technical and social sciences. The axiom of every network approach is that reality should be primarily conceived and investigated from the view of the properties of *relations* between and within units instead of the properties of these

units themselves. It is a relational approach. In social and communication science these units are social units: individuals, groups/ organizations and societies. The relational or network approach in social science is fundamentally different from the individualistic or atomistic approach of the standard empirical research methodology based on data matrices of units and their variables and the individual as the basic building stone of all social aggregates (Wellman & Berkowitz, 1998). Taking relations between and within social units as the primary point of departure instead means a paradigm shift for both social theory and empirical research. Relations acquire the focus of attention in theoretical statements like those below and in data collection and analysis (matrices of relations and their variables).

The radicalism of the network approach in social science differs. According to the radical view of Castells, referred to above, networks have already become the basic social units themselves. Adopting a less radical view it means a conception of networks as an increasingly important structure or mode of organization for individuals, groups, organizations and societies.

The most embracing theory able to conceptualize and explain the rise of networks as a mode of organization in society is systems theory. In the terms of this theory I will start with a definition of a network:

A network is a relatively open system linking at least three relatively closed systems.

The link between two units is called a relation. A system is a set of interdependent units working together to adapt to a changing environment. A *closed* system consists of fixed (sub)units primarily interacting among themselves to reproduce the system as a whole in a (pre)determined way. An *open* system consists of a changing collection of (sub)units primarily interacting with the environment to change the system as a whole in a random way. In my definition the term 'relatively' is emphasized as networks are opening up the relatively closed systems of 'organic' units (individuals, groups/organizations, societies) and by doing this keep them 'alive' linking their closed structures to the networks own open structure. In this paper I will argue that networks are helping these units to break old modes of organization and institution and to search for new scale levels, modes of organization, modes of control and finally new institutions.

I will give a list of kinds of networks under consideration. See Table 1.

Physical networks	Natural systems of higher complexity: ecosystems, river networks
Organic networks	Organisms: nervous system, blood circulation, strings of DNA in cells
Neuronal networks	Mental systems: neuronal connections, mental maps
Social networks	Social systems with concrete relations en abstract relationships
Technical networks	Technical systems: roads, cable and computer networks etc.
Media networks	Media systems connecting senders and receivers and filled with information and symbols

Table1. Kinds of networks

Investigating information and communication networks in social and communication science forces us to deal with every kind of network on this list. My own primary concern is the combination of social and media networks, for instance in the investigation of the social practices on the internet. However, every psychological aspect of this research is based on the fundamentals of a study of neuronal networks connected to the organic networks of the human body. Finally, the study of the social effects and causes of the technological development of ICTs requires knowledge of the characteristics of the physical networks shaping them. One of the reasons to argue for a multilevel network theory is the observation that the effects of all these networks form a synthesis in reality.

Another distinction required for the understanding of the multilevel network theory proposed here deals with the levels of abstraction obtained. Working with this theory one pretends to link not only different social levels (from individual to society at large) but also different levels of abstraction. The most general and abstract concepts used here to describe networks are the unit and the relation. But their most important instantiations are (1) societies and their abstract social *relationships or affairs*, (2) communities or groups and their concrete *ties* and finally (3) media organizations and their physical *connections* or channels.

The only theory in social and communication science that is able to accomplish this ambitious task is systems theory. This theory deals with relations between units in a larger whole and distinguishes levels within this whole and an environment outside. However there are different brands of system theory related to networks and network theory. A first brand to be described here is inspired by biology and the second brand reveals a physicist and mathematical inspiration.

The biological inspiration of systems theory reads systems as organisms in a physical environment (a.o Maturana & Varela, 1980, 1984 and Prigogine & Stengers, 1984). In this reading networks can be seen as adaptive systems. Our brain is a complex adaptive system. The same goes for our bodies. Increasingly our organizations and societies also are complex adaptive systems. All of them are relatively closed. However, they have to adapt to an ever more complex environment. Here they get the assistance of networks as relatively open systems. Adaptation occurs in three successive processes derived from evolution (systems) theory: interaction, variation and selection. So, the first axiom of this brand of network theory, derived from systems theory and to be applied to social reality is:

A₁ Networks increase the adaptive capacities of system units in relationship to their environment by interaction, variation and selection.

A_{1a} Networks increase interactions within and between systems units.

A_{2a} Networks increase chances of variation within and between system units.

A_{3a} Networks increase options for selections by system units.

First there is interaction. Networks support interactions within and between social system units. Inside organizations they help to break through the divisions of departments to enable the communication of more members than before in shifting teams and projects also offering them opportunities of self-steering the organization. Between organizations networks, particularly networks of ICT are reducing the limits of time and place formerly keeping their members communicative (inter)actions apart.

Increasing or intensifying interaction is able to lead to more variation. First of all, there is variation of scope as the reach of information retrieval and communication is enlarged.

Compare the two drawings in Figure 1. The circumference of all points of contact with the environment in the organic social unit is much smaller than in the extended network.

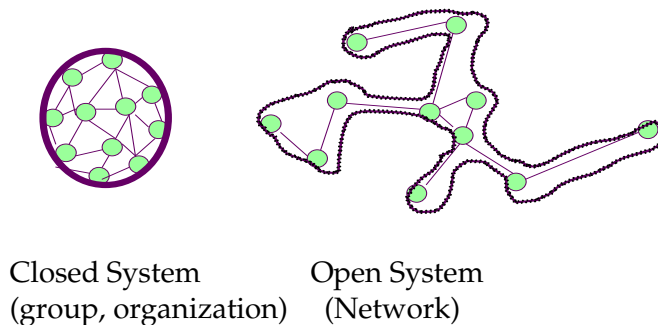


Figure 1. More Variation in Networks

Every one engaged in networking will recognize this idea: one has to break out of ones own small circle of people to obtain experiences and contacts outside, even when they are very superficial. Granovetter (1973) called this idea the strength of weak ties. Accepting the value of weak ties one should not deny the importance of strong ties. Variation also reaches into depth. Our own familiar environment offers opportunities of interaction and information by means of intensive ties and high-quality communication. It is the combination of variation in scope and in depth that makes networks strong as relatively open systems emerging from relatively closed systems but always remaining linked to them. A person engaged in networking is not a roaming nomad but someone who keeps a home base.

The final process is selection. Here the goal of networking is reached: choosing the most successful actions and actors. This serves the adaptation and survival of the particular system concerned. For example, an unemployed individual gets a job, a company finds the best chain of suppliers and customers and a society adopts a particular policy, organization and provision to uphold itself in the process of globalization.

The second brand of systems theory dealing with network theory has been inspired by physics and mathematics. It has made considerable progress in the last five years. The natural scientists engaged with this theory made their way to social science (Watts & Strogatz, 1998, Barabási & Albert, 1999, Barabási, 2002, Buchanan, 2002 and Watts, 2003). Their results were published in *Science* and *Nature*. They had some similarity to the investigations of the so-called six degrees of separation of Milgram (1967) and the strength of weak ties by Granovetter (1973) in social science.

Networks have been studied as mathematical objects called graphs for ages. Graphs depicted the potential links between a collection of units or objects shaping particular distributions, random and non-random. The first axiom of this brand of network theory, also derived from systems theory and to be applied to social reality is:

A₁ The system units of networks can be connected in ordered (clustered) and in disordered (random) ways.

A_{1a} Contemporary social/human networks increasingly create small worlds combining order and randomness in such a way that almost any pair of individuals or organizations can be connected via a short chain of intermediaries.

A_{1b} The origin of order in networked systems depends on the particular mechanism by which two units that are connected to a common third unit are more likely to be connected to each other than two units picked at random.

This brand of theory tries to explain how a collection of isolated units (randomly distributed) can be linked into a single mass (order). How can order appear in a system without a pre-existing center but with a number of interacting equals? The answer is connectivity: at a critical point, a phase transition in the system, “all parts of the system act *as if* they can communicate with each other, despite their interactions being purely local” (Watts, 2003: 63). This critical point appears as a sufficient number of (random) long-distance links connects a large number of local individual units ordered in all kinds of clusters (groups, communities, organizations). In this way a small world is created within a large-scale or global environment. Calculating the potential statistical distributions of these small worlds the physicists and mathematicians engaged forged the *a posteriori* basis for Milgram’s famous experimental result of the (average of) six degrees of separation between every inhabitant of the modern society and for Granovetter’s distinction between strong (clustered) and weak (long-distance) ties, the latter ties having the strength to connect the system as a whole and to support individual units.

However, the origin of order in networked systems is not statistical but substantial: it is the precise mechanism by which two units or nodes that are connected to a common third unit or node are more likely to be connected to each other than two units picked at random. The mechanism may be social, like the interpersonal attraction of friends or physical such as the exchange of electricity between proximate power stations (Watts: 99). The problem with the physicists and mathematicians engaged with network theory and moving to the field of social science is that they have experienced great difficulties in relating the formal *network* structures of nodes and relations to substantial *social* structures, agents and relations.

Duncan Watts, originally a physicist, now working as a sociologist at Columbia University has made the most advanced elaborations of physical and mathematical network theory for social science in his *Six Degrees of Separation* (2003). One of his elaborations is the extension of single degree distributions for unipartite networks, customary in mathematical network analysis as it describes links between nodes or individuals, with two distributions creating bipartite networks (Watts: 120-121). He proposes to observe a combination of the distribution of group sizes (how many actors belong to each group) and the distribution of how many groups each actor belongs to. The larger the number of groups an actor belongs to is and the larger these groups are, the smaller the number of degrees of separation will be.

This extension might be very relevant for a multilevel network theory. At least the level of the individual and the group are bridged. However, to reach the level of society a third distribution has to be added creating a tripartite network structure. This is the distribution of (global) society sizes: how many groups or organizations belong to each society? See Figure 2 where not every lower unit belongs to more than one higher unit.

One of the claims made in this article is that both the biological and the physicist/mathematical brands of systems theory are able to inspire a multilevel theory of the network society. The biological brand treating systems as collections of complex adaptive systems contributes the idea of *nesting*: the complex adaptive system of the human brain is nested in that of the human body, the group, the organization and society. The physicist/mathematical brand adds the idea of *emergence* in social systems: order emerges in randomness by a particular connection of nodes at all levels.

Hitherto, two approaches of network theory and analysis in social and communication science have appeared (see Watts, 2003, p. 48). The first approach tries to relate formal

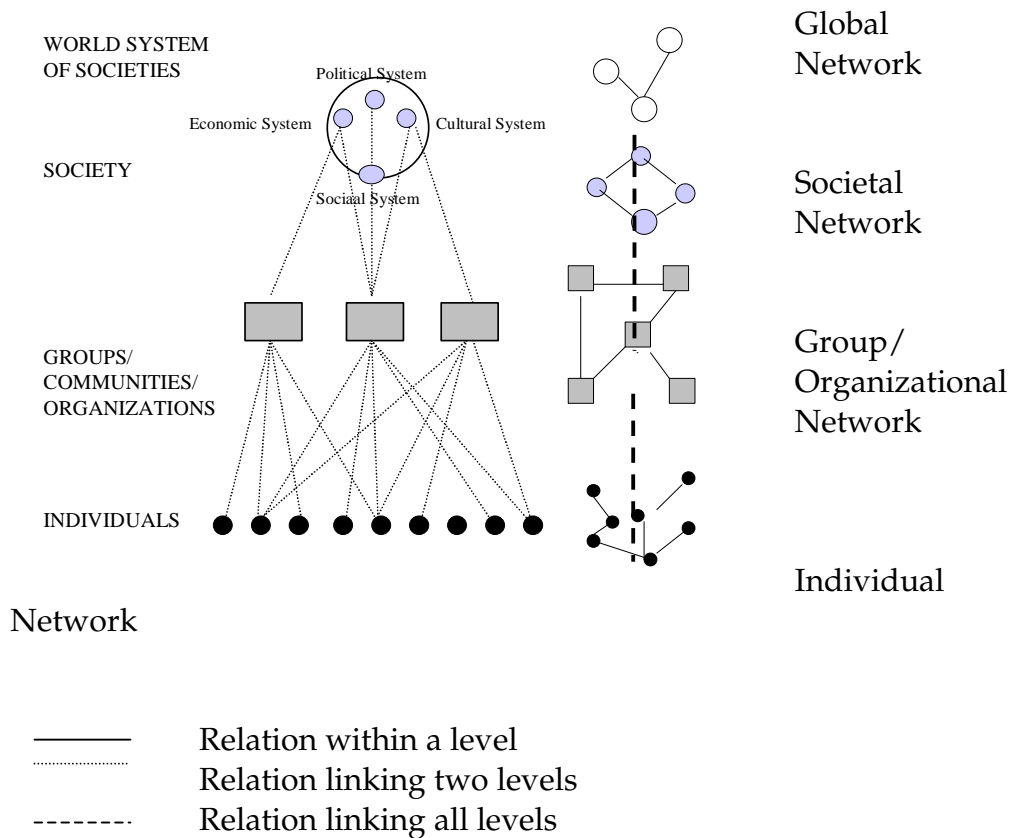


Figure 2: Four Social Units and Levels Linked by Networks

network structures to social structures. It makes statements about individuals and groups based upon relational network data indicating more or less *social distance*. It maps the characteristics, identities and preferences of individuals building patterns of relations with others. This is the common approach in social network analysis, from sociometry and the Milgram experiment to the work of Barry Wellman (1997, 2000, 2001 a.o.)

The second approach has become familiar in communication science, first of all in the work of Everett Rogers (1962 a.n.) and Rogers & Kincaid (1981). Here a network is seen as a *medium* for the exchange of information and the exertion of influence by individuals in particular positions. One of the instances is the propagation of innovations. In this approach network channels and the social positions of individuals are at the core of attention.

In the multilevel network theory propagated here these approaches based on the individual and group relationship level have to be extended with the organizational and societal level to reach a theory of the network *society*. This will be required to explain the contemporary rise of networks as social and media structures at every level of society. At the *individual* level we are witnessing the rise of networking as an explicit and increasingly systematic method of making contacts and improving social relations. Increasingly networks are linking individuals, that is parts, roles, tasks of features of individuals. Evidently, individuals are acting in a multitude of fully or partly separated networks of employees, citizens, family members, friends, acquaintances, fellow sportsmen etcetera. Below the concept of network individualism will be used to describe this phenomenon.

At the level of *organizations* corporations and institutions have to open themselves more and more to their environment to survive in competition or service. Internal

structures of organizations are breaking and external structures of communication are added to them. Acquiring new combinations of internal and external communication they are better equipped to adapt to a swiftly changing environment.

Networks also cause a comprehensive restructuring of *society at large*. They are breaking old modes of organization as they help organizations in their search for new scale levels new markets and new ways to govern and control. Networks link several processes of scale extension and scale reduction occurring simultaneously in modern society. At the one side they support globalization and socialization and at the other side localization and individualization. In this way they have accelerated modernization (Barber & Schulz, 1996, Castells, 1996, Van Dijk, 1999).

This article not only offers a call or proposal, but also gives a preliminary expression of the general results to be expected from a multilevel network approach from the perspective of society as a whole, that is the network society. It does so explicating ten statements about *changing relations in the network society*. They are describing a number of general *trends* characterizing the network society.

3. Ten Statements about Trends Characterizing the Network Society

1. The *articulated* relation

'In the network society the social *relations* are gaining influence (causal power) as compared to the social *units* they are linking.'

The priority of relations, both individual ties and social relationships has always been the prime axiom of the network approach (see above). However, the current rise of large-scale networks of organizations and media creates a strong tail wind for this approach. These networks become ever more pronounced in advanced societies. In all spheres of these societies a network structure is articulating (see section 1.). A first example is the political system. In this system institutional politics and public administrations at every level transfer power to other units directly getting into touch with each-other via networks: transnational corporations, international bodies, NGO's, local corporations, individual citizens and their social and political organizations. In this way the national state may be passed as the traditional centre of politics. Reacting to this shift of power the state itself transforms into a 'network state' linking increasingly independent and privatised government agencies (Guéhenno, 1993, Fountain, 2001).

In the economy, ever more called a 'network economy' (Kelly, 1998, Shapiro & Varian, 1999), one is able to observe the rise of networks of investors, suppliers, subcontractors and customers. Internally many organizations have become network organizations of largely independently working teams and projects (Monge & Fulk, 1999). With the aid of ICT-networks they are able to shape so-called virtual organizations apparently working without constraints of time, place and physical conditions (De Sanctis & Monge, 1999).

In the cultural sphere the old distribution networks of broadcasting and the press are converging with computer and telephone networks. In this way the multifunctional communication network of the internet was created linking all sources of culture in a single hyperlink structure (de Kerckhove, 1998). Finally, in everyday social life relations are no longer only built upon meetings but also, and increasingly on the use of the telephone and e-mail making these relations more explicit and selective (Wellman & Haythornthwaite, 2002).

From this most general statement of a multilevel theory of the network society numerous empirical statements can be derived about the causal effect of articulating

network structures on organizational and individual actors and their actions in all spheres of society.

Using ICT an increasing number of human relations is articulated further, that is abstracted from time, place and physical conditions. This is called virtualization. The exciting thing for a network theory is that this process has its limits, as the next statement holds.

2. The *substantial* relation

'Despite their articulation all social relations remain inextricably bound up with units and physical environments

In this statement my conception of network theory is different from most other theories. They give priority to forms in stead of substances. Forms are substantiated. The morphology of ties and nodes is lifted out to such an extent that what happens inside, communicative action with the rules, resources and meanings people use and create, is downplayed. Morphology has acquired a strong backing from empirical research following a network approach in social and communication science. Very sophisticated forms of social network analysis and mathematical graph analyses of nodes and ties have been developed. From the view of quantitative research their results are impressive. Trying to estimate the explanatory power of these analyses and taking the view of qualitative analysis the same results look rather sterile. It would be better to combine the quantitative analysis of the morphology of networks, the number of relations or ties, units or nodes and actions or contacts, with a quantitative and qualitative analysis of their substance in communicative action. See Section 4 for a further development of this position.

This second statement clearly relates to my view of the position of networks in society as compared to the view of Castells (see above). Networks are becoming the prime mode of organization and they are among the most important structures of advanced societies. However, they are not increasingly the substance of these societies as they are for Castells (1996), see Van Dijk (1999b). Societies still consist of individuals, groups and organizations. Of course these units form external and internal relations in networks, but these relations do not equal society. Their organic and material properties and their rules and resources should not be removed from the concept of society or 'the social' to bring it back to its supposed bare essence of relationship. Imagine a totally mediated society where all relations are fully realized by, and substantiated in media networks, where social and media networks equal each other. I take it for granted that even such a society would still be based on bodies, minds, rules and resources.

For empirical research this means that both the forms or network structures and the substance of communicative action should be investigated. Their interplay could be a central focus of theory building, like it is in the structure-agency concept of structuration theory. This approach is illustrated in the one-dimensional Figure 3, as compared to the three-dimensional Figure 2.

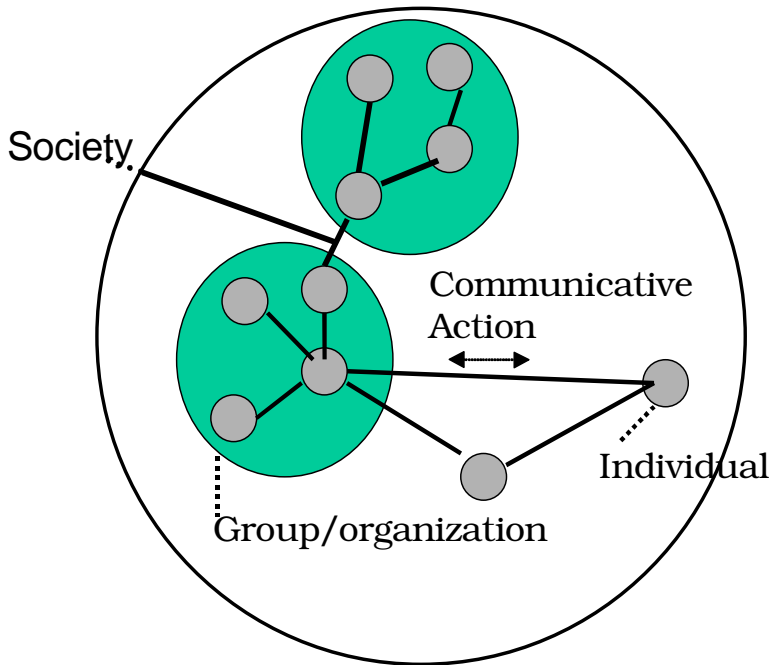


Figure 3. The Substantial Relation with Communicative Action in Networks

2. The *direct* relation

'In the network society individuals, groups and organizations are linked in increasingly direct relations, among others via multifunctional media networks like the internet.'

As individuals we always have made society via our organizations. In the network society we are doing this in a more direct way than ever before. The instruments are both social/organizational and media networks, or combinations of them. This state of affairs is most easy to observe on the internet as a multifunctional platform for interpersonal, organizational and mass communication. This multi-functionality is new. We used to have only separate media of mass communication unilaterally bridging the societal or organizational and individual level, and media of interpersonal communication serving only the individual or group level.

The increase of direct relations starts at the individual level. Here we may observe the phenomenon of *network individualism* (Wellman, 2000). This means that the individual in one of its roles increasingly is the most important node in the network and not a particular place, group or organization. The social and cultural process of individualization is strongly supported by the rise of social and media networks. Networks are the social counterpart of individualization. Using them the individual creates a very mobile lifestyle and a crisscross of geographically dispersed relations.

Using media networks the individual shapes organizations and societies at large more directly than before by their amplifying speed, reach and multi-functionality. In the sixties of the former century Stanley Milgram estimated that every world inhabitant is on average only six steps away from any other using networks (Milgram, 1967). This was called the thesis of six degrees of separation. In the mean time the conjecture can be made that the number of steps is diminishing from six to five or perhaps even four with the aid of the media networks of the Internet and telephony. This thesis of less degrees of separation reaches theoretical support from Axelrod's analysis of the complexity of organisation requiring faster and more direct relations of communication (Axelrod, 1997). This is made possible through clustering:

the lines in networks link individuals in clusters with relatively dense communication among each other. This increases the chance of hitting a line from one cluster to another. Theoretical support for this conjecture also is available in the mathematical brand of the network approach inspiring the measurement of social distance. Empirical support for this conjecture has been achieved to some degree by research for the distance between websites. The distance between one website to another appeared to be only 19 clicks away on average in 1999 (Albert et al., 1999, summarized in Barabási, 2002). The explosive rise of the number of sites does not result in an equally fast increase of the number of links and degrees of separation. Sites and their pages also are clustered to a large extent.

The increasing speed, reach, clustering and multi-functionality of media networks raise the directness of our relations. This means that the potential *reachability* or accessibility of others increases and that our world is getting smaller and perhaps more unified in this way. However, this does not mean that the real *approachability* of others increases, a matter to be dealt with below.

The conjecture described would be an interesting research question investigating the degrees of separation on a global and local scale. The same goes for the difference between reachability and approachability: how many contacts are sought and how many are realized by what kind of reaction or interaction?

3. The *multimedia* relation

'In the network society relations increasingly are realized by a *combination* of social and media networks.'

The increase of direct relations and accessibility through networking forces us to believe that the social cohesion of society is not threatened so much as many observers fear it is. One assumes that modern social and media networks are so selective that an increasing number of subcultures communicate completely separate from each other. The new media networks are supposed to reinforce this development.

However, if we look at the evolution in the discussion about the relationship between face-to-face and online mediated communication the situation looks different. Ten to fifteen years ago the common opinion was that online activities would *replace* meetings. Those were the days of the electronic cottage as the perspective of future social life. Afterwards it was discovered that online communication *adds to* offline and face-to-face communication. Now the opinion is growing that both kinds of communication should not be separated and that they will be *combined* more and more. The future is to interlinking social and media networks and continually switching face-to-face and mediated communication. Perhaps this will be realized even more in mobile contexts than in electronic homes and places of work, study or leisure.

The combination of social and media networks will create a very strong new infrastructure of our society. We should not be so afraid for a fragmentation of its public sphere by the new media as most observers are. Usually, they depart from the image of a unified public sphere being dominant in the middle of the twentieth century. Perhaps, this image has never been correct as it was produced by the old mass media themselves and the upper middle class controlling them. There have always been undercurrents and deviant opinions not getting sufficient outlets in the 'politically correct' public mass media of the past. The future public sphere is going to be much more complex anyway (Keane, 2000). It will become a *mosaic* of partly overlapping spheres. They will keep common denominators. The number of cross- and side-links between the media, old and new, is increasing. Producers are distributing the same raw sources of information in a large number of variations, channels and packages.

With some help consumers are able to find their way in the resulting information overload. They combine a growing number of media, though they spend less time on each of them.

4. The *self-referential* relation

'In the network society media networks themselves are becoming complex adaptive systems with a structure and self-reference. They correspond more or less with the structure and self-reference of the agents (senders, receivers) they link ... and with so-called 'reality'.'

The articulation of relations is able to lead to their growing independence, in particular when media networks are used. The combination of social and media networks causes the media to become social environments themselves (Meyrowitz, 1985). The internet is a classic example already. For this reason the impact of the media on man and society is rising. Increasingly, mass media are referring to themselves discussing about their own role in society and their own programmes or stars and circulating information among themselves.

Not surprisingly, a growing number of media investigators and experts are stressing the construction of reality by the (mass) media. One does not have to go as far as Baudrillard (1991) with his attention to media *simulacra* and provocative claims like the Gulf-war that never happened (it was a series of briefings of the Pentagon), or Luhmann (1996) who claims that the mass media have become relatively closed self-referential systems, to doubt the actual reflection of reality by the media who still keep this pretension.

But does this really mean that the mass media, from broadcasting and the press to the Internet are no longer able to serve man and society because they are enclosed in their own self-created world? When we look at the new mass media of the Internet at large, electronic papers and interactive broadcasting, this does not appear to be the case with regard to the classical functions of the mass media. Many observers agree that the intermediary, selective and information-processing functions are even stronger fulfilled in the new digital and interactive media than in the old mass media. Without all kinds of new information services users would not be able to find their ways through the enormous overload. To survive the information overload they keep being dependant on the offer of trustworthy selections by editors in portals and other services. Two other classical functions of the mass media, to serve as a societal forum and to socialize audiences are not threatened either. They are only organized in a more complicated way in partly overlapping public spheres (see above).

The only classical function that seems to be jeopardized is the control or watchdog function of the mass media for democracy. Public media have to select and produce the news a citizen needs to participate in a democracy. They are expected to adopt an independent critical attitude, both towards governments and commercial parties (Keane, 1991, McQuail, 1992). On the one side they can meet this expectation as the self-referential and complex character of the new mass media does put them in the position of upholding a particular independence and quality as increasingly important assets of a reliable information supply in the network society – There is a market for these assets. - At the other side, the adaptation of these media to the environment of suppliers and customers *using the same networks* causes them to adjust to the opinions and interests living among them at the particular moment. Most likely, this market is bigger. The bias and partiality in selection, processing and intermediation will grow, particularly when market conditions prevail. Presumably, we will keep and acquire new quality mass media for conservatives, liberals and socialists but very few independent critical press and television coverage or other information sources.

The conclusion about the adaptive self-referentiality of mediated relations and the new mass media realizing them in the network society is contradictory: at the one side they become more, at the other side less dependent upon their environment.

5. The *interactive* relation

'In the network society social relations become increasingly interactive by the combination of social and media networks with multilateral communication.'

The most important reason for mediated relations being both more and less dependent on their environment is the growing interactivity of the media and the organizations in the network society as compared to the 'mass society' with its one-way media and centralized institutions. Interactivity is a chain of action(s) and reaction(s). Presumably, it is the growth of interactive relations that has the greatest consequences for the structures of present and future (network) society. In all spheres of society one is able to observe a shift from the supply-side to the demand-side, from producer to consumer and from designer to user. In the economy one notices the reversal of the value chain from producer to consumer. In politics there is talk about governments and public administration trying to adopt a citizen view. In culture one sees a flourishing exchange of cultural (re)sources, for instance music files, on the Internet. In educational practices student demands have become vital sources of information for schools.

This shift cannot be denied. However, it is also exaggerated by many observers who expect that social relationships will be put upside-down completely. In fact, interactivity means an interplay of supply and demand. Selection, design and production remain with the suppliers; users mainly choose from preprogrammed menus. Their choice effects the next supply. Taking the economy for an example, we will observe not so much a reversal of the value chain as the creation of a *value network* with companies alternately serving as producer and consumer, or co-producer and buyer.

6. The *organized* relation

'The most important explanation for the rise of networks as a principle of organization is their combination of centralization and decentralization. In this way the organization becomes more flexible and acquires better control of risk and complexity than a centralist or local social unit'.

The 'secret' of networks is a very intelligent combination of openness and closed-ness, scale extension and scale reduction, decentralization and centralization of organization (Van Dijk, 1999). In this way they are able to reduce more complexity and risk than traditional centralist or local organizations. This claim has been made by many management theorists in the past, Peter Drucker (1988) being one of the first among them. According to Castells (2000, 2001) the use of networks 'results in an unprecedented combination of flexibility and task performance, of coordinated decision making and decentralized execution, of individualized expression and global horizontal communication, which provide a superior organizational form for human action' (Castells, 2001: 2). Castells claims that the networks of ICT enable networks existing long before 'to deploy their flexibility and adaptability, thus asserting their evolutionary nature' (Castells, *ibid.*:2). The systems theory described above would express it in the following way: decentralization enables more external interaction and more variation, while centralization adds internal interaction and the selection of conclusions and decisions. Networks do have centers, al be it frequently more than one center: the 'spiders' in the net. They are combining a horizontal co-ordination and a vertical control of activities. Media networks of ICT in particular are supporting this combination. *Infocracy* is replacing traditional bureaucracy (Zuurmond, 1994). Increasingly control is programmed in the

technical and organizational ways of working in networks. Old modes of bureaucratic organization and central co-ordination are disappearing, but not organizational control as such.

However, the one-sided popular view is that networks are 'flat' and do not reveal hierarchies. One is only too happy to depict existing organizations and institutions as ponderous vertical columns opposing them to dynamic horizontal networks. In this way the current opening of existing organizations and institutions by networks is equaled to their disappearance. While in fact the mode of organization of these institutions is restructured and new institutions are created.

7. The *coded* relation

'As a consequence of rising complexity and uncertainty social and media networks are more and more provided with programmed control and access codes'.

Networks carry the image of being open and free. They possess these characteristics only in a particular way. Networks are more informal in communication and decision making than traditional modes of communication and organization. However, in this way it is not clear either, where the most important interaction is happening. Networks tend to become diffuse, shadowy and nontransparent. Decisions are made in the sidewalks or in selective e-mail messages by a few persons, most often the 'spiders' in the net. This tempted the French political essayist Gu henno (1993) to put forward the statement that the rise of networks heralds the end of democracy. This seems exaggerated to me, but still I think that the use of networks potentially harms all known kinds of democracy unless one puts very much faith in the applications of teledemocracy to save them. The basic reason is that democracy needs time, it is slow and regulated. This is opposed to the speed and flexibility of organization and communication provoked by networks.

Networks are unable to be completely open and free anyway. Networks of ICT in particular require all kinds of programming, codes and access barriers. Not for nothing Lawrence Lessig (1999) called his celebrated book about the Internet *Code, and other laws of cyberspace*.

It is interesting to call attention to the Internet, indeed. Once this network of networks was praised for its quality of being an open, free and decentralized system. However, in the last ten years it has been closed, barred and regulated in a rapid way. Commercialization has advanced. Many sites are no longer accessible to every one because one needs an access code or payment. Governments and corporate institutions are eagerly looking for chances to regulate this medium, perhaps even more than the old mass media before (see Lessig, 1999, 2001, Van Dijk, 1999). Perhaps we are approaching the next stage in the evolution of the Internet. The medium is damaged every day by all kinds of viruses and hacking operations. The most popular way to challenge these attacks is close the medium even more. Most likely all kinds of safety measures will be taken to protect the strategically and economically valuable parts of this network. When this happens the Internet will no longer be a single or unitary medium. It will fall back to the status of a public switching facility linking both closed information or communication systems with secure and limited access and free, but extremely vulnerable public open access systems.

8. The *exclusive* relation

'Networks are selective in their operations, both inwards and outwards. Though they are appropriate to spread information and communication in principle, they lead to greater inequality of our present society and organizations in practice.'

Networks seem to be open and accessible, but in fact they are more exclusive and selective than the organizations with their memberships and requirements they are linking. In the

biological brand of systems network theory this is a consequence of the third adaptive system process: selection. It is true that interaction and variation are causing the spread of information and other (re)sources in networks, but the private selectivity and appropriation of the means of information and communication in our society lend them a more or less exclusive character. We all know the phenomena of core members, nodes, bridges and isolates, intimates and outcasts, 'spiders and flies' in networks. In all social and media networks there are more people outside than inside. Notably, one has to conquer a place in networks, while we have become automatic members of traditional organic social units like the family, the neighbourhood, the elementary school and society at large. These units offered the weak among us the chance to be pulled along in solidarity. In networks this does not happen that easy. In networks individuals, groups or organizations have to stand firm themselves.

There has always been inequality in social networks. When we are going to add media networks to them, a new dimension of inequality is appended. The technology used is divided unequally considering material possession, immaterial skill and practical usage. This goes for the expensive, complex and multifunctional information and communication technologies in particular. In the worst of cases these digital divides (of possession, skill and usage) might even turn into structural inequalities in our societies. This means that systematic differences in positions people occupy in society, in social networks and in media networks, or other media, become lasting and determine to a large degree whether they have any influence on decisions made in several fields of society. Structural inequalities might appear when a relatively small information elite is allowed to take all important decisions in society, a majority of the population participates to a certain extent and in particular ways and a large minority of people is excluded both from the technology and the positions enabling decisions.

In the physicist and mathematical brand of network analysis a so-called 'the rich are getting richer phenomenon', or a Matthew effect ("Unto every one who hath shall be given...") is observed (Barabási & Albert, 1999, Buchanan, 2002, Watts, 2003). This means that in particular ordered, non-random networks, called scale-free networks the strongest nodes and links get stronger and stronger. This is supposed to hold for all social and media networks. A mechanism appears in these networks, familiar to the well-known network effects, that increases the inequality of links and their substances. This mechanism could only be competed with deliberate social policies favoring equality.

9. The *insecure* relation

'The use of media networks makes social relations vulnerable, technically and social-psychologically. Creating trust, commitment and sufficiently information-rich communication is both a condition and a problem for networks.'

In the 1990s one has reached the understanding that networks of ICT are very vulnerable and that safety measures should have more priority. Vital functions of our risk societies and organizations are at stake because we have made ourselves completely dependant on new technologies while we cannot call back the old ones just like that. The solutions of this problem are another threat to the freedom and openness of networks described above.

The use of communication networks does not only rely on vulnerable technology but also on typically social and mental phenomena like trust, commitment and richness of information exchanged. A lack of these characteristics also makes network communication insecure and is able to lead to its break-down. They should be available at a particular minimum level. A whole tradition of CMC- and medium richness research in the 1980s and 1990s supports this conclusion. After some time CMC-investigators discovered that media networks are able to achieve more than one took for granted, comparing them to face-to-face

networking. More experience of communication in media networks gradually equalizes their capacities with those of face-to-face communication (see Walther, 1996 in particular). However, limitations remain with the volatile, remote and selective character of CMC as they lead to insecurity about the meaning of communications or communication partners among users. Therefore, trust is a vital condition in all networking both face-to-face and mediated (Handy, 1999). The same goes for commitment. Commitment to the activities and ties of networks is perhaps even more important than commitment to the goal, activities and colleagues in traditional organizations. Otherwise networks will easily fall apart. This is the prime reason why the managers of virtual and network organizations organize so many meetings, deliberations, cafés and parties to compensate for a potential lack of trust and commitment. In this way they are adding to the substantial part of networking (confer the second statement).

4. Prospects of the network approach in communication science

In this paper I argued for the necessity of a multilevel network approach bridging interpersonal, organizational and societal communication in social and media networks. Until recently social and communication scientists have studied social and media networks at the macro- or meso-level and at the macro-level separately. Moreover, most often social scientists have concentrated on social networks while communication scientists investigated media networks. The necessity of a multilevel network approach is derived from both social and media development. People in advanced societies are creating new structures and new modes of organizations in the shape of social and media networks at every level. Contemporary media networks have converged on multimedia platforms like the Internet.

The result of this social and media development is that all instantiations of social and media relations linking social units are getting in line: from individual through group and organizational *ties* to social *relationships* at large by means of multifunctional and multimedia *connections*. This suggests a reasoning and order of investigation upwards, from ties to general social relationships. This is the sequence promoted by the research techniques of multilevel analysis in social science. However, the macro-approach of structural network analysis reasons downwards working from the properties of societal networks to the level of organizational and individual ties (Wellman, 1988). I would suggest to take both directions in a multilevel network theory. This means that both global and individual or organizational properties are able to serve as points of departure in the analysis. A simple example of linking these levels in both ways would be a study of MP3 music file swapping on the Internet. One could start with an observation of the traffic between individuals exchanging these files, subsequently studying the consequences for MP3 service sites like Napster, Gnutella, Morpheus and Kazaa to analyse the goals and workings of these sites and finish with the effects on the relations of intellectual property right and power in the media sector of society. Going the other way round, starting with changes in property relations caused by the growth of free Internet exchanges and deriving their effects on the more or less commercial organization of music sites and ending with a study of the new opportunities of individual users would be an alternative.

According to Wellman (1988: 47) 'the structural approach has revealed powerful ways of using consistent analytic frameworks in linking 'micro' networks of interpersonal relations with 'macro' structures in large-scale social systems. However, I think these analytic frameworks are more a promise than a practice. The 'leap' from individual and organizational ties to societal and global relationships entails the definition of so-called *emergent properties* at every higher level (organization, society, world system). Social scientists are engaged with finding these properties and making them operational for empirical research. In this paper it was argued that we will not solve the problems related to

this task when we stick to the morphological approach of traditional network analysis. Instead, a synthesis of form and substance directly linking the network relations to communicative action and meaning was proposed. Our job is to show how formal attributes of particular relations are changing communicative actions and meanings, and the other way round. This is the promise and programme of structuration theory as it tries to solve the age-old problem of the structure-agency relationship. Realising this promise means a combination of quantitative and qualitative types of network analysis as will be explained below.

As I tried to show in this article the multilevel network theory called for might benefit from both the biological brand of systems theory (the network and its units being complex adaptive systems) and the physicist and mathematical brand of it (the network as a combination of ordered and random distributions of links between units). They were both repeatedly used in the ten statements about trends in the relations of current network society.

What is the current status of network theory and analysis in social and communication science? Conducting a short literature search with these terms already shows that the number of publications reached a peak in the 1960s through 1980s. In communication science the 1980s were indicative for the approach in communication networks. Rogers & Kincaid (1981), Knoke & Kublinski (1982) and Monge (198) were setting the trend in that decade. See Windahl , Signitzer & Olsen (1992) for a summary. After this time there have been very few advances in my view. The network approach in communication science has stagnated for at least a decade to return with the breakthrough of the Internet. However, contributing to a multilevel network theory would offer communication science the chance to reach a higher status in the explanation and policy design of new media development. At the last ICA-conferences and elsewhere the conclusion was reached that communication science or studies have missed many opportunities on this field and are surpassed by sociologists, economists, political scientists and juridical experts in getting a grip on the 'digital revolution' and its effects on man and society. See Rice (1999) and Steinfield (1999) for descriptions of this status. A lack of general theory is one of the prime reasons. Monge and Contractor (2003) have done a splendid job to list all theories that are relevant to communication networks. They have tried to link them and they have made a strong argument in favour of bringing them in a multilevel conceptual structure. However, this does not give us a general theory either, at least not one that equally applies to the societal level. Currently, communication theories about networks are confined to theories at the level of individuals or organizations and their applications of ICT: uses and gratifications, information or media richness, theories of CMC, diffusion of innovations to name the most important ones. However, simultaneously developed macro-theories of sociologists like Manuel Castells have not left the exploratory stage either. Castells gave a modest title to the theoretical summary of his trilogy on the Information Age (Castells, 1996,1997, 1998): *Materials for an Exploratory Theory of the Network Society* (Castells, 2000). So, communication science still has the opportunity to catch-up and develop a more embracing theory of the information or network society in the perspective of communication.

The network approach in social and communication science has a strong tradition of empirical research. The general axioms and statements phrased above should be appropriate for the deduction of numerous empirical statements on several fields. In a more or less explicit way some of them are available in descriptions of the network society like those of Castells. The first methodological principle to be derived from the argument above is that the combined study of the articulated and substantial relation requires both quantitative and qualitative research. The network approach has a good reputation in quantitative research. Empirically and mathematically it is very sophisticated at the price of extreme laboriousness.

However, above I have raised doubts about the fertility of the purely quantitative research of the formal properties of systems and relations at all levels and in every field. Especially in communication science a study of the formal characteristics of relations within and between units has to be combined with the studies of the communicative action and meanings (when units are individuals) explaining what is going on in networks and their relations. The combination of quantitative and qualitative network analyses might, perhaps at the expense of some advanced quantitative and mathematical elaborations, make the network approach more attractive for communication researchers.

A second methodological principle is a fundamental one. The network approach rejects methodological individualism as it is not based on relations but on individual units simply aggregated at higher levels (group, organization, society). The notion that units might be more than the sum of their parts is unfamiliar to methodological individualism. Therefore it neglects both the (inter)relations and interactions within or between units and the emergent properties of these units at a particular level. Unfortunately most statistical techniques depart from the axioms of methodological individualism. An example is the assumption of statistical independence of units of measurement. This assumption is the exact opposite of the prime assumption of every network approach: their dependence and interrelatedness.

Fortunately, many statistical techniques for the analysis of individual units can be transformed to enable the analysis of relations. Matrices of relations and their characteristics can be twisted into the familiar data matrices of units and their variables. This is done in the multidimensional scaling of social distances in relations between units based on matrices of mutual contacts (Berkowitz, 1988). The techniques of multilevel analysis in social research – very important in this context but usually based on a straightforward aggregation of individual units on higher levels - could be transformed in aggregations of relations on higher levels with a consideration of their emergent properties. According to Wellman (1988: 40) network analysts have continued to use standard statistical techniques in conjunction with measures of network properties.

A final remark. The multifunctional media network of the Internet has not only boosted the rise of social networks and a network society but has given us a host of new opportunities of (web-based) research as well. All units, relations, communicative actions and traffic patterns are registered in computer files. So, the raw data for research are available in huge quantities. Investigators able to manage them in creative ways are offered many applications of content analysis, discourse analysis, secondary analysis of existing numerical data, primary analysis of Internet sources and structures of information and navigation in websites. Moreover, they get new opportunities with web-based questionnaires and observations. This means that the prospects of developing and testing a multilevel network theory in empirical research look better than ever before.

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