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Electronic Weak Ties in Network Organisations

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Abstract

Granovetter's theory on the strength of weak ties provides an analysis of processes in interpersonal networks forming a very fruitful micro-macro bridge in sociology. When applied to organizations, theories of weak ties give a basis for understanding the mechanisms of work interoperability and information exchange. Recently the term 'virtual organization' is increasingly used to describe a new organizational form including a network of companies. It is essential to examine weak ties and their implications in the context of virtual organizations. In this case, weak ties of interpersonal and group relations are increasingly mediated electronically, through the use of e-mail and other services of the new information and communication technologies. Furthermore, these theories may be used as tools to comprehend processes of mediatization at the organizational level. For instance, in this way one can analyze situations of managerial deficit present in virtual organizations by implementing the use of the 'net-broker concept.' Finally, the way information flows and is processed within an organization depends on the media technologies used. The way people interact and share information through a computer-mediated communication channel depends on the social context of the used media technology. We intend to illustrate this point in the emerging patterns of weak ties in virtual organizations.

1. INTRODUCTION

Networks today are ubiquitous, from social connections with and between groups of friends and acquaintances to business associations with co-workers and organisations. Members of networks, both as groups and as individuals, maintain ties and information exchange channels between themselves. Examining these connections on different levels paints an interesting picture of how information exchange processes operate. Relating micro-level relations with macro-level models when examining interactions has proven to be a productive way of bridging the gap between the two areas from a sociological perspective (Granovetter, 1973; 1982). Granovetter's work has brought to the forefront weak ties and their meaningful role in the dissemination of information within networks and his theory on the strength of weak ties has provided a foundation upon which many emerging perspectives are building (Friedkin, 1982; Marsden & Campbell, 1983; Feldman, 1987; Pickering & King, 1995; Constant *et al*., 1996; Wellman, 1992; Garton & Wellman, 1995; Haythornthwaite *et al*., 1995; Garton *et al*., 1997; Haythornthwaite, 1998).

One way to study network dynamics is Social Network Analysis (SNA). It examines patterns of relationships between actors within their networks. Relationships and not, for example, social status, are used to group individuals and search for emerging patterns of information exchange between them. The proliferation of Computer-Mediated Communication (CMC) adds another dimension to social network analysis. Electronic mail, for example, is one of many tools being used and studied increasingly in relation to communication processes, particularly in an organisational context. These ideas take on a particular interest when applied to virtual organisations (defined in section 3).

Electronic mediation of activities also produces brokerage effects (Kraut *et al.*, 1998). Fernandez & Gould (1994) refer to the net-broker concept and hold that it revolves around the idea of one being in a position that connects otherwise disassociated actors in a network. It is a useful model for not only improving comprehension in creating analytical types, but for facilitating analysis of certain kinds of social activities

The way in which technologies are adapted by and used in an organisation is greatly dependent on the social context in which they are employed (Haythornthwaite, 2000). E-mail in particular helps to maintain and cultivate weak ties within and between networks (Feldman, 1987; Pickering & King, 1995). Granovetter (1973) and Feldman (1987) suggest that weak tie associations like e-mail have a conceivable effect on behaviour formation used to achieve information circulation within a network and its structure.

The structure of this paper is as follows: first, we will give an overview of social network analysis, adding in the relevant issues of tie strength, and CMC. Next, we will examine virtual organisations. In particular, the concept of virtualisation, net-brokerage, and how the above topics apply in a virtual environment. Finally, we shall conclude with a discussion and suggestions for further research.

2. SOCIAL NETWORKS

A social network is a set of actors and relations occurring among them. Actors can be individual people, groups of people, objects or events as far as certain relations hold them all together. Each kind of resource exchange is considered a social network relation and actors maintaining the relation are said to maintain a tie. The strength of a tie may range from weak to strong depending on the quantity, quality and frequency of the exchanges between actors (Marsden & Campbell, 1984).

2.1 Social Network Analysis

The very idea of the social network approach is that relations or interactions between actors are the building blocks that sustain and define the network (Wellman, 1988; Wasserman & Faust, 1994). Typically, interactions between actors result from exchange of resources, either material or informational, such as goods, money, information, services, social or emotional support, trust, influence etc.. Patterns of who is tied to whom reveal the structure of the underlying network: they show how resources flow among actors and how actors are interconnected in the network. A few very well known examples of social network analyses are: Granovetter (1973, 1974) who investigated exchange of job information among acquaintances and found that weak ties are operationally strong for the diffusion of such information. Wilson (1997) also found that the urban poor in isolated Black ghettoes lack connections with sources of work. Finally, Burt (1992) studied the dependency of social capital on 'structural holes' (which are particular kinds of network positioning in which a focal actor is connected to other actors who themselves are not connected with one another); thus, according to Burt,

social capital is not a direct attribute of actors but rather of their ability to sustain flexible configurations within a network.

Computer networks and in particular the Internet, have clearly become social networks (Wellman *et al*., 1996). In these social systems, actors may be human, such as information producers and consumers, or non-human such as computer machines and multimedia resources. Relations among the human Internet actors refer to informative and communicative uses, access, provision, procurement, commerce, work, education etc. Although human actors are always beneath the non-human ones,[1] typical relations among the latter consist of information (data) flows, traffic, exchanges of e-mails and postings in web pages, links, connections, network topologies etc.

In this way, there are applications of social network analysis to study the Internet such as: Garton, Haythornthwaite and Wellman (1999) tried to assess the role of e-mail and desktop videoconferencing within the context of overall communication. Haythornthwaite (2000) also collected data from four computer-supported distance-learning classes in order to build a picture of the size and composition of personal online networks. Lastly, Haythornthwaite (2001) has studied the strength of interpersonal ties among new media communicants arguing that, when the medium changes, weak ties are more vulnerable to dissolution while strong ties remain more robust. Studies have found that weak ties sustained by only one form of media, such as e-mail, are in danger of being cut off if that media changes or becomes unavailable (Haythornthwaite, 2001). If only one channel of communication is available, it follows that a tie is susceptible to extinction should that channel be altered or taken away.

2.2 Strong and Weak Ties

Tie strength is dependent on the quantity, quality, and frequency of knowledge exchange between actors and can vary from weak to strong (Marsden & Campbell, 1984). Increased frequency of communication and deeper, more intimate connections characterise stronger ties. Strong social ties, for example, will be between close friends and family members, while weak ties exist between acquaintances and business associates. Strong ties are considered more useful in facilitating the flow of information between individuals (Haythornthwaite, 1996). Weak ties, on the other hand, are of greater importance in encouraging exchange of a wider variety of information between groups in an organisation (Granovetter, 1973; Friedkin, 1982). People with few weak ties within a community, according to Granovetter, will become isolated from receiving new information from outside circles and will be resigned to hear the same re-circulated information within their own clique comprised of close friends (Granovetter, 1982; Haythornthwaite, 2000). A weak tie link between strongly tied groups is referred to as a local bridge (Granovetter, 1973). A local bridge is a good example of weak ties in action. Weak ties contribute to social solidarity; the greater the number of local bridges in a community, the more cohesive the community (Granovetter, 1973).

Weak and strong ties have different effects on the probability of information flow within a community. Weak ties are more effective in promoting the probabilities of exchange of resources with members of other departments within an organisation, while strong ties are more important for the probabilities of resource exchange for members of the same department (Friedkin, 1982). According to Friedkin (1982) the mix of weak with strong ties results in the highest probabilities of information exchange. From an

[1] Some have been attracted by the idea that in a complex heterogeneous translation, network agency can be performed by both humans and machines. This is the dogma of the 'Actor Network Theory,' in which the development and stabilization of scientific and technological objects (facts and artefacts) results from the construction of heterogeneous networks as concrete alignments between human actors, natural phenomena and social or technical intervening aspects (Callon, 1986; Latour, 1987). However, not everybody would subscribe to these ideas; for some this is a controversial theory and serious objections have been raised against it (Collins, 1994).

organisational perspective, CMC adds various optional channels with which individuals may communicate. These functions underlie social structure, collaborative decision-making and problem solving within an organisation (Granovetter, 1973; Feldman, 1987).

2.3 Computer-Mediated Communication and Social Context

Circulation of information and knowledge is important within the bounds of an organisation. Knowledge in and of itself facilitates a deeper and clearer understanding of an organisation by its members. Altering communication channels changes the competence of the processes that set an organization into motion (Pickering & King, 1995). Exchange of information between members of an organisation and even between different organisations is often carried out informally. This method of sharing data also develops with the influence of the local culture and its needs (Haythornthwaite, 1996). The extent to which CMC is utilised within and between groups is largely dependent on both group and organisational influences (Garton *et al*., 1997).

Communication mediums, however, need to be readily available to users in order to be truly adapted and assessed for their nature; if a resource is only partially accessible then frequency of use may be due not to the instrument itself but to other factors including accessibility. Along the same vein, if a system of communication is widely used then its adaptation becomes necessary for all wishing to communicate with members using this medium (Garton & Wellman, 1995). Haythornthwaite et al. (1995) refer to a study by Markus et al. (1992) which found accessibility of a medium and of individuals via that medium coupled with pressure from the local culture to adapt particular media influenced differences in organisational use of media such as e-mail, thus suggesting that group norms can dictate practice. In addition, when computer-mediated communication is employed, the way in which the information is shared depends greatly on the social context in which it is used. In a study by Haythornthwaite (2000) on groups of students participating in distance learning classes, it was found that looking at the profiles of groups of students who had varying frequencies of communication (from high to low) showed that different kinds of relations and media characterise ties. This is also illustrated in the way in which e-mail is adopted and utilised in organisations. Cliques with strong ties use more media to maintain their relations than do groups weakly tied to one another (Haythornthwaite, 2000).

3. VIRTUAL ORGANISATIONS

The definition of a virtual organisation in the literature varies, and has no uniform meaning. For example, a study done by Kraut *et al*. (1998, p. 2) suggests that "virtual organizing is a matter of degree." One definition of virtual organisations given by Laudon & Laudon is, "organisations using networks linking people, assets and ideas to create and distribute products and services without being limited by traditional organisational boundaries or physical location" (Laudon & Laudon, 2000). We will refer to this definition for the purposes of this paper.

A firm may choose to go virtual for two main reasons. Greater efficiency gained by obtaining goods and services from specialised manufacturers (Davidow & Malone, 1992) is one. The second reason is that use of information technology will reduce transaction costs (Malone, Yates & Benjamin, 1987).

The degree to which a company virtualises depends on what proportion of its important manufacturing procedures, for example, take place beyond conventional organisational boundaries (Kraut *et al.*, 1998). There are pros and cons for a firm wanting to send activities outside its own walls. Different transaction costs will be incurred. If more than one specialised company offers its services, the most efficient one may be

utilised, and the greater the number of offers, the less the chance of the firm falling prey to opportunistic behaviour (Kraut *et al.*, 1998). However, going virtual creates new transaction costs to consider. Governance will come at a higher price when goods and services are bought in the open market rather than produced in-house (Williamson, 1975; 1985; 1996).

3.1 Electronic Network Use and Coordination

Any kind of computer or data network that allows the sharing of information between companies will be referred to as an electronic network (Kraut *et al.*, 1998). Malone, Yates & Benjamin (1987) hold that electronic networks can help reduce the costs of governance. Malone *et al.* refer to the utilisation of electronic networks to increase the number of possible potential suppliers of a product or service as an electronic brokerage effect. This would also reduce the chances of the company facing opportunism (Kraut *et al.*, 1998). Opportunism is not the only problem corporations face. Coordination problems also must be handled. It is argued that because electronic networks reduce the costs of coordination, organisations will therefore use them more often to coordinate processes and thus become more virtual (Malone *et al.*, 1987). These arguments about governance and coordination costs extend to the notion that use of electronic networks will facilitate outsourcing for companies and as a result, they will become more virtual (Kraut *et al.*, 1998).

However, when organisations set up networks first internally and then move outward, they have better knowledge of business methods, are less susceptible to intrusion and can implement technical standards to guarantee congruency (Kraut *et al.*, 1998). Findings by Kraut and colleagues (1998) suggest that increased use of electronic networks by corporations is associated with less virtualisation, not more.

A strong complement to these e-networks is personal relationships. They are particularly valuable in coordinating complex business practices and help to build trust between members of a virtual firm; the formation of trust will also reduce the occurrence of opportunistic behaviour (Granovetter, 1985; Uzzi, 1997; Zucker, 1986). Most probably, these personal connections are in the form of weak rather than strong ties. Electronic management is more important for routine activities (Chan, 1997). In fact, Kraut *et al.* found that, "using electronic networks actually degraded the overall quality of the order process when firms failed to supplement network use with personal relationships (1998, p.20). Their data showed that personal relationships and electronic networks complement rather than substitute for one-another.

3.2 Net-Broker Concept

By suggesting the term of broker(age) as an entrance in analysing the social relations created by new media we hope to be able to advance the theoretical and practical understanding of the constitutive characteristics of knowledge societies. The term broker(age) has been defined in recent network analyses as "the occupancy of a structural position that links pairs of otherwise unconnected actors" (Fernandez & Gould, 1994). It resembles the idea of network actors or of "nodes: a person, group, organization, thing, event, and so on, linked to other in a network.... sometimes referred to as a node" (Emirbayer & Goodwin, 1994). In different historical periods types of brokerage emerge with considerable consequences both for organizational policies and strategies, as well as collective and individual actions. The advantage of such an approach is that it not merely enhances our theoretical understanding in creating analytical types but that it also makes possible a methodological translation of such categories to analyse specific types of actual social activities.

Brokers can further be linked with one another into more or less complex systems and networks with more or less definable boundaries setting communicative "agendas". One may even think of the legal system from this point of view of a broker system as it falls upon the juridical system to translate sets of issues into practical-legal actions. In the study by Fernandez and Gould referred to earlier, five types of (structural) brokerage are distinguished: liaison, representative, gatekeeper, itinerant broker, and coordinator.

The liaison is a brokerage relation in which all three actors occupy different groups. A typical example is the "arbitrator" between union and management negotiations (p. 1458). A second type of brokerage is the representative created "when one member of a subgroup takes it upon itself or is given the role of communicating information to, or negotiating exchanges with outsiders" (p. 1457). Such a situation is to be found when e.g. a leading firm of industry were to act as a spokesman for the rest of the industry in discussions with ethical committees or with the government. A third type is the gatekeeper role in which an "actor screens or gather resources from the outside and distributes them to members of his or her subgroup" (p. 1457). In the case of public policy, various relevant Ministries or else public associations often act in such gate keeping roles. The itinerant broker is the one where an intermediary actor mediates exchange of information between two principals belonging to the same subgroup. The fifth and last type of structural brokerage is found in a situation where all three actors belong basically to the same group. Fernandez & Gould label this type a "local broker" or "coordinator".

4. DISCUSSION

We have examined social networks, their analysis and the interplay of weak and strong ties within systems for knowledge exchange. We have also looked at electronic networks as social networks for information exchange and brokerage effects that may aid operations. When an organisation chooses to go virtual, it is more effective to observe the degree of virtualisation rather than a black or white view of virtual or not. The helpful personal relationships that Kraut *et al.* found balance use of electronic networking are weak ties in action. More to the point, they play the role of local bridges between strongly tied groups (each collaborating organisation).

Social network analysis is a valuable tool for understanding how information makes its way from one member to the next within a single corporation and between networked firms. With an improved understanding of how communication channels develop within and between organisations, information specialists will be better equipped to alter routes of knowledge exchange for the improved communication between networked individuals (Haythornthwaite, 1996).

Weak ties are necessary to prevent fragmentation of communities and facilitate the spread of new ideas (Granovetter, 1982). Findings by Kraut and colleagues (1998) support the idea that weak ties are facilitators of information exchange, particularly when electronic networks are being used. Our understanding of the many facets of CMC within a work-context will deepen as more research is done in the area of CMC and organisations.

On a theoretical level, it remains unclear how utilisation of electronic networks relates to the use of personal relationships and the degree of virtualisation (Kraut *et al.*, 1998). On one hand, governance and coordination of activities are vulnerable to human error when these actions rely on personal relationships; on the other hand, these personal ties may lead to reduced costs for governance and coordination if they pave the way for trust formation and exchange of favors (Kraut *et al.*, 1998). Furthermore, empirical findings are limited, and the dominant theory in the literature is that use of electronic networks leads to increased efficiency and therefore greater satisfaction of suppliers with

which they are used (Kraut *et al.*, 1998). The underlying assumption here is that governance and coordination are more complicated between organisations than within the same company and that electronic networks close this gap. The problem with this logic is that traditionally, organisations test things out first inside their own walls and then extend them outside. In this instance, use of electronic networks within a firm will lead to increased know-how of business practices and opportunity for standardisation of routine activities. If this happens, then use of electronic networks within a corporation should lead to greater internalization of production, and therefore less virtualisation (Kraut *et al.*, 1998).

A suggestion for further research into this area is to consider the social characteristics of people, what resources are made available to them in line with their position in the organisation, the interaction between current on and off-line relationships as well as social relationships and how they function in relation to electronic networks (Wellman *et al.*, 1996).

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