Chapter 3

What Do We Know about Proximity and Distance in Work Groups? A Legacy of Research[1]

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Summary

Significant increases in the geographic distribution of work have been touted widely. Yet a large body of evidence suggests that close proximity is beneficial to relationships and group interaction. We examine these benefits through the lens of research on the mere presence of others, face-to-face communication, shared social settings, and frequency of spontaneous communication. Technological and organizational remedies for the absence of these factors in distributed work groups are popular but often problematic. We propose that communication technology is more likely to be effective when groups are cohesive than when they are not, and that structured management (as well as technology) is likely to be needed in groups lacking cohesion.

"Collaboration is a body contact sport." The researcher who said this during an interview believes, as many do, that people's physical proximity has a tremendous impact on their ability to work together. There is considerable support for this belief in the academic community as well. Research harking back fifty years has demonstrated that close proximity between people is associated with numerous emotional, cognitive, and behavioral changes that affect the work process for the better. In this chapter, we describe these findings, discuss reasons why proximity has been thought very good for group functioning, and consider how well people adapt to working apart. Our purpose is to stimulate discussion on fundamental problems in the psychology of distributed work and the management of distance.

What Is Proximity?

Proximity refers to the physical distance between people measured in units such as inches, meters, or miles. In the research literature, however concepts like "proximity," "physical distance," "collocation," and "dispersion" have been operationalized differently over time (Monge & Kirste, 1980; Monge et al., 1985). Four and five decades ago, the dominant model of group dynamics was the small group framework of Kurt Lewin and his students (see Forsyth, 1998, pp. 1-24). Groups studied within this framework typically were collocated. A social psychologist in the 1960s, when speaking of proximity, might be talking about the seating arrangements at a table of diners, a jury, or a committee (Strodtbeck & Hook, 1961; Howells & Becker, 1962). During this same decade, the dominant model of organizations was driven by the production framework (e.g., Thompson, 1967), in which the proximity of workers typically was defined and dictated by work flow, task interdependence, and coordination needs (e.g., Kmetz, 1984).

Recent views of work groups are more differentiated. Researchers are studying online work groups, whose members meet rarely or never (see Walther, 2001 [chapter 10]; Moon and Sproull, 2001 [chapter 16]) as well as teams that are collocated, but for reasons of mutual learning and support rather than workflow (e.g., Liang, Moreland, Argote, 1995; Olson, Teasley, Covi, & Olson, 2001 [chapter 5]). Theorists of organization have embraced the idea that work groups can be strategically designed and distributed (or redistributed), to take advantage of changing resources and opportunities, including social network relationships (e.g., Eccles & Crane, 1988). Today, proximity might be defined in many ways—as the hallways and buildings separating work group members, the number of different locations in which people work over time, or the distance of members, units, or sites from headquarters (see, for example, Finholt, Sproull, & Kiesler, 2001 [chapter 15]). A technologist developing an application for "virtual proximity" might not care about users' actual proximity at all, but rather about their perceived proximity—there is even a journal on this topic called Presence: Teleoperators and Virtual Environments (MIT Press).

Our review of research on proximity is necessarily dominated by researchers' and practitioners' changing perspectives on groups, work, and technology rather than by a fixed definition of proximity. For example, as many organizations have grown in size and complexity, researchers have focused increasingly on how coworkers can collaborate in a distributed work environment (Kraut, Egido, & Galegher, 1990).

Despite researchers' changing perspectives on proximity over time, some rules of thumb seem evident. First, it seems clear that closer proximity among people has beneficial, but nonmonotonic, effects on interpersonal relations and group functioning. At nearly zero distance,

people in most situations are very uncomfortable. Generally, we only want to be extremely close to people we already like a lot (Freedman, 1975). People are most comfortable when they are a few feet from others—the number varying a bit depending on culture, relationship, and task (Sommer, 1969).

The first major response to greater distance occurs when people move, or are placed, outside the presence of others. Once people are no longer collocated, then direct observation and face-to-face conversation is difficult or impossible. A lack of observation and conversation poses problems for many groups trying to make decisions or work together. Alternatively, the absence of others aids people who want to work autonomously and without interruption, and those who value privacy and personal space. People tend to feel more comfortable in private than public spaces (e.g., Baum & Davis, 1980).

The second major response to greater distance occurs when people move or are placed, not just out of one another's immediate presence, but also sufficiently far away that the costs of getting together are markedly increased. When employees work at locations more than approximately 30 meters apart, they have much reduced daily contact and less frequent informal communication (e.g., Allen, 1977; Kraut & Streeter, 1995). Physical separation from other employees in daily life and work drastically reduces the likelihood of voluntary work collaboration (Kraut, Fussell, Brennan, Siegel., 2001 [chapter 6]).

We turn now to the mechanisms behind these two major responses to changes in proximity. That is, why is it often important to be able to work in the presence of others, face-to-face? Why might we need to share social settings and run into co-workers in the course of a day or week? Are there any clear "wins" for group work at a distance? If we are to evaluate the

benefits and costs of distributed work, we need to have the answers to these questions. We discuss them below, and provide a summary table of concepts and findings (see Table 3-1).

Insert Table 3-1 about here

Effects of the Presence of Others

In the earliest studies of groups, researchers noted a "social facilitation" effect (for a review, see Forsyth, 1998, pp.272-277).) That is, when people are in the presence of an audience, coworkers, or even others doing unrelated tasks, their performance changes. When people are working on well-learned or easy tasks, the presence of others increases their alertness, motivation, and speed. However, when people are working on difficult or unlearned tasks, the presence of others can be distracting, reduce accuracy, and increase feelings of stress (Zajonc, 1965).

The presence of others seems to increase a person's concern with what others think and increase their involvement with the group and the group's activity. When people are in others' presence, their heart rate and blood pressure increase, and they breathe more quickly (e.g., Walden & Forsyth, 1981). Members of the audience at a live performance enliven one another (an effect simulated in the television laugh track). People in face-to-face meetings command one another's attention and feel involved with group tasks. The attention we pay to those present tends to make our interactions with them more memorable than our interactions with those far away (Latane, Liu, Nowak, & Bonevento, 1995).

The presence of others increases conformity through its effect on felt surveillance and social pressure. In the famous Milgram experiments (e.g., 1974), when an experimenter and subject were in the same room, about 65% of subjects obeyed the experimenter's command to

give 450 volt electronic shocks to a “poor learner” (a confederate). However, when the experimenter left the room and gave his commands by telephone, only 20% were obedient to the 450-volt level. Milgram also tried changing the proximity of the subjects to the victim. When the subjects were seated right next to the victim, only 40% of the subjects were obedient and shocked the victim to the 450-volt level. Thus if the experimenter was close to the subjects, his authority was strong, but if the victim was close to the subjects, then the victim’s protests over-rode the demands of the experimenter. Bibb Latane and his colleagues developed a theory of social impact that has, as one of its main premises, that people who are proximate have more impact (Latane, 1981). Proximity increases social impact, such as obeying someone’s request to sing loudly, contribute to a charity, give a large tip, or do a favor or expend effort for the group. Likewise, in a group, free riding (letting others do the work) is minimized when members are proximate and each member’s contribution to the group project can be clearly identified (e.g., Hardy & Latane, 1986). A similar observation has been made in game theoretic discussions of cooperation. The ability to observe others directly increases the chance observers can see people cooperate and learn to cooperate themselves (e.g., Macy, 1991).

Over time, the continued presence of others improves people’s feelings of familiarity with them. This “mere exposure effect” (Zajonc, 1968) has been applied to the liking of people, music, art, and food to which we have had repeated exposure. In a simple experiment, women tasted good or awful liquids in the presence of other women. Between each tasting, some of the women were moved from one tasting booth to another, such that each woman spent 10, 5, 2, 1, or 0 trials with another woman. As predicted, the greater the exposure to another woman, the

more the woman was liked – and the taste of the liquid was irrelevant (Saegert, Swap, & Zajonc, 1973).

In sum, research suggests that the presence of others increases attention, social impact, and familiarity. These effects imply support for the dictum, "out of sight, out of mind," with several implications for distributed work. That is, distributed work that causes people to be out of one another's sight may lead also to their comparative inattention to coworkers, to a lower level of effort, or to an increase in free riding. If getting work done depends on close attention to others—say to make prompt corrections, to help out when work loads are heavy, or to receive hand offs—this inattention, lack of effort, or free riding can lead to delays in the work (e.g., Herbsleb, Mockus, Finholt, & Grinter, 2000). Many people have multiple tasks to do and many roles, with pulls on their attention from many directions. In the absence of coworkers, members are likely to choose tasks with more immediate demands. On the other hand, some distributed work might experience an improvement from the absence of others. For example, if task and reward interdependence are low and the work is complex, working alone should be beneficial to performance, as there would be little distraction from the presence of others and attention to their needs. Journalists authoring articles for their newspapers are an example of such a situation.

Effects of Face-To-Face Communication

In studies of the mere presence of others, researchers prevent research participants from talking with one another because communication always dominates the effects of mere presence. Only a few moments of face-to-face discussion can have huge effects on an interaction. For instance, in one of the earliest studies of competitive games, subjects who were instructed to "win as much as you can for yourself" nevertheless made cooperative choices that helped both players when they

could communicate with their partner. They cooperated on 71% of trials when they could communicate whereas they cooperated on only 36% of the trials when they could not communicate with their partner (Deutsch, 1958). Kerr and Kaufman-Gilliland (1994) showed that group members who were given 5 minutes to discuss an investment game with one another were far more likely to cooperate with the group than were group members who did not have this opportunity – and the effect was not duplicated when group members heard the group discussion but were not able to participate. Indeed there are over 100 studies showing the powerful effect of face-to-face discussion on cooperative choices in social dilemmas (e.g., Orbell, Dawes, and van de Kragt, 1988; see the review by Sally, 1995). These effects are thought to derive both from the commitment people feel when they make social contracts face-to-face, and from increases in group identity that accrue from face-to-face interaction.

Another important role of face-to-face discussion is in coordinating the efforts of a highly interdependent group such as a jury, aircraft crew, coaching staff, or research team (Tushman, 1979; Weick & Roberts, 1993). Heavy use is made of discussion in research and development teams where work is uncertain (e.g., Pelz & Andrews, 1966; Adams, 1976; Allen, 1977; Tushman, 1977). For example, a research team will need to decide what is to be done and how different people and subunits will work together. It will need to agree to a common definition of what they are doing, plan how to hand off components of the work expeditiously, decide who will take responsibility for meeting deadlines, and, in general, mesh the activities of the group. If the group is small and members are physically proximate, effective coordination can occur because the group can talk out problems together, keep all the details of the task in focus, and organize work (e.g., Kameda, Stasson, Davis, Parks, & Zimmerman, 1992**;** Weldon, Jehn, &

Pradhan, 1991). With discussion, group members develop deeper understandings of the task and they have opportunities to observe and learn from one another, though typically they do not reach theoretically maximum results (Steiner, 1972). (Coordination losses result in part from group inefficiency in combining effort and from free riding [e.g., Ringelmann, 1913; Williams, Harkins, & Latane, 1981].)

Face-to-face discussion also is a powerful tool to develop and maintain group culture, authority, and tacit norms (Levitt & March, 1988; Nelson & Winter, 1982). Discussions improve group commitment, socialization, and control. Discussion can overcome severe conflict among team members, as in the case of one U.S. Olympic rowing team (Lenk, 1969). In spite of animosity and disunity amongst the members, discussion led to the formation of coalitions that decided to cooperate with others, and the team won the Olympic gold (see Carron, 1982). In sum, research shows that face-to-face discussion has a strong impact on cooperation through its effects on bonds, social contracts and group identity, and it is the most powerful medium known for coordinating work within an interdependent group. To the degree that a distributed work group lacks chances to talk face-to-face, it also lacks the most direct and easy route to cooperation and coordination.

Effects of Shared Social Settings

Research in the tradition of "social ecology" (Barker, 1968) examines proximity through the template of social settings. Social settings, such as offices, meeting rooms, cars, restaurants, stores, and friends' homes, are associated with behavioral norms, mental schemas, and even scripts that sharply affect the way people act and the expectations they have of others. Mr. Smith's behaviors in a supermarket and in a bar are likely to differ far more across these two

social settings than Mr. Smith's behavior in the supermarket as compared with Mr. Brown's behavior in the supermarket. The strong impact of social settings in shaping behavior implies that people with whom we share social settings also share similar expectations, experiences, and perspectives.

Shared social settings promote the tendency to develop proprietary feelings about physical spaces. People use cues from their own and others' locations, such as functional activities associated with the location, artifacts, physical boundary cues, and physical distance signals to establish territories (Forsyth, 1998, pg. 320). Territories associated with social settings help organize people's social and work experiences (Edney, 1976).

The "shells" or boundaries that surround territories help groups avoid intrusion and interruption; others tend not to invade these spaces even if they are in a public space or path (Knowles, 1973). People start invading group spaces if the boundaries become fuzzy or if the distance among group members becomes large (Cheyne & Efran, 1972). Marking territory not only keeps others out but also increases feelings of ownership about the people in the territory. Hence, territories contribute to group identity, and increase people's satisfaction with their group and their work (e.g., Newman, 1972; Baum & Valins, 1977; Edney & Uhlig, 1977). People with contiguous territories tend to interact and to like one another (Moreland, 1987). Territories also reinforce feelings of privacy, information sources, and ownership of artifacts within the territory.

In sum, research shows that sharing social settings in physical space affects the similarity of people's expectations and experiences, and influences the likelihood of establishing a shared territory. These effects may be important in distributed work for two reasons. First, distance among workers typically means that the shared social setting is at a more abstract or symbolic

level than when workers are really in the same geographic location. Abstract similarities may be useful for some purposes (see Frost & King, 2001 [chapter 1]), but abstractions may present problems in actually accomplishing collaborative work. Second, the natural tendency to establish local territories may interfere with co-workers' identification with the larger collective, such as the distributed project group. Ambiguity of membership reduces group identity (Brown & Wade, 1987; see also Armstrong and Cole, 2001 [chapter 7]).

Effects of Spontaneous Communication

Distances between offices and work locations possibly have their highest impact on group functioning through their effect on informal, spontaneous communication opportunities (Brockner & Swap, 1976; Ebbesen, Kjos, & Konecni, 1976, Hays, 1985; Kraut & Streeter, 1995; Newcomb, 1981). That is, people who work in proximate offices run into one another at the water cooler, coffee machine, and copier. They see one another come and go to meetings. They meet in the lunch room. These casual encounters increase the convenience and pleasure of communication, and they allow for unplanned and multipurpose interactions (see Kraut et al., 2001 [chapter 6]; Nardi and Whittaker, 2001 [chapter 4]). Ongoing work progresses more seamlessly when people communicate often and spontaneously. With spontaneous casual communication, people can learn, informally, how one another's work is going, anticipate each other's strengths and failings, monitor group progress, coordinate their actions, do favors for one another, and come to the rescue at the last minute when things go wrong (Allen & Hauptman, 1990; Davenport, 1994; Trevino, Lengel & Daft, 1987; de Meyer, 1991, 1993; Weisband, 2001 [chapter 13]). When the distance between work places increases to about 30 meters or more, the

amount of contact declines precipitously (Zipf, 1949; Allen, 1977; Kraut, Egido, and Galegher, 1988).

Casual contact is important to relationships. People tend to like and be influenced most by people they encounter and talk with frequently (Festinger, Schachter & Back, 1950; Insko & Wilson, 1977). People receive most of their social support from people who live and work nearby and those with whom they are in most frequent contact (Wellman, 1992). Generally, strong personal ties—ties that are frequent, reciprocal, and extending over multiple content domains—are supported by spontaneous communication that occurs when people are in close physical proximity. Once strong ties are established, they can be, and frequently are, sustained using telephones or email (Wellman & Wortley, 1990).

Today, one hears many stories of people forging close work relationships at a distance through electronic communication; some researchers argue that, over time, electronic communication allows for sufficient spontaneous communication to support the development of new close ties (Walther, 2001 [chapter 10]). However, the evidence thus far suggests that physical proximity, with its many spurs to spontaneous communication, serves this purpose better. Work collaborations are more likely to be created and sustained, and are likely to be more satisfying and productive, than distributed (geographically distant) collaborations (e.g., Orlikowski, 1992; Smith et al., 1994; Kaut et al., 2001 [chapter 6]; Schunn et al., 2001 [chapter 17]).

In sum, research shows that the frequency of spontaneous, informal communication has dramatic effects on the strength of social and work ties, and on the evolution of activities that people do together and functions they serve for one another. These effects imply that distributed

workers will have more difficulty forming close collaborations, dealing flexibly with one another, and expanding the breadth of the relationships through a variety of unplanned mutual experiences. It implies that strong ties will be more difficult to forge and to sustain in the distributed than in the collocated work group. Hansen (1999) found that it was more difficult to transfer complex knowledge from one location to another when ties were weak.

Remedies for distance

In centuries past, traders, sailors, explorers, and diplomats maintained relationships with distant colleagues, coworkers, sponsors, and supervisors (Frost & King, 2001 [chapter 1; O'Leary, Orlikowski, & Yates, 2001 [chapter 2]). Today's group and organization, however, has far more options to support distributed group work and remedy problems of distance.

Communication Technology

Networked communication technologies, especially email and telephone, seem to offer a substitute for face-to-face communication (e.g., Sproull & Kiesler, 1991). In this regard, many researchers have examined whether mediated communication differs from face-to-face communication (e.g., De Meyer, 1991; Kraut, Galegher, & Egido, 1990; McGuire, Kiesler, Siegel, 1987; Siegel, Dubrovsky, Kiesler, & McGuire, 1986; see Walther, 2001 [chapter 10]). In laboratory studies during the past two decades, researchers typically compared participants who made decisions or solved problems in the presence of others and face-to-face, or separated, using email or other technology to communicate. In studies outside the laboratory, researchers typically examined the relationship of the amount of mediated communication use with some outcome variable such as work satisfaction or performance.

Many consistent communication benefits and costs have been demonstrated in the use of mediated communication. Technologies like the wired and cell telephone are awkward for group conversation but facilitate many other work tasks at a distance, such as scheduling, interviewing, talking over a problem, and touching base (Short, Williams, & Christie, 1976). Email is convenient for including many people in consideration of a plan or document, for carrying on multiple discussions asynchronously, for staying in touch, and for encouraging participation in group decisions (Kiesler & Sproull, 1991).

On the negative side, as many of us have discovered, email seems to encourage ever more communication and therefore is time consuming. Theories such as social presence and media richness posit large costs to mediated communications because of their low bandwidth (e.g., Daft & Lengel, 1984; 1986; Short, Williams, & Christie, 1976). All mediated communications constrain backchannel feedback to promote mutual understanding, and they limit paralinguistic cues to soften or emphasize verbal information (see Krauss, Garlock, Bricker, & McMahon, 1977). Mediated communications also may discourage effective conversational strategies, such as small talk that precedes and personalizes one person helping out another, or Socratic questioning in which one person leads another to adopt a new idea, or implicit learning of social conventions (see these points developed in Mark, 2001 [chapter 11] , and Nardi and Whittaker, 2001 [chapter 4]). Perhaps as important, mediated communications do not facilitate companionship – people doing things together. It is still hard to attend a conference or have a meal or go on a bike ride with someone by telephone or email.

Nonetheless, people seem able to adapt these technologies to their activities over time. Some distributed groups develop a strong group identity despite the limitations of email

(Walther, 2001[chapter 10; Armstrong & Peter, 2001 [chapter 7, addendum]). We do not know, however, whether long-term collaborations, in these instances, depend on at least occasional face-to-face contact (see, for example, Schunn et al., 2001 [chapter 17]). The strongest and most active collaborations seem still to be proximate ones.

In sum, many distributed work groups adapt their interactions well to today's communication technologies. These technologies allow for the exchange of work information without face-to-face communication and for spontaneous communication. However, because of the lack of real and perceived presence of others and lack of shared social setting, these technologies do not necessarily encourage communication. The style of communication in electronically-sustained work groups is likely to be somewhat less mutually attentive, less companionable, less frequent, and more effortful than when the team is nearby and talking face-to-face. Computer-based technology today allows distant co-workers to exchange an ever-increasing variety of information—documents, funds, drawings, advice, schedules, votes, and so on. It has been shown that the mediated exchange of information about coworkers' skill can be effective in promoting joint performance as when the coworkers are actually trained together (Moreland & Myaskovsky, 2000). However, it remains unclear how well these technologies can sustain ongoing work that requires close collaboration. One possibility, which we address at the end of this chapter, is that the use of communication technology is likely to be most successful when work groups have already forged close relationships, so that the existing feelings of alliance or commitment sustain motivation.

Structured Management

In recent decades, practitioners and scholars have argued that work can be designed for the situation (e.g., Hackman & Oldham, 1980; Wageman, 1995). In software development, for example, modularization or task decomposition (Parnas, 1972) rationalizes the work, and standard procedures for version control prevent conflicts in code. Task decomposition and version controls help people understand their goals and those of others, reduce errors, and reduce the need to redo work.

Structured management approaches have been applied to distributed work, as well, because they are theoretically an efficient alternative to face-to-face and spontaneous communication under conditions of complexity and uncertainty (Aldrich, 1979; Downs, 1967; Cyert & March, 1963; March & Simon, 1958). Instead of having to talk repeatedly about what each person should do, for instance, task decomposition allows a team to divide its work into manageable chunks. The members of the group, then, can work autonomously and hand over work according to a standard procedure. It should not be surprising, therefore, to find that recent solutions to effective teamwork in distributed software development have emphasized these methods (Moon and Sproull, 2001 [chapter 16]).

Task decomposition and standard procedures for administration can promote autonomy and independence of decision making, which, in turn, can reduce role ambiguity and increase local innovativeness (Johnson et al., 1998). Evidence from an extensive comparison of automotive product development teams suggests that one reason Japanese teams did well is that the managers of these teams had greater authority and independence than American and European managers did (Clark, Chew, & Fujimoto, 1987). In distributed software development, each phase

of the work cycle from planning through operation and maintenance can be done independently but deliverables are subject to review before they are passed on. Thus it is specified what is being delivered at each stage and how the deliverables can be tested or scrutinized to ensure that they do what they are supposed to do. All official project documents also may be under review. As well, groups can adopt naming conventions that must be adhered to project-wide. Perhaps they also agree that code cannot be written without design reviews, designs cannot be tested before design walk-throughs, changes cannot be made without issuing a modification request, no piece of code goes to system test without an integration test.

Structured management is far from a panacea, however. Grinter, Herbsleb, and Perry (1999), in their recent study of distributed R & D, describe problems of coordination, trust, and information exchange in projects that used four different modularization designs—organization around functional areas, products, customers, or process steps. All of these projects experienced problems in coordination, and in each of the projects, workers at distributed sites often lacked the expertise they needed to do their work. For example, when work was distributed by functional area, employees at each site did not have critical knowledge about other functional areas. Another problem was that employees at sites that were distant from the core work site missed much of the spontaneous communication that moved the work forward:

> For satellite sites. . . it is difficult not to be constantly surprised. Not having access to the corridor conversations, people at remote sites may have no clue about what is happening until a decision has formally been made. Potentially serious problems flow from this. For one, decisions that seem relatively unimportant to the central site may affect the satellite in significant ways, simply because the issues are not obvious to the

‘center.’ Even when there is no single ‘killer’ consequence of a decision, the cumulative effect of many surprises can be substantial. As one manager of a satellite site remarked, it is as if you are ‘fighting upstream instead of going with the flow.

As this study shows, structured management reduces some of the uncertainty of distributed work, but does not solve all the problems of distance. Moreover, formalization itself can place an extra burden on the group by increasing the need for a coordination infrastructure: clerical and management staff, training, reporting, and archiving. The care and feeding of bureaucracy can become more significant to employees than the ultimate goals they are supposed to accomplish Management sometimes uses standardization and rationalization of tasks to increase control, which can sap motivation. Structured management also might impede innovation by limiting the options explored by a work group..

Another disadvantage of structured management as a coordination strategy is that it can depersonalize interaction. For instance, with task decomposition, team members, or subgroups on the team, have different roles. Team members or subgroups working on their own tasks tend to develop divergent perspectives and habits of work (e.g., Brewer & Kramer, 1985; Tajfel, 1982). They may have little opportunity and eagerness to learn from others in the team, impeding the exchange of expertise and discovery (Newcomb, 1961; Faunce, 1958; Festinger, Schachter, & Back, 1950; Monge & Kirste, 1980; Jablin, Putnam, Roberts, & Porter 1986). Task decomposition can exacerbate demographic or skill differences that existed at the start (Jablin, 1979; Sykes, Larntz, & Fox, 1976; Monge, Rothman, Eisenberg, Miller, & Kirste, 1985).

A Hypothesis

Good work group performance often depends on (a) coordination of the individual efforts of members, and (b) cohesiveness of the group. Coordination and cohesiveness seem particularly important when the work is complex and "disjunctive"—where everyone in the group must solve a problem and agree to a single solution—but other work tasks also benefit from coordination and cohesiveness (for example, voting on a decision, in which each person's contribution adds legitimacy to the whole). Distributed work seems prone to both coordination and cohesiveness losses for the reasons we have reviewed and summarized in Table 3-1.

Furthermore, many distributed groups, at the outset, are likely to suffer not just from physical distance but also from social distance—a lack of group identity, or social diversity of the membership (Hinds & Bailey, 2000). For example, the decision to create a distributed work group might have been motivated by employees' geographic dispersion. With geographic dispersion often comes social and cultural diversity. Social and cultural diversity can make it harder for people to form friendships and to organize themselves, and can increase relationship conflict in groups (Orlikowski, 1992; Olson & Teasley, 1996; Pelled, Eisenhardt, & Xin, 1999; Smith et al., 1994); Jackson, May & Whitney, 1995; Moreland et al., 1996; see Mannix, Griffith, & Neale, 2001 [chapter 9]).

Task or cognitive diversity may result also when people with appropriate expertise, organizational experience, or credentials of people to do the work are geographically dispersed. Diversity in skill or technical background does not always boost performance in groups (Tziner & Eden, 1985), but management often believes that a mix of expertise increases creativity and know-how devoted to the task (Pelz & Andrews, 1966; Peterson & Nemeth, 1996). However, to

integrate this diverse expertise, the group must resolve differences of opinion, perspective, and expectations. Distributed work groups might do this poorly (e.g., Williams & O'Reilly, 1998; Mannix et al., 2001 [chapter 9]). Certainly they are less likely to try when they begin as strangers or with a strong sense of social distance (Gruenfeld, Mannix, Williams, & Neale,1996).

We hypothesize that the effectiveness of remedies for physical distance in work groups will depend on the degree of existing social distance or cohesion in the group. If existing cohesion is high, that is, if the work group members have a strong commitment to the group or to one another, then mediated communication technologies provide a plausible remedy for the lack of close physical proximity. Because the members are committed to the group's work, cohesiveness and motivation to keep in touch are less of a problem than when there is high social distance among members. Members with high commitment can use technology spontaneously to coordinate their work. On the other hand, if cohesion is low, and members do not have a commitment to the group, then the distributed work group faces problems not just of coordination but also of cohesiveness. It seems unlikely that email and other communication technologies would provide a sufficient remedy for a lack of cohesiveness and common group identity. Concerted attempts by some group members might increase the closeness of the group if the task had to be accomplished, but delays would be expected as the group worked through conflict.

We propose that structured management (in addition to the use of technology) may be a necessary (but possibly insufficient) remedy to the lack of physical proximity when a group lacks cohesion. The research reported by Moon and Sproull (2001 [chapter 16]) suggests that if distributed work can be modularized, and if standardized procedures for coordination can be

imposed, then social distance and a lack of cohesion may matter less to the group. Since the members of the group are comparatively autonomous and working within a clear structure, members do not need to adjust all of their work to the ideas of others. They do not need to be friends. They can use communication technology to chat with any group member with whom they have a common interest, but they need not participate in group decision making.

In short, we propose that technology will help cohesive distributed groups manage distance but that structured management, as well, will be needed in distributed groups that lack social cohesion. Other factors will need to be considered as well, of course. For example, Grinter, Herbsleb, and Perry (1999) argue that the selection of the appropriate division of labor should be driven by the hardest coordination problem in the project.

Conclusion

In this chapter, we have reviewed research on physical distance, noting the reasons why the presence of others, face-to-face communication, shared social settings, and frequent informal communication benefit relationships and group functioning. We have discussed the implications for distributed work groups, and the use of communication technology and structured management to address the challenges. We hope to encourage researchers to explore these possibilities.

It seems evident that far more research has been done on the ramifications of proximity than on its causes. Distributed work does not drop from the sky upon hapless groups. Surely it matters whether the antecedents of our collocation or great distance include chance, management decision, personal choice, technology investment, the architecture of the task, or side effects of some other problem such as resource dependence. The absence of an analysis of antecedents in

the literature is worrisome and probably leads us to reify and oversimplify the meaning of proximity and distance in distributed groups. A fruitful task for the future would be a better understanding of the factors that bring us to be engaged in proximate or distributed work.

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Endnotes

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