

19 Social Impacts of Electronic Mail in Organizations: A Review of the Research Literature

LAURA GARTON
BARRY WELLMAN
University of Toronto

E-mail is a communication network operating on a computer network that supports social networks. It combines locational flexibility, rapid transmission to multiple others across time and space, and the ability to store and process information. This chapter reviews research into how e-mail shapes—and is shaped by—organizational structures and processes. Although social phenomena strongly affect the use of e-mail, many discussions of media use have treated it as a voluntary, individual act of matching task to media. They have paid less attention to the influence of organizational power, group perceptions, and social network relations. E-mail provides fewer cues than face-to-face communication about interactions, physical context, or social roles. As this fosters status equalization, there is less awareness of group members' expertise, organizational niche and power, and ascribed characteristics. Under certain conditions, people are more uninhibited, nonconformist, and conflictual when using e-mail; groups are more polarized and take longer to reach consensus. However, groups using e-mail tend to produce more diverse opinions and better contributions to the decision-making process. E-mail increases access to new people; weakens spatial, temporal, and status barriers; and provides access to information that would otherwise be unavailable. When people communicate electronically, work groups become more fluid. People can participate actively in more groups, and those on the periphery get more involved.

DISENTANGLING RESEARCH FROM HOPE AND HYPE

Electronic mail (e-mail) has grabbed the attention of policy and propaganda machines. Major newspapers run at least one story per week about e-mail, the Internet, videomail, and other forms of computer-mediated communication

(CMC). The U.S. government is promising to do for communications in the 1990s what the interstate highway system did for transportation in the 1960s: provide convenient, high-speed, high-capacity text/data highways with reduced accident rates. Corporate use is widespread and increasing at an estimated rate of 32% per year: in 1991 there were 8.9 million corporate e-mail users in *Fortune* 2000 companies, estimated to grow to 15.6 million corporate users in 1993 and 25 million in 1995 (Electronic Mail Association, 1992). Moreover, these figures exclude noncorporate use.¹

All of this activity and visibility has generated much speculation about the social implications of e-mail. The inherently social nature of CMC means that this technology is likely to have both intended and unintended outcomes. The hoped-for advantages of CMC include productivity and efficiency gains; greater organizational communication, commitment, and solidarity; more participatory and egalitarian decision making; better decisions; and administrative and geographic decentralization (e.g., Hiltz & Turoff, 1978; Johnson-Lenz & Johnson-Lenz, 1994; Sproull & Kiesler, 1991b). Yet Jeremiahs have warned that CMC can also lead to increased management surveillance and control, more standardized work, centralized power and loss of branch autonomy, disrupted group processes and decision making, and increased worker alienation (e.g., Clement, 1992; Sproull & Kiesler, 1991a; Zuboff, 1988).

In this chapter we review social scientific research into how e-mail, the most prevalent type of CMC, shapes and is shaped by the social environment. Our goal is to disentangle empirical evidence from speculation. What do we know, as opposed to what do we hope, fear, or want to sell? More than most research reviews, this represents a Sisyphean task. It is impossible to keep up with the proliferation of research, especially because relevant studies are published in many disciplines, and often only in poorly circulated reports and conference proceedings. To keep this discussion under control, we focus on the *social* implications of *electronic mail within organizations*. We want to know about how people communicate with each other electronically within relatively bounded work groups. We look only at the predominant modes of communication: text-based services providing electronic mail among individuals, distribution lists from one individual to many, and computer conferencing among many organization members. We do not pay much attention to other forms of CMC, such as videoconferencing, public bulletin boards, and the sprawling interorganizational connectivity provided by the Internet. Ours is not an arbitrary focus on organizational e-mail; it coincides with the preponderance of CMC research on "computer-supported cooperative work" in North American organizational milieus.²

Correspondence and requests for reprints: Barry Wellman, Centre for Urban and Community Studies, University of Toronto, 455 Spadina Avenue, Toronto, Ontario, Canada M5S 2G8.

Communication Yearbook 18, pp. 434-453

AUTHORS' NOTE: Our research has been supported by the Social Science and Humanities Research Council of Canada and by the Ontario Ministry of Science and Technology (through the Information Technology Research Centre and the Ontario Telepresence Project). We thank the *Communication Yearbook* reviewers and Baljeet Bhachu, Dinutrina Dimitrova, Caroline Haythornthwaite, Emmanuel Hergott, Marilyn Mantei, Gale Moore, and Janet Salaff for their advice and assistance.

SOCIALLY RELEVANT CHARACTERISTICS OF ELECTRONIC MAIL

E-mail is "the entry, storage, processing, distribution and reception, from one account to one or more other accounts, of digitized text by means of a central computer [now becoming unnecessary] and remote terminals connected by a telecommunications network" (Rice, Grant, Schmitz, & Torobin, 1990, p. 28), with the following characteristics (based on Culnan & Markus, 1987; Rice & Associates, 1984; Sproull, 1991):

Asynchrony. E-mail users do not need to be in the same place at the same time. Like telephone communication and regular mail, e-mail transcends space, but unlike face-to-face (FTF) or telephone communication (without voice mail), e-mail also transcends time.³ Although this aids communication across time zones and eliminates telephone tag, it increases uncertainty about if and when a message has been received. Distance is more of a spur to use than time, as many e-mail systems support synchronous conversation.

Rapid transmission and reply. E-mail's rapid transmission of messages, even across continents, supports collaborative work.⁴ Indeed, e-mail devotees often refer to regular postal mail as "snail mail."

Textual nature. The text-based nature of e-mail makes it less able than FTF communication to convey conventional nonverbal social cues. This increases uncertainty about how to interpret messages, more so when they are from strangers.

Dyadic and multiple connections. E-mail may be sent one to one, one to many, or many to many (computer conferencing). Little effort is needed to send or forward messages to multiple sites. Individuals may belong to many groups, and groups can easily expand and contract. Work groups may form for specific tasks and then dissolve, or they may break into smaller groups with all members aware of subgroup proceedings. In many systems, it is as easy to communicate outside of one's own work group as within it, although many organizations keep all e-mail within their boundaries for security reasons.

Storage and manipulation. E-mail can be stored in external memory for future retrieval, searching, editing, and forwarding to others. People can edit their own and others' messages to change their meaning. The historical record of interaction may be used for surveillance of individual and group interactions, to review past decisions (as Oliver North belatedly learned), and to bring new members up to date.

WHEN IS E-MAIL USED?

Task, Perception, and Interaction

Although investigations of the circumstances under which people use e-mail fall under the rubric of "media choice," defining issues only in terms of choice

commits a voluntaristic fallacy by not considering organizational and normative constraints on individual behavior (Fulk & Boyd, 1991). It is impossible to avoid using e-mail when the organization sends all of its important messages on it or when using e-mail is a condition of employment. It is fruitless to send e-mail to coworkers who do not have access to the system or who never use it. In most organizations, e-mail is neither mandated nor rejected, but is one of several ways to communicate, along with telephoning (including voice mail), paper memos, faxing, scheduled FTF meetings, and unscheduled FTF encounters.

Many studies of media choice have looked at matches among the communication needs of a task, the capabilities of a communication medium, and the organization and individuals' perceptions about a medium's appropriateness for that task. Although analysts disagree about the details of task-media matches, some argue that a medium is chosen to reduce *uncertainty* in the absence of information (Rice et al., 1990; Rice & Shook, 1990; Steinfield, 1986). Others argue that *equivocality* is the key to task-media matches (Daft & Lengel, 1986; Daft, Lengel, & Trevino, 1987; Valacich, Paranka, George, & Nunamaker, 1993). Whereas *uncertainty* refers to the need to acquire information to accomplish a task, *equivocality* refers to participants' interpretation of the task itself. Other proposed keys to media choice are *routineness* (the extent of task variation) and *analyzability* (the extent to which persons can describe and complete a task by following known procedures) (Perrow, 1967; Rice et al., 1990).

We fear that this analytic approach has *asocially* concentrated on a single individual choosing among media, without taking into account the social relationships involved in communication. The "social presence" concept expands horizons a bit by including such elements as the ability of a medium to convey awareness of the other person and to support interpersonal relations (Short, Williams, & Christie, 1986). A somewhat similar concept, "media richness," involves the capacity of different media to provide immediate feedback and to support multiple verbal and nonverbal cues (Daft & Lengel, 1984, 1986; Daft et al., 1987). Rich media help participants to understand each other through feedback, multiple cues (similar to social presence), language variety, and personal focus (infusion of emotion and feelings; Daft et al., 1987). By contrast, lean media rely on rules, forms, and procedures. Working before the widespread proliferation of CMC, Daft and Lengel (1986) ranked media in order of richness: FTF, telephone, personal written documents such as letters or memos, impersonal unaddressed documents (e.g., bulletins, standard reports), and numeric documents. More recent research has placed e-mail between personal and formal written text (Schmitz & Fulk, 1991) or in some instances closer to the telephone (Lea, 1991). However, Schmitz and Fulk (1991) argue that the real difference is between FTF and simple alphanumeric text; formal/informal documents, e-mail, and the telephone all tend to cluster in the middle realm of media richness. Although the social presence and media richness approaches consider the capacity of media to support interaction, the rankings attached to these approaches still

assume that individuals operate as isolated rational choosers: assessing a task, appraising media, and making the best match.

Consistent with the task-oriented nature of these approaches, several studies have related the nature of the task to the media chosen to deal with it. One study found that 84% of the managers of a large company preferred to use FTF communication to deal with an equivocal task rather than the telephone, letters, fliers, and the public address system. Of these managers, 62% preferred to use written, addressed communication to deal with unequivocal tasks. Higher-performing managers were more sensitive to the interplay between the nature of the task and the choice of media (Daft et al., 1987). This study did not include e-mail, however. More recently, Rice et al. (1990) found that people use e-mail to deal with complex tasks, often in conjunction with other media. Their findings suggest that much communication is about multiple, complex tasks that are not suitable for simple task-media matching (see also Lea, 1991). Thus Lea (1991) found that the members of a large firm considered e-mail to be similar to FTF and the telephone in terms of spontaneity, and to be an appropriate choice for inconsequential as well as important communication (see also Rice et al., 1990; Rice & Shook, 1990).

As the medium is also a message, analysts must consider the social meanings attributed to a communication medium and the context within which it is used. One study found that managers often communicated face-to-face "to signal a desire for teamwork, to build trust, goodwill, or to convey informality," but they communicated on paper to signify authority and legitimacy (Trevino, Daft, & Lengel, 1990, p. 86). Perin (1991) has noted, "Although top-down policies may first appear on electronic mail . . . , their legitimization depends on being printed out as hard copy that arrives in paper mail" (p. 77).

Such findings raise the matter of how different communication media come to be perceived as appropriate for various tasks. Schmitz and Fulk (1991) propose that media evaluations are formed by social influence as well as by a person's experience and expertise (see also Fulk, Schmitz, & Steinfield, 1990). Under their social influence model, rational choice is only one possible reason people use different communication media. It is through interaction with others that people come to perceive the attributes of specific media as useful for specific tasks. Thus social networks are not only the fruits of interaction; they are also reference groups that define the appropriate use of media (Rogers & Kincaid, 1981).

Social Networks

The presence of a critical mass of users affects the extent to which people use e-mail. For instance, Steinfield (1986) found that people with more e-mail access to others in a large decentralized corporation used e-mail more than did people who had less such access. Those who had e-mail access to people *outside* their own work group were especially likely to use it; access to immediate

coworkers was less important because FTF communication with them was accomplished easily. Another study of a small office showed that those who were more involved in existing communication networks were more likely to follow group norms about whether or not to use e-mail (Rice et al., 1990). Schmitz and Fulk (1991) similarly found that people in the same communication network usually agreed about what medium to use for what purpose.

Substitute, Addition, or Booster?

Does the use of e-mail reduce the use of other forms of communication (a substitution effect), is it an addition to the total amount of communication, or does it also boost the use of other means of communication? One study showed a booster effect: Work groups that used e-mail had a higher level of overall communication than those that did not. This suggests that "the electronic superstructure is not a simple substitute for in-person contact, telephone calls, print correspondence, or any other conventional medium" (Bikson & Eveland, 1990, p. 286). The evidence is not clear, however; another study showed that e-mail use reduced the use of other media: Those groups that used e-mail heavily spent less time in FTF meetings, on the telephone, and exchanging paper memos (Finholt, Sproull, & Kiesler, 1990). Still another study found that frequent e-mail use was associated more with frequent informal FTF contact than with frequent formal FTF meetings, and that e-mail was often used to deal with emotional stress (Haythornthwaite, Wellman, & Mantei, 1994). These findings suggest that it is the way in which e-mail is used, and not the frequency of e-mail use, that affects the use of other communication media.

GROUP PROCESSES

Research into differences between FTF and e-mail groups has looked mainly at computer conferencing, a type of e-mail in which all of a group's messages are available to all members. Most of the work undertaken so far has consisted of experimental laboratory studies of two to five persons, comparing how FTF and computer conferencing groups solve specified problems within fixed time limits. Although some consistent findings have emerged, generalizations have been limited by the diversity of research designs: synchronous/asynchronous, experienced/inexperienced users, specially formed/ongoing groups (see also Culnan & Markus, 1987).

Just as task groups are a primary market for e-mail vendors, research into e-mail's impact on group processes has concentrated on decision making in focused, bounded task groups. Researchers have paid less attention to the use of e-mail to maintain socioemotional relationships (but see Johnson-Lenz & Johnson-Lenz, 1994) or to maintain the routine, nonfocused intercourse necessary to sustain organizational life, and they have paid less attention to diffuse, unbounded relationships that cut across organizations.

Organizational analysts describe task groups as having regular interactions, stable identities, interdependent members, collective orientations toward common goals, motivation to work together, structured interactions based on common roles and norms, and group members who are open to one another's influences. As these criteria were developed for task groups that interact face-to-face, often in a common space where all are accessible to all, analysts have wondered if they apply also to groups using e-mail, whose members are rarely in the same place at the same time. It may be more difficult to maintain group focus and identity when people cannot tell what other e-mail users are doing when they are not signed on or what else they are doing when they are signed on.

Much of this problem-solving-oriented research has focused on the consequences of e-mail filtering out nonverbal cues in communication (Culnan & Markus, 1987). E-mail does not supply nonverbal *interactional cues* to group members, such as eye contact, gestures, nodding approval, frowning, or hesitating before replying. There are no *contextual cues*, either: Participants cannot use seating arrangements to identify coalitions and cleavages, or choose meeting sites to identify the importance or sponsorship of meetings. Because e-mail users typically are identified by name only, people are not constantly reminded of the *social roles* others have beyond the narrow confines of the task group. Users may not be aware of another group member's gender, race, expertise, or organizational position.

The relative absence of such cues can foster extreme language, difficulties in coordination and feedback, problems in reaching group consensus, and group polarization (Goode & Johnson, 1991; Harasim & Winkelmann, 1990; Hiltz, Johnson, & Turoff, 1986; Kiesler, Siegal, & McGuire, 1984; Kiesler & Sproull, 1992). However, e-mail users may use nonverbal cues, either explicitly, by adding status information to their signatures, or implicitly, by their writing style or by forwarding communications to important persons (Walther, 1992).

E-mail's filtering of cues can have positive effects as well. Because of the need for coordinated focus, effective FTF groups can typically accommodate fewer than a dozen members. If more members are needed, FTF groups subdivide or some members become passive. Turn taking is regulated, so that only one person speaks at a time. By contrast, e-mail is less restrictive and can accommodate more ideas from more people. People may offer comments simultaneously and make proposals without a formal sequence. Subgroups can form to deal with particular problems without disturbing overall group focus. Larger group sizes are possible because passive voyeurs are less noticeable.

Status Equalization

In FTF groups, higher-status people talk more than lower-status people, men talk more than women, and managers talk more than subordinates. Those who participate have more opportunities to influence decisions. Because e-mail reduces status cues, status-induced imbalances also are weaker. E-mail can encourage

more open and equal discussion, leading to decisions based on knowledge rather than on the influence of high-status members (e.g., Kiesler & Sproull, 1992). However, we have not found any research addressing the possibility that high-status people may be reluctant to use e-mail because it can diminish their influence.

Members of e-mail groups tend to participate more equally than do members of FTF groups (Kiesler et al., 1984; Rice, 1987; Sproull & Kiesler, 1991a). For example, Kiesler and Sproull (1992) found that when a three-person group held e-mail discussions there was half the inequality in participation than when they talked FTF; for one thing, e-mail users could communicate simultaneously. But more equal participation and reduced status differences do not necessarily help an e-mail group to reach consensus. E-mail hinders the emergence of leaders, and this lack of leadership may inhibit group coordination (Hiltz et al., 1986). We caution that much of the evidence on equal participation and absence of leadership is the product of laboratory experiments conducted with university students, and may not be generalizable to paid-work situations. For example, one study that used respondents who were older than most university students did not find that the type of media used affected the equality of participation. Furthermore, those respondents who were experienced e-mail users tended to be more active participants in FTF as well as in e-mail groups (Adrianson & Hjelmquist, 1991).

E-mail's suppression of differences may extend to achieved expertise as well as to ascribed social status—a caution to those who believe that the lower salience of status on e-mail may lead to more-focused discussions and better decisions. One study found that e-mail significantly equalized both the actual and perceived performance of people with differing expertise as well as those with high and low social status. It was an indiscriminating "muffler" of all differences (Dubrovsky, Kiesler, & Sethna, 1988).

Nonconforming Behavior

In FTF groups, participation and influence are correlated with social status (Berger & Conner, 1973; Ridgeway, 1983; Webster & Driskell, 1978). The process of developing group norms and roles involves both verbal and nonverbal communication. In most cases, it results in movement toward consensus. E-mail's reduction of nonverbal cues and suppression of status information can hinder a group's movement to consensus by fostering nonconforming behavior and disagreement. Even in experimental task groups e-mail is often blunt, with uninhibited "flaming" language such as swearing and insults (Hiltz, Johnson, & Agle, 1978; Siegal, Dubrovsky, Kiesler, & McGuire, 1986). In one study of 54 student e-mail users, Siegal et al. (1986) recorded 34 instances of swearing, insults, and name-calling; by contrast, no such behavior took place in FTF discussions. Another study comparing task performance in FTF and e-mail conditions found

that students were less efficient and more uninhibited while using e-mail (Dubrovsky et al., 1988). This use of uninhibited, often-conflictual language may be related to a lack of visible social control and fewer nonverbal cues to help convey meaning (Sproull & Kiesler, 1991a). Attempts to introduce typographic cues become thin substitutes for nonverbal cues: There is no way to distinguish mild amusement from hilarity with a "smiley," :-). There are few reminders in e-mail of others or of the social context. When cues and controls are weak, people may pay less attention to the presence and opinions of others (Rice et al., 1990).

Some analysts argue that e-mail's speed and ephemerality encourage nonconforming behavior (Kiesler, Zubrow, Moses, & Geller, 1985). Others contend that e-mail encourages deindividuation through reduced self-awareness and increased feelings of anonymity (Siegal et al., 1986). Still others argue that it is inexperience with e-mail, and not the medium itself, that fosters uninhibited language. As groups establish a communication style that includes e-mail, uninhibited language may either decline or become normative (Adrianson & Hjelmquist, 1991). However, some researchers have found a lack of inhibition among experienced e-mail users as well as novices, adults as well as students, and strangers as well as friends (Kiesler et al., 1984).

Group Polarization

Do e-mail's weaker interactional cues and fostering of nonconformist behavior promote the polarizing movement of groups toward more caution or risk (McGrath, 1984)? E-mail groups shift to extreme positions more than do FTF groups (Kiesler et al., 1985; Kiesler & Sproull, 1992; Sproull & Kiesler, 1991a). Less social control and fewer normative constraints in e-mail promote more polarized groups. This may be because e-mail submerges individual identity. However, Lea and Spears (1991) argue that because people have social as well as individual identities, if e-mail submerges individual identities, then group membership should become more important and encourage group polarization. This suggests that it is social network pressure, and not deindividuating alienation, that is important for group polarization in e-mail.

Consensus

With few nonverbal mechanisms to guide e-mail groups, reaching agreement in them is lengthier and more complex than in FTF groups (Adrianson & Hjelmquist, 1991; Hiltz et al., 1986; Kiesler et al., 1984; Sproull & Kiesler, 1991a). It took 4 times as long for a three-person group to reach consensus in a real-time computer conference than in FTF meetings, and nearly 10 times as long for a four-person group that had unlimited time. It took more time to type and to read e-mail than to talk and to listen in FTF meetings. Feedback lags and weak interactional cues made it harder to know how others were interpreting

messages and how confident others were in their positions. People also had difficulty interpreting when the group was ready to come to a decision (Kiesler & Sproull, 1992).

Although both FTF and e-mail groups will initially propose a variety of alternatives and solutions, the process of reaching consensus in FTF groups is usually more gradual and sequential than that in e-mail groups. In e-mail groups, initial and subsequent proposals are less related to each other, and members spend more time and effort reconciling diverse ideas to reach consensus. E-mail groups tend to hold more votes, probably because they converge on decisions more slowly (Kiesler & Sproull, 1992).

Decision Quality

The difficulties that e-mail groups have in reaching consensus do not weaken the quality of their decisions. Indeed, e-mail discussion may increase decision quality by increasing the diversity of opinions presented and considered. In one experiment, participants dealt with a technical problem in which the facts were known, as well as a human relations problem with more ambiguous information. Both the FTF and e-mail groups improved the quality of their decisions after discussing the technical problem. By contrast, although the FTF groups reached agreement about the human relations problem, only one of eight e-mail groups did so. Yet external judges thought that the minority opinions in the e-mail groups tended to be better than those in the consensus FTF groups. These higher-quality suggestions were the result of the greater variety of opinions offered in the e-mail groups (Hiltz et al., 1986).

Another study showed that when e-mail users were isolated from each other, they produced higher-quality and more original ideas than did FTF groups (Valacich et al., 1993). The greater ability of the isolated e-mail users to communicate simultaneously meant that they could focus on the task without the distraction of other verbal and nonverbal communication. Small group research has shown that although the number of opinions given in a group is negatively correlated with reaching agreement in the group, it is positively correlated with the quality of decisions. This suggests that e-mail may produce more communication that aids high-quality decisions, but less communication that leads to consensus (Hiltz et al., 1986).

CONNECTIVITY

Access to New People and New Information

Research into the use of e-mail in actual organizational settings has employed a variety of methods and designs: experiments, ethnographic observation, closed-ended surveys, open-ended interviews, and electronic data collection. Actual

e-mail users interact in organizational contexts, and not in laboratories. Unlike the experimental groups discussed above, their interactions are not focused on one single task concentrated into two- or three-hour time limits. Group membership often fluctuates, people may have prior relationships, and they may be aware of one another's social characteristics and organizational positions.

E-mail extends the number and range of contacts and information in organizations. Many organizations use voluntary and required distribution lists (DLs) that send e-mail messages to many employees. They are a means of seeking and receiving information from a wide range of contacts and groups. In one study, employees in a large corporation received messages from 700 DLs that accounted for 80% of their daily e-mail (Finholt & Sproull, 1990). Respondents reported that these DLs extended their communication reach, supplying information that they would not receive in any other way. Some 58% of DL messages came from strangers, and 68% came from locations outside of the recipients' buildings; 63% of their e-mail came from people external to their department or chain of command. These messages were sent across as well as within DLs, and they helped integrate the firm (Finholt & Sproull, 1990; Kiesler & Sproull, 1988).

Similar evidence comes from a study of an office systems company where most messages were sent to DLs. Almost half of these messages were from people the recipients did not know, and 60% of the messages would not have been received if there had been no e-mail. Messages that respondents felt they were unlikely to have received without e-mail were also more apt to have been sent by people who were spatially or organizationally distant (Feldman, 1987). Similarly, a study of collaboration between scholars located in three countries and two continents found that e-mail aided networking among those who were already acquainted and connected previous strangers who had common interests (Carley & Wendt, 1989; Harasim & Winkelmans, 1990; Schwartz & Wood, 1993).

E-mail links people and work groups over space, time, and group boundaries. The frequently large memberships of DLs help maintain weaker ties. Indeed, the absence of constraining nonverbal cues and social controls may make it easier to communicate with weak ties by e-mail than FTF. Such wide-ranging ties are especially useful for linking heterogeneous people, getting new information, and integrating organizations (Granovetter, 1973; Feldman, 1987; Wellman, 1988). Thus e-mail users in one large multinational corporation reported an improved sense of connectedness with the company and greater access to high-quality information (Rice & Steinfield, 1994). Indeed, some people join many DLs precisely because they don't want to miss anything (Finholt & Sproull, 1990; Rice & Steinfield, 1994). Overload can be a problem: One study of a lab found that those who were responsible for delegating tasks felt in control of their e-mail, whereas those who received orders and could not delegate tasks felt overwhelmed (Mackay, 1988).

Informal Interaction

Informal interactions using e-mail sustain organizational processes and integrate peripheral members (Eveland & Bikson, 1988). In one decentralized corporation, more than half of those surveyed used e-mail at least occasionally to "keep in touch with others, take breaks from work, and participate in entertaining events such as games" (Steinfield, 1985, p. 241). Although task-related use was more frequent, people also used e-mail for play and pleasure. Similarly, Haythornthwaite et al. (1994) found that most members of a research group used e-mail to socialize, and many used it for emotional support.

In one study, Finholt and Sproull (1990) found that the messages in extracurricular, voluntary DLs placed a greater emphasis on fun and symbolic communication, whereas the messages in required, task-related DLs were designed to direct attention, coordinate activities, solve problems, and demonstrate competence. The extracurricular DLs were five times larger and more geographically dispersed than were required DLs. People were more likely to reply to messages in extracurricular DLs, although there was no difference from the required DLs in other measures of activity.

Informal e-mail helps to relieve workplace stress (Steinfield, 1985), to integrate new and peripheral employees into a group (Eveland & Bikson, 1988; Rice & Steinfield, 1994; Steinfield, 1985), and to encourage organizational involvement, cohesiveness, and commitment (Huff, Sproull, & Kiesler, 1989; Kaye, 1992; Sproull & Kiesler, 1991a). Although organizational research has shown that socializing with colleagues on and off the job promotes positive organizational attitudes, research has not yet clearly shown the benefits of socializing on e-mail for performance (Sproull & Kiesler, 1991a). However, Finholt and Sproull (1990) suggest that increased e-mail participation may improve performance in the long term because increased links among employees are useful in times of crisis and participation helps employees build skills and absorb ideas.

Cross-Cutting Group Boundaries

Geography has strongly affected the social structure of organizations, with the plant or the office being a key building block. Even when employees report to superiors located elsewhere, they usually spend most of their time communicating with people working nearby. Yet e-mail can support large, complex, and fluid groups that cut across existing organizational and territorial structures (Castells, 1989; Finholt & Sproull, 1990; Kaye, 1992). Thus Bikson and Eveland (1990) found that department-based communication clusters in the RAND Corporation became more open after e-mail was introduced.

On the basis of these preliminary findings, Bikson and Eveland (1990; Eveland & Bikson, 1988) designed a field experiment to investigate changes in the structure of relationships among 79 high-status men from a large corporation

who were split into two groups: one with access to e-mail and the other without. In the standard media group, people tended to belong to only one subcommittee, and relatively well defined clusters emerged that reflected these subcommittee boundaries. By contrast, the members of the e-mail group belonged to at least two subcommittees, and their interactions were less confined to subcommittees. The e-mail group also had broader leadership and formed a coordinating committee to link various subcommittees. "The technology supplied to the electronic group enabled a much richer and more dense interaction structure than could be supported by the technology available to the standard group" (Bikson & Eveland, 1990, p. 269). Kiesler and Sproull (1992) have noticed similar phenomena occurring with software development teams; they suggest that e-mail has the ability to create in-groups without creating out-groups.

Linking Core and Periphery

As it helps overcome the constraints of geography, e-mail can increase contact between head office and peripheral employees. "Core" and "periphery" can also have a metaphorical connotation, because e-mail has the potential to give low-status people more access to information and organizational power (e.g., Sproull & Kiesler, 1991a). One group has studied retirees who were more organizationally peripheral than continuing employees. Formed into two groups, one using e-mail and one not, those retirees in the e-mail group increased their involvement with other group members more than those in the other group, as measured by name/face recognition, making acquaintances, and frequency of contact. The e-mail retirees went from recognizing less than 10% of their group to recognizing more than 90%. Their contact with group members during two weeks increased from less than 20% to more than 50%, whereas contact between retirees in the non-e-mail group remained at less than 10%. The e-mail group held scheduled meetings, and retirees participated in 75% of scheduled meetings. By contrast, retirees in the non-e-mail group participated in only 19% of their group's meetings, principally because the non-e-mail group held many unscheduled meetings in offices that less than 12% of the retiree members were able to attend (Eveland & Bikson, 1988).

E-mail enables peripheral persons to increase their group involvement, fostering, in turn, a more positive orientation to the group. Thus the originally peripheral retirees had more time than employees to learn e-mail techniques, and they used their e-mail skills as well as their organizational experience and expertise to become central contributors to the group. Although members of the e-mail group initially rated their own performance lower than the members of the non-e-mail group rated their own performance, e-mail group members ranked themselves higher by the end of the project. By contrast, non-e-mail group members lowered their rating of their group's performance over time, with the peripherally connected retirees reporting the lowest evaluations (Eveland & Bikson, 1988).

Similarly, a study of a mid-sized city government found that e-mail use fostered increased participation by peripheral shift workers (Huff et al., 1989). The number of e-mail messages was correlated more strongly with increased participation (a measure of behavior) than with increased feelings of being informed (a measure of attitudes). Correlations with participation and attitudes were stronger for the number of messages sent than for the number received. Because the retirees in the Bikson and Eveland (1990) study were proportionately higher senders of messages than were the current employees, the frequency of sending e-mail messages may be an important predictor of overall organizational participation. By contrast, merely receiving information passively on DLs may not increase participation in organizational activities.

Social Control

Issues of control have been important themes in predicting e-mail's effects on organizations. Sproull and Kiesler (1991a) note the potential conflict between management's desire to maintain control over the organization and the attributes of e-mail that extend traditional communication patterns. They observe that open communication leads to unsupervised information sharing, through which employees might discover more about the company than management wants them to know. Management may fear that employees will use e-mail to organize collective action (Sproull & Kiesler, 1991a, p. 110). Increased connectivity through e-mail can also accelerate the flow of (mis)information, rumors, complaints, subversive communications, and practical jokes. Finholt and Sproull (1990) provide an example of a message circulated in a DL designed to report company news. The message explained how a division would be reorganized, who would have management responsibilities, and how the transition would proceed. Twelve days later, the sender issued another message, apologizing for the April Fool's Day joke. At IBM, an e-mail "gripenet" became the locale of so many organized complaints against corporate practices that management quickly shut it down (Emmett, 1982). Concern over what information is being communicated, and to whom, continues to rattle management's sense of propriety and control. Even when organizations encourage informal e-mail, managers often view it with distrust (Perin, 1991). For example, one corporation's managers monitored messages between professional women who were discussing career options because management feared their discussion would lead to demands for unionization and affirmative action (Zuboff, 1988).

In addition to e-mail's subversive potential, it can also extend managerial control, especially over outlying branches. Sproull and Kiesler (1991a) suggest that attempts to use CMC to strengthen centralized control may lead to organizational conflict. They expect that management practices will change "when people work in multiple groups, when groups are composed of members who collaborate only electronically, and when soft structures emerge without management directive" (p. 160).

CONCLUSIONS

Summary

E-mail is a communication network operating on a computer network that supports social networks. E-mail combines locational flexibility, rapid transmission to multiple others across time and space, and the ability to store and process information. These features make it an attractive tool for organizations that are geographically dispersed, work collaboratively, and are information-intensive. E-mail's technical characteristics condition but do not determine CMC. Changes associated with e-mail are determined by social as well as technical factors: organizational policies on the use of various media, the extent to which organizations support an open communication system, the nature of the task environment, influential users' perception of what media are appropriate for which tasks, and a critical mass of users.

Discussions of media choice within organizations have largely treated it as an individual, voluntary act of matching tasks to media; they have paid less attention to the influence of organizational power, group perceptions, and social network relations. Although e-mail is text based, like writing, in practice it is flexibly used, like FTF and telephonic communication, for complex tasks and spontaneous communication. The medium is also the message: FTF communication may be used to promote goodwill and build trust, e-mail may be used to gather opinions and discuss alternatives, and paper may be used to formalize decisions. It is not clear if e-mail substitutes for, adds to, or boosts the use of other communication media. The nature of interpersonal relationships, social networks, social influence, and organizational power structures all affect how groups and individuals use e-mail.

E-mail provides fewer cues than does FTF communication about interactions, physical context, and social roles. This fosters status equalization, as there is less awareness of group members' expertise, organizational niche and power, and ascribed characteristics, such as age and gender. Under certain conditions, people are more uninhibited, nonconformist, and conflictual when using e-mail to accomplish certain types of tasks. As it is more difficult to interpret the intentions of the sender in e-mail than in FTF communication, misunderstandings are more likely to emerge and more difficult to resolve. Although e-mail groups are slower to develop leaders and reach consensus, their greater range of ideas may produce more innovative and better decisions. To date, the narrow focus of e-mail-related research on decision making has led to the neglect of studies that (a) take into account previous relationships among group members and (b) analyze interactions over longer periods (c) that occur in real organizations where people must (d) simultaneously attend to a variety of (e) tasks and (f) social networks (see Walther, 1992).

It is such social networks that structure flows of resources (including information) in organizations. E-mail increases access to new people; weakens spatial,

temporal, and status barriers; and provides access to information that would otherwise be unavailable. When people communicate electronically, work groups become less fixed entities; they provide individuals with opportunities to participate actively in more groups. It is this participation in e-mail that is the key—not the mere passive receipt of information. The fluidity of communication structures can allow people with expertise to share their knowledge more broadly. Leadership and participation are broader, and those on the periphery get more involved. Information can spread more rapidly and widely than management would like, but the same technology enables those in the core to become more aware of what the periphery is doing. Branch workers may lose their autonomy, and middle managers may become less necessary and even unemployed.

Implications

We suspect that the differences we have discussed here between research focusing on task groups and that focusing on organizational connectivity reflect two ways to organize work (Wellman, 1993). Experimental research on task group performance is more relevant to an *open office* fishbowl, where a small number of densely knit persons work only with each other and are focused on a common goal. They are in a bounded space and have visual, physical, and verbal access to each other. There is little privacy, and it is easy for supervisors and peers to exercise social control. To support virtual open offices, CMC systems must make it easy for people to know coworkers' availability at a glance and to communicate instantly. It would be enough to click on each coworker's icon.

By contrast, research on organizational connectivity is more relevant to the *networking office*, in which workers move between interactions with many others. Such a situation often occurs among professionals who make multiple, often unexpected, contacts with colleagues in their own and other organizations. The Internet is an e-mail example familiar to many scholars. As people move between projects, they move between relationships. CMC must allow them to interact selectively with many of their potential correspondents and to maintain privacy and autonomy. Many design aspects of a CMC system to support this virtual networking office will be different from those needed to support a virtual open office.

E-mail is the precursor to more powerful, multimedia CMC systems with even broader social implications. If CMC brings increased connectivity with individuals and groups across space and time, will this alter the structure of organizational relations and of the social systems in which they are embedded? Will it result in the formation of new groups and communities of interest independent of organizational structures?

The effects of CMC may spread well beyond today's narrow focus on organizational tasks, productivity, and structure. CMC may increase the dispersal

of work, not only the current movement from the central business district to suburban offices, but from offices to homes. Informants tell us that a large Toronto corporation saves \$7,500 (Canadian) per year in real estate costs when one central office employee becomes a teleworker. CMC may lead to a new kind of piecework, with families huddled in their former "rec rooms," spinning words on their computers. We wonder if a follow-up article to this one will be titled "The Social Implications of CMC for Domestic Relationships."

NOTES

1. We caution that counts and forecasts are quite unreliable in the field because of rapid proliferation, numerous small buyers and sellers, and excessive optimism by hopeful vendors.

2. The best way to keep track of the field is to read the proceedings of the semiannual CSCW conferences (held in North America) and the ECSCW conferences (held in alternate years in Europe). See also the aforementioned CHI proceedings and Baecker (1993). Both the CSCW and CHI groups are affiliated with the Association for Computing Machinery.

3. Answering machines and, more recently, voice mail are two recent attempts to solve the need for temporal synchronicity when using the telephone. The digital nature of some voice mail means that it can offer some of the same features as e-mail, such as the ability to be forwarded. However, voice mail consumes many more bytes per message than e-mail and cannot be manipulated as easily.

4. Such long-distance speed is truer for communications that are within organizations than it is for the Internet, which often uses a complex set of computer transfers at intervening sites between the sender and the receiver.

REFERENCES

- Adrianson, L., & Hjelmquist, E. (1991). Group processes in face-to-face and computer mediated communication. *Behaviour and Information Technology*, 10, 281-296.
- Baecker, R. M. (Ed.). (1993). *Readings in groupware and computer-supported cooperative work: Assisting human-human collaboration*. San Mateo, CA: Morgan Kaufmann.
- Berger, J., & Conner, T. L. (1973). Performance expectations and behavior in small groups. In R. J. Ofshe (Ed.), *Interpersonal behavior in small groups* (pp. 131-140). Englewood Cliffs, NJ: Prentice Hall.
- Bikson, T. K., & Eveland, J. D. (1990). The interplay of work group structures and computer support. In J. Galegher, R. E. Kraut, & C. Egido (Eds.), *Intellectual teamwork: Social and technological foundations of cooperative work* (pp. 245-290). Hillsdale, NJ: Lawrence Erlbaum.
- Carley, K., & Wendt, K. (1989). *Electronic mail and scientific communication: The study of soar and its dominant users* (Working paper of the Department of Social and Decision Sciences). Pittsburgh: Carnegie Mellon University.
- Castells, M. (1989). *The informational city: Information technology, economic restructuring and the urban-regional process*. Oxford: Basil Blackwell.
- Clement, A. (1992). Electronic workplace surveillance: Sweatshops and fishbowls. *Canadian Journal of Information Science*, 17(4), 18-45.
- Culnan, M. J., & Markus, M. L. (1987). Information technologies. In F. Jablin, L. L. Putnam, K. Roberts, & L. Porter (Eds.), *Handbook of organizational communication* (pp. 420-443). Newbury Park, CA: Sage.

- Daft, R. L., & Lengel, R. H. (1984). Information richness: A new approach to managerial information processing and organization design. In B. Staw & L. Cummings (Eds.), *Research in organizational behavior* (pp. 191-233). Greenwich, CT: JAI.
- Daft, R. L., & Lengel, R. H. (1986). Organizational information requirements, media richness and structural design. *Management Science*, 32, 554-571.
- Daft, R. L., Lengel, R. H., & Trevino, L. K. (1987). Message equivocality, media selection, and manager performance: Implications for information systems. *MIS Quarterly*, 11, 355-366.
- Dubrovsky, V., Kiesler, S., & Sethna, B. N. (1988). *Expected and unexpected effects of computer media on group decision making*. Unpublished manuscript, Carnegie Mellon University, Committee on Social Science Research in Computing.
- Electronic Mail Association. (1992). *Electronic mail market research results*. Arlington, VA: Author.
- Emmett, R. (1982). VNET or GRIPENET. *Datamation*, 4, 48-58.
- Eveland, J. D., & Bikson, T. K. (1988). Work group structures and computer support: A field experiment. *ACM Transactions on Office Information Systems*, 6, 354-379.
- Feldman, M. S. (1987). Electronic mail and weak ties in organizations. *Office Technology and People*, 3, 83-101.
- Finholt, T., & Sproull, L. (1990). Electronic groups at work. *Organization Science*, 1, 41-64.
- Finholt, T., Sproull, L., & Kiesler, S. (1990). Communication and performance in ad hoc task groups. In J. Galegher, R. E. Kraut, & C. Egido (Eds.), *Intellectual teamwork: Social and technological foundations of cooperative work* (pp. 291-325). Hillsdale, NJ: Lawrence Erlbaum.
- Fulk, J., & Boyd, B. (1991). Emerging theories of communication in organizations. *Journal of Management*, 17, 407-446.
- Fulk, J., Schmitz, J., & Steinfield, C. W. (1990). A social influence model of technology use. In J. Fulk & C. W. Steinfield (Eds.), *Organizations and communication technology* (pp. 117-140). Newbury Park, CA: Sage.
- Goode, J., & Johnson, M. (1991, November). Putting out the flames: The etiquette and law of e-mail. *Online*, pp. 61-65.
- Granovetter, M. (1973). The strength of weak ties. *American Journal of Sociology*, 78, 1360-1380.
- Harasim, L. M., & Winkelmann, T. (1990). Computer-mediated scholarly collaboration. *Knowledge: Creation, Diffusion, Utilization*, 11, 382-409.
- Haythornthwaite, C., Wellman, B., & Mantel, M. (1994). Media use and work relationships in a research group. In J. Nunamaker, Jr., & R. Sprague, Jr. (Eds.), *Proceedings of the 27th Hawaii International Conference on Systems Science* (pp. 94-103). Washington, DC: IEEE Press.
- Hiltz, R. S., Johnson, K., & Agle, G. (1978). *Replicating Bales problem solving experiments on a computerized conference* (Research Report No. 8). Newark: New Jersey Institute of Technology.
- Hiltz, R. S., Johnson, K., & Turoff, M. (1986). Experiments in group decision making: Communication process and outcome in face-to-face versus computerized conferences. *Human Communication Research*, 13, 225-252.
- Hiltz, R. S., & Turoff, M. (1978). *The network nation*. Reading, MA: Addison-Wesley.
- Huff, C., Sproull, L., & Kiesler, S. (1989). Computer communication and organizational commitment: Tracing the relationship in a city government. *Journal of Applied Social Psychology*, 19, 1371-1391.
- Johnson-Lenz, P., & Johnson-Lenz, T. (1994). Groupware for a small planet. In P. Lloyd (Ed.), *Groupware in the 21st century: Computer supported cooperative working toward the millennium* (pp. 269-285). London: Adamantine.
- Kaye, A. R. (1992). Computer conferencing and mass distance education. In M. Waggoner (Ed.), *Empowering networks: Using computer conferencing in education*. Englewood Cliffs, NJ: Educational Technology.
- Kiesler, S., Siegal, J., & McGuire, T. W. (1984). Social psychological aspects of computer-mediated communication. *American Psychologist*, 39, 1123-1134.

- Kiesler, S., & Sproull, L. (1988). *Technological and social change in organizational communication environments* (Working paper). Pittsburgh: Carnegie Mellon University, Department of Social and Decision Sciences.
- Kiesler, S., & Sproull, L. (1992). Group decision making and communication technology. *Organization Behavior and Human Decision Processes*, 52, 96-123.
- Kiesler, S., Zubrow, D., Moses, A. M., & Geller, V. (1985). Affect in computer-mediated communication: An experiment in synchronous terminal-to-terminal discussion. *Human-Computer Interaction*, 1, 77-104.
- Lea, M. (1991). Rationalist assumptions in cross-media comparisons of computer mediated communication. *Behaviour and Information Technology*, 10, 153-172.
- Lea, M., & Spears, R. (1991). Computer mediated communication, de-individualization and group decision-making. *International Journal of Man-Machine Studies*, 34, 283-301.
- Mackay, W. E. (1988). Diversity in the use of electronic mail: A preliminary inquiry. *ACM Transactions on Office Information Systems*, 6, 380-397.
- McGrath, J. D. (1984). *Groups: Interaction and performance*. Englewood Cliffs, NJ: Prentice Hall.
- Perin, C. (1991). Electronic social fields in bureaucracies. *Communications of the ACM*, 34(12), 75-82.
- Perrow, C. (1967). A framework for the comparative analysis of organizations. *American Sociological Review*, 32, 194-208.
- Ridgeway, C. L. (1983). *The dynamics of small groups*. New York: St. Martin's.
- Rice, R. E. (1987). Computer-mediated communication and organizational innovation. *Journal of Communication*, 37(4), 65-94.
- Rice, R. E., & Associates. (1984). *The new media: Communication, research, and technology*. Beverly Hills, CA: Sage.
- Rice, R. E., Grant, A. E., Schmitz, J., & Torobin, J. (1990). Individual and network influences on the adoption and perceived outcomes of electronic messaging. *Social Networks*, 12, 27-55.
- Rice, R. E., & Shook, D. E. (1990). Relationships of job categories and organizational levels to use of communication channels, including electronic mail: A meta-analysis and extension. *Journal of Management Studies*, 27, 195-229.
- Rice, R. E., & Steinfield, C. W. (1994). New forms of organizational communication via electronic mail and voice messaging. In J. H. Adrianson & R. Roe (Eds.), *Telematics and work*, (pp. 109-137). Hillsdale, NJ: Lawrence Erlbaum.
- Rogers, E. M., & Kincaid, D. L. (1981). *Communication networks: Toward a new paradigm for research*. New York: Free Press.
- Schmitz, J., & Fulk, J. (1991). Organizational colleagues, media richness, and electronic mail. *Communication Research*, 18, 487-523.
- Schwartz, M., & Wood, D. C. (1993). Discovering shared interests using graph analysis. *Communications of the ACM*, 36(8), 78-88.
- Short, J., Williams, E., & Christie, B. (1986). *The social psychology of telecommunications*. London: John Wiley.
- Siegal, J., Dubrovsky, V., Kiesler, S., & McGuire, T. (1986). Group processes in computer-mediated communication. *Organizational Behavior and Human Decision Processes*, 37, 157-187.
- Sproull, L., & Kiesler, S. (1991a). *Connections: New ways of working in the networked organization*. Cambridge: MIT Press.
- Sproull, L., & Kiesler, S. (1991b). A two-level perspective on electronic mail in organizations. *Journal of Organizational Computing*, 2(1), 125-134.
- Sproull, R. (1991). A lesson in electronic mail. In L. Sproull & S. Kiesler, *Connections: New ways of working in the networked organization* (pp. 177-194). Cambridge: MIT Press.
- Steinfield, C. W. (1985). Dimensions of electronic mail use in an organizational setting. In J. Pearce & R. Robinson (Eds.), *Proceedings of the annual meeting of the Academy of Management* (pp. 239-243). Mississippi State: Academy of Management.

- Steinfield, C. W. (1986). Computer-mediated communication in an organizational setting: Explaining task-related and socioemotional uses. In M. L. McLaughlin (Ed.), *Communication yearbook 9* (pp. 777-804). Beverly Hills, CA: Sage.
- Trevino, L. K., Daft, R. L., & Lengel, R. H. (1990). Understanding managers' media choices: A symbolic interactionist perspective. In J. Fulk & C. W. Steinfield (Eds.), *Organizations and communication technology* (pp. 71-94). Newbury Park, CA: Sage.
- Valacich, J. S., Paranka, D., George, J. F., & Nunamaker, J. F., Jr. (1993). Communication concurrency and the new media. *Communication Research*, 20, 249-276.
- Walther, J. B. (1992). Interpersonal effects in computer-mediated interaction: A relational perspective. *Communication Research*, 19, 52-90.
- Webster, M., Jr., & Driskell, J. E., Jr. (1978). Status generalization: A review and some new data. *American Sociological Review*, 43, 220-236.
- Wellman, B. (1988). Structural analysis: From method and metaphor to theory and substance. In B. Wellman & S. D. Berkowitz (Eds.), *Social structures: A network approach* (pp. 19-61). Cambridge: Cambridge University Press.
- Wellman, B. (1993). Models of community, models of communication. In C. Belisle (Ed.), *Communications et nouvelle technologies*, (pp. 373-389). Lyon: PPSH.
- Zuboff, S. (1988). *In the age of the smart machine*. New York: Basic Books.