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The Equalization Phenomenon: Status Effects in Computer-Mediated and Face-to-Face Decision-Making Groups

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ABSTRACT

New computer-based communications technologies make possible new or expanded forms of group work. Although earlier researchers suggest that scant social information in these technologies might cause status equalization in groups, no experimental test of this phenomenon has been made. In a laboratory experiment, we compared face-to-face communication with electronic mail in decision-making groups whose members differed in social status. We examined status in two ways: by varying the external status of group members, and by varying the decision task to manipulate expertise. When the groups made decisions in face-to-face meetings, the high-status member dominated discussions with the three low-status members. Also, the high-status member more often was a "first advocate" in the face-to-face discussions, and first advocates were more influential than later advocates. These status inequali-

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ties in face-to-face decision making were pronounced just when the high-status member's expertise was relevant to the decision task. When the same groups made comparable decisions using electronic mail, status and expertise inequalities in participation were reduced. A striking and unexpected result was that "first" advocacy was shared by high- and low-status members in discussions using electronic mail. This behavior resulted in increased equality of influence across status and expertise. We discuss the implications of these results for research and for design of new communication technologies.

1. INTRODUCTION

One advantage of modern computer-based communications technologies is the group communication these technologies make possible (Fanning & Raphael, 1986; Finholt & Sproull, 1990). Computer text-processing tools and computer networks provide a high-speed information exchange and processing service that can reduce geographic, temporal, and size constraints on group communication. Does it also reduce social constraints on group communication? This question assumes greater significance as we further develop computer technologies to support collaboration and work in groups (DeSanctis & Gallupe, 1987; Greif, 1988; Kraut, 1987). Data from organizational case studies (e.g., Sproull & Kiesler, 1986; Zuboff, 1988), field experiments (e.g., Eveland & Bikson, 1988; Kiesler & Sproull, 1986), and laboratory experiments (e.g., McGuire, Kiesler, & Siegel, 1987; Siegel, Dubrovsky, Kiesler, & McGuire, 1986) indicate that some computer-communication technologies do reduce social barriers to communication. In this study, we extend that analysis to examine how a common form of electronic mail weakens a pervasive and deeply ingrained regulating force in group decision making: social status. We report data from an experiment and discuss how design and policy choices might affect this phenomenon.

1.1. Social Status in Groups

Group members as biological organisms confront few constraints on their communication as a result of instinctual patterns, but constraints develop in the form of a social order. Social order is based on a shared reality created by social structures and habitual interactions. Perhaps the most influential social structure of groups is the status hierarchy, the "pecking order" of group members established according to the relative value they hold of one another. In a group, members' status is partly derived from expectations established by their relative social position in the larger environment—from their race, gender, age, physical attractiveness, or organizational position. People carry ascribed statuses with them from group to group regardless of the groups' specific tasks. Members' status in groups also derives from their relative authority and expected performance on the group task. For instance, members can achieve high status in a group because they assume leadership in the group or because they are thought to be technically proficient at the work of the group. A sociological theory of this phenomenon is expectation states theory (e.g., Berger, Cohen, & Zelditch, 1972; Berger, Fisek, Norman, & Zelditch, 1977; Ridgeway, 1981).

In organizations, a group members' status reflects and is reinforced by the environment—the floor on which members have their office, their access to secretarial services, their clothing, their titles, and other physical and social arrangements that demark the status hierarchy (Barnlund & Harland, 1963; Dubin & Spray, 1964; Faunce, 1958; Jablin, 1987; Monge & Kirste, 1980; O'Reilly & Roberts, 1974). Such arrangements regulate communication. Physical boundaries reduce the opportunity and desire to share information outside these boundaries (Festinger, Schachter, & Back, 1950; Monge & Kirste, 1980; Newcomb, 1961). Increasing the distance between workers by only 10 ft can halve their interaction behavior (Faunce, 1958). Social boundaries also regulate communication. People have more contact within social categories than across them (Barnlund & Harland, 1963; Monge, Rothman, Eisenberg, Miller, & Kirste, 1985; Sykes, Larntz, & Fox, 1976). People in the same status group often feel protective of one another, which can lead to in-group bias and an unwillingness to share information or to seek it out externally (see Brewer & Kramer, 1985; Doridio & Gaertner, 1986; Tajfel, 1982, for reviews).

Along with boundaries, the status hierarchy carries preferential rules and norms, such as strictures on who is invited to which meetings and, within meetings, who is expected to have the floor. People who occupy valued social positions have more discretion over their own communications than do people who occupy less-favored positions (Berkowitz & Bennis, 1961; Dubin & Spray, 1964). Bad news travels up the hierarchy more slowly than down (O'Reilly & Roberts, 1974; Rosen & Tesser, 1970). In mixed-status groups, high-status people talk more, speak more frankly, have more control over the agenda, and through the dominance have more influence; these behaviors are expected and lead to group satisfaction (Berger et al., 1977; Cyert & March, 1963; Hoffman, 1978; Holtgraves, 1986; Jablin, 1987; Kirchler & Davis, 1986; Strodtbeck & Lipinski, 1985; Weiner & Goodenough, 1977). Status distinctions can promote group efficiency by regulating participation, but they can lead to organizational disaster by separating decision makers from information they should know (Allison, 1971; Shlaim, 1976; Wohlstetter, 1962). For instance, fatal air crashes have been attributed to the failure of crew members to contradict the captain forcefully in order to warn him of danger (Linde, 1988).

1.2. Reduced Social-Context Cues and Computer-Mediated Communication

The status hierarchy cannot regulate group behavior unless group members perceive the social order. Social distinctions, such as status differences, will not constrain communication if senders and receivers are unaware of them. It is not sufficient for people simply to hold different status positions; they must be aware of the fact that they do. Even the effects of physical boundaries are conditioned partially by perception because location covaries with norms. Thus, a person may have the technical capability to communicate by telephone with a group member who works in the penthouse headquarters, but knowing that the associate works "at the top" often deters communication. People perceive the social order through both static and dynamic social-context cues. *Static cues* emanate from artifacts and people's appearance, such as a chair at the head of a conference table and a business suit. *Dynamic cues* emanate from peoples' behavior—for instance, nodding approval, hesitating before replying, frowning with displeasure (e.g., Patterson, 1983; Ridgeway, Berger, & Smith, 1985).

Once group members perceive social-context cues, they adjust their targets of communication, the tone and content of their communications, and their social behavior to fit the imputed situation. For instance, when group members perceive social-context cues emphasizing status differences, then their speech and demeanor become more formal. Typically, when social-

context cues are strong, as when executives are face-to-face in a business discussion, members' behavior tends to be relatively other-focused, differentiated, controlled, and finely tuned to the status hierarchy. When social-context cues are weak, people's feelings of anonymity tend to produce relatively self-centered and unregulated behavior. Group members become relatively less concerned about making a good appearance (Cottrell, Wack, Sekerak, & Rittle, 1968). Group behavior becomes more extreme, more impulsive, and less socially differentiated (Diener, Fraser, Beaman, & Kelem, 1976; Singer, Brush, & Lublin, 1965).

All communication technologies attenuate the social-context cues available in face-to-face conversation. The telephone reduces dynamic and static cues by eliminating visual information about communicators. Letters and memoranda can produce communication that is less well-regulated than face-to-face communication. In practice, we do not experience frequent unregulated paper communication because the social-context cues attached to paper itself signal norms. People believe paper communication should not be used as a substitute for conversation and discussion (Siegel, 1988). Nonetheless in experimental comparisons, paper questionnaires elicited more antisocial opinions and more personal revelations than face-to-face interviews (Sudman & Bradburn, 1974). Written notes elicited more swings of opinions in groups than face-to-face discussions (Festinger et al., 1950, p. 176).

During the last 10 years, researchers have hypothesized that computer-mediated communication technologies such as electronic mail greatly attenuate social-context cues, even more than paper communication (Hiltz & Turoff, 1978; Kiesler, Siegel, & McGuire, 1984; Short, Williams, & Christie, 1976). Most applications eliminate dynamic cues and minimize static cues. A typical electronic mail message, for example, identifies senders and receivers by surname and address, but not by job titles, social importance, organizational hierarchy, departmental affiliation, race, age, appearance, first names, and gender. Also, it lacks a situational definition and reminders of the social setting. This lack is important because the technology can be used in a variety of formal and informal settings. A message might contain cafeteria menus, a proposal for a meeting, a secret corporate strategy, or a love note; probably each would be conveyed within a similar-looking text message format. People may possess social-context information from other sources, of course, but there are few cues in the computer interaction to remind people of that knowledge.

According to field research, when people use computer-mediated communication, they are less aware of social differences and communicate more across organizational and social boundaries (e.g., Sproull & Kiesler, 1986). In laboratory experiments, groups communicating electronically displayed more uninhibited behavior and made more extreme, risky, or unconventional decisions than when the same groups meet face-to-face (McGuire et al., 1987;

Siegel et al., 1986). In experiments comparing paper-and-pencil questionnaires with electronic mail questionnaires, people using electronic questionnaires gave more extreme, more revealing, and less socially desirable responses (Kiesler & Sproull, 1986; Sproull, 1986). Waterton and Duffy (1984) found that men in Edinburgh who completed a computer-mediated interview reported drinking more alcohol than did men who completed a paper-mediated interview. Others have reported similar effects after taking psychiatric histories on a computer (Greist, Klein, & Erdman, 1976).

Although these data are consistent with our theory, researchers have not yet specified the exact psychological mechanisms through which reduced social-context cues deregulate communication. We suggest two possible processes. First is reduced evaluation anxiety. In the absence of nonverbal and paralinguistic reminders of other people in the interaction, peoples' attention may be directed away from others, as would be their concern with being positively evaluated (Kiesler, Zubrow, Moses, & Geller, 1985). In her study of Drugcorp, Zuboff (1988) quoted a respondent as saying,

> DIALOG [the computer communication system] lets me talk to other people as peers. No one knows if I am an hourly worker or a vice president. All messages have an equal chance because they all look alike. The only thing that sets them apart is their content. If you are a hunchback, a paraplegic, a woman, a black, fat, old, have two hundred warts on your face, or never take a bath, you still have the same chance. (p. 371)

Second, reduced feedback and scrolling screens may lead people to forget that messages are communications, not just soliloquies to a computer. People can forget the nature and size of their audience or even that their communications will be read (Sproull & Kiesler, 1986). Zuboff described how employees in her study felt "psychologically secure" and were able to pour out their thoughts at the keyboard. She quoted one respondent,

> When I discuss something on DIALOG, in the back of my mind I know somebody else is going to hear it, but it isn't as obvious as if we were all in one room. It's like I know the tape recorder is running, but I kind of block it out. (p. 370)

Either or both of these processes could account for the reduced impact of computer-mediated communication on social differences and social attributes of people.

1.3. The Equalization Phenomenon

Recurring across many studies of computer-mediated communication is a behavioral response to computer-mediated communication that we call the

"equalization phenomenon." A typical pattern in face-to-face groups systematic inequalities of participation and influence. For instance, in three-person group, one person may assume leadership and talk 45% or mo of the time (e.g., Hoffman, 1978). Yet the distribution of discussion remar has been more equal when groups have made decisions electronically tha when the same groups have made decisions face-to-face (see McGuire et a 1987, and Siegel et al., 1986, for real-time computer conference ar electronic mail data; Weisband, 1989, for asynchronous electronic mail dat Easton, 1988, and Zigurs, 1987, for real-time decision support rooms data None of these experiments examined the effect of computer-mediate communication on preexisting differences in social status, which as ju noted, is known to be exceedingly stable and strong. None examined th effects of expertise differences on different tasks. Yet we believe status an expertise equalization might happen in computer-mediated communicatio because of reduced evaluation anxiety or increased social inattention. Wit less evaluation anxiety, high-status and expert persons have reduced threat t their position and low-status and inexpert persons have less fear of rejectior With social inattention, both sides would be managing their different role performances less meticulously.

1.4. Hypotheses Tested

To test hypotheses about computer-mediated communication and statu equalization in groups, we chose decision tasks frequently used in experimental group research. These were *choice shift* tasks that require groups to decide level of risk that a hypothetical person should accept in order to pursue a mor attractive but riskier career or lifestyle alternative. Given these choices face-to-face groups make decisions that are more extreme than, but in th same direction as, the initial preferences manifested by group members or b the organization as a whole (Kaplan, 1977; Kogan & Wallach, 1967; Stoner 1961). Group members' private attitudes usually polarize in the same extreme direction but to a lesser degree (e.g., Moscovici & Zavalloni, 1969; Myers & Lamm, 1976). We formed four-person groups, one of which initially hac higher external status than the others, and asked these groups to reach consensus of four-choice shift-type tasks. To manipulate internal status (expertise), two of the choices (from previous research) were appropriate to the higher status person, and two devised especially for this study were appropriate for the lower status persons.

General Equalization. We argued that group members who talk via computer are less aware of and less concerned with social distinctions than when they are face-to-face. Therefore, we hypothesized:

- Participation will be more equal in computer-mediated than in face-to-face discussions. Group members will make more explicit proposals (less mitigation) and more uninhibited remarks.

External Status Equalization. We argued that low-status group members will feel less reticent in computer-mediated group discussions than they will in face-to-face discussions. Therefore we hypothesized:

- The high-status group member will have a participation advantage, but this advantage will be reduced in computer-mediated group discussions as compared with face-to-face discussions.

Internal Expertise Equalization. We attempted to manipulate internal status in the group by varying the decision tasks. Two decisions were about the freshman curriculum, which matched the experience of the low-status group members, and might confer more expertise to them than to the initially high-status member. We hypothesized:

- The participation advantage of the high-status group member will be reduced or reversed when groups work on decision tasks for which the low-status group members have relevant expertise. However, in computer-mediated communication, the advantage of low-status group members on these tasks will be reduced. Likewise, the advantage of the high-status group member on tasks in which that member is an expert will be reduced in computer-mediated communication.

Advocacy Effect. Status equalization might affect actual influence indirectly through a change in who speaks first. Frequently, people who talk early and much in group discussions have more influence (Asch, 1946; Hoffman, 1978). In two recent studies, the first person in the group to advocate a proposal explicitly to the other members tended to predict the final group choice very well (e.g., McGuire et al., 1987; Weisband, in press). Previous research suggests that high-status members tend to be the first advocates of a decision position in face-to-face groups because they are confident and talkative (e.g., Hoffman, 1978). They are also likely to be effective; if they advocate a position that is close to that of other group members, they will confirm others' respect; but even when they are insensitive to preexisting group opinion, they might influence others through their excess of "idiosyncrasy credits" (Hollander, 1978). We hypothesized:

- A high-status group member more than a low-status member will be the first person to advocate a position in the group discussion (but

especially when the high-status member is also the expert), and group choice will be correlated with that first advocacy. In computer-mediated communication, the difference between the high-status group member and low-status group members in first advocacy will be reduced (as will expertise differences), hence the relative influence of the high-status group member will be reduced.

- We did not make a prediction about how much influence the first advocate would have in face-to-face and computer-mediated discussions. Because first advocacy is as apparent in a computer-mediated message as in a face-to-face discussion, it is not a hidden social cue; therefore, the impact of first advocacy should be the same in both conditions.

2. METHOD

2.1. Design

The design was a 2 × 2 (Communication Condition × Decision Task) repeated measures with order of decisions and discussion conditions balanced separately. Every experimental group was assigned one high-status member, an MBA graduate student, and three low-status members, college freshmen. Each of these groups discussed and came to consensus on four decision tasks. To vary communication condition, the groups discussed two of the decisions while face-to-face and two while separated and communicating through electronic mail. (The order of these conditions was assigned randomly.) Cross cutting the discussion condition was a decision task manipulation: we varied the group's decision tasks in order to magnify or reduce preexisting status differences within the groups. To do this, two of the four decision tasks concerned career choices of college graduates, issues about which the high-status graduate should have had more expertise and experience than the low-status freshmen. By contrast, two of the four decision tasks concerned the freshman curriculum, issues about which the high-status graduate would have no more expertise and less recent experience than the low-status freshmen. One graduate decision task and one freshman decision task was assigned to each communication condition, with the order varied randomly.

2.2. Subjects and Procedure

The subjects were 96 Clarkson University students—60 men, 36 women, 24 were enrolled in the graduate MBA program, and 72 were college freshmen. All participated in the experiment as part of a management course. These subjects were randomly assigned to 24 groups of 4 members each,

except that 1 member was high status (an MBA student) and 3 members were low status (freshmen). To control the effects of status deriving from gender, groups were either all women or all men.

At the beginning of the experimental session, each group met together with an experimenter. To reinforce the status difference, the group members were asked to introduce themselves by stating their name, academic status, experience before Clarkson University, and favorite hobby. (Also, in the electronic mail condition, the first person in the list of group members was the high-status member.) Then the experimenter gave the group instructions for coming to consensus on four choice dilemmas (Kogan & Wallach, 1967; Siegel et al., 1986). Each choice dilemma involved a risky but attractive alternative and a safer but less attractive alternative. The group was asked to come to consensus and to give advice to someone as to the level of risk that person should accept in choosing the risky but attractive alternative. For instance, should Mr. H become the concert pianist he has always wanted to become or take the safer route of becoming a physician? The group had to discuss the dilemma and choose a level of risk ranging from 1 out of 10 to 9 out of 10 to reflect its judgment as to how much risk the pianist-to-be should accept. After explaining this task, the experimenter asked the subjects to complete a questionnaire that asked them to indicate privately which level of risk they preferred to choose the more attractive alternative on each of the four decisions they would encounter as a group.

In the next stage of the experiment, the groups had to reach consensus and indicate their group decision on four choice dilemma issues, two—one "graduate choice" and one "freshman choice"—during face-to-face discussion and two—one graduate choice and one freshman choice—during computer-mediated discussion. The two graduate decision tasks were taken from previous research on choice shift; they were the "top graduate program versus moderately good graduate program" and "concert pianist versus physician" choice dilemmas (Kogan & Wallach, 1967). We devised the two freshman decision tasks for this study. In the first freshman decision task, an undergraduate curriculum committee had to decide whether to require the introductory programming course in the freshman year or later; the first alternative would be riskier but would provide students earlier training. The second freshman decision task also concerned programming and involved a professor's choice of whether to teach PASCAL or BASIC in the introductory course for freshmen. (From pretests, students considered PASCAL more difficult and riskier but also more useful.) Both tasks were pretested to ensure that they were engaging and likely to produce initial differences of opinion.

In the face-to-face discussions, the group members were seated around a table. They were told that while face-to-face they would be tape recorded but that the tapes would be confidential. In the computer-mediated discussions, each subject was seated in a separate room in front of a microcomputer simulating a computer terminal. Each was then logged into a group mail (distribution list) account especially constructed for his or her group. The electronic mail system was a CMS ERCMAIL system on an IBM4341. An assistant gave each subject instructions for using the electronic mail system for group communication, and each subject practiced sending and reading electronic mail to and from the designated group. (The program is illustrated in Figure 1.) The subjects then exchanged electronic mail and came to consensus. In both conditions, groups were told they would have about 15 min to reach each decision but actually got as much time as they needed to reach consensus.

After all group decisions were made, the group members again indicated their private preferences and completed a postgroup questionnaire. Items assessed the subjects' perceptions of their own and other group members' credibility, influence, and likability. Another questionnaire assessed subjects' comfort and prior experience with computer mail. Then the experimenter debriefed the subjects.

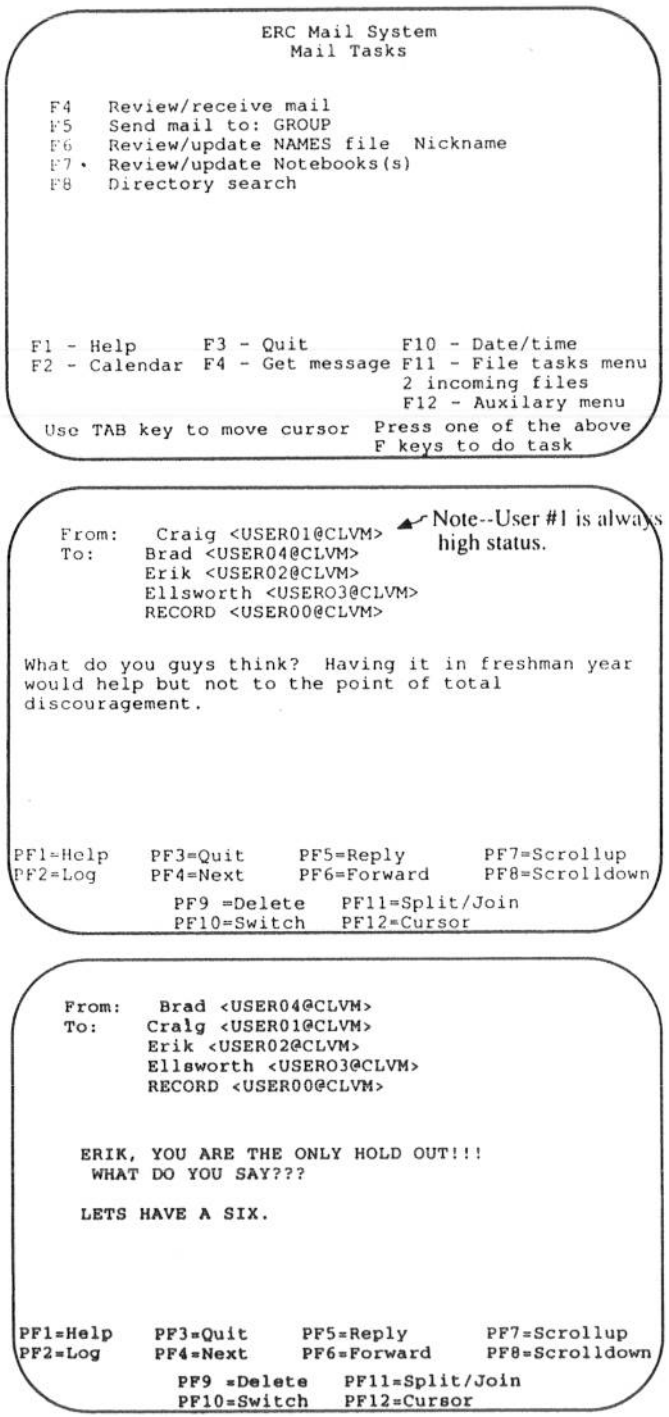
2.3. Dependent Measures

Raw data from this experiment included individual preferences and group choices of risk, which could range from 1 (out of 10) to 9 (out of 10) for the risky but attractive alternative on each of the four decision tasks. The data also included tape recordings of each discussion, which were transcribed and printed, and automatic records of all computer messages, along with the times they were sent. We used a reliable content coding scheme for group discussions that we had developed in previous research (Siegel et al., 1986).

In the content coding of group discussions, the main unit of analysis was each separable thought or remark that group members uttered during the group discussion. Coders divided subjects' statements into remarks and counted them. Types of remarks were also coded. As in previous studies, we counted socially deviant or "uninhibited" remarks (e.g., swearing, name calling, threats). To evaluate the role of advocacy, we also counted remarks that explicitly proposed or advocated one of the levels of risk (e.g., "I think we should pick number three. . . .").

The data from preferences, frequency of participation, decisions, content of discussions, and ratings were used mainly in group-level analyses of variance (ANOVAs). We evaluated participation by comparing groups' total number of remarks across conditions with equality of participation within the group using the Gini coefficient (Alker, 1965). As in previous studies, we evaluated differences among groups in *choice shift,* traditionally defined as the group-level absolute difference between the average of prediscussion preferences and the group decision, and in *attitude polarization,* defined as the

Figure 1. **Example of electronic group mail.**



difference between average prediscussion preferences and average postdiscussion preferences (Nagao, 1983). In this study, group-choice shift and attitude polarization were highly correlated: .94 in the face-to-face discussion and .79 in the computer-mediated discussion. Analyses of condition effects gave essentially the same result whether group choice or postgroup attitudes was the dependent variable; hence, we do not discuss attitude polarization further in this article.

3. RESULTS

3.1. Preliminary Analyses

Using ANOVAs, we evaluated order effects on group choices across decision tasks and discovered no systematic effects. In the analyses that follow, we evaluate the effects of discussion condition without regard to the order in which the conditions were experienced. We also evaluated differences among groups and tasks. There were some effects of gender of group. (Groups were either all women or all men.) In female groups as compared with male groups, high-status group members participated more than the low-status group members, but this difference only occurred face-to-face; gender-related status differences were eliminated in the computer-mediated discussions: interaction $F(1, 21) = 4.7$, $p < .05$. Gender of group had no effect on individual influence or on choice shift or polarization in the groups.

We used questionnaire ratings of credibility that group members made of themselves and others in the group to evaluate the effectiveness of the status manipulations. Subjects were asked to rate themselves and others with respect to their final group task. We averaged three items: how much relevant information the person had, how competent the person was to render a good opinion, and how believable the person's arguments were. Although high-status members tended to be seen as more credible than low-status members across all tasks, this difference was not statistically significant. Yet, in accordance with our expectations, the ANOVAs showed that high-status group members were regarded by other group members as more credible than low-status members when the group performed a graduate decision task (mean difference = .59). The advantage of high-status persons was reduced but not eliminated with the freshman decision and with both tasks in the electronic mail conditions (mean differences range from .29 to .02): interaction $F(1, 20) = 8.63$, $df = 1, 20$, $p < .01$.

In rating their own credibility, high-status members rated themselves as more credible than low-status members on the graduate decision task but not on the freshman decision task (mean difference = .41 vs. −.01), $F(1, 18) = 10.81$, $p < .01$. Interestingly, group members did not rate their own

credibility differently when using electronic mail as compared with face-to-face discussion, despite the fact that perceptions of others differed. The high-status members thought they were highly credible in both conditions. Differences in perceived influence and likability generally followed the same pattern as credibility ratings but less strongly so. High-status group members were liked more than low-status group members, with the difference greater on the graduate decision task, $F(1, 20) = 4.98$, $p < .05$. Taken together, the results show (a) that our status manipulation was successful for the graduate decision task, and (b) that asking the group to work on a decision more relevant to the expertise of the freshmen members successfully reduced ascribed status differences but did not reverse them.

3.2. General Equalization

We examined the main effects of discussion condition on differences in participation and choice to evaluate the extent to which our results replicated those of previous research and met the assumptions of this study. Figure 2 shows the results. In this study, as in a study by Weisband (in press), the groups were given as long as they liked to come to consensus; our results are similar to those of the Weisband study: Groups took much longer to reach consensus when they interacted electronically, although total remarks exchanged were not different in the two conditions. We are not saying that the kind of information exchanged in both conditions was the same. As predicted, the proportion of the discussion devoted to explicit decision proposals and uninhibited remarks was greater in the electronic mail discussions.

The finding of more uninhibited behavior, or flaming, in the electronic mail conditions replicates results of other studies (McGuire et al., 1987; Siegel et al., 1986; Weisband, in press). Compared with 102 uninhibited remarks in 21 electronic mail discussions, there were only 12 uninhibited remarks in four face-to-face discussions. In one group (dropped from the formal analysis of uninhibited remarks as an outlier data point), the electronic mail discussion was so heated that the subjects had to be escorted separately from the building following the experiment. A content analysis of the uninhibited remarks indicates that all but 3 were angry sanctioning statements, usually made against a group member for not conforming to the group majority (e.g., in one electronic message: "John, we are at 6. Agree or we will get you!!!").

We predicted that participation inequality would be reduced in computer-mediated discussions. The data in Figure 2 show that our prediction was supported and that results of previous studies were replicated (McGuire et al., 1987; Siegel et al., 1986; Weisband, in press). Perhaps the most striking finding about participation, one we did not expect, was the much increased number of first advocates in electronic mail: On average, there were 2.5 first advocates per group discussion. These were all group members who sent proposals to the group before they had received any messages from others. Because in face-to-face discussion, only one member could be the first advocate, whereas in the electronic mail discussions all four members could be first advocates (and in some groups, that did happen), the face-to-face discussions and electronic mail discussions are qualitatively different and are not strictly comparable.

Figure 2. **Attributes of face-to-face discussion and electronic mail discussion in group decision making.**

Measure	*M*	*SD*	*F*[a]	*p*
Minutes to consensus				
Face-to-face	3.2	2.6	212.8	.001
Electronic mail	33.7	17.0		
Total remarks				
Face-to-face	45.6	35.9	ns	
Electronic mail	46.1	27.4		
Explicit decision proposals				
Face-to-face	9.8	4.9	14.6	.001
Electronic mail	14.4	6.2		
First advocates per discussion[b]				
Face-to-face	25%			
Electronic mail	62.5%			
Uninhibited remarks[c]				
Face-to-face	.26	4.9	8.1	.001
Electronic mail	1.02	6.2		
Inequality of participation[d]				
Face-to-face	.21	.09	11.4	.01
Electronic mail	.15	.07		
Choice shift				
Face-to-face	1.14	.87		
Electronic mail	1.10	.68	ns	

[a] $df = 1, 22$, except where noted. Total sample size consists of 24 groups and includes 46 discussions taped in the face-to-face condition and 48 in the electronic condition. (Missing discussions in the face-to-face condition are due to malfunctioning tape recordings.)

[b] Only one member could be a first advocate in face-to-face discussion; up to four could be the first advocate in electronic mail discussions (by sending a proposal before having received any). Comparing the percentage of members who were first advocates in electronic mail (62.5%) against the face-to-face standard of 25% in 24 groups gives a z score of 7.1, which is highly significant but not interpretable (see text).

[c] $df = 21$. We dropped one group from this analysis because the number of uninhibited remarks in the electronic conditions was more than 10 times the number in any other group.

[d] Gini coefficients.

We examined individual-level correlations across all conditions and within conditions among the variables just discussed. Generally, participation measures were uncorrelated with group choice but correlated significantly with one another. Thus, total remarks and participation rates were correlated positively with first advocacy and with perceived credibility at the $r = .15$ to .20 level. Not surprisingly, the total number of remarks and the number of explicit decision proposals was negatively correlated, $-.59$ in face-to-face discussions and $-.35$ in computer-mediated discussions. These correlations reflect the difference between a terse discussion ("Choose 3!") and a full exchange of views. As Figure 2 shows, electronic mail groups more often chose the terse type of discussion, using explicit proposals. Uninhibited remarks were practically nonexistent in face-to-face discussion and uncorrelated with other measures in those discussions. But in computer-mediated discussions, uninhibited remarks were positively related to time to decision (.47) and total number of remarks (.85) and negatively related to explicit proposals ($-.32$). These correlations suggest that uninhibited remarks, time to decision, and total number of remarks in electronic mail discussions reflect the presence of controversy or conflict. On the contrary, explicit proposals predict shorter decision making, more inequality, and fewer uninhibited remarks. They seem to indicate the (successful) attempt of group members to shorten discussion and reach consensus.

3.3. External Status Equalization

To evaluate external-status differences across all conditions, we examined the difference in each group between the high-status group member and the average of the low-status members. High-status members talked more (13.5 remarks or 30% of each discussion vs. 10.8 or 23% for the average low-status member; t for absolute difference $= 2.36$, $p < .05$, t for difference in proportion of talking $= 4.74$, $p < .05$). High-status members were more often first advocates than low-status members (63% vs. 38%, respectively; $t = 3.27$, $p < .001$). Defining influence as a smaller difference between individual prediscussion preferences and group choice, high-status group members did not have more overall influence than low-status group member did, but first advocates, regardless of status, had a slight (nonsignificant) advantage ($t = 1.55$, $p = .12$).[1]

Communicating electronically reduced status effects on participation—the predicted "equalization phenomenon." Figure 3 shows interactions of status and discussion conditions. The high-status member's absolute participation and relative participation were significantly reduced in electronic mail discussions. As noted in Figure 3, the greater influence of the high-status member tended to decline in the electronic mail conditions, but this change was not statistically significant. A changing relationship between status and advocacy was seen at the individual level. Across individuals, correlations between first advocacy and influence were more positive for high-status group members who were interacting face-to-face ($r = .35$, $p < .02$), somewhat less positive for high-status group members who were interacting by electronic

[1] This analysis had to be carried out at the discussion level because it did not include 38 discussions in which both high- and low-status members were first advocates. Analyses at the group level left too many missing values. ANOVAs of the difference in influence between first advocates and other group members in discussions (mainly face-to-face) when either a high- or low-status member(s) was first advocate showed that high-status first advocates had more influence than did low-status first advocates, $F(1, 54) = 3.82$, $p < .06$.

Figure 3. **Difference between the high-status group member and the average of low-status group members in face-to-face and electronic mail discussions across all decision tasks.**

Measure	High Status (Graduate)	Low Status (Average Freshmen)	F[a]	p
Total remarks				
Face-to-face	15.3	10.1	5.3	.05
Electronic mail	11.7	11.5		
Participation rate (% of total remarks)				
Face-to-face	33%	22%	9.2	.01
Electronic mail	27%	24%		
First advocates per discussion[b]				
Face-to-face	41.3%	19.6%	ns	
Electronic mail	83.3%	56.3%		
Perceived credibility[c]				
Face-to-face	1.83	1.42	2.5	.13
Electronic mail	1.61	1.44		
Influence of first advocates[d]				
Fact-to-face	.84	1.81	ns	
Electronic mail	1.33	1.44		

[a] The dependent variable in these analyses is the difference for each group between the high- and average-low-status member; $df = 1, 21$, except where noted (missing groups are due to damaged tape recordings in the face-to-face condition).

[b] In this and the following figures, the face-to-face and electronic mail discussions are not strictly comparable because first advocates are self-selected. Furthermore, in the face-to-face discussion, only one member could be a first advocate. In 38 of 48 electronic mail discussions, the high-status member and one or more low-status members were first advocates (see text). We carried out ANOVAs for purposes of illustration.

[c] $df = 20$ due to some missing questionnaire responses in three groups.

[d] The score reflects the difference between the initial preference of the member and the group choice. Hence, the lower the score, the more influence the member had on the group.

Figure 4. **Decision task (expertise) effects on the difference between the high-status member and the average of low-status members in face-to-face and electronic mail discussions.**

Measure	Expertise and Status Condition					
	Graduate Decision		Freshman Decision			
	High Status (Graduate)	Low Status (Freshmen)	High Status (Graduate)	Low Status (Freshmen)	F[a]	p
Perceived credibility of group members						
Face-to-face	1.98	1.34	1.69	1.50	8.6	.01
Electronic mail	1.50	1.46	1.72	1.43		
First advocates per discussion						
Face-to-face	52.2%	15.9%	30.4%	23.2%	3.9	.06
Electronic mail	82.6%	63.8%	91.3%	53.6%		
Influence of first advocates[b]						
Face-to-face	.67	2.09	1.14	1.63	3.5	.07
Electronic mail	1.53	1.21	1.14	1.73		

[a]The dependent variable in these analyses is the difference for each group between the high- and average-low-status member; $df = 1, 21$ or $1, 22$. (Missing groups are due to damaged tape recordings in the face-to-face condition.) We report significant interaction effects.

[b]A smaller score indicates more influence of the member.

mail ($r = .25$, $p = .08$), and not correlated for low-status group members who were interacting either face-to-face ($r = .08$) or by electronic mail ($r = .09$).

3.4. Internal Expertise Equalization

We predicted that equalization effects would emerge more strongly if we took expertise into account. As previously described, two of the four decision tasks, the graduate decisions, were intended to fit the experience and knowledge of the high-status person, a graduate MBA. By contrast, two of the issues concerned the freshman curriculum and presumably would increase the relative expertise of the low-status members who were freshmen. We did not find that expertise differences affected participation per se; hence, communication conditions also did not have an effect. However, as shown in Figure 4, three factors—Credibility, First Advocacy, and Influence—were affected jointly by the decision task (expertise), status, and communication conditions. First, the credibility advantage of the high-status member was greater in the face-to-face discussions when the decision was a graduate-Level 1 (difference = .59). The advantage was less, but not absent, when the decision was a freshman-level choice (.19). In the electronic mail discussions, the high-status member had no credibility advantage at all when the decision was at the graduate level and a little more advantage than the high-status person had in the face-to-face discussion when the decision was at the freshman level (.29). These results fit with our predictions.

The figure also indicates that high-status members were much more likely to be first advocates than low-status members when the groups were discussing the graduate decisions face-to-face; this advantage was reduced when the groups were discussing the freshman decisions. In the electronic mail conditions, the high-status member was not more likely to be a first advocate when the groups were discussing the graduate decisions. But, some advantage of the high-status person reappeared when the decision was a freshman-Level 1 (about the same advantage as in the face-to-face condition with the same decisions). Another way of describing this result is by comparing the ratio of high-status to low-status first advocates in each condition. In the face-to-face conditions, the ratio was 3.3:1 for the graduate decisions and just 1.3:1 for the freshman decisions. In the electronic mail conditions, the ratio was 1.3:1 for the graduate decisions and 1.7:1 for the freshman conditions. From this, we conclude that a combination of high status, expertise, and face-to-face discussion led to above-average rates of first advocacy; other combinations did not.

Finally, Figure 4 shows how first advocates of differing status influenced group choices with different decision tasks when *more influence* was defined as a smaller difference between the member's initial preference and the group choice. (This analysis ignores the different rates of first advocacy by members of different status.) During face-to-face discussions of the graduate decisions, high-status members who were first advocates had a much greater influence on the group choice than low-status first advocates. During electronic mail discussions of the same decisions, the absolute and relative influence of high-status first advocates was reduced. During the face-to-face discussions of the freshman decisions, high-status group members had a somewhat greater influence on the group choice than low-status first advocates, but it was a smaller advantage than was found with graduate decisions; also, this difference was not changed in electronic mail discussions.

In sum, in the face-to-face condition, influence and perceptions conformed to the expected "social order." In our experiment, the graduate students were presumably more knowledgeable about the issues raised by the graduate decision tasks. Thus, in addition to their general weight in the group, high-status members who also had expertise were more assertive (via first advocacy), had more influence, and were perceived as having more credibility than low-status members. Low-status members' influence and credibility was enhanced by decision tasks about which they had expertise, the freshman curriculum issues. These combined status and expertise effects were reduced

and, in some cases, even reversed when the decision making was carried out through electronic mail.

4. DISCUSSION

The purpose of this study was to examine status equalization in computer-mediated group decision. Our results provide further evidence of the equalization phenomenon, observed in previous research on computer-mediated communication, and extends this evidence to the realm of status hierarchies. The impact of external status on participation and advocacy and the correlation between advocacy and influence was reduced when groups communicated by electronic mail rather than face-to-face. The combined impact of status and expertise on credibility and influence also was reduced when groups communicated by electronic mail. The results lend support to our argument that computer-mediated communication of the type we studied muffles social-context cues and hence social differences.

A phenomenon that surprised us was the many group members who, in using electronic mail, advocated a position right away, before they had heard from other group members. In a sense, this is an artifact of the asynchrony possible in electronic mail, but the behavior also led to social impact of some importance. To illustrate this point, consider the five kinds of group discussions depicted in Figure 5. Here we have taken all group discussions (disregarding group effects) and divided them into five post hoc categories depending on whether high- or low-status members or both were first advocates. In the face-to-face discussions, the high-status member was much more likely to be a first advocate (considering that only one of the four group members was of high status), and those high-status members who were first advocates participated more and had more influence than low-status first advocates (Situation 1 vs. Situation 2). Also, note how advocacy followed expertise: Low-status members were more likely to be first advocates when the discussion was about a freshman decision. Next, take the electronic mail discussions. In only two discussions, a high-status member became a lone first advocate; in only eight discussions, low-status members became the only first advocates (Situations 3 and 4). The large majority of electronic mail discussions fall into Situation 5, where first advocacy was shared by high- and low-status members. Here, status differences in participation and influence fall squarely between the results for Situations 1 and 2. This figures illustrates how status equalization processes in our study were confounded and took place somewhat indirectly, through changes in the likelihood of first advocacy. Indeed a close look at all the data in Figures 2 and 3 suggests that the main impact of electronic mail discussions might have been through increases in the participation and assertiveness of the low-status members (i.e., inexpert member). These gains did not seem to increase much the influence of these

Figure 5. **Differences between high- and low-status group members in five kinds of group discussions.**

Group Discussion	Number of Discussions of Each Kind[a]		Participation Difference	Influence Difference[b]
	Freshman Problems	Graduate Problems		
Situation 1:				
Face-to-face; the high-status member was the first advocate	7	12	.13	−.65
Situation 2:				
Face-to-face; a low-status member was the first advocate	16	11	.09	.28
Situation 3:				
Electronic mail; the high-status member was the first advocate	2	0	−.06	−.83
Situation 4:				
Electronic mail; a low-status member was the first advocate	3	5	.05	.58.
Situation 5:				
Electronic mail; the high-status member and one or more low-status members were first advocates	19	19	.03	−.20

[a]There were 46 codable face-to-face discussions and 48 codable electronic discussions. [b]A negative difference indicates more influence of the high-status member versus the average-low-status member.

low-status, inexpert members on group decisions, but they were associated with a decline in the influence of the high-status, expert members. Given that advocacy was a self-selected behavior, these are speculations to be tested in future research.

Our data do not allow us to attribute the impact of computer-mediated discussion to a specific social psychological process. The results are consistent with a reduced evaluation anxiety explanation of computer-mediated communication as well as with a social inattention explanation. Some researchers suggested that computer-mediated communication effects are produced simply because electronic communication is done in writing whereas face-to-face communication is done orally. The argument here is that the absence of paralinguistic channels in computer-mediated communication forces group

members to be more assertive and uninhibited in their writing and that having to write takes a long time and is frustrating. Studies of paralinguistic cues (Christie, 1985; Kraut, Lewis, & Swezey, 1982; Williams, 1977) indicate that, for full communication to occur, written communication may have to be explicit and forceful, and such a process could account for across-the-board effects of computer-mediated communication on time to decision, uninhibited remarks, conflict, and so forth. Yet we can think of no reason to expect high- and low-status (or more or less expert) members to be differentially affected by writing; the explanation does not seem to account for the status equalization effects we report. In accord with this conclusion, the postgroup questionnaire data on our subjects' computer experience and ratings of their comfort with the discussions show no main effects or interactions with any of the other variables.

One factor we did not evaluate in this study is the impact of electronic mail on the quality of decision making. The judgmental tasks we used had no "correct" answer with which to compare arguments and group choices. Both negative and positive effects could be envisaged. On the negative side, electronic groups might be less likely to think a decision is important, to make careful arguments, and to think carefully about others' arguments. Hence the proportion of high-quality arguments might be reduced in computer-mediated discussion. We would predict this to hold especially when task importance rests almost entirely on social factors, as when the boss tells a group to work on a problem that the group believes is inconsequential. Alternatively, the quality of decisions might improve. In tasks having a correct decision, groups must recognize and accept the correct choice. They sometimes do not when correctness is not obvious and social factors intrude, as when a low-status group member advocates the correct choice (see Kirchler & Davis, 1986). From our theory of social-context cue effects, we would predict computer-mediated discussion to increase the quality of decision making when such social factors would otherwise work against the group finding a correct answer. The computer-mediated interaction will focus attention on the solution, not on the person who offers it.

Our study has a number of other limitations related to the fact that it was a laboratory experiment. Experiments are a way of empirically testing assumptions in a way that cannot be done through natural experience alone. But experimental groups never duplicate organizations and life. The simple problem is that important factors are left out. For instance, in our study the group members did not routinely work together. With familiarity, routines, and social norms, established groups may overcome or create problems in decision making that experimental groups do not exhibit. A more difficult problem arises when group process and technology variables do not scale at the same rate; then, multivariate effects change, causing a phenomenon in an organization or real group to look very different from the way that phenomenon looks in the laboratory (for further discussion, see Kiesler & Sproull, in press). In this study, we found changes in participation as a consequence of a technology use, but we do not know how such changes might scale in an organizational setting. How would situational pressures for equalization compare, for instance, with institutional pressures to maintain status hierarchies? Or, to consider another factor we could not study in the laboratory, what is the impact of the addition of new people to decision-making groups? In organizations, electronic groups can be much larger, more complex, and more fluid structurally than their face-to-face counterparts (Finholt & Sproull, 1990). These interactions can increase connections between the periphery and the center of the organization and connections among peripheral workers. Thus, not only will the size of the decision-making group increase, but more peripheral employees are likely to see a relatively greater increase in their participation than are central employees (Eveland & Bikson, 1988; Hesse, Sproull, Kiesler, & Walsh, 1990; Huff, Sproull, & Kiesler, 1989). Those peripheral employees who become experts in using the technology itself may become even more involved in group communications (Eveland & Bikson, 1988). In sum, although we were able to use the experimental technique to study a small piece of the technology-participation link, we cannot generalize very far.

Notwithstanding its limitations, the findings of this study suggest some directions for thinking about managing and designing electronically linked groups. A much-discussed aim of networking technology is to increase access equalization, that is to permit people to communicate regardless of their physical location (e.g., Huff et al., 1989; Markus, 1987; Rice, 1984). Our data and that of others suggest that technology also can effect social equalization, and we attribute that to the muffling of social-context cues. Technology designs now being developed and installed might alter the equalization patterns we found. With greater bandwidth, electronic mail could communicate more social information about people, perhaps through individualized message formats, pictures, or voice. More social information about social differences will lead to a greater behavioral response to those social differences. We already see this happening in mail systems that use people's full names in message headers rather than content-free alphanumeric addresses. In a study of one company that uses such a mail system, we found that responses to men and women are systematically different, whereas responses to social differences that cannot be detected from the mail system headers (e.g., age) are not different (Constant, personal communication, January 23, 1990).

More generally, decisions to "design in" more and different social information in computer-based communication systems are social decisions as well as technical ones. They may be expensive decisions as well. For example, the telephone companies encountered unexpected political resistance to caller-

identification systems. Systematic research does not provide the answers to these decisions, but it suggests some issues to address. One issue is that changes in social information also affect social regulation and therefore people's control. Furthermore, these changes in control will not be even; the distribution of control will change as well. The caller-identification controversy illustrates, with the telephone system, how this can happen; in that instance, opposition to the telephone companies centered around the rights of callers to control their own identification versus the rights of receivers. In computer networks, operations staff usually insist that senders be identified. Should we now design systems whereby much paralinguistic information about senders automatically accompanies their messages? Some people and some organizations advocate such systems, but that may have social costs for others. More social information is not always better for everyone.

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