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**MODE OF COMMUNICATION AND THE "RISKY SHIFT":
A CONTROLLED EXPERIMENT WITH COMPUTERIZED CONFERENCING
AND ANONYMITY IN A LARGE CORPORATION**

BY

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**RESEARCH REPORT NUMBER 21
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ABSTRACT

Peer groups of five managers in a large company with a well developed corporate culture engaged in choice dilemma tasks using three modes of communication: face-to-face, synchronous computerized conferences with regular names, and synchronous computerized conferences with assigned pen names. This is the final technical report on the experiment, including documentation of all procedures, and reports of the tests of all hypotheses, including those which were not supported.

Choice behavior varied by problem and mode of communication. On a problem related to a major decision on the future of the company, conservative choices and conservative shifts dominated. On two choice dilemma problems related to individual level decisions, risky shifts were prevalent. Groups were more conservative in the pen name condition. The results are reviewed as they relate to conflicting theories that have been put forth to explain choice dilemma behavior in groups, including diffusion of responsibility, social comparison, and polarization models. The social comparison model receives the strongest support.

Results are also presented for hypotheses related to the assumption that pen name conferences will exhibit more disinhibited and deindividuated behavior than conferences in which comments are signed with the real name of the contributor. Our results do support the hypothesis that pen name conferences will exhibit more deindividuation than the other modes of communication, defined as a greater likelihood of going along with the group and its norms. There was little disinhibited behavior in either mode of computerized conferencing. Pen name conferences showed consistent but statistically insignificant tendencies toward less disagreement about the final group choice, more participation, and greater equality of participation.

Subjective satisfaction of participants tends to be highest in Face-to-Face mode and lowest in the pen name computer conferences, but the differences are statistically significant only for a factor which we have named "Persuasion" and which includes social-emotional components. Very few background characteristics of the participants are related to variations in satisfaction with computerized conferencing, among this fairly homogeneous set of with pen name communication than are males.

In sum, within this particular organizational context, the pen name condition of computer conferences exhibited some significant differences in terms of process and outcome and did not produce any extremely negative results. As a result, we believe that groups of managers facing important decisions in which the welfare of the organization must be placed above the egotistical interests of the participating employees might fruitfully consider pen name conferences as a viable decision-making option.

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CHAPTER 1

INTRODUCTION: NATURE AND PURPOSE OF THE EXPERIMENT

Computer-mediated communication (CMC) systems use a computer to structure, store, and forward communications among people. Two major variations are message systems, which handle discrete items generally sent to one or a few people, and conference structures, which are for extended group discussions on a single topic or task. In all of these systems, one communicates by typing into and reading from a computer terminal or micro-computer, using either a typewriter-like printer or a video display. Among the structural variations that can be introduced is the ability to communicate using pen names rather than the automatic signing of each entry with the real name of the author. (For background on the nature and impacts of computer-mediated communication, see Hiltz and Turoff, 1978; Kerr and Hiltz, 1982; Hiltz, 1984; Rice 1984).

Most of the usual channels of non-verbal communication, such as eye gaze, facial expressions, and voice variations are missing in CMC. Since these are important channels for social control (see Edinger and Patterson, 1983), one might expect an increase in disinhibited behavior in computerized conferences as compared to face-to-face conferences. One might particularly expect to observe a lack of inhibitions behavior in pen name conditions. Indeed, in a recently reported series of experiments, it was observed that "people in computer-mediated groups were more uninhibited than they were in face-to-face groups" (Kiesler,

Siegel, and McGuire, 1984: 1129).

This report describes and presents the results of the third in a series of controlled experiments designed to explore how computerized conferencing (CC) as a medium of communication influences group decision-making discussions (see Hiltz, Johnson, Aronovitch, and Turoff, 1980; Hiltz, Johnson, and Turoff, 1982; for an interim summary see Turoff and Hiltz, 1982). Our ultimate goal is to understand how the introduction of various forms of CMC into organizations may change the process and outcome of organizational decision-making. Our basic theoretical premise is that the social context into which a technological innovation such as CMC is introduced will interact with and mediate its use and impacts. In this experiment, we wished to explore the extent to which the tendencies of the technology influence communication and decision making, using realistic tasks within an actual organization.

The independent variable is mode of communication: a face-to-face mode (FTF); synchronous computerized conferencing in which all items are entered showing the contributor's name (CC REG); and synchronous computerized conferencing in which all items are entered using pen names, which protect the anonymity of the participants (CC PEN). The dependent variables are group decision behavior; communications process, particularly the amount and type of participation and whether or not the patterns indicate deindividuation or disinhibition; and subjective satisfaction with the communication modes.

A "pen name," similar to a "handle" on CB radio, marks communications as coming from a particular individual and allows directed responses, but does not reveal the identity of the individual. On large public networks such as The Source, a substantial proportion of participants choose to be identified only by pen name (e.g., "Superman," "MadamX" or "AppleLover.") For this experiment, identification by full or "real" name vs. pen name was imposed on entire groups, rather than chosen by individuals. The pen names were assigned and neutral, so as not to suggest any particular attributes.

Eighteen participating groups were composed of five middle-level managers or professionals employed by a large corporation, who were attending a company-sponsored course during the time that they participated. Their task was to reach agreement on the maximum level of risk which they were willing to accept in order to pursue an attractive opportunity for themselves as individuals, their office group, or their company as a whole. This is called the "choice dilemma" or "risky shift" type of situation. Each participant first read the account of the hypothetical but realistic opportunity, which described the main payoffs and risks involved. After individually recording and communicating to the group their initial judgment about the minimum odds of success that would have to prevail before they would pursue the opportunity, the group discussed the situation and attempted to reach agreement on the amount of risk which they would accept.

The dependent variable of primary interest is the extent to which the group discussion shifts the acceptable level of risk. In most of the previous studies, there has been a "risky shift:" the group decision after discussion demonstrates a greater willingness to accept risk than was evidenced by the individuals before discussion. The Choice Dilemma or "risky shift" has been one of the most widely used types of experimental treatments in small group research. To the extent that decision-making groups are consistently either too conservative or too risky, of course, an organization's long-term growth and survival will be affected. However, it is not the shift phenomenon per se which can account for the popularity of this type of experimental task. It is the fact that the repeated choice procedures provide a good measurement device for studying the interplay of individual opinions and group decision-making processes. In addition, the choice dilemma tasks are fairly short, so that one can repeat several different situations with the same group.

Both of our previous experiments used a complex and hypothetical rank-ordering task, "Lost in the Arctic." For this final experiment in the current series, we decided to change to this simpler and different type of group task, in order to be able to see if some of our previous findings about the effects of computerized conferencing vs. face-to-face discussion could be replicated with a different type of task. We were also most interested in contrasting computerized conferencing using anonymous entries with computerized conferencing using real names. Choice dilemma situations relevant to the specific organization serving as the source of decision-making groups are

more appropriate for this purpose than the complex rank-ordering tasks. The choice dilemma focuses the group attention upon a single choice for each person (rather than fifteen separate choices of priority, as in the complex rank-ordering task). Thus, it is very easy for all members to clearly see which if any of them is very different from the others, and for the experimenters to subsequently determine if anonymity has any apparent effect upon opinion changes in the direction of conforming with the group.

Our primary interest in this study is in how a new medium of communication and the variations which can be incorporated into it, such as the use of pen names, affects group decision-making. Only one prior study was located which varied mode of communication for choice shift tasks. Kogan and Wallach (1967b) used physically separated subjects (five undergraduate males per group) employing "voice only" communication through an intercom, producing a form of audio conferencing. Risky shifts comparable to those for face-to-face conferences in previous experiments occurred. As the authors point out, the voice is "a powerful vehicle for communicating affects as well as cognitions" (p. 46). By contrast, computer-mediated communication in decision-making groups seems to emphasize task-oriented communications at the relative expense of social-emotional communication, and may be experienced as "depersonalizing" or "deindividuating," at least by neophytes.

Our secondary interest is in using the opportunities provided by computerized conferencing and the particular organizational

setting to explore some of the many inconsistencies and theoretical controversies generated by the scores of previous experiments with choice dilemma situations. This study adds to the variety of evidence on choice dilemma situations by using a relatively neglected type of subject and problem situation. The participants are mid-career managers and professionals (rather than young students, as in so many previous studies). The organization for which they work represents a relatively conservative subculture: caution is more valued than risk-taking in this organization. Thus, there is the likelihood that we will encounter conservative shifts rather than the pervasive risky shifts of earlier studies. Some prior studies have looked at the way in which the particular choice-situation can result in conservative vs. risky shifts (see, for example, Stoner, 1968 and Maderas and Bem, 1968). However, no prior studies were located within a conservative subculture. The field setting used was chosen to provide a strong likelihood that the members of the groups would genuinely consider one another peers; the subjects had some history of acquaintanceship and the likelihood of substantial future interactions. Finally, the choice situations developed were realistic for the participants and their organization, rather than the purely hypothetical situations of the choice dilemma questionnaire used in most previous studies.

LITERATURE REVIEW

Format of the Typical Choice-Dilemma Experiment

Beginning with Stoner (1961), a number of experiments have presented individual subjects with problems that involve a

series of choices entailing various degrees of risk vs. possible payoff, of the following type (This account is taken from Teger and Pruitt, 1967: 545):

1. Mr. A., an electrical engineer, who is married and has one child, has been working for a large electronics corporation since graduating from college five years ago. He is assured of a lifetime job with a modest, though adequate salary, and liberal pension benefits upon retirement. On the other hand, it is very unlikely that his salary will increase much before he retires. While attending a convention, Mr. A is offered a job with a small, newly founded company which has a highly uncertain future. The new job would pay more to start and would offer the possibility of a share in the ownership if the company survived the competition of the larger firms.

Imagine that you are advising Mr. A. Listed are several probabilities or odds of the new company proving financially sound. Please check the lowest probability that you would consider acceptable to make it worthwhile for Mr. A to take the new job.

-The chances are 1 in 10 that the company will prove financially sound.

-The chances are 3 in 10 that the company will prove financially sound.

-The chances are 5 in 10 that the company will prove financially sound.

-The chances are 7 in 10 that the company will prove financially sound

-The chances are 9 in 10 that the company will prove financially sound.

-Place a check here if you think Mr. A should not take the new job no matter what the probabilities.

First the individual members of the group read the description of the choice situation and indicate the highest degree of risk acceptable. Then there is a period of group discussion, and group consensus is reached on the items. Finally, there is an individual post-test. The surprising finding, almost consistently, is that the group shifts toward higher risk-taking decisions than the decisions for the combined individuals before

discussion. Individual post-discussion choices have also tended to show a risky shift.

Typical scoring techniques and results are reported by Wallach, Kogan, and Bem (1962: 532-533):

Since larger scores indicate greater conservatism, a negative difference (or score decrease) indicates a shift in the risky direction...

Suppose we define a group as showing a risky shift from pre-discussion individual decisions to consensual group decisions if the difference score for its total score, as defined above, is a negative one. Fourteen out of 14 male groups and 12 out of 14 female groups are found to move in the risky direction, both results being very significant by a sign test. Such a finding demonstrates, therefore, that the risky shift phenomenon is quite consistent across groups.

Twelve of these "choice-dilemma" situations are included in the most commonly used instrument for studying "risky shifts." Usually referred to as the CDQ, Choice Dilemma Questionnaire, it was originally devised by Stoner (1961) and elaborated on by Kogan and Wallach (1964). All of these choice dilemmas involve completely hypothetical situations of giving advice to another party, and generally elicit initially "risky" choices. Dion, Baron, and Miller, in their excellent review (1979:365), present a critique of the use of the same twelve choice-dilemma situations in the bulk of the research done during the 1960s:

While some researchers rightly argue that some advantages result from loyalty to a single set of materials (or a single apparatus), the long-run disadvantages are greater. The most obvious point is that standardization severely limits the generalizability of any obtained effects. Numerous, unknown subtle characteristics of the specific experimental materials may be essential for producing the observed effects. For example, one possible explanation for the high frequency of risky-shifts obtained with Choice-Dilemma items is that this task requires decisions about hypothetical situations with no personal consequences for the decision-maker. In this respect, one could

effectively argue that the research on the risky-shift tells us very little indeed about group risk-taking, although it may provide substantial information about group processes.

It is easier to criticize the lack of "realism" in choice dilemma situations than to devise situations which are both realistic and of some consequence. For instance, Blascovich, Ginsburg, and Veach (1975) tried to increase realism by using blackjack games and chips; however, the participants were staked to the chips, and did not risk losing a great deal of their own money. A few studies employed a design whereby subjects could actually lose their own money; they tended to produce shifts towards caution (Felsenthal, 1979:335). How will groups "really" act when their careers, their lives, or the future of their organization is at stake? It is obviously ethically impossible to experiment with decisions of consequence on a "real" basis. However, we can attempt to use situations that are realistic in the sense that they involve decisions of the type that managers and professionals in a particular organization actually do face.

For this experiment, versions of the choice-dilemma situation were devised which would be realistic for the participants in this sense. They ask the participants to play their "real" role (employee of the company), making a hypothetical but realistic decision related to their organization. The participants could and did identify with the situations. Thus, though the situations used were "hypothetical," they were much more realistic and relevant to the participants than the original CDQ items.

Process Differences: Pen Names and Deindividuation

In our previous work, we have noted that there are some structures and communication processes within online groups which lead to personal relationships and social control by the group, and others in which these processes break down (see Hiltz and Turoff, 1984). The use of pen names can be expected to weaken some of the usual constraints on interpersonal behavior that takes place in groups within corporate settings. Among the types of behavior we would expect to see exacerbated are "flaming" (name calling, aggressive messages), questioning of the "corporate wisdom," and perhaps changes related to conformity to group decisions. There may also be effects on leadership or dominance behavior in a discussion, and in the nature of the actual decisions reached.

Computer-mediated communication in general may lead to "deindividuation" and "disinhibition." "Depersonalization" or "deindividuation" occurs when the group process is such that individuals feel to some extent that they have lost their self-awareness and identity, as well as individual identifiability and evaluation by other members of the group. In such a circumstance, the individuals feel submerged into the group (deindividuated). They may also feel free from the usual social control constraints of the group and may engage in "disinhibited," "deviant" or anti-social behavior which they would usually inhibit. (see for instance, Festinger, Pepitone, and Newcomb, 1952; Zimbardo, 1970; and Diener, 1979, 1980).

In speculating about the possible social effects of all forms of teleconferencing, Johansen, Vallee and Spangler (1979:19) note that "the separation of participants eliminates the fear of physical violence which, however subtle, is at least possible in any face-to-face encounter." If pen names are used, then not only is there little possibility of immediate retribution, but later sanctions are also impossible, since no one can know who made a remark that deviates from the rules of considerate group behavior.

Unable to see one another or to hear tone of voice, people feel more "detached" or "depersonalized." "Social presence" is decreased in all forms of teleconferencing as compared to face-to-face meetings (See Short, Williams, and Christie, 1976). Edinger and Patterson (1983) review the important role of nonverbal behavior in managing, influencing, or controlling the behavior of others in face-to-face groups. Such nonverbal behavior as distance, gaze, and facial expressions are absent in all forms of computer conferences and therefore cannot be used to attempt to influence or control the behavior of others. Differences in status or power within an organization or group may also be used to attempt to influence the behavior of others, and these would be less likely to become salient in pen-named conferences.

What will happen when social control processes break down? We will expect more "disinhibited" behavior, which we will define in the context of this experiment as:

A) Comments which break general social norms of polite behavior, either by using "bad words" or attacking individuals by calling them names or making fun of their position in a discussion; or

B) Comments which show disregard for the norms of the corporate setting, by embodying possible disloyalty towards or criticism of the company.

For the reasons cited in the above literature review, we would expect more disinhibited behavior in pen name conferences than in real-name computer conferences.

"Deindividuation" is a somewhat complex and ambiguous concept because its components are sometimes mixed with what we have termed "disinhibition." The research tradition reaches back to LeBon's nineteenth century work, *The Crowd*, in which he argued that under some circumstances, a group of people becomes transformed into a united entity that seems to develop a collective mind. The term "deindividuation" seems to have first been used in 1952 by Festinger and his colleagues. They observed that sometimes group develops a climate

in which the individuals act as if they were "submerged in the group." Such a state of affairs may be described as deindividuation; that is, individuals are not seen or paid attention to as individuals. The members do not feel that they stand out as individuals (Festinger, Pepitone, and Newcomb, 1952: 382).

Subsequently, Zimbardo (1969, 1970) focused on the conditions that produce deindividuation, such as anonymity, and on the nature of the deindividuated state, including loss of

self-awareness and loss of self-regulation. He predicts that as a result, deindividuated behavior is likely to be emotional and irrational. It is important to note that we do not incorporate this latter component into our definition. Deindividuated behavior is "going along with the group," which does not necessarily mean negative, irrational, or abnormal behavior. For example, it may mean going along with a rational argument that other group members agree with, even if you individually feel very emotional about the issue. We will segregate the "emotional, impulsive, irrational" behavior that Zimbardo spoke of into our definition of "disinhibition."

The various previous studies agree that deindividuation involves a decrease in the amount of self-consciousness and self-monitoring of behavior. When this occurs within the context of a group whose task is to seek consensus, will it result in less likelihood of compromise or conformity in order to reach agreement, or more likelihood? One could argue that there would be less effective pressure from the group. However, Diener et. al. (1980) hypothesize that when members' attention is drawn away from a self-conscious focus on themselves and the impression they are making, it is drawn "toward the group as a whole." They speculate that there will be less reliance on one's own standards and more influence by external cues being provided by the group.

We will define "deindividuation" as a decreased reliance by individual group members on their own opinions and values, and increased conformity to group opinions and norms. When

deindividuation occurs, members feel like part of the collectivity, rather than like individuals. CCPEN mode, in which individuals have no identity, will clearly be more "deindividuating" than CCREG or FTF communication modes. Thus, we predict on the basis of previous work with the concept of deindividuation that participants in pen-name conferences will be more likely to be able to reach agreement on a group decision than those in real-name conferences or FTF communication mode. We also predict that in a conservative subculture such as that of the host organization for this experiment, group decisions will be most conservative in the CCPEN mode.

Before continuing our review of previous studies, we will pause to describe the setting, subjects, and procedures for this study in more detail. This will provide the background for a literature review which enables us to develop hypotheses about how some of the theoretical explanations about choice shifts and group communication processes may be explored within the social and technological context of this study.

METHOD

Setting and Subjects

Our previous field experiment used managers and professionals in a variety of organizations (Hiltz, Johnson, and Turoff, 1982). For this experiment, we searched for a single organization which could provide us with 18 groups of five middle-level managers and professionals. We wanted to decrease the uncontrolled variance which had resulted from conducting the experiments in many different organizations and settings during our previous field experiment. At the same time, we wished to maintain the strategy of using a field setting, with groups of actual managers and professionals making decisions within their organizational setting.

The organization chosen is a Fortune-500 company which regularly conducts short courses to enhance the professional development of its employees. As an organization, it has a reputation for being conservative and for treating its employees well. The experiment was conducted during a three-week course which covered new communications technologies. The students, who were our subjects, were middle-level managerial and professional employees from various locations around the Company. They spent the three weeks in residence, having daily coffee breaks and lunch as well as classes together, and tending to go out in small groups together during the evenings. They definitely considered one another peers. They were also a fairly homogeneous group, being at mid-career. On the average, they

had worked for the company about 15 years (mean= 16.0, median= 14.8) and were middle aged (mean= 42.5, median= 41). About four out of five are male, as would be expected in American corporations. Only 20% had not previously used a computer terminal, and a little over half had previous experience with some other form of computer-mediated communication.

The experiment took place in a suite of offices and conference rooms. For the face-to-face groups, the participants stayed in the conference room for the entire session. For the computerized conferencing conditions, they met in a conference room for orientation, were then escorted to individual offices with portable printing terminals, and returned to the conference room for de-briefing. Upon arrival, there were hot and cold drinks and snacks available, in order to make sure that no participant would be beset by hunger pangs during the approximately three hours of the experiment. The first step when all arrived was for each person to introduce himself or herself to the group, including a description of their position and geographic location within the Company. The refreshments and introductions were intended to help to reinforce feelings that they constituted a group of peers within the organization.

Procedures

To introduce ourselves and the project and obtain volunteer participants, we gave a presentation to the entire class (about 125 employees) on some of our previous research on computerized conferencing, and distributed sign-up sheets in mailboxes. The experiments were scheduled so as not to conflict with the

classes-- in the late afternoon, after dinner, and on Saturdays. Volunteers were asked to check off all times when they would be able and willing to participate. We had more volunteers than the 90 required for the experimental design. The groups were assembled by first filling in those time periods for which there were only a few volunteers, and then filling in the rest of the groups from among those who indicated their availability during the scheduled times. The subjects were thus not randomly assigned to group, but rather according to the chance of their availability at common times. Some attention was paid to trying to distribute the relatively small number of females among the groups as evenly as possible, since sex composition has been significant in previous studies. The subjects were most cooperative-- only one, for instance, failed to "show" at the scheduled time. They viewed their participation as part of their management training, and played their roles as decision-makers with gusto. At the end of the course, after the experimental runs were completed, we made a presentation on the experiment and the initial results.

The organization chosen is one with which we had extensive prior contacts and a great deal of familiarity. Working with two sponsoring members of the staff for the course, we were able to devise seven choice-dilemma scenarios which were realistic situations for managers in that organization at that time (December 1981). The seven problems and the procedures for conducting the face-to-face groups were pre-tested on groups of employees who were enrolled in the session of courses conducted just prior to the time period during which we conducted this

study. During the pre-tests, we discovered that the managers and professionals took the role-playing situations very seriously, discussing and arguing for as much as an hour before reaching a decision on a choice-dilemma. This meant that we could only give two situations per group. We chose the two "best" problems in terms of the pre-test ratings of how realistic and relevant and interesting and clear the scenario was for administration to all groups. Two similar situations with high ratings were selected for the second session replication provided for the groups initially in the face-to-face condition.

The Appendix includes the full text of all instructions, problems, and procedures. The participants were instructed to record their choices in terms of the minimum number of chances out of 10 they were willing to accept, with 1 out of 10 the most risky choice and 10 out of 10 meaning they were unwilling to take the risk even with 100% assurance of success. The three problems used for each group were supposed to represent three different levels of consequences. A prior study by Converse and Cooper (1979) indicated that there is a relationship between decision importance and the magnitude of attitude change. Decisions of moderate importance produced more change than those with either high or low importance.

The first problem was very simple and had no long-term consequences at all. It was meant as a means of practice with the format of the decision-making exercise, particularly for those using the unfamiliar commands of a computerized

conferencing system to communicate. This "practice" problem, "The Investment," is a simple situation in which one can see a logically correct odds to choose (A ten to one payoff is given; therefore odds of 2 in 10 of success are definitely worth taking, on a purely mathematical basis.) Groups were instructed that this was just for practice with the nature of the problems and their procedures, and that they were free to ask the experimenter for clarification or assistance in understanding the procedures or task at any time. A maximum of twenty minutes was allowed for this "practice problem." The individual and group choices are interesting as a kind of indicator of how "risky" they tend to be.

PRACTICE PROBLEM: THE INVESTMENT

You and the others in this group have been offered an investment opportunity which has a chance of returning \$10,000 to you in a year's time. You would have to invest \$1,000; this would be \$200 for each member of your investment group. This is a one time opportunity to become part of an investment pool in a new enterprise. The situation is really such that either you get the \$10,000 or lose the \$1,000.

What is the minimum chance of success you would need in order to make this investment?

The problems described as their "real" (as compared to "practice") tasks were chosen so that one represented a decision of an individual manager, with important repercussions for him or her, but not for the Company as a whole (The "Inside Gamble"); and one represented a major policy decision with long-term consequences for the entire Company ("The Retail Plunge"). Here is the text of these problems:

THE INSIDE GAMBLE

You are a middle level manager who has in the past and can expect in the future to make average progress in the company--regular, though not spectacular raises and promotions. A senior level manager has gotten permission to form a development team

to try to develop a completely new product which may have spectacular success in the marketplace. You would be totally responsible for the management of the development team. If successful, your work with this team would bring you recognition at the highest levels and significantly increase your rate of advance. However, there is another, competing development team in your company working on a competitive product, and several other companies are known to also be making crash efforts. The group might never get a product out the door at all. Should it fail and be disbanded, assignment to an inconsequential position is the best you could expect from the company.

What would have to be the minimum chance of success of the new development group before you would accept the offer to manage it?

THE RETAIL PLUNGE

A new and costly marketing strategy has been proposed. At a cost of perhaps as much as \$1 billion over three years, the company can try to capture a majority of the new consumer market for terminals, personal computers, and software. This would involve opening over 500 direct retail outlets and a massive TV and print advertising budget. All marketing studies indicate that a lesser investment would not have a reasonable chance of capturing a primary position in this market. If the marketing offensive were successful, it would permanently secure important new markets. If it were a failure, it might severely limit the Company's ability to raise capital for any large new development efforts for a decade or more.

What would the minimum chance of success within three years have to be before you would recommend backing this new strategy?

Note that the estimated size of the potential market for the personal computer and related consumer software was very large. Participants in the course of discussion cited projections of \$30 billion, \$50 billion, and higher for the decade. Thus, it is a choice situation in which both the risks and the rewards are very high. As one participant put it, "The Inside Gamble" was "merely" a "bet your job" choice, whereas "The Retail Plunge" was a "bet your company" situation.

In all communication conditions, each individual first read the problem, and wrote on a recording form (for F-t-F groups) or

entered online (for CC groups) their initial choices. A "private" initial opinion was recorded, as well as a "public" initial choice which was shared with the group. Then the group discussed the situation. They were instructed (in writing, and with oral emphasis on the instruction before receiving the problems) that their job was then to assume they were a committee of the Company called together to make the decision or to advise on the decision (as appropriate). They had a twofold task: to arrive at the best possible decision, based on discussion of the pros and cons, and to reach agreement. If they were unable to reach consensus on the degree of riskiness acceptable to all, they could end the discussion without agreement if four out of five so voted.

At the end of the discussion, the participants entered the following information on final choices (on the offline form or in response to online prompting):

- .their perception of the group decision;
- .whether the group had reached consensus on the choice, or accomplished a "group decision" which was an average of different final choices;
- .whether they actually agreed with the group decision;
- .if they did not agree, their own final individual choice.

For the two situations described to the groups as their "real" problems (as opposed to the practice problem), the experimenters withdrew from the field of interaction. In the face-to-face discussion, the experimenter retired to a small table in a corner of the room with her/his back to the group following distribution of each problem, and waited to be notified by the

group that they were ready for a new problem or procedure. A tape recorder was placed in the middle of the table around which each group sat during the discussion. The group was told that the experimenter would not answer any questions. In the computerized conferencing condition, the doors to each office were closed after the completion of the practice problem, and the participants were told to summon the experimenter only if they became disconnected. In both conditions, a 40 minute time reminder was delivered (orally or online), but the group was permitted to continue the discussion as long as they liked.

Following the two "real" problems, participants individually completed a post-experimental set of questionnaires giving background information on themselves, their reactions to the problem-situations, and their subjective satisfaction with the discussion process and outcome. They were then debriefed.

SYNCHRONOUS CONFERENCES

The most "unrealistic" aspect of this experiment is that the groups using CC were required to conduct their discussions in "real time," or synchronously. Though participants in computerized conferences are sometimes online at the same time, it is much more usual for participation to be asynchronous. Generally, participants sign on any time it is convenient, and spend as much or as little time as they wish. A "real" choice dilemma might be discussed during a period ranging from several days to several weeks. Some of the participants might spend a total of five minutes on the discussion, and some might spend

five hours or more, depending on their interest in the situation, whether or not they were travelling during that period, convenience of terminal access, and other factors which could not be controlled. A "controlled" experiment in which asynchronous conferencing is used is a contradiction in terms. Thus, in order to make sure that only mode of communication was varied among the groups, and that observations of participant behavior could be collected for the entire discussion, synchronous CC was used.

.SIMPLE TAILORED SUBSYSTEM

The host system for this experiment is EIES, the Electronic Information Exchange System, generally considered to be the most comprehensive computerized conferencing system. A system like EIES has more than a thousand different commands or procedures which can be used by groups for different types of tasks. For any particular group and task, a subset can be selected which enables them to accomplish their task without learning more than necessary about the system. In the CC conditions for this experiment, a simplified subsystem of EIES was used, to minimize training time. Participants had only four commands to learn. The participants could not send private messages to each other; all contributions were entered into the common group conference with the command "+enter." The participant then automatically received any waiting comments, and was automatically placed back in the "write" mode. The command "+choose" (#) allowed a participant to change his or her choice of the minimum acceptable odds (1 in 10, 2 in 10, etc) for the situation at any

time; this automatically generated a "one-line interrupt" which notified the other four of the shift, e.g.:

CHARLEY ADAMS (902) HAS CHOSEN 6

The command "+end" constituted a vote to end the discussion without consensus, and generated a similar instant notification to the others, e.g.:

SALLY SMITH (903) HAS VOTED TO END THE DISCUSSION

The command "+look" enabled a participant to pause in the midst of writing to look at any new entries, then be placed back in write mode to finish the comment.

.THE THREE MODES: CC REGULAR, CC PEN, AND FACE-TO-FACE

For six of the groups, all entries were headed with the full name of the participant (as well as time of entry and a unique "conference comment" number, which can be used as a shorthand way of indicating which previous comment you are responding to in a new entry). This is the normal or "regular" way in which entries in EIES appear. In the six groups in the pen name condition, the pen names were assigned (we used "one" "two" "three" "four" and "five" for half of the groups; and five colors for the other half. People seemed to prefer the colors). The items entered were identified only by the pen name and the conference entry number. The subjects were instructed not to give away any hints about who they "really" were, and amazingly,

none of them did. Usually, EIES conferees can choose whether to make a particular entry appear with their regular name or with a pen name. For the experiment, the CC REG groups were not aware of this option and were thus unable to use it, whereas the CC PEN groups had pen names imposed on them for all entries.

The six groups which had a face-to-face ("FTF") discussion were invited to come back two weeks later and try similar problems in a computerized conferencing condition. This was done to give them the promised opportunity to try a new communications medium. Only four of the six included the same five participants two weeks later, so it is not possible to obtain any significant results by using the repeated measures for these groups.

Content Coding

An initially very ambitious scheme for content analysis was devised and applied to the recordings and transcripts of the second and third problems. The unit of analysis was the "comment," whether this was a speaking turn or a written entry. A version of Bales Interaction Process Analysis was used, which expanded the "giving opinion" category by breaking it down into separate recording of counts and exact words used for introducing a new argument in favor of risk or conservatism. (See Appendices K and L for the form, categories, and instructions). It also attempted to cross-classify each comment by the task-oriented dimension and the presence or absence of a social-emotional dimension. The complex scheme proved unworkable, at least for the undergraduate students who were

used as coders. Two coders independently coded each transcript or recording. The inter-coder reliability was extremely low. However, we could rescue the counts of pro-risk and pro-conservative arguments, since their content had been extracted verbatim. In the three of the eighteen groups for which there were some disagreements between coders about the number and content of the arguments, the study director (Hiltz) reviewed the complete record of the discussion and resolved the question.

With hindsight, the "practice" or first problem should also have been coded this way. We had incorrectly assumed that since the first problem was described as practice, it would not show clear differences by mode. Later analysis indicated that this was an incorrect assumption.

A more fundamental difficulty was that the recordings, since they were done on a simple tape recorder designed to minimize intrusion into the group processes, were difficult to understand. In 1984, a graduate student (Linda Shatzer) was located who will undertake the transcribing and content recording of the FTF discussions as part of a Ph.D. dissertation. Thus, the content analyses presented here are partial and preliminary.

For a second content analysis, the first author recorded and classified incidents of "disinhibited" behavior, using only the written transcripts for the CC conditions. When the FTF transcripts become available, this analysis will be expanded.

Analytic Designs

Three different Analysis of Variance (ANOVA) designs are used to analyze the data in this study. Independent ANOVA designs are used to compare the three different communication conditions on most dependent variables. Correlated (Repeated measures-Randomized Block) ANOVA designs are used to compare differences in the problems, ignoring communication modes. Mixed Factorial (Lindquist Type I) ANOVA designs are used when it is necessary to look at overall differences in communication modes and problems as well as possible interactions between mode and problem. The Mixed Factorial design essentially combines the Independent ANOVA and Correlated ANOVA designs into a single analysis.

COMPETING EXPLANATIONS FOR CHOICE-SHIFTS:

ALTERNATIVE HYPOTHESES

Why does most of the previous research show groups making riskier choices than individual members would have made before discussion? Among the theoretical explanations which have been offered and supported by at least some experimental evidence are diffusion of responsibility; the nature and influence of group leaders; cultural bias in favor of risk taking, with consequent normative pressure on group members; social comparison and conformity pressures; and the polarizing or enhancing effect of persuasive arguments during the group discussion process (See Brandstatter, Davis and Stocker-Kreichgauer, 1982). We will review each of these explanations briefly, noting their

implications in terms of derived hypotheses for testing the predictive power of these competing explanations within the context of this experiment.

Diffusion of Responsibility

One hypothesized explanation is that the group causes a "diffusion" or sharing of responsibility:

It is possible that there is at work in these groups a process of diffusion or spreading of responsibility as a result of knowing that one's decisions are being made jointly with others rather than alone. Increased willingness to take risk would eventuate from this decreased feeling of personal responsibility (Wallach, Kogan, and Bem, 1962).

It is further asserted that (Kogan and Wallach (1967a: 51):

...failure of a risky course is easier to bear when others are implicated in a decision;...consider a homogeneous group composed of test anxious individuals, that is, individuals uniformly fearful of failure...(such people) might be especially willing to diffuse responsibility in an effort to relieve the burden of possible fear of failure.

It is argued that conditions of anonymity will enhance the diffusion of responsibility, and thus increase the probability of a risky shift:

Anonymity is basically an individual's subjective feeling of minimal self-consciousness and lowered identifiability. A feeling of anonymity can be created by allowing persons to communicate by means of written messages or intercoms (Dion, Baron, and Miller, 1970:321).

To the extent that diffusion of responsibility is operative and produces risky shifts, we would expect to observe the following:

Hypothesis 1: There will be risky shifts in all conditions and for all problems.

Hypothesis 2: There will be the greatest risky shift for the condition providing the most diffusion of responsibility from the individual to the group as a whole: computerized conferencing using pen names.

Hypothesis 3: There will be the greatest risky shift for situations in which the consequences are largest. Thus, if diffusion of responsibility is operative, we would expect the greatest risky shift for the third problem in in this experiment, "The Retail Plunge." This is expected because fear of accepting individual responsibility for failure increases with the consequences of such failure.

The Leadership Explanation

A second theoretical explanation is that the very type of individual who tends to choose the riskiest decisions is also the "take-charge," persuasive, leader type of personality, who therefore tends to dominate the group discussion and influence the low risk takers to accept his/her position. (This explanation is advanced by Collins and Guetzkow, 1964, among others, but rejected by several subsequent experimenters as unconvincing and not supported by direct testing).

Detractors of the leadership hypothesis assert that the relation between initial riskiness and attributed influence is more apparent than real. For example, Kelley and Thibaut (1968, p. 81) suggest that:

The correlation has generally been obtained by

post-experimental questionnaires giving the subjective reports of participants about relative influence... The correlations between initial riskiness and influence may simply reflect what has happened: subjects observe the shift to occur and infer from it that the initially risky persons must have been more influential.

To the extent that the "risky leaders" theory is operative, we would expect the following results:

Hypothesis 4: Dominant individuals in the discussions will have the riskiest initial choices.

Hypothesis 5: Risky shifts will be less in both conditions of computerized conferencing than in face-to-face conferences, because participation is more equal in the former (dominant leaders seldom emerge without specific structures in the software to help the group to designate a leader).

Cultural Bias

Another hypothesis is that something about the social nature of the group discussion process itself is involved in producing risky shifts following discussion. The norms of American society that people (especially men) are supposed to take risks in order to achieve success, and the consequent desire of individuals not to appear "chicken" or deviant from commonly accepted norms in publicly announcing their choice, become operative during group interaction.

A key experiment which ties this explanation to mode of communication is Wallach and Kogan (1965), who contrasted the amount of "risky-shift" in the three following situations:

- a. Discussion until consensus was reached.
- b. Discussion and re-voting before consensus was reached.
- c. "Consensus without discussion," in which subjects communicate their risk preferences to each other by written messages without face-to-face discussion.

The "risky-shift" occurred for both face-to-face groups, but not for the written communication group.

Teger and Pruitt (1967) used a written successive ballot technique similar to a Delphi technique, and found only a small "risky-shift."

The argument is that the face-to-face interaction is necessary in order to bring the social-normative pressures fully to bear. This relates to mode of communication in that our previous work has shown that computerized conferences seem to create less pressure to conform to the opinions of others.

In our study, the setting is a company which represents a conservative subculture. This may be true of many large, older companies with a dominant market position to protect. To the extent that subcultural norms operate to produce shifts, then we ought to see:

Hypothesis 6: There will be a tendency towards conservative shifts in all problems, but they will be greater for the problems specifically relating to the Company (2 and 3);

Hypothesis 7: There will be conservative shifts for all

communication modes, but they will be greatest for face-to-face conferences and least for computerized conferences with pen names, where the least social pressure to conform is generated.

Note that hypotheses 6 and 7 directly contradict the hypotheses derived from "diffusion of responsibility" and "leadership" theories. By testing these rival hypotheses, we will be assessing the relative merits of each explanation for the particular organization studied.

Conformity Pressures and Social Comparison

Variations of the Cultural Bias argument focus upon the processes of conformity and social comparison per se. Groups may focus their communication not upon discussion of the substantive issues or pro-risk or pro-conservative values which underlie these issues, but rather upon gaining consensus, creating pressure for those with deviant or extreme choices to compromise and conform. Conformity can be defined as changes in behavior or belief consisting of movement toward the behavior of the majority of the group, in response to real or imagined group pressure (Kiesler & Kiesler, 1969; see also the classic experiment by Asch, 1951). Cecil, Chertkoff, and Cummings (1970: 273) found support for the following conformity explanation by purposively manipulating the risk-choice composition of groups to create situations in which two out of three members would be risky or conservative:

... the risky shift is due, at least in part, to the effects of group pressure. On issues producing a risky shift most individuals are risky, therefore a randomly selected group would often be composed of a majority of

high risk takers. Group pressure by the majority might lead the minority to conform, thereby producing a risky shift.

To the extent that group conformity pressures are operative, the discussion would be expected to focus explicitly on comparisons among the choices, and to emphasize compromise in order to achieve consensus, rather than emphasizing a rational exploration of the substantive issues related to a decision-choice.

The effectiveness of such group pressures to conform depends upon the activation of "social comparison" processes. The participants must have some basis for considering one another to be of similar social and ability levels. Studies by Teger & Pruitt (1967) and Sanders and Baron (1977) indicate that social comparison plays a large role under some conditions. For example, shifts can be observed when there is merely a sharing of information on choices among group members, with no discussion at all. Goethals and Zanna (1979:1469) produced convincing evidence for the point of view that "social comparison processes can be engaged fully only when comparability is established by knowledge of other group members' standing on traits thought to be related to risk taking."

Hypotheses related to this theoretical model for explaining choice shifts are as follows:

Hypothesis 8: Participants will compare their initial decisions

with those of peers and attempt to bring their choices more in line with the others if they find themselves at an extreme. Thus, the most risky member of each group will shift towards a more conservative choice, and the most conservative member of each group will shift towards a more risky choice.

Hypothesis 9: Social pressures for compromise and conformity are less operative in computerized conferencing than in face-to-face conferences. Thus, a larger proportion of the face-to-face groups will reach agreement, and there will be a greater decrease in the standard deviation of choices around the group mean for the face-to-face condition.

The Polarization Model

Underlying this explanation is the premise that the group discussion will emphasize a dominant preference (risky or conservative), thus further pushing the group towards that pole. Other terms used to describe this theory are enhancement and persuasive arguments. The discussion process enhances the risky or conservative tendency of the members of the group by eliciting more persuasive arguments in one direction than in the other.

If most members of the group agree that risk is the correct value for the problem under consideration, then most of the reasons and justifications brought out in the discussion will favor risk. The subjects will then hear additional reasons why risk, is correct, moving them further toward the value of risk, and causing them to take even greater risk (Teger and Pruitt, 1967:543).

Vinocur (1971) demonstrated that on certain issues, groups generally exhibit a "cautious shift" rather than a "risky

shift." He found that when the mean of initial individual judgments is somewhat risky (.5 or under), then risky shifts occur; if it is on the "cautious" side, then cautious shifts tend to occur. The effect of the group discussion is thus asserted to be one of pushing the group toward the risky or cautious pole that is already their tendency. Related work by Myers and Bishop (1971) shows that the process of shifting to more extreme views on issues is associated with a discussion in which most of the statements favor the dominant point of view. In other words, the rhetoric of discussion becomes skewed in one direction, and thus produces opinion shifts in that direction. (See also, Burnstein and Vinokur, 1975,1977; Burnstein, Vinokur & Trope, 1973).

We will explore the adequacy of this explanation by using a content coding of the discussions to count the number of statements favoring conservative or risky arguments. If the group polarization process is operative, we should expect to find the following:

Hypothesis 10: If the average pre-discussion choice is conservative (5 or above), there will be more "pro-conservative" arguments raised during the discussion than pro-risk arguments; and vice-versa.

Hypothesis 11: Group choice will shift in the direction indicated by the number of different pro-risk vs. pro-conservative arguments offered. This will hold across all communications conditions.

As Sanders and Baron (1977) point out, social comparison and persuasion processes are not mutually exclusive. For example, participants may become receptive to arguments which will justify their shifting their choice closer to the group average. Singleton (1979, p. 53) also proposes such a "combination" theory:

1. Cultural values determine the alternative toward which most individuals are attracted and, hence, the total distribution of choices on a given decision problem.
2. The total distribution determines the distribution of choices within randomly composed groups.
3. The distribution of choices determines the proportion of arguments presented for choice alternatives, which determines the thrust of the discussion...
4. Individual changes are a function of conformity motives--the desire to make the "correct" choice and/or be consistent with others-- and some other process(es), e.g., persuasive argumentation.

CO-VARIATES AND ADDITIONAL HYPOTHESES

The above hypotheses relate to the nature of choice shifts and to the processes underlying such shifts. In addition to looking at how much and in what direction choices are shifted by discussion, we are also interested in the relative likelihood that groups will be able to reach agreement in various modes of communication. We also wish to look at differences in subjective satisfaction with the communication process, especially as this may vary with attributes such as age, sex, and typing skill.

Hypotheses About Group Process

How does the use of pen names as a form of anonymity affect the communication process and outcome in computer-mediated communication? Evidence of disinhibition, deindividuation, and equality of participation are the chief variables of interest.

Given problems with quality of the tape recordings and the reliability of the results of the initial ambitious attempt at complete content coding for all groups in all modes, we will restrict the tests of hypotheses about disinhibited behavior to counts for problems 2 and 3 in CCREG and CCPEN modes only, for which there are written transcripts. Within the context of this study, we will operationalize this search for effects of anonymity on disinhibition as follows:

H12: Pen name conferences will contain more incidents of disinhibition in the form of "flaming," that is, attacks on individuals or the group. Included are insults and the use of profanity.

H13: Pen name conferences will contain more examples of disinhibition in the form of comments that may be considered to be disloyal towards or critical of the organization.

Hypotheses about deindividuation can be tested with data generated for all three modes.

H14 Deindividuation: There will be more agreement on a final group decision in pen name conferences than in FTF or computer conferences in which regular names are used. (This will be operationalized as a smaller standard deviation for final group decision).

H15 Deindividuation: Group decisions made in CCPEN mode in this conservative subculture will be more conservative on an absolute basis than group decisions made in CCREG or CCPEN mode.

We will also look at any possible effects of mode on amount and equality of participation. There may be more unequal participation with pen names. In a group of peers with no designated leader or manager, the usual norm would be for all members to try to "do their part" in helping the group reach a decision. Protected by pen names, those who feel least enthusiastic about the task or the group or the medium itself may not participate as actively, since their lack of participation is not personally identifiable. To the extent that this is true, we would expect to find:

H16: There will be fewer comments in pen name conditions, on the average (measured by mean comments) and

H17: There will be more inequality of participation in pen-name conditions.

Following measurement procedures developed in previous experiments, inequality of participation is measured by the

difference between the expected proportion of comments or lines by each participant if there were complete equality (20% in groups of five), compared to the observed distribution, as follows:

$$I = (1/N \text{ Sum } (E_i - O_i)) / (1 - 1/N)$$

Where E_i = expected cumulative proportion of comments if all contributed equally; O_i = observed cumulative proportion starting with the least active member; N = size of group. This index varies from 0 for total equality to 1.0 for complete inequality (a monologue).

Subjective Satisfaction Hypotheses

We expect that face-to-face meetings will generally receive higher subjective satisfaction ratings than the computerized conferences, given that we are experimenting with "new" users, and it takes some time to get comfortable with the medium. Within these parameters, however, we expect to find the following:

Hypothesis 18: Subjective satisfaction will be highest for FTF and lowest with pen name computer conferences.

We expect this because CC in general and pen names in particular are unfamiliar as a form of communication, and being forced on the participants rather than chosen by them for selected interactions.

Hypothesis 19: Subjective satisfaction with CC will be higher for females, younger employees, those with more previous experience using computers and better typing skills.

SUMMARY

A field setting was chosen to study the effect of mode of communication on opinion shifts on choice dilemma problems. The subjects were mid-career managers and professionals in a large conservative organization. There was one practice problem, followed by two choice dilemmas which were realistic types of decisions facing managers in that organization at that time (1981).

The independent variable is mode of communication. Six groups of five members conducted their discussions in each of three communication modes: face-to-face, synchronous computer conferences using their names, and synchronous computer conferences using assigned pen names.

A review of previous experiments on choice dilemma situations shows that there are conflicting theoretical explanations for the usual outcome, a "risky shift" following group discussion. Eleven hypotheses on expected choice shift behavior were derived from the following alternative theoretical explanations:

- .Diffusion of responsibility
- .Leadership characteristics
- .Cultural bias in favor of risk-taking
- .Social comparison and conformity
- .Polarization

Results for these alternative predictions of choice shift behavior are included in Chapter 2.

A second set of hypotheses focuses on the differences between CC with identified participants and CC with pen names. It is expected that the use of pen names will increase "deindividuation," with resultant effects upon the discussion process and outcome. Tests of the deindividuation hypotheses are included in Chapter 2 on the group decision outcomes, and those for disinhibition and amount and relative equality of participation are included in Chapter 3, on communications process.

A final set of hypotheses relates to relative subjective satisfaction with the three modes of communication. Results for these hypotheses are presented in Chapter 4.

CHAPTER 2

CHOICE SHIFTS AND DECISION OUTCOMES

Let us begin by looking at the detailed data on how the various groups shifted their choices for the three problems and the three communication conditions. Having first gotten an overall feeling for what occurred, we will then turn to a systematic test of the various alternative predictions and explanations of choice shift behavior, as it is affected by communication mode and type of problem situation.

OBSERVED BEHAVIOR BY MODE AND PROBLEM

Tables 1-1 through 1-3 are all presented in the same format. The numbers in the tables are the mean choices by group. The six face-to-face groups are shown first, followed by the six groups using CC with regular names, and then the six with CC and pen names enforced. These scores were calculated by averaging the individual scores in each group. There were a handful of cases for which there were missing individual scores, and the group's means represent the average of the four choices reported to us rather than all five. The left hand side of the table shows the choice shift results for the "public" choices: the initial public choice compared to the final group choice, whether that was arrived at by consensus or by averaging the group choices at the point when four out of five voted to end the discussion without consensus, and then asking all five if they agreed with this number. The right hand side of the tables shows the shifts for "private" choices: the initial private

choice, and the final individual choice, after the group had made its decision. These are shown for completeness, but will seldom be mentioned in the discussion of results. Analyses of variance showed no significant differences between public and individual shifts, and it is the public or group shifts which generate data comparable to that for most previous choice shift studies. In describing the results, shifts of less than .5 will be referred to as "very small," those of .51 to .99 as "small," and those of 1.0 or larger as "substantial."

For the practice problem, we note first of all a tendency towards conservatism, in the sense that the mean initial public choices are all above the 2.0 (two chances out of ten) which would mathematically "pay off," since the return on this investment was to be ten-to-one. In interpreting the "shift" column, note that a positive number denotes a "risky shift." The shift was calculated by subtracting the final group choice from the initial public choices. If the initial choices were larger, then the group discussion resulted in the members being willing to accept lower odds of success, or a "risky shift." Conversely, a negative number in the shift column means that the group decided on a more conservative choice than the individuals had chosen before discussion, thus exhibiting a "conservative shift."

Looking first at the public choices on the left hand side of the table, we note that for this problem, three of the six face-to-face groups made substantial risky shifts; and there was only one very small "conservative shift." For the CC condition

with regular names, five of the six groups made a substantial risky shift. For the CC condition with pen names, there was one very small conservative shift, one small conservative shift, and only one of the six groups made a substantial risky shift. One's initial impression, then, is that there is a significant effect of mode of communication on shift behavior for this problem, with pen name computerized conferences least likely to produce shifts.

For the second problem, "the inside gamble," we encounter an individual decision within the context of the Company. Initial public and final group choices both tend to be somewhat more conservative, as would be expected. There are apparently differences among communication conditions, but they follow a slightly different pattern. Looking at the public choices, the only conservative shifts occur in the face-to-face condition. Half these groups show some conservative shifts and half some risky shift, but only one shift in each direction is substantial. In the CC regular condition, for the public choices, half show a substantial risky shift, and half little or no risky shift. The CC pen name condition tends to produce little or no shifts at all, for this problem.

In understanding what happened during the second problem discussions, it is important to know that most groups re-defined the problem. The situation as described implied that "the worst" that could happen is that the manager would be fired if she or he failed. The groups tended to begin their discussions of this problem with a denial of this possibility; they did not

feel that the Company would ever fire anyone for failing to succeed at a difficult task. ("I can't imagine us being fired even though it does not say so," stated a typical participant). On the contrary, they redefined "the worst" as "sitting in the penalty box for awhile," which we had said was "the best" that one could hope for if you did not succeed. ("You're not penalized for not bringing off a high risk project," continued the employee quoted above). When a participant made this argument in favor of re-defining the risks, he or she was generally successful in convincing the others to accept this argument, and thus a more risky choice.

The "retail plunge" problem, shown in table 2-3, differs from the others in that initial choices are the most conservative, and it is the most likely to produce conservative shifts in all communication conditions. Looking at the public choices, we have two substantial conservative shifts and one small one in the face-to-face condition, and no substantial risky shifts. In the CC condition with regular names, there are once again two substantial conservative shifts, plus two very small ones, and no substantial risky shifts. For the CC pen name conditions, we get, as on the other problems, the smallest shifts. There is one substantial conservative shift, two very small ones, one very small risky shift, and two groups with absolutely no shift at all.

Summarizing these observations, it does appear that the amount and direction of shifts is related to both problem and mode of communication. As the problem changed from one involving a

relatively small amount of money or the career of an individual, to a situation explicitly dealing with the future of the Company, risky shifts were replaced by conservative shifts. For all problems, the CCREG mode tends to produce the largest shifts, whereas the CCPEN mode is the most likely to produce little or no shift. Defined as a shift under .5, the CCPEN mode produced 4 out of six groups in this "little shift" category on the first problem, five out of six on the second problem, and five out of the six on the third problem. This is a significant difference, as indicated below. (Since the 18 observations are not independent, a chi square test is not appropriate.)

Likelihood of a Shift, by Condition

Mode	Very Little Shift	Larger Shift	Total
FTF	7	11	18
CCREG	6	12	18
CCPEN	15	3	18
ALL	26	28	54

TABLE 2-1
RESULTS BY GROUP FOR THE PRACTICE PROBLEM
(MEANS OF CHOICES)

COND & GROUP#	INITIAL PUBLIC	FINAL GROUP	SHIFT	PRIVATE		SHIFT
				INITIAL	FINAL INDIV	
FTF1	4.0	3.0	1.0	4.4	3.0	1.4
FTF2	3.0	3.0	0	3.0	2.8	.2
FTF3	2.8	2.9	-.1	2.6	2.4	.2
FTF4	3.0	3.0	0	3.0	2.6	.4
FTF5	4.6	2.0	2.6	4.0	2.4	1.6
FTF6	5.2	4.0	1.2	5.2	4.0	1.2
X FTF	3.8	3.0	.8			
CCREG7	3.2	2.0	1.2	3.2	2.0	1.2
CCREG9	4.6	3.0	1.6	4.6	3.8	.8
CCREG11	4.6	4.0	.6	4.6	3.4	1.2
CCREG14	3.8	2.0	1.8	3.6	6.4	-2.8
CCREG16	4.0	3.0	1.0	4.0	2.6	1.4
CCREG18	3.4	2.2	1.2	4.4	2.0	2.4
X CCREG	3.9	2.7	1.2			
CCPEN8	5.8	6.0	-.2	5.8	6.0	-.2
CCPEN10	4.4	4.0	.4	3.2	3.0	.2
CCPEN12	3.4	2.0	1.4	3.4	2.0	1.4
CCPEN13	3.0	3.0	0	3.0	2.8	.2
CCPEN15	5.2	4.8	.4	5.2	4.1	1.1
CCPEN17	3.4	4.0	-.6	3.8	3.2	.6
X CCPEN	4.2	4.0	.2			

TABLE 2-2
RESULTS BY GROUP FOR THE INSIDE GAMBLE PROBLEM
(MEANS OF CHOICES)

COND & GROUP#	INITIAL PUBLIC	FINAL GROUP	SHIFT	INITIAL	FINAL	SHIFT
				PRIVATE	INDIV	
FTF1	4.8	4.2	.6	4.8	4.4	.4
FTF2	5.8	6.0	-.2	5.4	5.8	-.4
FTF3	2.4	2.0	.4	2.4	2.0	.4
FTF4	4.2	5.0	-.8	4.2	4.4	-.2
FTF5	5.8	7.0	-1.2	4.8	7.2	-2.4
FTF6	4.0	3.0	1.0	4.0	3.0	1.0
X FTF	4.5	4.5	0			
CCREG7	4.6	4.6	0	4.6	4.4	.2
CCREG9	5.8	5.0	.8	6.0	5.2	.8
CCREG11	5.6	4.0	1.6	5.4	4.4	1.0
CCREG14	3.2	3.0	.2	5.0	3.0	2.0
CCREG16	4.8	3.4	1.4	4.0	3.2	.8
CCREG18	4.2	2.0	2.2	4.0	3.0	1.0
X CCREG	4.7	3.7	1.0			
CCPEN8	5.6	5.0	.6	5.2	5.2	0
CCPEN10	5.0	5.0	0	5.2	4.0	1.2
CCPEN12	5.2	5.0	.2	5.6	5.4	.2
CCPEN13	3.2	3.0	.2	3.4	3.0	.4
CCPEN15	6.4	6.4	0	6.4	7.0	-.6
CCPEN17	5.2	5.0	.2	5.0	5.0	0
X CCPEN	5.1	4.9	.2			

TABLE 2-3
RESULTS BY GROUP FOR THE RETAIL PLUNGE PROBLEM
(MEANS OF CHOICES)

COND & GROUP#	INITIAL PUBLIC	FINAL GROUP	SHIFT	INITIAL	FINAL	SHIFT
				PRIVATE	INDIV	
FTF1	4.8	4.0	.8	5.0	4.0	1.0
FTF2	7.8	8.0	-.2	7.8	7.4	.4
FTF3	5.8	5.2	.6	5.4	5.8	-.4
FTF4	3.2	5.0	-1.8	3.6	4.8	-1.2
FTF5	5.8	8.0	-2.2	6.0	8.0	-2.0
FTF6	4.4	4.0	.4	4.4	4.0	.4
X FTF	5.3	5.7	-.4			
CCREG7	5.4	5.5	-.1	5.4	5.7	-.3
CCREG9	6.4	6.0	.4	6.2	6.0	.2
CCREG11	4.8	5.0	-.2	5.2	5.0	.2
CCREG14	7.2	9.0	-1.8	7.2	9.0	-1.8
CCREG16	7.6	9.0	-1.4	7.6	9.0	-1.4
CCREG18	5.2	5.2	0	5.8	5.7	.1
X CCREG	6.1	6.6	-.5			
CCPEN8	7.0	7.0	0	6.2	6.4	-.2
CCPEN10	5.8	6.2	-.4	6.6	6.5	.1
CCPEN12	5.8	6.0	-.2	5.6	6.2	-.6
CCPEN13	5.0	5.0	0	4.8	5.2	-.4
CCPEN15	7.2	8.6	-1.4	7.6	8.8	-1.2
CCPEN17	7.4	7.0	.4	7.2	7.4	-.2
X CCPEN	6.3	6.6	-.3			

CHOICE SHIFTS: STATISTICAL ANALYSIS OF THE DATA

In Table 3-4, the group level data (18 scores) are analyzed statistically to see which of the differences we have observed are significant. For the practice problem, the smaller public choice shifts for the pen name computerized conferencing condition miss significance at the .05 level according to a simple analysis of variance. When a Duncan Multiple Range Test is performed, however, the risky shifts in CCPEN are significantly smaller than the choice shifts in CCREG mode.

On problem 2 (Inside Gamble), the analysis of variance as well as the Duncan Multiple Range Test shows significant differences between face-to-face and CCREG. By the third problem, where all conditions tend to show conservative shift, there are no significant differences.

As in the previous tables, private shifts are shown for completeness. There appears to be some tendency for the public shifts to be larger than the private shifts in CCREG, whereas in CCPEN, the opposite is true, the private shifts tend to be larger. We did not have any hypotheses about this phenomenon and offer it only as an observation that may evoke hypotheses for future studies.

Turning to differences among problems (Table 2-5), we see that the third problem does produce choice shifts that are significantly different than the other two. When faced with a

decision affecting the company rather than themselves as individuals, the shifts are generally in a conservative direction.

Table 2-6 uses the Lindquist Mixed Factorial Design of analysis of variance to test for interaction effects. There are no significant interactions between group and mode of communication, or between mode and problem. As we saw in examining simple one-way analysis of variance between modes within each problem (Table 2-4), the differences among modes are not consistent. Therefore, it is not surprising that when we look at the interaction effects, "mode" is not a statistically significant source of variation, though problem is.

MODE AND ABSOLUTE CONSERVATISM

There is another set of consistent differences in the first three tables of "raw results": choices made by people in the pen name condition are more conservative, on the average, than choices in other communication modes. This is true both of initial public choices and final public choices. An analysis of variance for mean initial public choices is shown in Table 2-7. No one of the differences in conservatism is significantly different, taken alone. However, even though these are not independent observations, there is very little chance that all three replications could have shown this great a difference in the level of conservatism in initial public choices by chance.

Something is going on here in terms of the communication mode affecting the tendency towards risky or conservative choices.

Remember that these initial choices are not made independent of mode. In the face-to-face group, they will have to be announced orally by each individual (even though they were recorded for us in hand written form). In the CCREG mode, the participants have already had a short preliminary discussion in this mode, and they know that their choices will be delivered to others in writing with their names attached. In the CCPEN mode, they know that their initial choices will be delivered in writing by computer, but that their choices will not be identified. The latter mode is tending to make them more conservative.

The alternative explanation is that there was some difference in the characteristics of the people who were assigned to the various communication modes. We have no basis to believe that this is true. There was no way in which the assignment of individuals to groups and of groups to mode could have biased group composition in this manner. In addition, there are no significant relationships between mode of communication assigned and such characteristics as age, education, years of experience with the Company, or previous computer experience.

As a result of the differences in initial choices by mode and of the differences in choice shifts by mode, there are significant differences in the nature of the final group choices (as identified and reported by the individuals). The CCPEN groups have a consistent and significant tendency to make more conservative choices than groups interacting in other modes.

This is a confirmation of the Hypothesis numbered 15 in the

introductory chapter. We assert that the process that explains the finding of more conservative choices in CCPEN is "deindividuation." In the pen name condition, where individuals are not identified, their individual values and opinions are less important than the dominant group values and opinions. In this conservative subculture, the surrounding organizational values are conservative. Thus, in CCPEN condition, deindividuation produces more conservative choices.

TABLE 2-4
CHOICE SHIFTS BY COMMUNICATION MODE
SIMPLE ANALYSES OF VARIANCE AND
DUNCAN MULTIPLE RANGE TESTS*

	FTF	CCREG	CCPEN	ANOVA
SHIFT1PUB	.78 (AB)	1.23 (A)	.23 (B)	F=2.6, P=.11
SHIFT1IND	.83 (A)	.70 (A)	.55 (A)	F=.1, P=.91
SHIFT2PUB	-.03 (B)	1.03 (A)	.20 (AB)	F=3.8, P=.05
SHIFT2IND	-.20 (B)	.97 (A)	.20 (AB)	F=3.0, P=.08
SHIFT3PUB	-.40 (A)	-.52 (A)	-.27 (A)	F=.1, P=.91
SHIFT3IND	-.30 (A)	-.50 (A)	-.42 (A)	F=.1, P=.92

*Means with the same letter are not significantly different

KEY:

SHIFT1PUB= The difference between the mean public initial choice before discussion and the final group choice, Problem 1. Positive values represent risky shifts and negative values represent conservative shifts.

SHIFT1IND= Mean initial private choice minus mean final individual choice, problem 1.

TABLE 2-5
 TEST FOR SIGNIFICANT DIFFERENCES AMONG PROBLEMS:
 RANDOMIZED BLOCK ANOVA

	MEAN	PUBLIC SHIFTS DUNCAN*
	SHIFT	GROUPING
PROB1	.75	A
PROB2	.40	A
PROB3	-.39	B
GROUP: F=1.1, P=.40		
PROBLEM: F=8.7, P=.001		

	INDIVIDUAL (PRIVATE) SHIFTS
PROB1	.69 A
PROB2	.32 A
PROB3	-.41 B
GROUP: F=1.2, P=.35	
PROBLEM: F=6.5, P=.004	

*Duncan Multiple Range Test
 Means with same letter are not significantly different

TABLE 2-6
 PUBLIC CHOICE SHIFTS BY MODE AND PROBLEM:
 TEST FOR INTERACTIONS
 (LINDQUIST TYPE 1 MIXED FACTORIAL DESIGN)

PROBLEM	FTF	CCREG	CCPEN	ALL
1	.78	1.23	.23	.75
2	-.03	1.03	-.20	.40
3	-.40	-.52	-.27	-.39
ALL	.12	.58	.06	

MODE: F=2.2, P=.14
 GROUP BY MODE: F=1.0, P=.48
 PROBLEM: F=9.2, P=.001
 MODE BY PROBLEM: F=1.5, P=.23

TABLE 2-7
 CONSERVATISM BY MODE OF COMMUNICATION
 (MEAN CHOICES N=90)

PROBLEM 1

MODE	INIT PUBLIC	FINAL GROUP
FTF	3.8	3.0
CCREG	3.9	2.7
CCPEN	4.2	4.0
	F=.28 P=.76	F=15.6 P=.001

PROBLEM 2

MODE	INIT PUBLIC	FINAL GROUP
FTF	4.5	4.5
CCREG	4.7	3.7
CCPEN	5.1	4.9
	F=.67 P=.52	F=7.1 P=.001

PROBLEM 3

MODE	INIT PUBLIC	FINAL GROUP
FTF	5.3	5.7
CCREG	6.1	6.6
CCPEN	6.4	6.6
	F=2.2 P=.11	F=3.5 P=.03

PROCESS DIFFERENCES BY CHOICE BEHAVIOR

A Pearson's correlation matrix was created to measure the relationships among all of the variables in the study. Tables 2-8 and 2-9 may help us to understand some of the underlying processes that produced the observed choice shift behavior.

Particularly for the first problem, there is a relationship between conservatism and activity. The more conservative members of the group entered both more text items and more choice shifts. By the third problem, where all participants tended to be conservative, there is no such relationship. In fact, more conservative members were slightly less active in discussions and significantly less likely to make choice shifts on that problem. What we seem to see is a flurry of activity in defense of conservative arguments when these values are threatened.

In terms of the relationship between initial public choices and later choice shifts, on all problems the initially most conservative members tended to make the largest risky choice shifts. But the relationship is weakest for the third problem, where conservative values were dominant.

For each group, we identified the person or persons with the initially most risky choice, using the public choice, and compared this with the final group choice made by that person. Likewise, we identified the person or persons with the initially

most conservative choice and compared this with the final group choice. These tedious data are not included here. For all of the groups, the dominant pattern is compromise, with the most conservative members agreeing to a more risky choice, and the most risky members agreeing to a more conservative choice. However, the pattern of the exceptions is interesting.

On the first, trivial practice problem, the one exception is a group where three out of the five members began with a choice of 2; they succeeded in getting the other two to agree with them without shifting their choices toward a less risky number. Combining this information with that in the previous tables, we see that the more conservative members argued more on this problem, but were forced to change or willing to be convinced.

On the second problem, which is in the Company context but involves only an individual, all of the "most conservative" members shifted towards more risky group choices, but in three of the 18 groups, the most risky members convinced the others to come around to their point of view. So, on the second problem, the pattern of individual shifts also shows the arguments in favor of risk to be somewhat more persuasive.

On the third problem, all of the "most risky" members shifted in the conservative direction, but there were four of the eighteen in which the most conservative member or members did not move at all and convinced others to agree with their point of view. Thus, when conservative values are invoked by a problem dealing with the Company, conservative arguments seemed somewhat more

persuasive.

Amount of Agreement

Table 2-10 analyzes amount of agreement by condition, using the standard deviations of the final group choices and the final individual choices. There are no significant differences among modes or problems. Practically all the groups agreed. We will discuss these results further in the next chapter.

Risky and Conservative Arguments

Table 2-11 shows the number of different pro-risk and pro-conservative arguments raised during the group discussions. There is a parallelism between the relative number of these arguments and the previously observed direction of shift on the problems. For problem 2, where there tended to be risky shifts, more pro-risk arguments tended to be raised. For problem 3, where there tended to be conservative shifts, there is a tendency for more conservative arguments to be raised. There are no significant differences among the number of arguments raised between modes when each of the counts is examined individually. It is interesting, however, that the CCPEN condition seems to be the most "unbalanced" in the sense that for the risky-shift problem, pro-risk arguments by far predominated for this mode, while for the conservative-shift problem, conservative arguments dominated.

Table 2-12 looks at this balance as the dependent variable, measured as the proportion of risky arguments to total arguments. There is a significant effect for problem but not

for mode, and the previously described observation of an apparent interaction between mode and problem is supported at the .06 level of confidence. The discussions in CCPEN mode do seem to be more one-sided, but we do not have quite enough repetitions with an N of 18 groups and only two problems coded in this way to be completely sure that this apparent tendency did not appear by chance. Though not statistically significant, the more one-sided nature of the discussions in CCPEN supports the hypothesis that this mode produces deindividuation, with group members more likely to present only arguments that support the dominant position of the group.

Effectiveness of Arguments

There are weak, statistically insignificant correlations between the relative number of arguments in a group that were risky and the amount of risky shift (Table 2-13). Whatever is happening to produce shifts, we can see that the dynamics of the balance of the arguments does not have a great deal to do with it.

TABLE 2-8
 PEARSON'S CORRELATION COEFFICIENTS
 INITIAL PUBLIC CHOICES VS. AMOUNT OF "RISKY SHIFT"

	SHPUB1	SHPUB2	SHPUB3
IPUB1	.89 .001		
IPUB2		.76 .001	
IPUB3			.66 .001

N=90

KEY: IPUB1= Initial public choice, Problem 1.
 (High values more conservative)
 SHPUB1= Shift in vote between initial public vote
 and final group choice, for problem 1. Positive
 values are "risky shifts."

TABLE 2-9
 PEARSON'S CORRELATION MATRIX FOR COMPUTER CONFERENCES
 CONSERVATISM AND ACTIVITY

	ITEM	NUM	ITEM	NUM	ITEM	NUM
	NUM1	CHOOSE1	NUM2	CHOOSE2	NUM3	CHOOSE3
IPRI1	.34 .01	.25 .03				
IPUB1	.35 .01	.28 .02				
IPRI2			.07 .3	.18 .08		
IPUB2			.11 .2	.28 .01		
IPRI3					-.07 .3	-.26 .02
IPUB3					-.04 .4	-.22 .05

N=60. Second number in each cell is level of significance.

KEYS:

IPRI1= Initial private choice on problem 1.

IPRI2= Initial public choice on problem 1.

High values are conservative.

ITEMNUM1= Number of items entered in discussion of problem 1.

NUM CHOOSE1= Number of public choice changes, problem 1.

TABLE 2-10
 AMOUNT OF AGREEMENT BY COMMUNICATION MODE
 MIXED FACTORIAL DESIGN ANALYSIS OF VARIANCE OF
 STANDARD DEVIATIONS OF FINAL CHOICES

MODE	SDFGC	SDFIV
FTF	.0486	.006
CCREG	.0060	.105
CCPEN	.0000	.009

ANALYSIS OF VARIANCE
 (LINDQUIST) MIXED FACTORIAL DESIGN

SOURCE	F	SIGNIF LEVEL
--------	---	-----------------

FINAL GROUP CHOICE (FGC)		
MODE	1.69	.22
PROBLEM	.47	.63
MODE X	0.17	.95
PROB		

FINAL INDIVIDUAL CHOICE (FIV)		
MODE	1.62	.23
PROBLEM	1.82	.18
MODE	.5	.73
BY PROB		

TABLE 2-11
NUMBER OF DIFFERENT PRO-RISK AND PRO-CONSERVATIVE
ARGUMENTS, BY MODE AND PROBLEM
ANALYSIS OF VARIANCE

PROBLEM 2

MODE	NUMRI	NUMCON	TOTAL
FTF	5.5	2.5	7.5
CCREG	3.8	1.7	5.5
CCPEN	4.0	.8	4.8
ALL	4.4	1.7	6.1

F=1.2	F=1.5
P=.33	P=.25

PROBLEM 3

MODE	NUMRI	NUMCON	TOTAL
FTF	3.0	2.8	5.8
CCREG	2.2	3.2	5.4
CCPEN	3.0	4.2	7.2
ALL	2.7	3.4	6.1

F=.20	F=.47
P=.82	P=.63

KEYS:

NUMRI= NUMBER OF DIFFERENT PRO-RISK ARGUMENTS RAISED
NUMCON= NUMBER OF DIFFERENT PRO-CONSERVATIVE ARGUMENTS

TABLE 2-12
 MEAN PROPORTION OF RISKY ARGUMENTS
 BY MODE AND PROBLEM
 ANALYSIS OF VARIANCE

MODE	PROB2	PROB3	BOTH
FTF	72.2	45.2	58.7
CCREG	71.4	46.4	58.9
CCPEN	89.3	29.9	56.9

MODE: F=.01, P=.99
 PROBLEM: F=37.4 P=.000
 MODE BY PROBLEM: F=3.3 P=.06

TABLE 2-13
 CORRELATION BETWEEN RISKY ARGUMENTS AND
 AMOUNT OF RISKY SHIFT

	NUMRI2	NUMRI3
SHIFT2	.11 P=.67	
SHIFT2I	.02	
SHIFT3		.26 P=.3
SHIFT3I		.19 P=.44

KEYS

SHIFT2= PUBLIC CHOICE SHIFT FOR PROBLEM 2

SHIFT2I= INDIVIDUAL (PRIVATE) CHOICE SHIFT PROBLEM 2

NUMRI2= NUMBER OF RISKY ARGUMENTS FOR PROBLEM 2

RESULTS VS. ALTERNATIVE HYPOTHESES FOR CHOICE SHIFTS

A. Diffusion of Responsibility Hypotheses

These hypotheses predict explain risky shift on the basis that individuals feel less responsible when the choice is made by a group as compared to their own individual decision. The hypotheses in support of this theoretical position were not supported.

H1: Risky shifts did NOT occur in all conditions and in all problems.

H2: The pen name condition, providing the most diffusion of responsibility, did NOT produce the greatest risky shifts. On the contrary, pen name conditions tended to produce less shift than other conditions.

H3: Rather than the greatest risky shifts occurring in problem 3, as expected if "diffusion of responsibility" were operative, this produced the greatest conservative shifts.

Diffusion of responsibility was an attractive theory to explain shifts which occurred for problem situations and cultural contexts in which risk was invoked as a value, and risky shifts occurred. For this set of problem situations and subculture, however, where conservatism may be invoked as a value, the results consistently refute the theory that diffusion of responsibility accounts for group choice shift behavior.

B. Leadership Behavior

We will explore the results for dominance and inequality more in the next chapter, which focuses on process differences among communication modes. However, even the simple analyses presented in this chapter serve to refute this theoretical explanation. In the two problems which tended to produce risky shifts, it was the most conservative members, not the most risky members, who tended to dominate the discussions and choice shift announcements. In the third problem, where conservative shifts occurred, the conservative individuals entered slightly fewer comments. Thus, there is no evidence that differences in amount of participation created differences in influence that accounted for the choice shifts.

H4: Dominant individuals in the discussions did NOT have the riskiest initial choices.

H5: The hypothesis that "Risky shifts will be less in both conditions of computerized conferencing than in face-to-face conferences, because participation is more equal in the former" was not supported. The greatest risky shifts took place in the CCREG mode of communication.

C. "Cultural Bias" in a Conservative Subculture

The specific hypotheses relating to the predominance of conservative shifts because of the values of the corporate

subculture were not supported. Initial conservative choices and a conservative shift tended to occur only on the third problem, which related to a decision affecting the Company. On decisions involving only a small amount of money, or the individual's career, initially "risky" (<5) choices prevailed in the majority of groups.

It appears that our initial conceptualization of the relative salience of conflicting cultural and subcultural values was incorrect. We assumed that the subcultural norms would be dominant because the participating managers and professionals were instructed that they were to play their roles specifically as decision-makers within their organization. The actual observations (Tables 2-1 to 2-3) show that only for the problem which related to a decision affecting the Company were the values of the corporate subculture more salient than those of the surrounding pro-risk general American culture.

H6: The hypothesis predicting conservative shifts was not supported as stated. However, there is support for a revised version of a subcultural hypothesis, as follows:

REVISED H6: Within a conservative subculture characterizing a specific organization or group in American society, there will be fewer risky shifts and more conservative shifts, the more explicitly the problem or task affects the group or organization.

H7: Predicted the greatest conservative shift for the

face-to-face mode for all problems, since this generates the most pressure to conform to subcultural values. This did not occur. In the problem which produced conservative shifts in most groups, it was the CCREG mode of communication that showed the most conservative shifts, whether measured by the proportion of groups with a conservative shift or the mean shift. We cannot think of any explanation that could tie these observations to support for a "cultural bias" or "subcultural bias" theory.

Conformity Pressures and Social Comparison

There was support for the process of social comparison being operative, but not for the related hypothesis that pressures to compromise or conform would be the operative social process to produce shifts after social comparison.

H8: "Participants will compare their initial decisions with those of peers and attempt to bring their choices more in line with the others if they find themselves at an extreme. Thus, the most risky member of each group will shift towards a more conservative choice, and the most conservative member will shift towards a more risky choice."

All of the "most conservative" and "most risky" individuals shifted toward the group on the first, trivial problem. On the second problem, all of the most conservative individuals shifted, but in three of the 18 groups, the most risky person or persons did not shift. Only one of these three had someone else who agreed with their risky choice. What seems to have happened

here is that most groups re-defined the situation as "not very risky," insisting that the Company would never fire anyone for failing at the difficult task described. These particular arguments, when made, were convincing to others.

On the third problem, there were three groups in which the most conservative individuals did not shift. In a fourth group, there were three individuals with an initial choice of 7 and two with an initial choice of 8, and the majority with a 7 "won;" however, this cannot really be counted in assessing social comparison and shift hypotheses.

In sum, out of a total of 54 group decision choices and a total of 108 predicted shifts, only six cases fail to support the social comparison prediction. This is very strong support, with only about 5% of the predicted shifts failing to occur.

H9: There was not enough variation in the measure of conformity, the standard deviation of the final group choices, to possibly provide support for the hypothesis that there would be more agreement in FTF mode. Practically all groups in all modes reached agreement: only four out of 56 did not.

Hypotheses Relating to the Polarization Model

Classifying the group decisions shown in tables 2-1 to 2-3 according to whether groups that started out risky got "more risky" and groups that started out conservative (mean initial public choice over 5) got more conservative, we find that not to be the case. For example, looking at the face-to-face

discussions for problem 1, five of the six groups started out "risky." Of these, two showed no shift, one a slight conservative shift, and two a risky shift. The group that started out conservative showed a risky shift. In CCPEN for this problem, four groups started out risky and two started out conservative. One of the risky groups had a sizable conservative shift, and one had no shift; one of the two conservative groups had a risky shift. The general prediction of the polarization model is just not consistently borne out. In fact, overall, there are 28 groups in which there is a shift in a risky direction if the initial mean choice was under 5 and a shift in the conservative direction if it was 5 or over; and 26 groups in which such a predicted shift does not occur.

H10: Table 2-14 shows that there is NOT a statistically significant tendency for there to be a pattern of rhetoric whereby "If the average pre-discussion choice is conservative, there will be more 'pro-conservative' arguments raised during the discussion than pro-risk arguments; and vice-versa."

H 11: There is also little evidence of the second part of the polarization argument, that the relative number of pro-risk and pro-conservative arguments will determine the direction and amount of shift. The correlations shown in Table 2-13, between the number of different risky arguments made and the subsequent choice shift, are small and statistically not significant.

In sum, unbalanced numbers of persuasive arguments are apparently having a little bit of influence on the nature of

choice shifts, but the polarization explanation accounts for only a very minor part of the observed choice shift behavior.

TABLE 2-14
ANALYSIS OF VARIANCE FOR THE POLARIZATION HYPOTHESIS
INITIALLY RISKY OR CONSERVATIVE CHOICE VS.
RELATIVE NUMBER OF RISKY AND CONSERVATIVE ARGUMENTS
MEANS BY PROBLEM

INSIDE GAMBLE PROBLEM

INITIAL CHOICE	DIFF RISK-CON
5 OR OVER	2.7
UNDER 5	2.9
	F=.05 P=.82

RETAIL PLUNGE PROBLEM

INITIAL CHOICE	DIFF RISK-CON
5 OR ABOVE	-1.2
UNDER 5	1.3
	F=2.03 P=.17

DIFF RISK-CON= # RISKY ARGUMENTS MINUS # CONSERVATIVE ARGUMENTS

SUMMARY

Choice behavior varies by both mode of communication and problem-situation. In this conservative organization, a problem which explicitly referred to the future of the Company elicited initially conservative choices and conservative choice shifts in all modes. When the problem situations involved decisions affecting individuals, the choices and choice shifts tended to be risky. However, there are exceptions to this pattern, with some groups making conservative choices and/or shifts on the individual-level decisions, and a few groups making risky choices and/or shifts on the Company-level decision. We think these results reflect a conflict between the generally pro-risk values of the larger society and the conservative values of the organizational subculture.

The absolute and relative amounts of shifts did not consistently show the same pattern for all three problems, nor were the differences among modes statistically significant for all problems. However, it appears that the CCREG mode tends to produce the largest amount of shift, and the CCPEN mode the smallest shift. More replications with more choice dilemma problems that tend to produce risky or conservative shifts will be necessary in order to come to definitive conclusions about how amount and direction of shift varies by mode of communication, and how this interacts with the problem situation and the nature of the subculture in which the decision-making groups are located.

In terms of alternative theories which have been used to explain choice shifts in past research, our data do not provide any support for a diffusion of responsibility or "risky leaders" type of explanation. There is strong support for the operation of social comparison processes, whereby the most risky member of a group shifts closer to the group average, and vice-versa. There is an indication that subcultural values and polarization processes may play some role, but the relationships underlying these models do not show much consistency or statistical significance.

Behavior in the CCPEN mode is different than that in the CCREG mode. In the pen name mode, social comparison and compromise behavior predominated. Although the pen name groups reached agreement on a final group choice, without any exceptions, they showed a statistically significant greater likelihood of little or no shift in either direction for the mean values of their choices between the pre-discussion choices and the group choice. This means that they were reaching agreement essentially by a process of comparison, compromise and averaging. In addition, their absolute choices were more conservative than those of groups in other modes of communication. The explanation we offer is "deindividuation." This mode of written communication which does not identify the individual makes people feel less like individuals and is most likely of the modes used to make individuals feel swept up into group processes. With deindividuation, the dominant values of the corporate subculture, which conflict with the values which the individual

members may hold in favor of risk taking, are more salient. Secondly, they are more likely to compare their opinions with the group and then move their choices toward the group average, since there is no way for them to "lose face" as individuals by giving into the group.

CHAPTER 3

PROCESS DIFFERENCES

DISINHIBITED BEHAVIOR

Three types of "disinhibited" comments were noted for this analysis. An "insult" is name-calling or putting down of another group member or of the group as a whole. "Profanity" includes "four letter" and other words which might be considered obscene or sacreligious, including abbreviations of such words. "Disloyalty" to the Company includes criticism of the Company or intimations that one might leave and work elsewhere. The unit of analysis was the conference comment, the equivalent of a "turn" in a face-to-face discussion. The identification and recording of such comments was done by the experimenter rather than by research assistants.

All examples of such comments that occurred in the six regular and six pen name computer conferences are included in the accompanying table. Some of the comments labelled as "insults" may have been meant "in fun," but they may have been interpreted as insults. Every comment that may possibly have been interpreted as falling into the above types of disinhibited behavior has been included.

Once a member of a group engages in disinhibited behavior, it raises the probability that more incidents will occur in the

same group. For this reason, the comments have been arranged by group and in the order in which they occurred. The problem on which the comment was made is also noted, in order to provide more information on the context in which disinhibited behavior occurred.

There is not much difference in the probability that one or more disinhibited comments will occur. There were no such comments in two out of the six pen name conferences, and in three out of the six regular conferences. However, once a participant does engage in disinhibited behavior, it appears that it is likely to be followed by more such comments, on the average, when pen names are used. In the regular conferences where disinhibited comments occurred, there were two in two of the conferences and one in the third. In the pen name conferences, there were 2, 3, 5, and 7 such comments. The sample is small, but the greater tendency for a "bandwagon" effect of insults and profanity does appear to occur for pen name conferences.

However, overall, the surprising finding is that there really is a very low level of disinhibited behavior in either of the computer conferences. These extracted quotations represent all of the comments in hours and hours of group discussions. Not a single occurrence of disinhibited behavior in about half of all the computer conferences was observed. This runs contrary to a popular expectation that pen name conferences and computer conferences in general may provide an interaction space with all the seriousness and social control of a mardi-gras where the participants are masked. On the contrary, when the participants

are part of a social organization or community, and when they have ongoing expectations of common group identity and shared activities to accomplish, the mode of communication does not produce high levels of disinhibited behavior.

Looking at the type of disinhibited comment, it is noteworthy that comments that could be interpreted as disloyal to the Company are much more likely to occur in the pen name condition: five out of the six such comments. Whether this is "good" or "bad" depends upon whether one wants to encourage criticism of the Company. If one wants only loyalty and praise for the organization, it is obviously safer to enforce the use of signatures on all entries. If one wants to know what people are "really" thinking about the Company, pen names are more likely to make people feel safe in expressing such opinions.

TABLE 3-1: INCIDENTS OF
DISINHIBITION IN COMPUTER CONFERENCES

G8- REG- 0

G9-PEN

DISLOYALTY: "Anything learned in this project would make me a valuable commodity for other companies if my efforts weren't appreciated here." (Inside Gamble)

INSULT: "Hey four, are you so close to retirement that you don't want to risk it?" (Inside Gamble)

DISLOYALTY: "One, do you have another job offer?" (Inside Gamble)

INSULT: "Why do two and four have such little confidence in their abilities?" (Inside Gamble)

INSULT: "Four... put some action where your mouth is." (Inside Gamble)

PROFANITY: "I am not willing to commit that much money and expose the Company to such great risks unless I am damn sure that we will have the proper results..." (Retail Plunge)

DISLOYALTY: "We ALWAYS take a wait-and-see attitude. Then we spend much more money playing catch-up..." (Retail Plunge)

G9- REG- 0

G10-PEN

INSULT: "Five, you talk too much." (Practice problem)

INSULT: "Five, you still talk too much." (Practice problem)

DISLOYALTY: "The whole company seems to be getting out of the risk game. Where are the entrepreneurs? Working at [competitor]?" (Retail Plunge)

G11-REG

INSULT: "Chicken group" (Practice problem)

DISLOYALTY: "If the project failed we could always sell shoes." (Inside Gamble)

G12- PEN

INSULT: "902 probably still has good ole US govt savings bonds." (Practice problem)

INSULT: "Two, your mother wears combat boots." (Practice

problem)

INSULT: "Hey, three, is your money in series E bonds too?"
(Retail Plunge)

DISLOYALTY: "Hey, five, no, it's even worse, it's in [Company] stock." (Retail Plunge; Three responding to above taunt)

G13-PEN

INSULT: "You guys are all cowards..." (Practice problem)

INSULT AND PROFANITY: "Hey number 1 why are you so damn obstinate?" (Inside Gamble)

G14-REG

PROFANITY: "g..d...i, jerry... G>>DAMN>>" (Practice problem)

G15-Pen-0

G16-REG

PROFANITY: "How about this [rings bell several times]. I bet that got the damned bell" (Inside Gamble)

PROFANITY: "[Competing company] has scared the xxxx out of us."
(Retail Plunge)

G17-PEN-0

G18-REG-0

DEINDIVIDUATION

Our conceptualization of deindividuation is the extent to which the individual members seem to lose their identity or individuality and get "caught up in" the group. One indicator was the amount of agreement with the final group choice on each problem, as measured by the standard deviation.

As it turned out, this was not a sensitive enough indicator to capture differences among modes in this particular corporate setting. As one of the subjects put it during a de-briefing, "If we are given a job, in this company, we get it done. Our task was to reach agreement. Therefore, we were determined to reach agreement." Surprisingly to us, given our first experiment with ad-hoc groups, almost all of the groups reached agreement on a final group choice, for all problems and in all conditions. We had 18 groups each considering three problems. Overall, out of the 56 group decisions, there were only four on which there was even a single person not agreeing on what was the final group choice. Three of these occurred in face-to-face groups; one in CC with regular names, and NONE in CC with pen names.

The results were shown in Table 2-10, for which all three problems are combined, since there are no significant differences among problems in terms of agreement on final group choices. The differences that do occur are in line with our hypotheses about how the nature of these three modes of communication would be related to the phenomenon of

deindividuation. However, there is so little variance that the differences fail to reach statistical significance. When amount of agreement on final individual choices is used there is a tiny bit more variation, but not enough to produce any significant differences.

The second indicator of deindividuation for this experiment involved a prediction that (conservative) subcultural values would influence the decisions more in the CCPEN mode than in other modes. As we saw in the previous chapter, group decisions are most conservative in the CCPEN mode.

PROCESS DIFFERENCES: AMOUNT AND EQUALITY OF PARTICIPATION

We repeated analyses related to absolute and relative amount of participation using two indicators, the number of comments entered (equivalent to the number of speaking turns in a face-to-face group), and the number of lines entered (similar to total speaking time in a face-to-face group). Two two analyses produced almost identical results. Tables 4-2 and 4-3 present the results for one analysis based on number of comments, and one on number of lines. Individual-level data and a simple analysis of variance are used. The total absence of significant differences precludes the need for a more sophisticated analytic design.

In terms of amount of participation, for all three problems, there is a somewhat higher level of participation on the average in the pen name condition. However, none of the differences are statistically significant.

For inequality of participation, there are again consistent but statistically insignificant differences. Discussions in both communication modes and for all problems exhibited a high degree of equality in participation; there was slightly more inequality in the regular name conditions.

TABLE 3-2
 MEAN NUMBER OF COMMENTS, BY COMMUNICATION MODE

PROBLEM 1
 CCREG 4.83
 CCPEN 5.63
 ANOVA, F= .88, P=.35

PROBLEM 2
 CCREG 5.40
 CCPEN 7.07
 ANOVA, F= 1.93 P=.17

PROBLEM3
 CCREG 5.57
 CCPEN 6.17
 ANOVA, F=.52, P=.47

TABLE 3-3
 INEQUALITY OF PARTICIPATION BY COMMUNICATION MODE
 MEAN INEQUALITY INDEX FOR NUMBER OF LINES*

PROBLEM1
 CCREG .23
 CCPEN .20
 ANOVA, F=.13, P=.72

PROBLEM 2
 CCREG .26
 CCPEN .25
 ANOVA F=.01, P=.91

PROBLEM 3
 CCREG .23
 CCPEN .22
 ANOVA F=.03, P=.86

 *Index values may range from 0 for total equality to 1.00
 for total inequality.

SUMMARY AND DISCUSSION

It is commonly assumed that the use of pen names in a computerized conference will result in behavior characterized by a kind of normless abandonment of standards of behavior for polite and constructive interaction. From this point of view, using pen names might be fun, like going to a Mardi Gras wearing a mask and costume, but it is not an activity that a serious business organization would consider using.

We compared aspects of the group interaction process in computerized conferences using real names and those using assigned pen names. Our experiment was conducted using decision-making tasks for peer groups of managers within a large corporation with a well developed and conservative "corporate culture."

No statistically significant differences were observed for various types of behavior that could be considered to illustrate "disinhibition." There was relatively little disinhibited behavior in either type of computerized conference. We examined insults, profanity, and expressed criticism or disloyalty towards the Company as categories of disinhibited behavior. In about half the computer conferences, there was not a single incident of disinhibited behavior of these types. There do appear to be slight qualitative differences. If one person makes a disinhibited comment, then it appears slightly more likely to be followed by others when pen names are used. And,

it was only with pen names that any criticism of the Company occurred.

Almost all groups agreed on what was the final group decision for each of the problems. There were no instances of disagreement on the final group choice for the 18 pen name discussions; one out of 18 for the regular name discussions; three out of 18 for the face-to-face discussions. Thus, the findings are in the direction predicted by the "deindividuation" hypothesis: pen name conferences show more agreement with the group. However, the differences are not statistically significant.

In the previous chapter, we did see a significant tendency for the group decisions in the CCPEN mode to be more conservative. In this subculture, this might be interpreted as an indicator that deindividuation occurs more in pen name conferences.

Other aspects of "disinhibition" or "deindividuation" might be related to the absolute and relative amount of participation. Whether measured by number of comments (turns) or number of lines entered, we find that there is more participation, on the average, in pen name conferences, and greater equality of participation. However, once again, the differences are too small to be statistically significant.

Comparison with Other Experiments

Our results are completely different than those for the only other comparable experiments, by Kiesler and her colleagues.

The differences may be due to using different types of subjects and groups, or differences in the CMC software. Another possible explanation is differences in procedures in terms of the exact nature of the choice shift problems used or in the content coding, but we do not think that these latter differences are significant.

Kiesler, Seigel and McGuire (1984) used the original Stoner choice dilemma problems on three person groups of Carnegie Mellon students, employing communication modes similar to those in our study: face-to-face, anonymous computer conferences and non-anonymous computer conferences. They found more uninhibited remarks in computer conferences than in face-to-face conferences, and more in anonymous conferences than non-anonymous conferences (Ibid., figure 4, page 1129).

The Carnegie-Mellon software, called "Converse," differed considerably from the EIES structures used in our experiments. It divided a screen into three parts, in each of which the messages being produced by each participant scrolled independently. The EIES conference modes encouraged each participant to concentrate on what he or she was thinking and composing for the discussion as long as necessary, by blocking out receipt of all communications except one-line notifications of choice shifts during composition, then delivering the full text of other entries that had been completed in the interim. Our experiment also used hard copy terminals rather than video display units, so participants could refer back to any part of the proceedings. The EIES version of CMC probably encourages

more lengthy and thoughtful participation. It could also be that the hard copy record produced for the participants gave them a greater sense of accountability.

Though differences in software may be influential, we suspect that the most important source of differences in findings is that the corporate culture within which our groups communicated was simply stronger in its effects than the tendencies toward depersonalization generated by the medium. Kiesler et al. were using students who did not know each other in their initial experiment and completely hypothetical tasks. We were using groups of managers who were role playing a choice dilemma which was realistic for their organization. Take our managers and professionals out of the corporate context, give them a VDU on which comments seem to live only momentarily and then scroll off into oblivion, and they, too, would probably act disinhibited.

Conclusion

Our conclusion is that in cohesive task-oriented managerial groups, the use of pen names rather than real names in computerized conferences will not dramatically alter the interaction process. Pen names may make people feel a little bit freer to criticize the organization or to attack one another's positions on the issues being discussed. They may result in a slightly greater tendency toward "deindividuation" in the form of going along with the group. They may encourage greater participation and greater equality of participation. However, these are very slight tendencies; the amount and type of interaction is primarily determined by other factors related

to the organizational setting, interpersonal relationships among group members, and the nature of the group task.

In terms of theoretical implications, our findings suggest that a clear distinction should be made between the concepts of disinhibition and deindividuation. In much previous work, they are grouped together as if they are different aspects of the same thing. In a crowd, where there is no strong subculture to provide norms, both would tend to occur together. Within the confines of a managerial group in a conservative corporate culture, however, they are quite distinct. Disinhibition is not likely to occur very much in this context, because the norms are too strong. Deindividuation, which is not necessarily anti-social, can take the form of greater than usual conformity to the norms of the group, despite one's personal opinions.

SUBJECTIVE SATISFACTION WITH THE COMMUNICATION MODES

Subjective satisfaction of participants was measured by a large number of questions on the post-experimental questionnaires. We will first examine how ratings on the individual items vary by communication mode. For the two sets of items which show variation by mode, a factor analysis is used to identify a smaller number of underlying dimensions. The four factors identified are then analyzed in relation to characteristics of the participants as well as communication mode.

The scales directly measuring satisfaction with communications mode were originally developed and used by the Communications Studies Group in Great Britain, for experiments comparing face-to-face, audio conferencing, and video conferencing (see Short, Williams, and Christie, 1976). They have subsequently been used for many other studies, including our own previous experiments. The items represent a number of different functions that were identified by a "Description and Classification of Meetings" and are usually called the "DACOM" scales as an acronym. For each of the functions, such as generating ideas, exchanging opinions, resolving disagreements, and getting to know the other members, the participants rated the communications mode which they used on a one to seven scale, where 1 meant completely satisfactory and 7 meant completely unsatisfactory. Thus, low mean ratings represent positive ratings and mean ratings over 4.0 represent negative ratings.

As shown in Table 4-1, almost all of the DACOM items produced statistically significant differences in subjective satisfaction ratings. For all group meeting communication functions rated, face-to-face communication was rated the most satisfactory, CCREG received the next best ratings, and the CCPEN condition received the worst ratings. For all functions except exchanging opinions and problem solving, the mean ratings for CCPEN were actually slightly on the negative (unsatisfactory) side of the scales, ranging from 4.1 to 4.8. The differences were significant for all functions except receiving orders (for which face-to-face is also seen as not very satisfactory) and problem solving. The largest differences of all occur for persuasion, where face-to-face is rated as highly satisfactory and both CC modes are not. The next biggest difference is for getting to know someone, where there is the same large gap between the FTF and CC modes; surprisingly, there is not much difference reported between the CCREG and CCPEN modes. Apparently, these participants are saying that you can "get to know" someone moderately well online even if you do not know them by name. The standard deviations of ratings within modes tend to be around 1.1 for FTF and a higher 1.6 for the CC modes.

A number of other items were also used to tap subjective satisfaction, with the problems and the groups. The Inside Gamble and Retail Plunge problems were rated on a number of dimensions, such as how clear, realistic, and interesting they were. Very few of these ratings are significantly related to communications mode used by the rater. For Inside Gambler, the

problem was significantly clearer in the CC modes. Where 1 meant completely clear and 7 meant completely unclear, the mean ratings were 3.3 for FTF, 2.2 for CCREG, and 2.5 for CCPEN. The differences between the face-to-face and computer conferencing modes was significant at the .01 level. The group discussions on both the Inside Gamble and Retail Plunge problems were considered significantly more informative in face-to-face mode. Since there were few differences in ratings of the problems, these items were not analyzed further.

A third set of five items on the post-experimental questionnaires asked the participants to rate their feelings about the group and their own participation. Several of these questions showed significant response differences by mode (see Table 4-2). As with the previous rating scales, we used seven-point scales with 1 being the most positive rating and 7 the most negative. Taking part in the research was rated as pleasant in all modes, and the participants were satisfied with their own performance in all modes. For these two items, satisfaction is slightly but not significantly higher in FTF. There is a small but statistically significant tendency for the participants to report that the general feeling of the group is more friendly in FTF and CCREG modes as compared to CCPEN mode. Though the group is reported to have taken the problems seriously in all modes, the FTF mode is perceived as significantly "more serious" than the two CC modes. Groups in all modes rate their discussions as productive, but the FTF mode is seen as significantly more productive.

In sum, then, our data support the following hypothesis:

H17: Subjective satisfaction with communication modes and the group discussions which they support is highest for face-to-face and lowest for CCPEN.

We have no data with which to prove the possible explanation that these variations are related to the amount of experience with the three communication modes, with CCPEN receiving the lowest subjective satisfaction scores because it is the most unfamiliar. This would require a longitudinal study stretching over weeks or months, in which groups use all three modes often enough to become familiar and comfortable with them. We do have some indirect evidence for this explanation, however. A longitudinal study measured users of a CCREG mode with the DACOM scales after approximately four and 18 months of use, and the scale ratings were strongly related to amount of experience online (See Hiltz, 1984). Secondly, in terms of actually reaching agreement, the CCPEN groups were no worse (but on the contrary slightly better) than the FTF groups. Yet, the unfamiliar CCPEN mode is rated as significantly less satisfactory for this function. Our assertion is that groups will be less satisfied with unfamiliar modes of communication than with familiar modes, regardless of their objective suitability for various group communication functions.

TABLE 4-1
 SATISFACTION WITH THE COMMUNICATION MODES
 MEAN RATINGS AND ANALYSIS OF VARIANCE

ITEM	FTF	CCREG	CCPEN	F	P
INFORMATION	2.4	3.2	3.8	7.17	.001
GENERATING IDEAS	2.4	3.3	3.8	7.17	.001
PERSUASION	2.4	4.0	4.8	23.0	.001
DISAGREEMENTS	2.8	4.2	4.8	13.7	.001
GET TO KNOW	2.5	4.3	4.6	17.1	.001
GIVING ORDERS	3.4	3.8	4.4	3.3	.04
RECEIVING ORDERS	3.6	3.8	4.1	.96	.39
EXCHANGING OPINIONS	1.9	3.0	3.6	12.3	.001
PROBLEM SOLVING	3.1	3.6	3.8	2.2	.11
REACHING AGREEMENT	2.6	3.7	4.2	9.3	.001

RATING SCALE:

1=COMPLETELY SATISFACTORY 7=COMPLETELY UNSATISFACTORY

FULL WORDING FOR ABBREVIATED ITEMS:

INFORMATION: GIVING OR RECEIVING INFORMATION

DISAGREEMENTS: RESOLVING DISAGREEMENTS

GET TO KNOW: GETTING TO KNOW SOMEONE

TABLE 4-2
 MEAN SATISFACTION RATINGS WITH ASPECTS OF THE GROUP DISCUSSION
 BY COMMUNICATION MODE
 MEANS AND ANALYSIS OF VARIANCE

ITEM	FTF	CCREG	CCPEN	F	P
PLEASANT	2.1	2.5	2.3	.65	.52
OWN PERFORMANCE	2.7	3.1	3.1	.57	.57
GROUP FEELING	2.0	1.8	2.5	3.3	.04
TOOK PROBLEMS	2.4	3.5	3.5	6.1	.01
PRODUCTIVE	1.1	1.5	1.4	5.6	.01

N=30 RESPONDENTS PER MODE

ITEMS:

Taking part in this research was: (1= Pleasant to 7= Unpleasant)

How satisfied are you with your own performance in this group discussion? (1= Completely Satisfied to 7= Completely Unsatisfied)

The general feeling of our group was: (1=Friendly to 7= Unfriendly)

The group generally took the problems they were given: (1= Seriously to 7= Not Seriously)

Do you believe the group felt the discussions to be: (1=Productive to 7= Unproductive)

SATISFACTION FACTORS AS THEY RELATE TO
PARTICIPANT CHARACTERISTICS

We performed a factor analysis to find the underlying dimensions of the DACOM scale items plus the five general satisfaction items. A factor analysis finds which items cluster together; it is up to the analyst to identify or name them. By virtue of this analysis, we reduced the 15 separate items to four underlying dimensions or factors. The factor scores were then written to an SPSS output file, added to the data records for each participant, and used as the dependent variables in testing our hypotheses about how subjective satisfaction varies with the characteristics of the participants.

Table 4-3 shows the way in which the 15 items "loaded" on each of the four factors which are identified in the analysis. Factor 1 centers on persuasion and encompasses resolving disagreements, reaching agreement, feeling productive, and getting to know someone. We have labelled it the "Persuasion" factor since this is the most highly correlated component. Factor 2 is related to the entire discussion being a satisfying experience. The items that are its main components are that it was enjoyable, that the participants were satisfied with their own performance, and that the group was productive. We will call it the "Good Meeting" factor. Factor 3 relates to the task areas in Bales Interaction Process Analysis: giving and receiving information, giving and receiving opinions, and thus working towards solving the problem. We will call it the "Task

factor." Factor four, labeled "Orders," is two items only: giving orders and receiving orders. Clearly, the participants think of these communication functions as different than any others: they involve coercion or power as contrasted to persuasion.

The next table, 4-4, shows how scores on the four subjective satisfaction factors vary by condition, and whether the differences are significant. The only factor for which face-to-face communication is rated as significantly more satisfactory than the CC modes is Persuasion. On the Persuasion factor, FTF is clearly rated the best, and CCPEN is clearly rated the worst. Moreover, the shapes of the distributions on this factor differ by mode. In FTF, kurtosis is 2.041 (standard deviation= .633). This indicates that most cases are located close to the mean. For CCREG, the distribution approximates a normal curve (Kurtosis= 1.130; SD= .807). For CCPEN, by contrast, we have something approaching a bimodal distribution: Kurtosis= -1.108, SD= .818. Participants were much more divided on their opinions about whether CCPEN is good for persuasion.

The differences between modes approach significance for the Task factor. For the Good Meeting factor, CCPEN receives the highest rating, but the differences are not significant. It is surprising that the scores are almost the same for the Orders factor. One would think that the pen name condition, in particular, would not be effective for giving and receiving orders.

The final table in this section, 4-5, shows the correlations among the background variables and the Persuasion, Good Meeting, and Task factors, within each of the three communication modes. There are only 30 cases for each mode, so that a correlation must be strong in order to be significant. In our population, we had little variation on many of these background variables, so that a lack of a correlation does not mean that one would not be found if the measurements had been taken for a larger and more diverse number of subjects in each mode. In fact, some of the stronger correlations are with satisfaction with the face-to-face mode! For instance, one of the largest coefficients indicates that participants who had no previous experience using computer-mediated communication are least satisfied with the Task factor aspects, for the face-to-face mode. The correlations were puzzling to us at first, but we began to make some sense of them when we examined them within the context of this experiment and the host organization, and used partial correlation coefficients to sort out spurious relationships.

On the Good Meeting and Task factors there is a significant relationship with years worked for the Company and with age (which is in turn correlated with years worked). The relationship is not what we expected. Those who have worked more years (and are older) are less satisfied with the FTF mode. Years worked is the underlying variable: when it is controlled, age is not significantly correlated, whereas the partial correlation for years worked is still significant when controlling for age.

Why do those who have worked longer for the Company feel less satisfied with the FTF condition? Part of the explanation seems to be related to previous experience with computer-mediated communication. Those who have worked longer for the Company are LESS likely to have previous CMC experience ($R=.58$, $p=.001$ for the FTF condition). When Prevcom is controlled, the correlation for factor 3 is not significant. For factor 2, the correlation is reduced to $.39$, but still significant. The older, longer-term employees are apparently more disappointed that they did not get to use a CC condition. (All subjects were informed about the three communication modes being randomly assigned to the groups).

Looking at Prevcom itself, there is no relationship for the Persuasion factor. For the "Good Meeting" factor, those with previous experience are significantly more satisfied with FTF and CCREG. For the Task factor, those with previous CMC experience are more satisfied with FTF and CCPEN, but less satisfied with CCREG. These correlations remain significant when controlled by age, years worked, typing, frequency of current computer terminal use, or education. The explanation may be related to the specific nature and applications of the inhouse mail system some of the participants used, which we are not at liberty to describe.

Those with more education are more satisfied with FTF and CCREG on the Persuasion factor. This may be related to their superior communication skills.

There is an overall positive relationship across conditions between frequency of terminal use and satisfaction on the Persuasion and Good Meeting factors. When broken down by condition, only the correlation for the Good Meeting Factor in FTF remains significant. When typing and Prevcom are controlled for, the correlation no longer remains significant.

Typing is positively related to the persuasion factor for FTF and CCREG, and to the Good Meeting factor for FTF. Our speculation is that the relationship may have something to do with the kind of manager who learns to type well. Such a manager may place a high value on direct communication in any mode, as contrasted to indirect communication through a third party such as a secretary. CCPEN, with no identification of participants, may seem less satisfying to those who enjoy directly communicating with their peers.

There were so few females (as few as three out of 30) when mode was controlled that we could not find any consistently significant differences related to the satisfaction factors.

In sum, we did not find support for our hypotheses about variations in subjective satisfaction with CC modes:

H19 RESULTS: Relative satisfaction with CC is NOT consistently higher for younger employees, those with previous experience with computer-mediated communication, or those with better typing skills.

We have offered some ex-post facto speculations about the differences that were observed.

TABLE 4-3

VARIMAX ROTATED FACTOR MATRIX
FOR SUBJECTIVE SATISFACTION ITEMS

ITEM	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
	PERSUASIO N	GOOD MEETING	TASK AREA	ORDERS
INFORMATION	.23	.26	.63	.21
IDEAS	.40	.29	.37	.12
PERSUASION	.84	.04	.26	.06
DISAGREEMENTS	.75	.23	.40	.04
GET TO KNOW	.55	.16	.26	.11
GIVE ORDERS	.14	.00	.14	.80
RECEIVE ORDERS	.04	.05	.13	.99
OPINIONS	.41	.16	.65	.09
PROBLEM SOLVING	.36	.31	.59	.15
AGREEMENT	.61	.17	.48	.17
PLEASANT	.06	.77	.30	.01
OWN PERFORMANCE	.15	.68	.36	.02
GROUP FEELING	.36	.27	.19	.10
TOOK PROBLEMS	.46	.42	.05	.03
PRODUCTIVE	.58	.71	-.02	.03

TABLE 4-4

SUBJECTIVE SATISFACTION FACTORS BY CONDITION

ANALYSIS OF VARIANCE

FACTOR	FTF	CCREG	CCPEN	F	P
PERSUASION	-.70	.18	.59	22.1	.001
GOOD MEETING	-.02	.10	-.08	.28	.76
TASK AREA	-.26	.07	.20	2.23	.11
ORDERS	-.06	-.02	.09	.16	.85

NOTE: HIGH SCORES INDICATE DISSATISFACTION

TABLE 4-5

CORRELATION MATRIX

PARTICIPANT CHARACTERISTICS BY FACTOR SCORES

VARIABLE	CONDITION AND FACTOR								
	PERSUASION			GOOD MEETING			TASK		
	FTF1	REG1	PEN1	FTF2	REG2	PEN2	FTF3	REG3	PEN3
YEARSWORK	.13	.11	-.28	.60	.01	.01	.50	.26	.02
P	.24	.30	.08	.01	.47	.49	.01	.10	.47
AGE	-.18	-.19	-.24	.41	.05	.20	.37	.08	.18
P	.18	.17	.12	.01	.41	.16	.02	.35	.19
PREVCOM	-.03	.24	-.02	.56	.46	.11	.64	-.36	.44
P	.44	.12	.46	.01	.01	.29	.01	.03	.01
EDUCATION	-.41	-.49	.06	-.01	.11	-.09	-.03	-.21	.22
P	.01	.01	.38	.49	.47	.49	.43	.15	.14
TYPING	-.35	-.35	.17	-.48	-.18	.05	-.13	-.16	-.25
P	.03	.04	.20	.01	.19	.41	.25	.21	.11
FREQTERM	.04	-.13	-.15	-.35	.07	-.28	-.25	-.11	-.28
P	.42	.27	.23	.03	.37	.08	.09	.30	.08

N=30 CASES PER CELL

KEYS: FTF1= FACTOR 1, FACE TO FACE MODE

EDUCATION 1= <HIGH SCHOOL 6=DOCTORATE

YEARSWORK= NUMBER OF YEARS EMPLOYED BY COMPANY

FREQTERM= FREQUENCY OF COMPUTER TERMINAL USE

1=NEVER 2=OCCASIONALLY 3=WEEKLY OR MORE

PREVCOM= PREVIOUS EXPERIENCE WITH COMPUTER-MEDIATED COMMUNICATION

1=YES 2= NO

TYPING 1= HUNT AND PECK 4= EXCELLENT

SUMMARY

Face-to-face communication receives the highest subjective satisfaction ratings from participants, followed by CCREG and CCPEN. When the various direct ratings of the modes are combined with other questionnaire items measuring aspects of subjective satisfaction, four factors emerge. FTF receives significantly better ratings only on the Persuasion factor. There are no significant differences among modes for the "Task," "Good Meeting," or Orders factors. In sum, the only real difference perceived among the modes is that it is easiest to persuade others in face-to-face, and most difficult using pen names. Once this factor is removed, differences among modes on other subjective satisfaction factors are small and inconsistent.

Participants in the CCPEN mode are much more divided in their opinions about the effectiveness of the mode for persuasion. There is much less dispersion of subjective satisfaction scores on this factor for FTF and CCREG. This is one of our main findings about how subjective satisfaction ratings differ among modes of communication. Perhaps CCPEN is like Pistachio ice cream or caviar: either you love it or you hate it.

We did not observe the expected relationships between age, education, previous experience using computer-mediated communication or terminals, or typing skill and satisfaction with CC modes. This does not mean that there are no

differences, but rather that with the small number of subjects (30) in each mode and the relative homogeneity among the subjects on many of these characteristics, we could not detect any statistically significant or theoretically explainable patterns of differences. The observed differences occur more for the face-to-face condition than for the CC conditions. Our strongest observed differences are that those with no previous use of computer-mediated communication and those who have worked longer for the Company are less satisfied with the "Good Meeting" and "Task" dimensions of the face-to-face mode. Speculations on the reasons for these unanticipated relationships have been presented.

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Appendix A
Introductory Statement to Subjects and Outline of Procedures

1) CC Conditions

1. Roving Coordinator introduces self and other members, including Monitor.

As each person arrives, greet them and introduce self. Invite them to have snack. (Apples, coffee, tea, cold drinks, and cookies provided for each group).

As each arrives, write name and nickname on board; list each one next to the number of the room in which they will be.

When all have arrived, start formal introductions. In the introduction, each participant is asked to say a few words about their position/function within the Company.

Give brief explanation of purpose of experiment and procedures to be followed (see below, Appendix B).

2. Administers protection of human subjects form by reading it through; answers any questions; waits for all to sign and collects forms.

3. Explains medium:

a. One communicates by typing into and reading from terminals.

b. Diagram the terminal-TELENET-EIES and back setup (show monitor terminal in this diagram).

c. Explain semi-asynchronous nature of medium as it will be used, pointing to diagram. Give example: person one types in and then enters a question; other persons may be busy typing when it is entered-- they will receive and read it as each one finishes what they are working on and are ready to receive new entries.

They type in and send-- meanwhile person one will probably be busy typing something else-- Thus, five minutes or more may go by between the time a question is asked and the answer received.

d. Need to keep entering new things-- don't just sit and wait-- say something else while you are waiting.

e. Takes getting used to discussing things with several discussion threads going simultaneously.

f. Explain EIES communications structures-- Messages, conferences, notebooks. They will be in conference; everything they type goes to other persons in the discussion. Explain database and analysis capabilities. They will have a simple example, and will actually have a discussion space for words and data display for data estimates they are inputting.

g. (Pen name condition only-- explain that they will be identified only by pen name and ask them not to divulge their "real identity" in any of their comments.)

4. They go to their terminals. Request Monitor to take the two persons (by name) who will become 901 and 905. Take the other three.

Rooms are assigned to ID in the order 904,902,903,901,905--so that participants in pen name condition cannot guess identities from a simple association with the order of the rooms entered.

5. At terminals, orient each person to Carriage Return key, + key, shift key, backspace key.

Tell them not to hit break or interrupt. Show them the light which goes off if they become disconnected.

6. Leave each person reading instructions; then circulate among the five rooms and the monitor terminal throughout the practice period. Answer any questions; observe directly over shoulders or indirectly on monitor terminal that each subject is competently using all commands.

7. At beginning of real problem, shut doors. Stay in the area to assist if terminals become disconnected.

8. At end of last problem, distribute questionnaires; after each is through, escort or send them to conference room.

9. Deliver debriefing (and tape it). Remind them not to discuss the problems or procedures with others.

10. Deliver post-experimental seminar.

FtF Conditions

Follow steps 1 and 2 above. Then distribute and review instructions on procedures for discussing the problems. Ask if there are any questions. Distribute practice problem and turn on recorder. Retire to corner of room with back to group. Move again only when they have completed discussion and are filling out post-discussion information for practice problem. Collect these sheets and distribute next problem. Retire to corner again; etc.

Appendix B

Orientation to the Experiment (Spoken to Subjects in all Conditions)

We are here today to have you participate in decision-making exercises which were designed for (members of your organization). The purpose of this study is to test the effectiveness of different modes of communication for managerial decision making. We are using three different forms of communication to discuss the same problems. Some groups will engage in a face-to-face meeting. Others will use one of two different forms of computerized conferencing. (Your group will...)

The steps that will be involved are as follows:

1. Since this is a federally funded research project, we need to obtain your signed formal "informed consent" before proceeding. So we will first read through that and see if you have any questions.

(2.a. CC only) Then we will teach you how to use the computerized conferencing system.

2. We will then review with you the procedures to follow in discussing each of the problems.

3. We will then have you discuss and try to reach agreement on several of the problems. We will spend about an hour and a half on this.

4. Then you will individually complete a pair of questionnaires which systematically ask for your reactions to the group decision making process.

5. You will receive a full presentation on the nature and purpose of the study on the last day we are here (give date). After the conclusion today, however, we will answer questions you may have.

To begin with, then, here are the informed consent statements. Our apologies for the legalistic way in which they are worded-- they must follow federal standards for what is included and how it is worded.

Appendix C
Monitor Role- CC Conditions

1. About one half hour before, get all terminals in place and tested. Check for adequate paper.
2. Sign on monitor terminal and set up the experiment with +risky/sxpt (complete instructions in cc745).
3. Be sure to have monitor command summary (cc 795) on hand.
4. At time minus five minutes, approximately, go around and sign each terminal on and do +xpt. Then go to conference room.
5. After being introduced, copy down the names and nicknames for each participant, as they are put on board by "Rover" (Roving Coordinator).
6. Go back and enter each name on the appropriate terminal and let the initial instructions print out on the terminals.
7. Go back to conference room and alert Rover that terminals are ready. Wait for and take two of the subjects.
8. Go to monitor terminal when subjects have been oriented to terminals and are reading instructions. Keep track of comments entered by each subject and alert Rover if anyone falls behind.
9. When subjects are out gate for practice problem, set timer for 15 minutes. Thereafter, set timer for 30 minutes after out gate on each problem. If timer sounds, enter a comment in conference that XX minutes of discussion time have passed.
10. Reset states of subjects if they are disconnected or otherwise need assistance or intervention.

Appendix D
CONSENT FORM

Name of Project Investigators: Dr. Murray Turoff, Principal Investigator; Dr. Roxanne Hiltz, Project Director; Dr. Kenneth Johnson, Consulting Psychologist

Title of Project: Development and Experimentation in Computerized Conferencing

I acknowledge that on (the date noted below) I was informed by Dr. Murray Turoff, Principal Investigator, of the New Jersey Institute of Technology, of a project concerned or having to do with the following:

Development and evaluation of computer mediated communications to support managerial decision making.

I was told that with respect to my participation in said project that:

- 1) The following possible risks are involved: None
2. The following procedures are involved:
 - a) You will be randomly assigned to a group of five members of the (Company name) course, which will be assigned to times for group decision making exercises which will take approximately two hours.
 - b. At the end of the group decision exercise, you will be asked to fill out a questionnaire giving your reactions to selected aspects of the experience.
 - c) All data collected will be treated as confidential. Results will be available to those outside the three-member project team only in the form of statistical analysis and anonymous quotations.
 - d) Participants are asked not to discuss the problem or exercise with anyone who may be a future participant. A signature below indicates willingness to comply with this request.
3. The following possible alternative procedures that may be advantageous to you include: none.
4. The following benefits are expected by your participation:
 - a) An opportunity for hands-on experience with the use of a computerized conference.
 - b) A post-exercise presentation which fully explains the series of research projects of which this is a part, what we have found so far, and what we expect to find in analyzing your discussions.

I am fully aware of the nature and extent of my participation in said project and possible risk involved or arising therefrom. I hereby agree, with full knowledge and awareness of all of the foregoing, to participate in said project. I further acknowledge that I have received a complete copy of this consent statement.

I also understand that I may withdraw my participation in said project at any time and that I may inspect a copy of the Institutional Assurance filed by the New Jersey Institute of Technology with the U.S. Department of Health and Human Sciences.

Date:

Place completed:

Signature:

Printed Name

Appendix E
Initial Instruction: All CC Conditions

Hi! Today you are going to learn to use a computer-mediated system for human communication. We are going to teach you how to "talk" with the other members of this conference, by typing what you want to say on this terminal and having it sent to the other conference members. Then we are going to teach you two commands related to deciding the amount of risk you may accept in various situations, since that is the type of problem your group will have to solve after you have practiced using the system.

First, we want to review the basic procedures for using this system.

1. Typing in a "SCRATCHPAD"

When you want to send something to the other conference members, you will be typing into what is called a "SCRATCHPAD." These are numbered lines into which you type the text of what you want to say. The terminal will tell you when it is ready for you to start typing by printing

ENTERING SCRATCHPAD:

1:.text

2?

The .text on the first line is a command to automatically format your text when it prints out. When the first space on a line is left blank, it starts a new paragraph. Lines are filled in and automatically given a neat format.

You can now type the first line of what you want to say on this line that begins with a 2? When you are finished typing a line, press the RETURN key. This will give you a new numbered line which looks like

3?

When you have typed what you wish on line 3, and need more lines, pressing the RETURN key at the end of every line will give you a new numbered line on which to type. ALWAYS WAIT FOR A QUESTION MARK TO APPEAR BEFORE YOU RESUME TYPING. Even if what you have to say takes only one line or letter, always press the RETURN key after you have typed a line. Pressing the RETURN key enters what you have typed into the computer. Until you press the RETURN key, nothing can be done with the line you have typed.

Sometimes, the computer will stop in the middle of printing things,

and will not give you a question mark (the signal that you may type something in). Just be patient. It is finding something else to deliver to you. When it has delivered everything that is supposed to come to you, it will give you a line number or a question with a question mark, and then you can type in again.

2. Cancelling a line

Since what you type does not go to the computer until you press the RETURN key, you can change your mind or correct a mistake before sending it. Most people do not bother to correct minor typing errors, as long as the meaning is clear. However, if you want to cancel a line and retype it, hold down SIMULTANEOUSLY the CONTROL (CTRL) key and the X key (think of it as drawing a big X through the line you have started to type, and starting over again. This is the one time when you do not need to wait for a question mark). You may also use the backspace (backspace key or Control and H held down simultaneously).

While there are many text editing features available, we are not going to take the time to teach them to you for this exercise. If you do wish to eliminate a line or lines, you may delete them by entering the following sort of command as the first thing on a new line:

*1,3

(This would delete lines one and three and renumber the remaining ones.)

HOW TO SEND WHAT YOU HAVE TYPED TO THE OTHER CONFERENCE MEMBERS

Once you have typed into your scratchpad what you want to say, you can send it to the other members of the conference by typing

+enter

as the first and only thing in a NEW LINE of your scratchpad, and then pressing the RETURN key.

The +enter is a command which must be entered precisely. The + must be the first character on a new line. There can be no space between the + and the enter. It must be followed by a Carriage Return.

Now the system will print out your comment as the others will see it. It will then ask,

OK to add (Y/N)?

Assuming it is understandable, answer Y and press RETURN.

If there is some mistake, answer N, and the system will ask

Delete Scratchpad (Y/N)?

If you answer Y, the entire item will be deleted and you will start over again in a blank scratchpad. If you answer N, you will be put back on the last line, ready to add a correction or additional sentences. You will then use the +enter command and answer Y to OK to add in order to add the corrected item to the conference.

What you have typed will now be sent by the computer to ALL of the members as a conference COMMENT.

Whenever you ENTER a comment, you will automatically receive waiting comments that have been entered. YOU MUST KEEP TYPING THINGS IN AND ENTERING THEM, IN ORDER TO KEEP RECEIVING COMMENTS FROM THE OTHERS.

You will also receive a copy of your entered comment, so you can see what it looked like. A conference builds up a common transcript of all of the comments entered by the members, and each of the comments entered by you and the other members is given a number. If you are responding to a comment by someone else, you may wish to refer to it by number.

SOME IMPORTANT THINGS YOU MUST KNOW

1. The system may ask you some questions.

Type y and press the RETURN key for YES.

Type n and press the RETURN key for NO.

2. In addition to the other members of this conference, there is a Monitor whose number is 912. The Monitor will occasionally send you instructions asking you to do certain things.

3. You are being provided with a very limited interface for this exercise. A number of unexpected but possible events could cause you to get disconnected or thrown into the standard interface. Call for the monitor if you get disconnected. The command, +XPT, entered as the only thing after receiving a question mark from the system, will always put you back where you should be.

YOUR FIRST PRACTICE

PLEASE DO EACH OF THE FOLLOWING WHEN THE TERMINAL PRINTS

ENTERING SCRATCHPAD:

1:.text

2?

a) Type in a greeting or comment to the other participants, that is one line in length. Then press the RETURN key. The terminal will print

b) In typing the second line of your initial message to the others, type in one or two words, and then try cancelling it by holding down the CONTROL (CTRL) key and pressing X at the same time. You will be returned to the left margin, ready to enter the line again.

c) Add another line or two if you like to complete your first comment to the group. Then type

+enter

as the FIRST AND ONLY THING ON A NEW LINE IN YOUR SCRATCHPAD, and press the RETURN key.

Assuming the item is correct when it prints out, answer Y to OK to Add. If it is not correct, answer N (no) to OK to Add. The system will then ask if you want to delete the scratchpad. If the item is totally incorrect, answer Y to delete it. If you just want to add something, answer N; and you will be put back at the last line, to make your addition and +enter the item.

What you have typed has now been sent to all members of the conference as a conference comment. Your comments and the numerical estimates you will be asked to supply in the problem solving phase will be automatically identified by the computer.

When all of you have entered at least two practice comments, the group will be given additional instructions and a practice problem.

PLEASE TEAR OFF THESE INSTRUCTIONS AND REREAD THEM BEFORE TRYING YOUR FIRST PRACTICE

Pen Name Condition: Replacement paragraph

What you have typed has now been sent to all members of the conference as a conference comment. The computer will automatically give it a header with your assigned "pen name". For this exercise, your comments and the numerical estimates you will be asked for later in the problem solving phase will be identified only by this pen name. The use of a "pen name" rather than your "real name" may make you feel more free to give your opinion. Please do not sign your actual name within the text of your comment to "give away" who you really are. One of the purposes of this exercise is to see how the use of anonymity made possible by this form of communication may change the kinds of things people say.

Appendix F
Instructions for Problem Discussion

The type of problem we are going to give you today has to do with assessing the amount of risk you would be willing to accept in order to strive for a desirable goal. You will be asked to supply the minimum probability of a "payoff" that would be necessary in order for you to take the risk, expressed as 1 chance out of 10, 2 out of 10, etc. For instance, if you enter "4," this means that there would have to be at least 4 chances out of ten (or a 40% probability) for success before you would accept the risk. You may choose any integer from 1 to 10. However, remember that "10" means absolute certainty of success; we will interpret it to mean that you would not want to take the more risky course even if absolutely assured that it would be successful.

After receiving a problem, you will be asked to supply the minimum chance of success that would be acceptable to you, personally, if you were making the decision. Then you will be asked to give your initial view to be shared with the group; this may be different. Then you will discuss the situation and act as an advisory committee charged with recommending a decision. Your task as a group will be to reach agreement on the chance of success that would be necessary in order for the group to advise pursuing the more risky option. We hope that each member of the group will contribute the "pros" and "cons" which they see in the two options before the group tries to agree on a decision that will be the best possible solution.

You should use your experiences and observations as an (Company name) employee in analyzing the problem situation.

"Reaching consensus" is defined as arriving at an average that is an integer number that all group members can "live with," even if they are not in complete agreement. At the end of the discussion, you will be asked to indicate if your private opinion differs from the group average.

During the group discussion, you may change your existing choice of a minimum probability by entering the command

+CHOOSE #

(for example, +choose 8) as the first and only thing on a new line, and pressing RETURN. The other conference members will automatically be notified of your new choice and the new group average.

The group discussion will continue either until you reach agreement (the computer will determine if you have all entered the same probability choice), or until four out of the five group members decide that agreement is not possible, and vote to end the discussion by entering the command

+END

When you reach agreement or four of you enter +END, the next problem will be presented. Each time the discussion of a problem is ended, the computer will notify you that discussion is ending and ask for your final opinions on the problem.

You will be notified if you spend more than 30 minutes discussing a problem. We have estimated that you should be able to complete the one practice and two "real" problems in under 1 1/2 hours. However, we are placing no time limits on your work as a group, and you may continue to discuss a problem even after receiving a 30 minute notification.

In sum, your task is twofold:

To REACH AGREEMENT on the BEST POSSIBLE SOLUTION.

Here is a simple problem for you to practice on. The purpose of this practice is only to become familiar with the type of problem and procedure. We are going to limit you to fifteen minutes for this practice, so that you will have plenty of time to spend on the "real" problems.

Appendix G
The Problems
PRACTICE PROBLEM: THE INVESTMENT

You and the others in this group have been offered an investment opportunity which has a chance of returning \$10,000 to you in a year's time. You would have to invest \$1,000; this would be \$200 for each member of your investment group. This is a one time opportunity to become part of an investment pool in a new enterprise. The situation is really such that either you get the \$10,000 or lose the \$1,000.

What is the minimum chance of success you would need in order to make this investment?

THE INSIDE GAMBLE

You are a middle level manager who has in the past and can expect in the future to make average progress in the company-- regular, though not spectacular raises and promotions. A senior level manager has gotten permission to form a development team to try to develop a completely new product which may have spectacular success in the marketplace. You would be totally responsible for the management of the development team. If successful, your work with this team would bring you recognition at the highest levels and significantly increase your rate of advance. However, there is another, competing development team in your company working on a competitive product, and several other companies are known to also be making crash efforts. The group might never get a product out the door at all. Should it fail and be disbanded, assignment to an inconsequential position is the best you could expect from the company.

What would have to be the minimum chance of success of the new development group before you would accept the offer to manage it?

THE RETAIL PLUNGE

A new and costly marketing strategy has been proposed. At a cost of perhaps as much as \$1 Billion over three years, the company can try to capture a majority of the new consumer market for terminals, personal computers, and software. This would involve opening over 500 direct retail outlets and a massive TV and print advertising budget. All marketing studies indicate that a lesser investment would not have a reasonable chance of capturing a primary position in this market. If the marketing offensive were successful, it would permanently secure important new markets. If it were a failure, it might severely limit the Company's ability to raise capital for any large new development efforts for a decade or more.

What would the minimum chance of success within three years have to be before you would recommend backing this new strategy?

Problems for Repeat Groups Only (FtF first, Cc Later)
PRACTICE PROBLEM: THE INVESTMENT

You and the others in this group have been offered an investment opportunity which has a chance of returning \$100,000 to you in a year's time. You would have to invest \$10,000; this would be \$2,000 for each member of your investment group. This is a one time opportunity to become part of an investment pool in a new enterprise. The situation is really such that either you get the \$100,000 or lose the \$10,000.

What is the minimum chance of success you would need in order to make this investment?

THE CREATIVE BASTARD

A manager has interviewed a number of applicants for a job in his software development group. It has come down to two choices. One individual meets all the requirements of the job and will no doubt perform adequately and will fit in nicely with the current development team. The other can be described as brilliant but temperamental. He has some chance of making unusually creative contributions to the effort. However, he is definitely going to be harder to manage and will probably create problems in the team as a whole because of his aggressive manner and moodiness.

What would have to be the minimum chance of the temperamental, but brilliant, individual for making a highly significant contribution to the effort in order for you to recommend hiring this individual rather than the adequate one?

SHORT TERM PROFITS VS. LONG TERM OPPORTUNITIES

You are the head of a company having a division which sells fairly standard office products such as typewriters, dictating machines and copiers. It is currently a very successful division by all usual measures. Other divisions of your company have begun to introduce products in the office automation area and there are many more of these products on the drawing board. You have the opportunity presented to you to sell off the current office products division which largely represents products for manual office operations for a good price. Both the manufacturing and the sales divisions would be included in the sale. This would provide the capital and the atmosphere for a major commitment by your company to computer based office technology. Essentially you would be selling off a currently successful operation for the opportunity to move whole hog into a still unproven market.

What is the minimum chance of success you would have to estimate for your company in this new market to decide to sell off the current operation?

Appendix H
Orientation to the Pretest

We are here today to have you try out some decision-making exercises which were designed for (Company name) students. The purpose of this study is to test the effectiveness of different modes of communication for managerial decision making. At the beginning of December, we will be conducting a formal experiment in which groups of (Company name) students use three different forms of communication to discuss the same problems. Some groups will be using a face to face meeting, which is what we will be using today. Other groups will use two different structures for a computerized conference.

With the help of (Manager Name) here at (Company name), we have made up seven problem situations which we hope are interesting and relevant to the (Company name) managerial environment. Our purpose today is to test out some of these problems to see what you think of them, and also to test out procedures for conducting the face-to-face discussions. Among other things, we need to find out how long it will take you to deal with the problems, in order to finalize our plans.

The steps that will be involved are as follows:

1. Since this is a federally funded research project, we need to obtain your signed formal "informed consent" before proceeding. So we will first read through that and see if you have any questions.
2. We will then review with you the procedures to follow in discussing each of the problems.
3. We will then have you discuss and try to reach agreement on several of the problems. We will spend about an hour and a half on this. We think that you can reach a decision on three or four of the problem situations in that amount of time, but we really don't know.
4. Then we will have you spend about five minutes filling out a questionnaire which systematically asks for your reactions to the problem.
5. Finally, we will give you a short presentation on the nature and purpose of the study we are conducting, what we expect to find, and answer any questions that you may have.

To begin with, then, here are the informed consent statements. Our apologies for the legalistic way in which they are worded-- they must follow federal standards for what is included and how it is worded.

Appendix I
MONITOR COMMAND SUMMARY

+risky/sxpt set up experiment (test s.b. rerun of run zero)

+risky/mon run the monitor terminal, displays log and cc's

when Note. 912 should type +risky/xpt not +risky/mon

 first signing on. +risky/mon is faster way to

resume.

+risky/xpt run experiment for first time on an account
(+xpt after that)

+states print the current states for each user.

+fixstate force a user to be moved to a different state.

+risky/log print the log for a previous run.

+risky/table print the current choices during an experiment.

+risky/numprob set the total number of problems including
practice.

 used to end xpt early

+risky/enddisc terminate discussion.

+risky/faster set 901 to 905 to class zero.

Appendix J

SEQUENCE OF SUBJECT STATES FOR RISKY SHIFT EXPERIMENT

state

description

1. Name entry, +scm, initialization.
2. Initial instructions
3. Comment practice initialization.
4. Comment practice.
5. End of comment practice, first practice problem text given.
6. Initial choices entered (all problems)
7. Problem discussion.
8. Problem ending.
9. Gate for final comment reception.
10. Final choices entered.
11. Problem incremented.
12. Problem delivered and branch to state 6 unless done.
13. Experiment over.

Appendix K

Content Coding Form for Experiment Three

Group and condition

Problem or segment

A	B	C
(positive)	(neutral tone)	(Negative)

1. Pro Risk Argument
2. agrees with above
3. disagrees with above
4. Pro Conservative argument
5. agrees with conserv.
6. disagrees with cons.
7. Suggests compromise
or number shift
8. agrees with above
9. disagrees or refuses
10. Process
11. Soc-Emo only
12. other

Appendix L
Content Coding Instructions- Risky Shift

The unit is the "theme", corresponding grammatically to a paragraph, and often to a complete comment in a written transcript. It is all the sentences or sentence fragments which a person uses to make some statement. Some conference comments are two or more units-- they are clearly two or more different thoughts or themes.

We are coding the different strategies for moving the group towards a decision.

Basically, these are the substantive arguments (pro risk or pro conservatism) which try to rationally persuade the others.

And the pure pressure of negotiation.. in the form of "How about compromising on 4?" or "John I will move up to 4 if you will move down to 6"... compromising or pressuring on the "numbers" without any attention to content.

Then there is the social-emotional aspect. Instead of or in addition to substantive argument or negotiation/compromising appeals, one can consciously or unconsciously use social-emotional pressures.

Social-emotional positive will include what corresponds to things that would be in Bales categories 1 and 2--- praise, friendliness, joking. Social-emotional negative will be in categories that correspond to Bales 11 and 12-- showing tension, anger or frustration, making nasty cracks or attacks on individuals or the group.

Now, the social-emotional overtone will be cross-coded with the strategy ones. That is, a statement can be made with no social-emotional overtones or content included, or it can have a joke or a nasty comment included. So things are included on the two dimensions at once.

Another category of interactions is "group process"... these are requests or contributions that do not have to do with trying to get people to move their decision, but with getting straight where the group is or what is happening or suggesting what procedure they may follow.

Process-- neutral might include things like "Shall we vote to end the discussion because we cannot agree?" or requests for information such as "John, what is your current number?" or "How much time have we taken?". Or, giving information like "I'm flexible on this one".

Social-emotional (11)- positive would be entries or statements that include ONLY social-emotional, like telling a joke or saying "Good Boy Joe" without any other content. Category 11-negative would be the opposite-- a comment or statement which is purely emotional (one example that comes to mind is a comment that consists entirely of "Kiss off!"). There is neither a cognitive argument here nor an

attempt at negotiation or pressure to reach consensus purely by compromising on the numbers, but just a emotional response, which nevertheless does do something to the group process.

Use A for social -emotional positive, (B for neutral logically does not exist), and C for negative.

Other- These are statements or entries which cannot be fitted into any of the above categories. This will include entries which are so garbled as not to be understandable.

APPENDIX M

POST EXPERIMENTAL QUESTIONNAIRES
 QUESTIONNAIRE FOR GROUP DISCUSSION PARTICIPANTS

NAME/# _____ GROUP _____
 DATE _____ CONDITION _____

In recording your reactions and reflections about the group decision-making exercise in which you have just participated, please circle the number on the rating scales below which best represents your feelings. For example, the first set of questions ask you to think about the group discussion system used today and to rate it on a one to seven scale for how satisfactory you think it would be for each of several kinds of communications tasks.

For each question a rating of 1 means Completely Satisfactory; a rating of 4 is Neutral; and a rating of 7 means Completely Unsatisfactory.

- | | | |
|-------------------------------------|--|-------------|
| 1. Giving or receiving information: | | <u>Mean</u> |
| | :---1---:---2---:---3---:---4---:---5---:---6---:---7--- | |
| | Completely Neutral Completely | 3.1 |
| | Satisfactory Unsatisfactory | |
| 2. Generating ideas: | | |
| | :---1---:---2---:---3---:---4---:---5---:---6---:---7--- | |
| | Completely Neutral Completely | 3.2 |
| | Satisfactory Unsatisfactory | |
| 3. Persuasion: | | |
| | :---1---:---2---:---3---:---4---:---5---:---6---:---7--- | |
| | Completely Neutral Completely | 3.7 |
| | Satisfactory Unsatisfactory | |
| 4. Resolving disagreements: | | |
| | :---1---:---2---:---3---:---4---:---5---:---6---:---7--- | |
| | Completely Neutral Completely | 3.9 |
| | Satisfactory Unsatisfactory | |
| 5. Getting to know someone: | | |
| | :---1---:---2---:---3---:---4---:---5---:---6---:---7--- | |
| | Completely Neutral Completely | 3.8 |
| | Satisfactory Unsatisfactory | |

6. Giving Orders:

:---1---:---2---:---3---:---4---:---5---:---6---:---7---	<u>Mean</u>
Completely Neutral Completely	3.9
Satisfactory Unsatisfactory	

7. Receiving orders:

:---1---:---2---:---3---:---4---:---5---:---6---:---7---	3.9
Completely Neutral Completely	
Satisfactory Unsatisfactory	

8. Exchanging opinions:

:---1---:---2---:---3---:---4---:---5---:---6---:---7---	2.8
Completely Neutral Completely	
Satisfactory Unsatisfactory	

9. Problem solving:

:---1---:---2---:---3---:---4---:---5---:---6---:---7---	3.5
Completely Neutral Completely	
Satisfactory Unsatisfactory	

10. Reaching Agreement:

:---1---:---2---:---3---:---4---:---5---:---6---:---7---	3.5
Completely Neutral Completely	
Satisfactory Unsatisfactory	

The following questions deal with your feelings about your group and its discussions and your participation today.

Once again, we ask you for a rating of between 1 (top or best rating) and 7 (bottom or worst rating).

11. Taking part in this research was:

:---1---:---2---:---3---:---4---:---5---:---6---:---7---	2.3
Pleasant Neutral Unpleasant	

12. How satisfied are you with your own performance in this group discussion?

:---1---:---2---:---3---:---4---:---5---:---6---:---7---	2.9
Completely Neutral Completely	
Satisfactory Unsatisfactory	

13. The general feeling of our group was:

:---1---:---2---:---3---:---4---:---5---:---6---:---7---	2.1
Friendly Unfriendly	

14. The group generally took the problems they were given: Mean
 :---1---:---2---:---3---:---4---:---5---:---6---:---7---:
 Seriously Neutral Not Seriously 3.1

15. Do you believe the group felt the discussions to be:
 :---1---:---2---:---3---:---4---:---5---:---6---:---7---:
 Productive Neutral Unproductive 3.4

16. On the average the problems the group dealt with were:
 :---1---:---2---:---3---:---4---:---5---:---6---:---7---:
 Completely Neutral Completely 3.7
 Realistic Non-Realistic

17. Did your group seem to have an individual who served as a leader?
 (1) YES? ----- or NO? ----- 1.8

18. If yes, what is the name (or number) of this person who served as a leader?
 NAME or NUMBER? -----

BACKGROUND INFORMATION

Please circle the number preceeding your response.

1. Are you: (1) male (73) (2) female (14)
2. Please state your age: (x=42.5)(years).

3. Your highest educational level:
 - . (1) Less than high school (0) (4) 4 year college (49)
 - . (2) High school graduate (0) (5) Master's Degree(21)
 - . (3) Some college (12) (6) Doctorate (5)
4. How long have you worked for IBM? (x=16) (years)

5. The type of job you are now in can best be described as:
 - . (1) Management (25)(2) Technical (37) (3) Mixed (22)
6. Is your previous experience mainly:
 - . (1) Management (19)(2) Technical (42) (3) Both (23)
7. How Frequently have you used terminals for interactive programs?
 - . (1) Never (18) (2) Occasionally(28)(3) Weekly or more (41)
8. Have you previously used an "electronic mail" or other computer-mediated communication system?
 - . (1) Yes (38) (2) No (49)
9. How well do you type:
 - . (1) Hunt and peck (26) (3) Good typing (25 wpm)(21)
 - . (2) Casual typing (28) (4) Excellent typing (40 wpm)(12)

BACKGROUND INFORMATION

Page 2

10. Please give your job title and a brief description of your main responsibilities.

11. In regard to your financial responsibilities for other family members, do you currently feel

(1) Unable to take risks which might jeopardize the security of persons dependent upon you (7 = 8%)

(2) Able to take very limited risks (28 = 31%)

(3) Able to accept any opportunity which may be good for you (50=56%)

12. DO YOU HAVE ANY ADDITIONAL COMMENTS ABOUT YOUR EXPERIENCES TODAY?

QUESTIONNAIRE FOR GROUP DISCUSSION PARTICIPANTS

NAME/#

DATE

Please rate each of the problems on the following 1-7 scales. Circle the number corresponding to your evaluation next to the name of each problem. You may refer back to the text of the problems to refresh your memory.

1. In relation to your background and experience, the problem is:

: 1 : 2 : 3 : 4 : 5 : 6 : 7 :

Completely
Relevant

Neutral

Completely
Irrelevant

PROBLEM:

YOUR RATING:

MEANS

Short Term Profits vs.
Long Term Opportunities

1 2 3 4 5 6 7

The New Computer

1 2 3 4 5 6 7

The RFP

1 2 3 4 5 6 7

The Creative Bastard

1 2 3 4 5 6 7

The Inside Gamble

1 2 3 4 5 6 7 3.0

The Outside Opportunity

1 2 3 4 5 6 7

The Retail Plunge

1 2 3 4 5 6 7 3.9

2. The problem is

: 1 : 2 : 3 : 4 : 5 : 6 : 7 :

 Completely Neutral Completely
 Clear Unclear

PROBLEM:

YOUR RATING:

PROBLEM:	1	2	3	4	5	6	7	
Short Term Profits vs. Long Term Opportunities	1	2	3	4	5	6	7	
The New Computer	1	2	3	4	5	6	7	
The RFP	1	2	3	4	5	6	7	
The Creative Bastard	1	2	3	4	5	6	7	
The Inside Gamble	1	2	3	4	5	6	7	2.7
The Outside Opportunity	1	2	3	4	5	6	7	
The Retail Plunge	1	2	3	4	5	6	7	3.3

3. The problem is

: 1 : 2 : 3 : 4 : 5 : 6 : 7 :

 Completely Neutral Completely
 Interesting Boring

PROBLEM:

YOUR RATING:

PROBLEM:	1	2	3	4	5	6	7	
Short Term Profits vs. Long Term Opportunities	1	2	3	4	5	6	7	
The New Computer	1	2	3	4	5	6	7	
The RFP	1	2	3	4	5	6	7	
The Creative Bastard	1	2	3	4	5	6	7	
The Inside Gamble	1	2	3	4	5	6	7	2.6
The Outside Opportunity	1	2	3	4	5	6	7	
The Retail Plunge	1	2	3	4	5	6	7	2.6

4. The situation struck me as:

: 1 : 2 : 3 : 4 : 5 : 6 : 7 :

 Realistic Unrealistic

PROBLEM:

YOUR RATING:

PROBLEM:	1	2	3	4	5	6	7	
Short Term Profits vs. Long Term Opportunities	1	2	3	4	5	6	7	
The New Computer	1	2	3	4	5	6	7	
The RFP	1	2	3	4	5	6	7	
The Creative Bastard	1	2	3	4	5	6	7	
The Inside Gamble	1	2	3	4	5	6	7	2.9
The Outside Opportunity	1	2	3	4	5	6	7	
The Retail Plunge	1	2	3	4	5	6	7	3.3

5. The group discussion was:

: 1 : 2 : 3 : 4 : 5 : 6 : 7 :

 Informative Uninformative

PROBLEM:

YOUR RATING:

PROBLEM:	1	2	3	4	5	6	7	
Short Term Profits vs. Long Term Opportunities	1	2	3	4	5	6	7	
The New Computer	1	2	3	4	5	6	7	
The RFP	1	2	3	4	5	6	7	
The Creative Bastard	1	2	3	4	5	6	7	
The Inside Gamble	1	2	3	4	5	6	7	3.7
The Outside Opportunity	1	2	3	4	5	6	7	
The Retail Plunge	1	2	3	4	5	6	7	3.7

6. The group found reaching agreement on this problem to be:

: 1 : 2 : 3 : 4 : 5 : 6 : 7 :

Easy

Hard

PROBLEM:

YOUR RATING:

Short Term Profits vs. Long Term Opportunities	1	2	3	4	5	6	7	
The New Computer	1	2	3	4	5	6	7	
The RFP	1	2	3	4	5	6	7	
The Creative Bastard	1	2	3	4	5	6	7	
The Inside Gamble	1	2	3	4	5	6	7	3.7
The Outside Opportunity	1	2	3	4	5	6	7	
The Retail Plunge	1	2	3	4	5	6	7	3.6

7. Do you have any comments or suggestions about improving the problems or the procedures?