

Replicating Bales Problem Solving Experiments On a Computerized Conference:

A Pilot Study

Starr Roxanne Hiltz, Kenneth Johnson, and Gail Agle

Research Report Number Eight

Computerized Conferencing and Communications Center

New Jersey Institute of Technology

January 1978

This research was partially supported by a grant from the Division of Mathematical and Computer Sciences, MCS-76-16598. The opinions expressed herein are those of the authors and not necessarily of the National Science Foundation.

CONTENTS

Page

Abstract . . . . .	iii
Acknowledgements . . . . .	V
I. Introduction: Objectives of the Study . . . . .	1
II. Theoretical Background: The Bales Experiments and Interaction Process Analysis . . . . .	4
Inequality of Participation . . . . .	6
III. Hypotheses and Indicators . . . . .	9
Dependent Variable Measures . . . . .	9
IV. Methodological Goals, Problems, and Procedures . . . . .	13
Preparations for the Experiments: Face to Face . . . . .	13
Procedures: Face to Face Discussions . . . . .	14
Computer Conference . . . . .	16
Methodological Shortcomings . . . . .	17
V. Findings . . . . .	22
A. Results of Tests of the Hypotheses . . . . .	22
1. Amount of Communication . . . . .	22
2. Ability to Reach a Decision . . . . .	24
3. Differences in Bales Interaction Profile Analysis . . . . .	24
4. Equality of Participation . . . . .	28
5. Subjective Satisfaction . . . . .	31
6. Satisfaction with Teleconferencing Media for Specific Aspects of the Group Process . . . . .	33
B. Qualitative Observations . . . . .	39
1. The Push Towards Sociability . . . . .	39
2. Projection of Group Process Onto the Task . . . . .	41
3. Participant's Uncommunicated Behavior . . . . .	44
VI. Summary: Methodological and Theoretical Implications of the Pilot Study . . . . .	47

CONTENTS (cont)

Page

Appendices

1. Bales Human Relations Case . . . . .	.50
2. Sample run of the experiment . . . . .	.55
3. Post Experimental Questionnaire . . . . .	.70
4. Instructions and Procedures . . . . .	
a) Recruitment Form . . . . .	.73
b) Experimental Procedures (as stored on-line) . . . . .	.74
5. References . . . . .	.78

## ABSTRACT

Computerized Conferencing is a new form of communication in which the participants type their comments into a computer terminal, and receive their instructions and the comments of others printed on their terminal. This is a report on the results of a pilot study which was aimed mainly at exploring and solving the methodological problems presented by the need to adapt the procedures for conducting and coding face-to-face discussions to studies of this new medium. It represents the first set of controlled experiments on group discussions via a computerized conference.

The independent variable in this pilot study was mode of communication (Computerized Conferencing vs. Face to Face discussion). Dependent variables measured various aspects of the process and outcome of the discussions conducted by groups of five students on updated versions of the Bales human relations problems, including Interaction Profiles, inequality of participation, whether or not the group reached a consensus by the end of the 40 minute discussion period, and subjective satisfaction.

There were some uncontrolled sources of variation in this pilot study, and a very small total number of trials (twelve). Therefore the findings should be interpreted as suggestive of promising ones for further research rather than as a set of "proven" or "disproven" hypotheses. This report summarizes some of the qualitative differences between the communication modes which were observed as well as the differences which were measured quantitatively and can be subjected to statistical analysis.

The most important of the findings are:

- 1) Almost all subjects were able to learn to use a simple subset of the computerized conferencing system after only twenty minutes of training and practice.

- 2) The trials themselves went quite smoothly; the ability to control and monitor the communications process and to obtain a complete record for later detailed analysis reaffirmed the experimenters' initial supposition that computerized conferencing is a promising medium for controlled experiments.
- 3) In terms of face to face vs. computerized conferencing, differences were observed in amount of communication, proportion of overt agreement or disagreement, inequality of participation, and probability of reaching consensus on a problem solution within a forty minute time period. There were no significant differences in subjective satisfaction with the group discussion process.

## ACKNOWLEDGEMENTS

The experimenters are indebted to the research assistants on this project for their dedicated performance: Gerry Lavner, Ray Lackovic, and Dan Elicona. We are also grateful to the psychology department and other faculty at Upsala College who loaned the use of their laboratory, equipment, and offices for conducting the experiment. Among the many N.J.I.T. personnel who helped with getting the EIES system in shape to handle the experiments and who helped with training subjects and conducting the computerized conferencing trials are Murray Turoff, Jim Whitescarver, John Howell and Julian Scher. Anita Rubino coordinated the typing of experimental materials and reports with her usual efficiency and reliability, for which we are grateful.

We also wish to acknowledge that the EIES system utilized for conducting these experiments was developed under funding from the Division of Science Information of the National Science Foundation.

## I. INTRODUCTION: OBJECTIVES OF THE STUDY

Most of the important decisions in our society are made by groups of people who meet to discuss a problem and reach a decision. From meetings of the President's Cabinet or "summit" negotiations, through corporate boards of directors, manager's staff meetings, and decision-making committees of clubs and organizations of all kinds, the face-to-face discussion and group decision-making process holds sway. Given the "energy crisis", much of the time and energy necessary to transport people to all of these face-to-face meetings might be saved if a remote form of discussion such as computerized conferencing were used to carry on many of these discussions. Secondly, there are indications that the range of ideas and data introduced into discussions and the quality of the final decisions made might, in many cases, be higher for computerized-conferencing than for face-to-face discussion.

On the other hand, there are indications that computerized conferencing might have some negative effects upon group communication and problem solving processes. There might be more misunderstanding, since all of the rich non-verbal cues are missing. It might be impossible without some sort of consensus-oriented structure being imposed for any leadership to emerge, or for any decision to be made. It might so handicap persons with little typing skill that they are unable to participate in a way that contributes to the discussion.

We simply do not know what sort of effects computerized conferencing has for specific kinds of individuals, groups, and tasks. What is needed is a series of studies that enable us to pin down the unique impact which this new medium has upon group communication processes, and the factors and conditions with which this impact varies, including the features of the computerized conferencing system itself, the nature of the task or problem, and the composition of the group.

These are among the conclusions which emerged from a previous review of experimental data on how communication processes affect group problem-solving or decision-making, and the implications of experimental findings for the potential impact of computer conferencing on such group processes. That report concluded:

Thus far, there has been little, if any, controlled experimentation with computer conferencing for the purpose of assessing the impact of this mode upon group communication and decision-making processes. Such a series of experiments ought to be one of the priority items on an agenda for near-future research related to the development and assessment of the effects of computer conferencing. (Hiltz, 1975, p. 87)

Ultimately, the objective is twofold:

1) To provide a dynamic interplay between the design of computerized conferencing systems -- their features and their user interface -- and experimental testing of user reactions to specific design features. By feeding back the results of the experiments we hope to be able to increase the flexibility of and positive impacts of computerized conferencing upon group communication and problem-solving processes; to modify and remove those features which lead to negative effects; and to understand the conditions under which computerized conferencing should and should not be used.

2) To be able to use this medium to study the human group communication process. This second and no less significant goal involves the exploration of how best to use the computer as a research tool for social psychologists studying the group communication and decision making process.

For the pilot study the immediate objective was to:

1) Test the feasibility of conducting controlled experiments on a computerized conferencing system.

2) Locate the methodological problems involved in modifying experimental procedures developed by social psychologists for face-to-face group discussions.

3) Detail the software requirements desirable to support experimentation.

4) Generate some data which would be used to support or reject hypotheses about the impact of this medium, in order to select promising hypotheses for more rigorous testing in a subsequent series of controlled experiments.

The chief variable of theoretical interest was the impact of computerized conferencing as a communications mode upon the process and outcome of group decision making, as compared to face-to-face discussions. The specific system used was a modified sub-set of the capabilities of "E.I.E.S." (Electronic Information Exchange System), built and operated at the New Jersey Institute of Technology under a grant from the Division of Science Information of the National Science Foundation.

In computerized conferencing, each participant is physically alone with a computer terminal attached to a telephone. In order to communicate, he or she types entries into the terminal and reads entries sent by the other participants, rather than speaking and listening. Entering input and reading output may be done totally at the pace and time chosen by each individual. Conceivably, for instance, all group members could be entering comments simultaneously. Receipt of messages from others is at the terminal print-out speed of 30 characters per second.

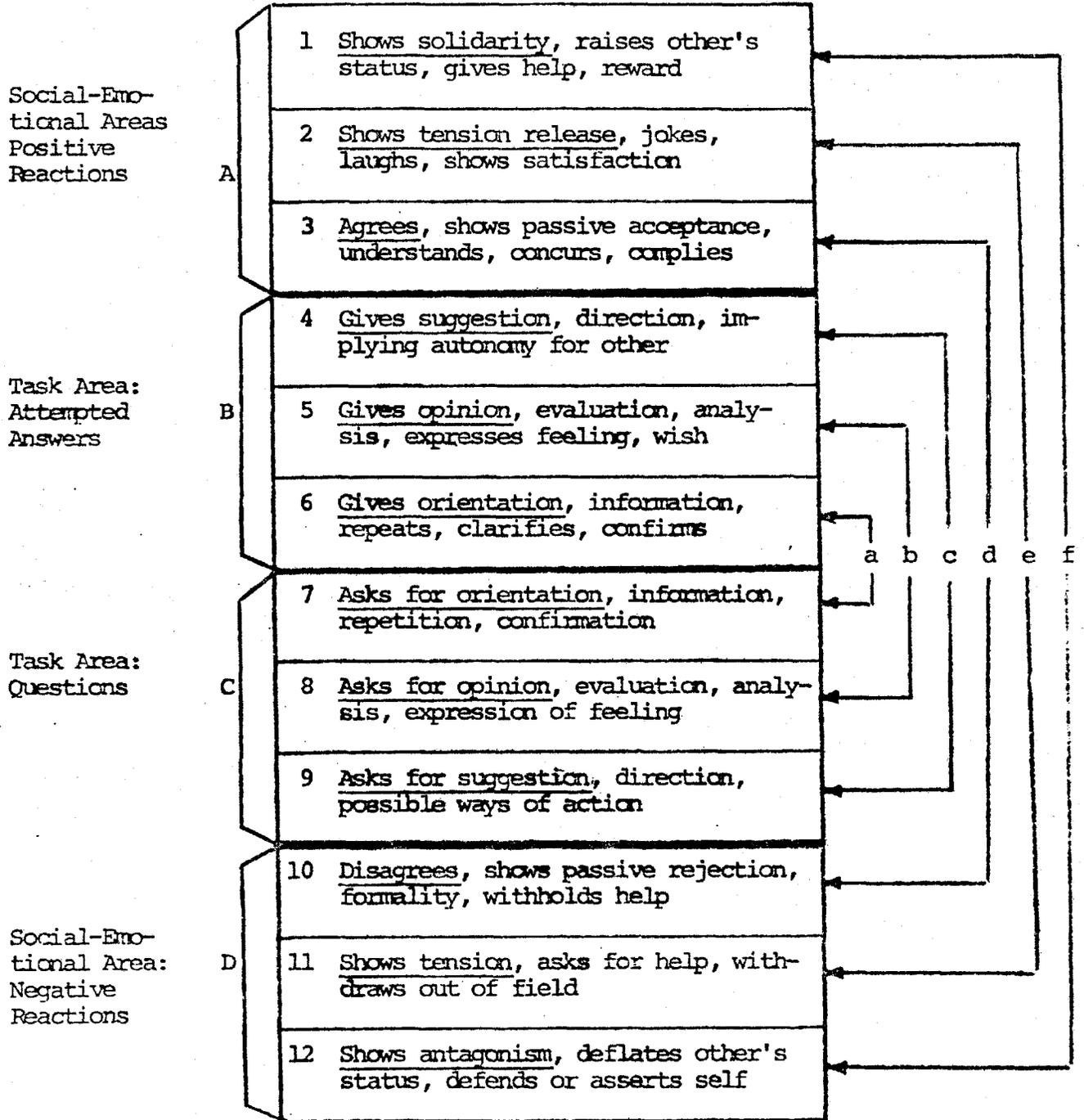
## II. THEORETICAL BACKGROUND: THE BALES EXPERIMENTS AND INTERACTION PROCESS ANALYSIS

Working at the Laboratory of Social Relations at Harvard, Robert Bales and his colleagues developed a set of categories and procedures for coding the interaction in small face-to-face decision making groups which became very widely utilized and generated a great deal of data about the nature of communication and social processes within such groups. (See Bales, 1950a; Bales et. al. 1951).

Coding of the communications interaction by Interaction Process Analysis involves noting who makes a statement or non-verbal participation (such as nodding agreement); to whom the action was addressed; and into which of twelve categories the action best fits (see Figure 1).

FIGURE 1

Categories in Interaction Process Analysis  
(Bales, 1950, p. 258)



INTERACTION PROCESS CATEGORIES DEFINED  
AND GROUPED BY TYPES

Key: a. problems of orientation, b. problems of evaluation, c. problems of control, d. problems of decision, e. problems of tension-management, and f. problems of integration.

Bales and his colleagues have established that for small groups asked to discuss a complex human relations problem with no clear "solution" or "answer", there emerges both a fairly standard distribution of types of contributions and also clear "phase" movements and regularities. For example, he found about twice as many "positive" as "negative" reactions. The use of Interaction Profile Analysis was chosen to enable us to quantify just how the content and sequence of group communications differ in the computer-conferencing communications mode as compared to the face-to-face conference. Some of the results of the Bales studies are described in the next section, in order to provide the theoretical basis which lay behind the replication experiments.

#### Inequality of Participation

One standard mode of assessment of group interaction utilized by Bales and his colleagues is the "who-to-whom matrix," with the originators of statements designating a series of rows and the recipients, the columns.

It was found that if the

Participants are ranked by the total number of acts they initiate, they will also tend to be ranked:

- a) by the number of acts they receive,
- b) by the number of acts they address to specific other individuals, and
- c) by the number of acts they address to the group as a whole. (Bales, et al., 1951, p. 468.)

There usually emerges a "top man" who sends and receives a disproportionate number of messages, and who

- a) addresses considerably more remarks to the group as a whole
- b) receives more from particular others than he gives out to them specifically (Bales, et al., 1951, p. 465.)

Commenting on the processes which produce this dominance, Bales (1955, p. 34) has written:

This tendency toward inequality of participation over the short run has cumulative side effects on the social organization of the group. The man who gets his speech in first begins to build a reputation. Success in obtaining acceptance of problem-solving attempts seems to lead the successful person to do more of the same, with the result that eventually the members come to assume a rank order by task ability. In some groups the members reach a high degree of consensus on their ranking of "who had the best ideas." (The members are interviewed by questionnaire after each meeting.) Usually the persons so ranked also did the most talking and had higher than average rates of giving suggestions and opinions.

Other experiments have also found that the amount and type of communicating which a person does in a face-to-face group discussion involving problem-solving is strongly related to the probability of being perceived as a "leader". Some studies and coefficients of correlation obtained include:

- a) Norfleet (1948), using Bales IPA, found correlations of .94 and .95 between relative rank on amount of participation (communication) and relative rank on perceived productivity among group members.
- b) French (1950) found a correlation of .96 between time spent talking and ratings of leadership.

What, then, causes a person to do most of the talking? The tendency for an individual to be slow in responding or jumping into a conversation, or prone to speedy replies and interruptions, was noted by Chapple and Arensberg in 1940 and has come to be recognized as a fairly stable individual characteristic: The L.V.R., latency of verbal response, measured by response time on sentence stub completion tasks. For example, in a task which minimized differences in competence (moral dilemmas, such as whether a man with a wife dying of cancer should steal some expensive drug which might save her), Willard and Strotbeck (1972) found that a participant's L.V.R. was the strongest predictor of participation (correlation of  $-.60$ ), compared with measures of I.Q. and personality.

What is interesting here is that the evidence indicates that persons who happen to be "fast on the draw" in a face-to-face verbal situation, and who may

not be particularly intelligent or correct, tend to dominate the discussion and decision-making process in small groups. Computer conferencing as a mode of communication suppresses L.V.R. as an operative variable, it is hypothesized, since all participants may contribute comments whenever they choose regardless of simultaneous input by other group members. Thus, it seems probable that there will be more equality of participation. (It is also quite possible that intelligence and correctness might be much more highly correlated with the leadership processes in decision-making that develop in a computer-conferencing group; this might be tested in future experiments).

We thus arrived at the predictions, based on the literature, that computerized conferencing, as compared to face-to-face discussions, will probably result in more equal participation, and that this, in turn, is likely to lead to the generation of more ideas and suggestions on how to solve a problem, but less likelihood of reaching a decision in a given amount of time, since it is less likely that with equal participation a single leader will emerge to push the group towards agreement. A related factor is that the absence of non-verbal communications may make it easier for a "deviant" group member to hold out against the other members of the group, since the group cannot impose sanctions as rapidly.

### III. Hypotheses and Indicators

Drawing on the experimental results and reasoning summarized above, our hypotheses were that:

1) There would be some differences in the type and amount of communication among group members, as measured by Interaction Profiles.

2) There would be a tendency towards more equality of participation in computerized conferencing.

3) It would be more difficult for a group to reach a unanimous decision within the 40 minute time period using computerized conferencing.

Though we did begin with these specific hypotheses, this was conceived of more as exploratory experimentation, in which we were as much interested in qualitative findings and in emergent hypotheses, as in testing these pre-formulated hypotheses.

#### Dependent Variable Measures

##### 1) Interaction Profile (Type and Amount of Participation of Individuals)

The Bales IPA categories were used to code spoken or written communications. An important methodological problem lay in equating the coding of written messages produced in computer conferences with the coding of verbal and non-verbal messages produced in face-to-face conferences. The who-to-whom data were coded live in the face-to-face situation, since eye contact establishes the person to whom a remark is addressed, while the categories were coded by reviewing tape recordings of the face to face sessions. For computer-assisted sessions typed transcripts (computer print-outs) were examined to determine both who-to-whom and category codings. For all sessions, the results were converted to overall percentages of spoken or written communication in each of the twelve categories.

##### 2) Inequality of Participation

An index of inequality of participation in a group was generated using the

same approach as economists use in constructing a Lorenz curve and "Gini coefficient" to measure inequality of distribution of income in a society. It compares the cumulative percentage of statements made, starting with the least active participant, against the cumulative percentage of the number of participants. This index is constructed in such a way that it yields a value of 0 if there is total equality of participation, and 1 if there is total inequality, regardless of the size of the group. The numerator represents the observed differences between the proportions of statements made by each of the participants and the proportions they would have made if each contributed an exactly equal share. The denominator consists of the maximum value which this sum of observed differences could possibly reach in a group that size in which there was total inequality, with one of the members making all of the statements. Thus, the index compares observed inequality to the maximum possible for a group that size.

A graphic representation can be made which consists of histograms in which shaded areas will show the difference between observed participation and the amount that would have occurred if there had been total equality. The index itself is computed as follows:

Let I = Index of inequality

N = Number of members in group

$O_i$  = Observed cumulative proportion of statements

E = Expected cumulative proportion if there were total equality of participation; equal to the cumulative proportion of the number of members of the group.

$$I = \frac{\frac{1}{N} \sum_{i=1}^N (E_i - O_i)}{\frac{1}{2} \left(1 - \frac{1}{N}\right)}$$

For example, for the case of a group sized five, with "total inequality", the results and the calculation would appear as follows:

Person	% of Statements	$O_i$	$E_i$	$(E_i - O_i)$
1	0	0	.2	.2
2	0	0	.4	.4
3	0	0	.6	.6
4	0	0	.8	.8
5	1.0	1.0	1.0	0
				Sum = 2.0

$$\begin{aligned}
 I &= \frac{\frac{1}{5} (2.0)}{\frac{1}{2} (1 - \frac{1}{5})} \\
 &= \frac{.4}{.4} \\
 &= 1.0
 \end{aligned}$$

For "total equality", the calculations would be:

Person	%	$O_i$	$E_i$	$(E_i - O_i)$
1	20	.20	.2	0
2	20	.40	.4	0
3	20	.60	.6	0
4	20	.80	.8	0
5	20	1.00	1.0	0
				Sum = 0

$$I = 0$$

Note that the differences between "observed" and "expected" are not squared.

This index was computed for the number of Bales interaction units contributed for each individual.

3) Whether a Decision was reached; whether it was unanimous or not.

Determined by the experimenters reading the transcript or listening to the tape. Two persons independently made these judgments for each trial.

#### IV. METHODOLOGICAL GOALS, PROBLEMS, AND PROCEDURES

A very limited goal was officially stated for this project, of replicating a few trials of the classic Bales experiments. The main purpose was to determine what problems might arise when they were used to compare face to face discussions with computerized conferencing discussions; and, to determine if any special software aids are needed for the running of social science experiments in a computerized conferencing environment. It was also hoped that pilot study could yield some usable data, if possible.

##### Preparations for the Experiments: Face to Face

- a. Three of the Bales problems were updated and re-written. For example, the locale of one of the human relations problems was changed from a World War II airplane factory to a Vietnam war helicopter factory, and such dated phrases as "Cheese it" were translated into more contemporary slang.
- b. A post-experimental questionnaire was developed which included not only the original Bales items on subjects ratings of one another, but also ratings of the problem itself, measures of subjective satisfaction and reaction to the experiment, and items from the Communications Studies Group scales rating the suitability of computerized conferencing for various communications purposes. (See Appendix 3).
- c. Two student research assistants were trained in the use of Interaction Process Analysis, using first written materials and then a tape of an actual group discussion.
- d. A "script" was constructed and rehearsed, detailing what would be said and done to the subjects, by whom, at each point in the experiment.
- e. Subjects for the face-to-face replications of the Bales experiments were recruited in classes on the Upsala campus and assigned to five groups. These classes include a substantial proportion of older, part time students as well as young undergraduate students. There is also racial and ethnic diversity. Each subject filled in a recruitment form (See Appendix 4A).

### Procedures: Face-to-Face Discussions

As subjects arrived in the experimental room, they were asked to indicate their first names. They were then asked to take a seat around the conference table and a name plate and number was placed in front of each participant. They were given magazines to read and asked not to talk to one another until all arrived. Then use of tape recorders and observers was then explained. Next, they were told that their task was to discuss a human-relations case about a problem facing an administrator, and the initial instructions as worked out by Bales were given. (see Appenndix 2. Note that the same Bales instructions were used for all face to face and computer assisted sessions.) They were then given individual copies of the cases and asked to read them separately.

After seven minutes, the experimenter collected the five cases and announced "O.K., you may now begin conferencing. You have 40 minutes to come to a group decision. At 10 minutes before the end, you will be given a warning of the remaining time allotted."

In the face-to-face condition, subjects were seated in a room for which there are observation rooms separated by large one-way mirrors on either side (see Figure 2). Experimental apparatus includes:

a) Sound equipment wired to two tape recorders and two speakers, so that all observers hear proceedings clearly, as well as seeing them through the windows.

b) A timer system synchronized with digital clocks in front of the observers in each observation room. Each minute, the timers make a flash and a click which can be heard on the tapes as well as by the observers. Observers are instructed to draw a line at each change of a minute and to note the clock time, in order to facilitate later checking and reconciliation of recorded data.

We realized from the beginning that the main methodological problem would be to arrive at reliable and comparable Bales IPA coding procedures (who-to-whom and 12 content categories) for the face to face and computer conferencing forms of discussion, since we did not want any differences in outcome to be attributable to differences in coding the interaction. The initial plan was to code "who-to-whom" live from the interaction process (since this could not be captured from the sound recordings in most cases), and to code the content of the communications solely from the tapes, rather than including non-verbal gestures (which would not be present with a computerized conferencing transcript). The timers enabled us to reconstruct "who" was making each statement during the later coding of content, by matching the records for each minute of interaction.

After the first "dress rehearsal" run, it was felt that in order to be able to compare the results to computerized conferencing experiments, the Bales coding should be expanded to account for the non-verbal content in more detail; and that there had indeed been a great deal of communication taking place in the group through non-verbal means. Might not at least some of this mainly social-emotional content get translated into words when participants were restricted to verbal (written) communication only? For instance, instead of laughing, might not a person write "ha! ha! "? Instead of nodding, might not a person send a message saying, "I agree"?

Procedures were developed and implemented starting with the first trial ("Monday") which facilitated separate observation and recording of the spoken words and non-verbal communication. However, not enough time had been provided to perfect these techniques, so we have decided not to use the non-verbal data. In addition, the coding reliability on that first trial using the new procedure was not felt to be very high, so we discarded the IPA data for that trial. What we have at this point is the who-to-whom matrix and the Bales codes for all

spoken communications for three face-to-face trials; plus non-verbal codings for several segments of the three trials. The analysis will compare the Bales distributions for (face to face) spoken only, with the distributions for the written transcript of the computerized conferencing conditions. We do suggest that future experiments make use of coded data on the non-verbal behavior in face-to-face groups.

"At the end of the 40 minutes allowed for group discussion the experimenter entered the room and allowed, if needed, an additional 5 minute "grace period" for the group to articulate its group decision. At the completion of the group discussion, the participants individually filled out a post-experimental questionnaire. Then they were de-briefed by an experimenter. We do have the usable questionnaire data and recorded discussion and debriefing for the "Monday" group.

The audible statements were recorded on a who-to-whom basis by one observer on each side. Following the experimental session the tapes were coded statement by statement for each minute segment, for the purpose of completing and reconciling any differences in the who-to-whom data generated for each minute, and for making the Bales category designations. Sample minutes of each day's tapes were independently coded by one of the experimenters and compared with the codes arrived at by the student observer-assistants, in order to assure high levels of reliability. It took each team of two student assistants approximately two working days to completely code and summarize the data for each session in this fashion.

Computer Conference: Subjects arrived in the experimental area individually and were escorted to a computer terminal where they had their name and number entered. They were given a set of instructions on how to use a computer terminal and practiced typing in some letters. Then they were placed in a conference and

received a print-out of instructions for use of the system, and were told that they might enter statements to the other group members for approximately a twenty minute period. (See appendix: these instructions were loaded as conference comments).

Approximately twenty minutes after all subjects were seated at their terminals, the group task instructions were printed out on the terminals. Then the problems were hand delivered by assistants, and collected approximately eight minutes later. All remaining instructions, time-remaining warnings and grace period allowances were essentially the same as those used in face to face sessions but were delivered to computerized conferences at fixed time intervals over the terminals of the participants. Assistants circulated throughout the experiments to make sure that no one lost their telephone connection, ran out of paper, or otherwise needed help.

#### Both conditions

The experimenter in charge greeted each subject, paid him or her, briefly described the task of the group, and then turned the subject over to an assistant to be escorted to the experimental room (for face to face) or to their terminal.

#### Methodological Shortcomings: A Summary of Ideal vs Actual Procedures

The kind of experimental design which underlies the trials conducted and the statistical analysis which will be used is a simple one using mode of communication as the independent variable and random assignment of subjects to four experimental groups in each of three conditions:

Condition A: Face to face

Condition B: Computerized conferencing,  
group communications only

Condition C: Computerized conferencing, private or  
anonymous communications allowed

This would give us the following diagram of the design

Communication Mode

A	Groups 1-4
B	Groups 5-8
C	Groups 9-12

All other conditions -- the problems used, coders used, treatment of subjects before the running of the trials -- etc. -- should have been "controlled" to be exactly the same. Because we were conducting a pilot study aimed primarily at developing procedures and assessing feasibility, however, there were many respects in which the study did not match this design. These are listed below.

1. The subjects were not randomly assigned to the various communication mode conditions. The population used and recruiting methods used were approximately the same -- that is, recruiting talks using the same script to summer school classes at Upsala College. However, the face to face condition was run in the summer of 1976, when the EIES system was not yet ready, and the computerized conferencing conditions in the summer of 1977. Given this fundamental flaw, we did not bother to go through any strict randomization in assignment to groups or of groups to condition. Students were assigned on the basis of their availability on a certain day and also on the basis of not putting two persons in the same class into the same experimental group, so as to minimize the chances for prior acquaintance.

2. Since we were testing out problems for suitability, three different problems were used the first year (in the face to face trials). The "best" of these, according to subject ratings of interest and realism, was then used for all trials the second year. Though Bales had developed the set of problems to be comparable, nevertheless, this is an uncontrolled source of variation between two of the face to face trials and the computerized conferencing trials.

3. The first of the groups run face to face did not produce completely usable data, as described above. Though the team had conducted one "trial run" beforehand, they did not feel confident that the Bales IPA coding was complete or accurate for "Group one"; therefore, these data will not be used. Only the subject questionnaire data and the tapes of their decision will be used.

4. The same experimental assistants and coders should have been used for all trials, or at least differences in personnel should not have corresponded to differences in condition. In fact, one of the assistants could not take part in the study the second year; so the detailed coding was done by assistants A and B the first year, and assistants B and C the second year. Although they were trained in a similar way, this could have produced some differences in coding.

5. The experiences of the subjects before the actual running of the trial should have been exactly the same in the two conditions. In fact, the members of the computerized conferencing groups were given a twenty to thirty minute training session prior to presentation with the problem and the beginning of the forty minute discussion period. During this time, they were encouraged to send items to one another as a form of practice. Among the differences which this practice session may have produced are:

a) Fatigue among the computerized conferencing subjects, since they were actually at their terminals for over an hour.

b) An opportunity for the c.c. subjects to get to know one another before the onset of the problem solving discussion. The face to face subjects did not talk to one another prior to being given the problem to discuss.

6. In terms of ideal design, the third condition would have been either a conference with anonymous comments allowed or a message-based communication process which allowed for the delivery of private messages to an individual member or to a subset of group members, in addition to the usual group messages seen by

all members of the group. Since the primary objective of this project was a methodological one of assessing the feasibility of running full scale experiments in the future, it was decided that it was more important to try both conditions -- that is, a message-based discussion, and a set of instructions and procedures which allowed anonymous statements in a conference-based discussion. Both of these did run fairly smoothly and successfully (though the message-based trials were very difficult for the experimenters to feel in control of, since they were unable to see any of the private messages until the experimental session was completed). This means that there are two trials in each of two somewhat different conditions. For some analytic purposes, they have been lumped together as conditions which allow the computerized conferencing participants to make "protected" statements which do not reveal or identify their comments to the group (either thorough anonymity or thorough private messages the whole group does not see). For most of the analysis all computerized conditions are considered together. However, it may very well be that these three variations are quite different, and that it is a mistake to consider these data as examples of a similar communications condition.

The end result is that these trials as a group violate the assumptions upon which statistical tests are based. The tests that will be used to determine whether or not there are significant differences between conditions must therefore be interpreted only as suggestive of conclusions which the data tend to support. However, the differences that were found might very well be attributable to one of these uncontrolled sources of variation, rather than solely to the difference in communication mode. In addition, we are working with a very small number of groups and subjects in each condition. Therefore, the reader must be cautioned not to make "too much" of the results. That a hypothesis tends to be supported by the data means only that, in our opinion, it deserves a full scale

experiment, not that these data have "proven" it.

If there are such methodological flaws, why do we bother to analyze the data at all? Despite the uncontrolled sources of variation, these data are by far more "controlled" and quantified measures of key variables than can be extracted from any field trial. That is, it is the closest thing which we have to a completely controlled experiment which exists to date. Therefore, while we caution the reader not to make "too much" of the data, we also did not want to make "too little" of it either, by failing to be extract from it the insights and leads which it can give us.

## FINDINGS

### A. Results of Tests of the Hypotheses and Other Quantifiable Results

#### 1. Amount of Communication

The most striking difference between the face to face and the computerized conditions is that there was a great deal more quantity of communication face to face. The computerized condition actually had a little more time, since one of the face-to-face groups finished before 40 minutes, and most of the computerized groups went into their five minute "grace period" after the expiration of the initial forty minutes of discussion time. Nevertheless, about two and a half times as much was communicated in the face to face condition, as coded in Bales units. Number of words would be a better measure of quantity; however, a more precise measure could not possibly change the difference we found, which was a mean of 502.3 units for the face to face groups as compared to 189.75 units for the computerized groups communicating by typing and reading.

One thing that we conclude from this is that, at least with minimal previous training such as our subjects received, computerized groups should be allowed more time to reach their decision. It is very possible that much of what is communicated orally in the face to face condition is redundant and unnecessary; or that perhaps the same amount of transfer of information and opinions etc. can take place in a more concise manner in the typing and reading mode. However, as we monitored the computerized groups, we did note that many of them seemed to feel rushed by the deadline. Typically, shortly after the participants had each made some initial observations and suggestions and just begun commenting on one another's contributions, they would get a ten minute warning. Thus, the time limit artificially cut off what would have been the "natural" tendency to take much longer.

It must be kept in mind that our suggestion that computer conferencing requires more time to reach a group decision may be an overextension of our data. The longer time required by the computer conferencing groups participating in this research may be due to the limited training which they received in use of the computer system. With this twenty minute practice period many subjects, namely those who arrived late or who were slower in learning to use the system, were still "learning" during the early phases of the group discussion. (See, for example, the comments made by Elizabeth, a "late arriver", in computer conference 905, Wednesday, shown in Appendix 2: sample run of the experiment). It is also noteworthy that this group, in which a member "arrived late", and the group with the "sluggish" system described in the section below on qualitative observations, are the only computer conferencing groups which failed to achieve a unanimous group decision in the time allotted. Whereas qualitative observations clearly indicated that it took longer for participants to get reactions to their comments in the computer-assisted modes and that such groups often seemed rushed, we are suggesting that the additional overall time required to reach a decision in the computer conferencing mode may disappear with experienced users. Experienced computer conferencing users or naive subjects given a longer period to practice using the system may not take longer than face to face groups to solve the same problem.\*

It must also be pointed out that the mechanics of computerized conferencing are such that the amount of information the group exchanges in any given time period is a strong function of the size of the group. For groups of ten or more, even at the input rate exhibited in these trials, the number of words passed might surpass that of the face to face meetings. This means that obser-

---

\*See Johansen, 1976, for further discussion of this possible "pitfall" in laboratory experiments with new users.

vations on groups may change significantly as a function of size. It is our intention in future trials to look at groups of sizes of ten or more.

## 2. Ability to Reach a Decision

There were not enough trials to produce statistically significant results for this variable. The observed outcomes are summarized below.

Face to face groups: All four reached a decision  
No expressed disagreements with these decisions

Conferencing: One group failed to reach a solution.  
One group split 4-1.  
Two groups reached unanimous decisions.

Conferencing with anonymity, or private messages All four groups reached unanimous decisions.

This is a variable that needs much further research in order to be able to explain the differences. They could be due to the time pressure on the conferencing groups, as noted above. It could be that the ability to make "protected" comments through the use of anonymity or private messages in the computerized condition does facilitate a consensus formation process. We hope to explore this aspect of the outcome of the group discussion process in subsequent experiments. We also hope to be able to introduce consensus formation aids into a subsequent set of experiments, which would explicitly call for votes at a certain point and then feed back the results for the group, to see if this helps groups to reach a decision and/or speeds up the decision making process. An additional possibility is that whereas computer conferences may take longer to reach consensus the quality of the decision reached may offset this disadvantage. Quality of decision is another variable which we hope to explore further. In generating procedures for rating quality of decision, it is planned to use the final segments of the output of the twelve groups in these experiments to serve as the trial data in the development and validation of measures. We also plan to use tasks in which high quality solutions have already been determined by experts in the field.

Figure 3

Mean Percent of Comments in each of Bale twelve categories for Face to Face (n = 3) and Computer Conferencing (n = 8) Groups: Mann Whitney U Values, and Probabilities

Category	Mean for F to F	Mean for CC	MWU	P
1 (Shows solidarity)	.75	2.45	19	> .10
2 (Tension release)	3.17	.56	0	< .02 *
3 (Agrees)	22.51	5.42	0	< .02 *
4 (Gives suggestion)	5.24	9.33	18	> .10
5 (Gives opinion)	41.16	55.64	21	< .10
6 (Gives orientation)	14.91	11.86	7	> .10
7 (Asks for orientation)	3.20	3.16	9	> .10
8 (Asks for opinion)	2.06	5.73	22	< .05 *
9 (Asks for suggestion)	.64	.94	13	> .10
10 (Disagrees)	4.34	.70	0	< .02 *
11 (Shows tension)	1.14	1.60	15	> .10
12 (Shows antagonism)	.94	2.99	16	> .10

\* significant at .05 level

Figure 4: Mean Percent of Comments in Each of the Twelve Bales Categories and Inequality Indexes; Mann Whitney U Values and Probabilities

Bales Category	Face to Face			Computerized								U=	P
	Tue	Wed	Thu	Mon	Tue	Tue	Wed	Thu	Thu	Fri	Fri		
1	1.37	.40	.47	7.35	2.06	3.54	2.56	0	2.67	.71	.70	19	>.10
2	5.66	2.19	1.66	0	1.03	1.52	.86	0	0	1.06	0	0	<.02 *
3	21.10	25.10	21.33	7.35	7.22	4.55	1.71	3.85	6.67	6.38	5.63	0	<.02 *
4	4.80	7.37	3.55	18.38	15.46	7.58	12.39	4.95	6.00	7.09	2.82	18	>.10
5	36.02	39.64	47.63	52.21	29.38	50.51	52.14	70.88	65.33	50.71	73.94	21	<.10-
6	18.35	18.33	8.06	4.41	23.71	16.16	12.82	6.04	7.33	15.24	9.15	7	>.10
7	4.29	3.19	2.13	.74	4.64	8.08	1.71	.55	0	3.90	2.82	9	>.10
8	2.06	.80	3.32	5.88	9.79	3.54	8.55	3.30	6.67	5.32	2.82	22	<.05 *
9	.86	.60	.47	.74	2.06	0	1.28	0	2.00	0	.70	13	>.10
10	3.95	2.19	6.87	1.48	1.55	0	.85	.55	.67	.35	.70	0	<.02 *
11	.86	.20	2.37	1.48	1.03	1.52	2.56	0	2.00	3.55	.70	15	>.10
12	.69	0	2.13	0	2.06	3.03	2.56	9.89	.67	5.67	0	16	>.10
Index	.4155	.5527	.2560	.2464	.2965	.1237	.2286	.1648	.2867	.0974	.2184	2	<.05

categories for the three face to face groups for which full coding was reliable and eight computerized groups are shown in Figure 3.. Figure 4 shows the results for each individual trial in more detail, from which the means were computed and upon which the Mann Whitney U tests were computed.

The nonparametric Mann-Whitney U-test was chosen to compare the two conditions (face to face and computerized) because of the nature of the samples. The sample size of three groups for the face to face condition was too small for use with parametric techniques, and the unequal size of the two sets of trials also makes the assumption of homogeneity critical for parametric techniques. Thus, the nonparametric Mann-Whitney U-test was chosen, since it requires only independent selection of samples and an ordinal level of measurement. (See Siegel, 1959). With the number of groups used, the .02 level of probability is the lowest value which can be obtained in the statistical tables.

The main differences are in categories three (agreement) and ten (disagreement). There was a lot more overt agreement communicated among the members of the face to face groups than was typed into the conferencing system. Included in "agreement" was anything that was understandable on the tape recording as a symbol of agreement. In other words, the participants did not have to say "I agree with you"; an "uh-huh" or "yeah" was coded as agreement. It appears that at least with new users of computerized conferencing who have not become socialized to the need to make everything explicit in this medium, there will be less overt cuing of the extent of agreement with the statements of others.

Most of the other differences which are statistically significant are substantively so small that we hesitate to say that they might mean anything. They very well might be due to lack of reliability in coding. On the other hand, there is a fairly substantial larger amount of "giving opinions" in the computerized conditions. This just failed to reach the .05 level of significance

(the U value was 21; 22 is the .05 level in this case). We do think that there is a good chance that a larger sample of groups would produce a statistically significant tendency towards more people giving more opinions in the computerized conferencing than in the face to face condition. In this regard it is well to note that more opinions were solicited in computer conferencing groups; and that the tendency for computer conferencing groups to give higher levels of category eight("asks for opinion",) is statistically significant at the .05 level. In addition the generation of more opinions is related to the greater equality of participation, which is discussed below.

#### 4. Equality of Participation

The relative number of Bales units contributed by each participant was used as the basis for computing an index of equality of participation. As explained in the Methods section, this is an adaptation of the "Gini coefficient", which would reach 0 if all five members of our groups had each contributed 20% of the comments (no inequality of participation); and 1.00 if one person had done all the participation and the others were just a passive audience (total inequality).

The value of the indexes for each of the groups is shown in the bottom row of Figure 4. There is a statistically significant tendency for there to be more inequality in the face to face discussion mode. It should also be noted that the only reversal was for Thursday's face to face group, which had a lower value than two of the computerized groups. This is the only group shown in this table which did not use the "forest ranger" problem. Thus, the relatively lower amount of inequality in that discussion could have been due to the difference in the problems being discussed.

## Subjective Perceptions of Lack of Dominance

Our confidence that the apparent greater equality of participation in computerized conferencing reflects real differences rather than errors attributable to coding by observers is increased by the fact that measures of subjective perception by the participants show the same thing. Included in the post-experimental questionnaire as questions one to five (see appendix) were Bales' measures of subjectively assigned rankings of participants on different behaviour dimensions related to leadership. What is shown in table 5 is the mean number per group who were able to rank quality and amount of participation. The data show that the participants in computerized conferencing were significantly less likely to be able to rank-order the group. (This difference was predicted initially, and the values of P are for a directional alternate hypothesis).

Figure 5

Subjective Perceptions of Leadership: Mean Number of Persons per Group Able to Answer Questions Related to Leadership

Mann Whitney Values - Directional Alternate Hypothesis

Question	F t f	CC	U	probability
1. Participated Most	4.75	3.75	6.5	N.S.
2. Best Ideas	4.50	3.38	4	<.025
3. Effectively Guide	4.50	3.13	2	<.01
4. Group Leader	4.50	3.00	2	<.01
5. Most Likable	4.25	3.00	4.5	<.05

## 5. Subjective Satisfaction

Answers to questions 18 to 23 of the post-experimental questionnaire were compared for four face to face groups and the eight computerized groups. There were no statistically significant differences in amount of satisfaction with participation in the group discussion.

There is one difference that stands out, however, when one visually compares the mean responses for the twelve groups. Question 11 measured the pleasantness of the experience on a one to seven scale. ("Taking part in this research was: 1 (pleasant)... 7)(unpleasant)". The means for the two groups conducted on the message system (Thursday) were 3.0 and 3.25. None of the means for any of the other groups were above. 1.8. There is no statistical test that can be used for only two groups, and for good reason, since many other sources of variability might explain this difference. However, we think that there is a good chance that it reflects a genuine difference in the relative ease and pleasantness of conducting a group discussion in a common conference vs. the more disjointed exchange of messages, some of which do not go to all group members.

Conducting the experiments on the message system was definitely less satisfactory to the experimenters, since they could not constantly monitor all that was going on in the private message traffic. It could be that the greater dissatisfaction felt by the experimenters somehow got transmitted to the subjects; but we think this unlikely. Our conclusion is that while it is possible to conduct experiments over a message system, we do not wish to do so in the future, since it seems to be less satisfactory as both means of communication for a group discussion from the viewpoint of the participants, and as a means of monitoring and controlling the proceedings from the point of view of the experimenters. However, it would of course take an experiment specifically designed

and run to test these observed differences before one could say with any confidence that they are not attributable to any of the sources of variation which we did not control.

In addition to the questionnaires, subjective reactions or satisfaction were probed in the de-briefing face to face discussions. The following excerpt is fairly typical of the mix of reactions received from the computerized conferencing subjects.

Monday Afternoon. Group-Debriefing Excerpt

Exp: The reason we wanted to talk to you one more time is to get any reactions or any suggestions or questions.

Black Female: It's kind of a unique kind of communication, that's for sure. But I enjoyed it.

Second Black Female: After the initial lull, it started to be fun.

White Female: I'd much rather communicate in person. See the expressions. I think its good for taking or giving instructions, but...

Second Black Female: I think it's kind of good sometimes, though. Because you're not swayed -- you know, sometimes you look at somebody's face...This way, you really couldn't see...

White Female: It was awfully difficult sometimes to write down exactly what you meant.

Exp. Were there any times that you felt frustrated or confused?

Black Female: Not really.

White Female: No...

Exp. Are there any suggestions that you have, for things that we might do differently?

White Female: Sure, what you might think about is coming to one session to kind of learn the machine a little. You know, I type, but I kept hitting that break button (laughs). It would just kind of destroy what you were trying to do. I think it would be better to communicate if you really knew the machine.

It is interesting to note that

1) It is a black woman who points out the possible advantage of not seeing the other participants and judging them on their appearance.

2) One of the subjects suggested (without prompting) that it would be better to have a separate training session, in which participants would achieve mastery, before coming back to actually engage in their discussion task. The other participants, when asked if they would return a second day if they had just a learning-practice session the first day, claimed that they would.

#### Satisfaction with Teleconferencing Media for Specific Aspects of the Group Process

Figure 6 shows how users of three different kinds of teleconferencing systems (audio, video, and computerized) rated the media for specific aspects up the group discussion process. The scales were developed by the Communications Studies Group and are called the DACOM scales (Description and Classification of Meetings).

The data in Figure 6 must not be taken at face value, because there is no comparability among the various data sources. The experienced EIES users were not engaged in any particular task at all. The subjects, tasks, and all other conditions for the four studies were not at all comparable. In addition, the scales for the Bales replications reported here and for the Institute for the Future's studies of PILOT users were reversed, with the "unsatisfactory" on the left and "satisfactory" on the right. (Corrections were made for this in the table by reversing the direction of the deviation from the neutral 4.0 point; but the different order may affect answers, since there tends to be a slight response bias on scales toward answers that appear first). Thus, the only totally valid comparisons are differences in suitability within each medium-study, not across studies.

New users of computerized conferencing do not make very large distinctions after only an hour about the uses for which it is most and least satisfactory. Overall, they find it most satisfactory for exchanging opinions and giving or receiving information, and least satisfactory for "getting to know someone". The range of mean ratings is only 3.2 to 4.6.

Comparisons of First-Time Users on CSG Scales:

Video-Conferencing, Audio Conferencing and Computerized Conferencing

FIGURE 6-A

Completely Satisfactory

Completely Unsatisfactory

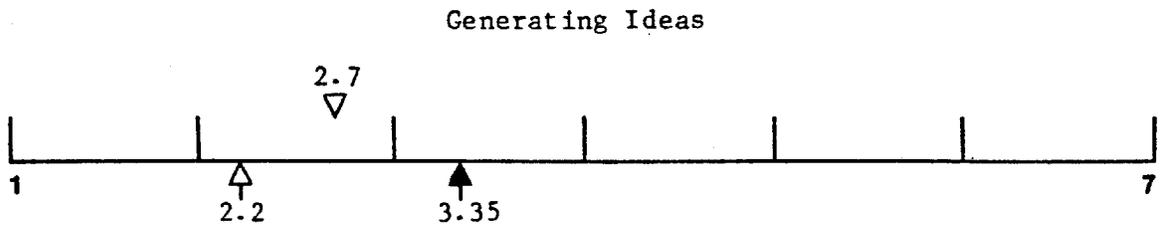
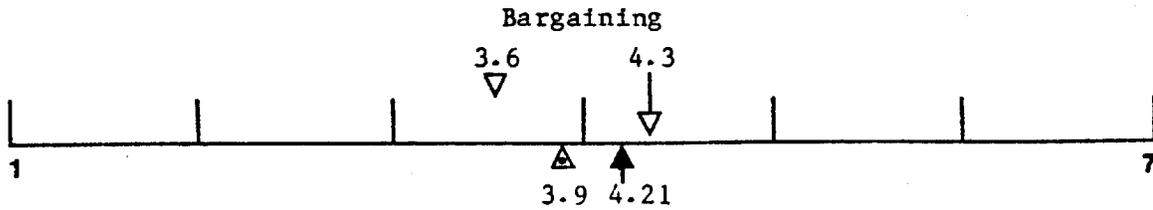
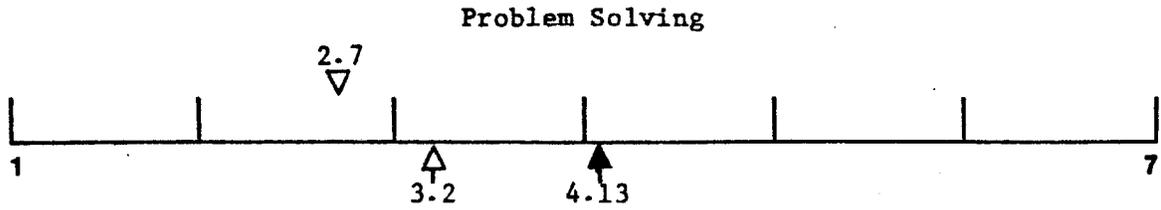
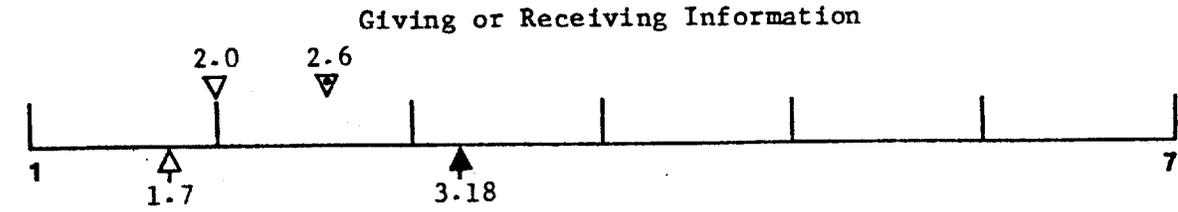
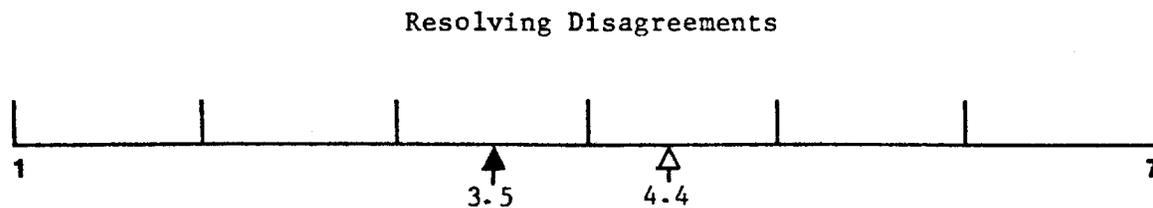
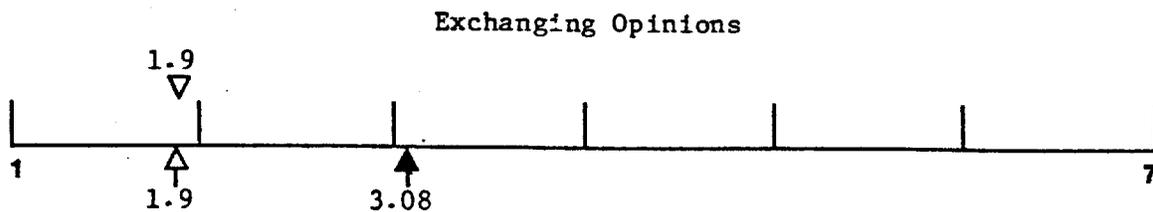
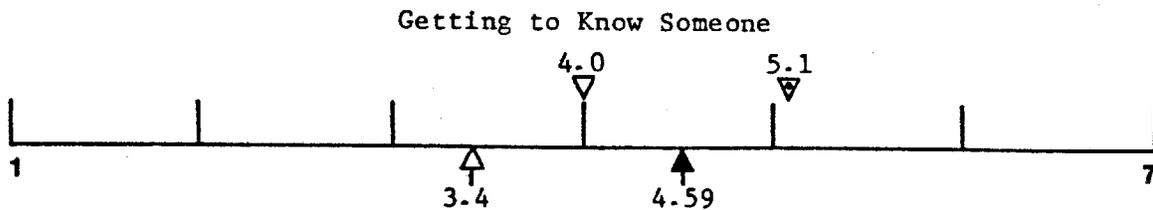
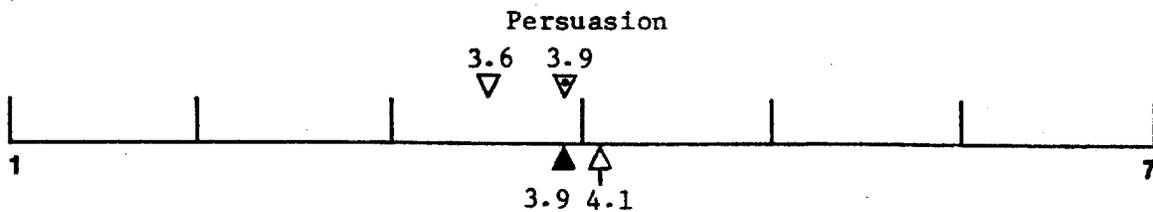


FIGURE 6-B

Completely Satisfactory

Completely Unsatisfactory



Key

- △ = 13 experienced EIES Users (N=13)
- ▲ = computerized conferencing: Bales replication with students (scale reversal performed) (N=40)
- △ = Confravision: Champness, 1973a, as reported in Pye and Williams, 1977.
- △ = Audio Conferencing ("Remote Meeting Table") Champness, 1973b, as reported in Pye and Williams, 1977.

About the time that these studies were conducted, the hypothesis was emerging that there are much more complex and lengthy stages to learning to use computerized conferencing than for video or audio conferencing, because it is so different from anything that participants are used to. The mechanics of the system really have very little to do with it-- it is learning to send and receive subtle cues and make oneself understood in a totally different medium that one has to learn. (See Hiltz and Turoff, 1978, Chapter 3, "Social and Psychological Processes in Computerized Conferencing" for a full explanation of these differences). In order to provide a very limited test of this hypothesis, the Communications Studies Group DACOM scales were added to the follow-up questionnaires sent to EIES users who had used the system for more than three months and spent at least four hours on line.\* There were only a few of these sent out, during the summer of 1977; thirteen were returned from non-NJIT EIES users, and these are the basis for the data in figure 6.

Note that there is a greater distinction made by these more experienced users about the specific kinds of tasks for which the medium is more and less satisfactory. First impressions or esthetic responses are not the same as the opinions of experienced users. For example, the experienced users find it almost completely satisfactory for giving or receiving information (1.7). and for exchanging opinions (1.9). (These are the same tasks for which it is rated most highly by the new users; but the ratings have shifted much farther towards the completely satisfactory end of the scales). It is on the satisfactory side of neutral for "getting to know someone". It is rated least satisfactory for persuasion (4.1, just slightly on the unsatisfactory side of neutral) and "resolving disagreements" (4.4).

As stated above, since the data were gathered for non-comparable tasks

---

\*We are indebted to Robert Johansen for specifically suggesting the inclusion the CSG scales in the follow-up questionnaires.

and subjects, any comparison between the CSG data and the EIES data can at best be suggestive of things worth studying in future controlled experiments.

However, it is very interesting that of all three media rated in any of these studies, the highest rating for "getting to know someone" occurs for experienced users with computerized conferencing. Even the new users rate it higher for this task than did the CSG users of the audio conferencing system. Therefore, one cannot by any means dismiss computerized conferencing as cold or impersonal or low in "social presence".\*

Pye and Williams (1977, p. 233) conclude that "numerous carefully conducted experiments on information transmission, problem solving, group decision making and interviewing have found all vocal media to be very similar in effectiveness for these tasks" (face to face, audio and video are included). However, as we have seen from their data, people perceive audio to be less satisfactory than video (and both to be less satisfactory than face-to-face). We hypothesize that part of the explanation is that they simply have not become adept at using the unfamiliar communication channels.

---

\*A recent draft report from the Institute for the Future (Johansen, DeGrasse, and Wilson, 1977) used the same DACOM scales for energy researchers who were long-term users of PLANET. On almost all tasks, the mean ratings were in between those obtained for new EIES users vs. experienced EIES users. This gives us more confidence that the results reported above are generalizable to a variety of populations and specific computerized conferencing systems, in terms of the range of results that would be obtained. The notable exceptions were for persuasion, and particularly for "getting to know someone", on which both the first time and the experienced EIES users ranked that computerized conferencing system higher than Planet users rated theirs. (PLANET values for these two tasks, with scales reversed to fit those reported above, were 4.4 and 4.8, respectively. Johansen et. al., p. 78) This is not surprising, since some of the software features designed into EIES were specifically aimed at these functions.

These speculations are one of the reasons why we plan to provide a separate and much longer training session for future experiments on computerized conferencing. Our subjects had mastered the mechanics of sending and receiving items after only twenty minutes of training and practice; but they had by no means mastered the more subtle aspects of how to best use the medium, and were not comfortable with it.

## B Qualitative Observations

### 1) The Push Towards Sociability

Knowing that computer-mediated communication seems "cold" or "machine-like" or "inhuman", most new users seem to heavily compensate for this by engaging in very strong efforts to be warm, friendly, and personal. Some evidence for this arises out of the replications of the Bales experiments. In the face-to-face condition, there is usually a brief period when the participants exchange names, but no extensive socializing among strangers who were brought together for this single group meeting. In the computerized conferencing condition, however, we observed very overt attempts to be personal and friendly. Below are some examples of messages sent among participants who had never met face-to-face and who were five to twenty minutes into their period of learning and practicing the use of the system.

C 904 CC7 JUDY (5,905) 6/21/77 1:22 PM

HI MY NAME IS JUDY. I AM A PART TIME STUDENT AT UPSALA AND A FULL TIME MOTHER OF THREE. I AM ALSO EMPLOYED IN A ALCOHOLIC REHAB. CENTER. MY TYPING IS TERRIBLE SO PLEASE EXCUSE MY MISTAKES. THANK YOU. HI CINDY. HI ANNE.

C 904 CC9 CINDY S (6,906) 6/21/77 1:24 PM

I AM CINDY AND I AM A MOTHER OF A 6 YEAR OLD BOY. I AM HERE TODAY FOR A GROUP EXPERIMENT THAT I AM SURE WE WILL ALL ENJOY.

C 904 CC11 ANNE (2,902) 6/21/77 1:27 PM

THE WEATHER TODAY IS PARTLY CLOUDY.  
HI, MY NAME IS ANNE AND I AM A MOTHER OF FOUR, TWO DAUGHTERS IN COLLEGE, ONE BOY IN HIGH SCHOOL AND ONE BOY IN JUNIOR HIGH. I AM PRESENTLY ENROLLED IN THE PARALEGAL PROGRAM HERE AT UPSALA. I USED TO TEACH CHEMISTRY AND PHYSICS IN THE HIGH SCHOOL, BUT I AM CHANGING MY CAREER. MY HUSBAND IS AN ATTORNEY.

C 904 CC12 CINDY S (6,906) 6/21/77 1:28 PM

IS THERE ANYONE THERE WHO ALSO SPEAKS SPANISH OR ITALIAN? ANYONE THERE WHO IS A MUSIC BUFF?

C 904 CC15 DAVID (3,903) 6/21/77 1:33 PM

IS THIS HOW WE ARE ALL GOING TO SPEND THE NEXT TWO HOURS OF OUR TIME? WELL, I SAY THAT IF THEY WANT TO PAY FOR IT, THEN BY ALL MEANS IT IS OKAY WITH ME.

C 904 CC18 ANNE (2,902) 6/21/77 1:36 PM

I ONCE TOOK A SHORT COURSE IN CONVERSATIONAL ITALIAN BECAUSE I TOOK A TRIP TO ITALY TWO YEARS AGO, BUT I CANNOT SPEAK IT. DOES ANYONE PLAY TENNIS?

C 904 CC19 CINDY S (6,906) 6/21/77 1:36 PM

I STILL DIDN'T GET ANY ANSWERS FOLKS, HOW ABOUT IT? DEAR DAVID YOU ARE RIGHT. THIS IS EXACTLY HOW WE ARE GOING TO SPEND THE NEXT TWO HOURS. HAVE FUN. CINDY.

C 904 CC21 JUDY (5,905) 6/21/77 1:37 PM

SORRY CINDY. I DO NOT SPEAK ANY LANGUAGES. I DO ENJOY GOOD MUSIC: WHEN I HAVE THE TIME. ANYONE OUT THERE SPORTS ORIENTATED?

C 904 CC25 CINDY S (6,906) 6/21/77 1:41 PM

SORRY JUDY, I AM NOT INTO SPORTS. ANNE WOULD YOU CONSIDER TEACHING ME TO PLAY TENNIS? THAT IS ABOUT THE ONLY THING ATHLETIC I MIGHT BE ABLE TO HANDLE.

C 904 CC27 JUDY (5,905) 6/21/77 1:42 PM

YES ANNE. I PLAY TENNIS EVERY CHANCE I GET. LUCKY ME. I HAVE A TENNIS COURT ONE HALF BLOCK AWAY FROM MY HOUSE.

C 904 CC32 ANNE (2,902) 6/21/77 1:46 PM

WOW. WE ALL COULD GET TOGETHER FOR TENNIS AT MY HOUSE. I PERSUADED MY HUSBAND TO PAVE OUR BACKYARD AND WE PUT IN A MAKESHIFT TENNIS COURT. IT IS A LOT OF FUN. SO CINDY, I'LL BE GLAD TO SHOW YOU SOME OF THE FUNDAMENTALS. BUT, I'M STILL WORKING ON MY BACKHAND AND SERVE.

C 904 CC34 CINDY S (6,906) 6/21/77 1:48 PM

THANKS ANNE. I WOULD LIKE THAT. BY THE WAY FOLKS, I AM A SENIOR HERE AND A MUSIC MAJOR. SO IF ANYONE TAKES AN INTRO. COURSE TO MUSIC AND HAS PROBLEMS, I WILL GLADLY HELP OUT.

Leave-taking also tends to be more explicitly friendly than the verbal (spoken) segments recorded among participants at face-to-face meetings. For example, consider these final comments from conference participants in another experiment.

C 903 CC165 MARJORIE (3,963) 6/20/77 5:37 PM

I AGREE. JOANNE, KYLE, STEVE AND DOLORES. FONDLY, MARRGE B.

C 903 CC106 KYLE (6,906) 6/20/77 5:37 PM

I AGREE WITH STEVE. IT HAS BEEN FUN WORKING WITH YOU GUYS. BYE BYE.

C 903 CC107 JOANNE (5,905) 6/20/77 5:39 PM

IT HAS BEEN FUN DISCUSSING THIS PROBLEM WITH YOU. THANK YOU.

C 903 CC106 DOLORES (4,904) 6/20/77 5:39 PM

IT WAS FUN. HAVE A NICE SUMMER.

Remember, these persons had never met face-to-face and had been interacting for less than two hours. The level of positive comments and feelings appears to be very high.

## 2) Projection of Group Process Onto the Task

Frequently, the experimental team monitoring a group discussion as it came across the terminal was struck with the fact that the participants began talking about themselves and their groups problems and feelings, in the guise of discussing the problem of the group in the "forest ranger" story, which they were nominally trying to discuss and resolve. This tendency to discuss their own group processes while purportedly working on their problem case was far more evident in the computerized conferencing groups than in the face to face groups.

For example, one group consisted of four women and one man. The females seemed to immediately "bond" as we saw in the above section; but the male appeared to be hanging back and feeling "outnumbered" or threatened by the females. Note that in the excerpts below, it is especially interesting that the male says (in comment 93) not the gramatically correct "man or woman", but the situationally-specific "man or women".

C 904 CC60 ANNE (2,902) 6/21/77 2:18 PM

DAVE SINCE YOU ARE THE ONLY MAN IN THIS GROUP HOW ABOUT SOME THOUGHTS?

C 904 CC73 DAVID (3,903) 6/21/77 2:29 PM

OLDER MAN YOUNGER BIG DEAL A FIRE CAN TELL THEM APART AND THE FIRE WAITS FOR NO MAN OR WOMEN THIS IS A DECISION THAT SHOULD A QUALIFIED PERSON AND GOOD JOE IS THERE FOR THE TIME SO I FEEL THAT HIS EXPERIENCE SHOULD BE TAKEN ADVANTAGE OF AND LET BILL GET THE KNOWLEDGE THROUGH BOTH FIRST HAND AND FROM JOE.

C 904 CC75 DEBORAH (4,904) 6/21/77 2:33 PM

DAVID I AGREE WITH YOU 100 PERCENT. BUT THERE IS ONE SMALL PROBLEM OF A DIFFERENCE IN MONEY BETWEEN THE TWO JOBS. BILL IS MARRIED WITH A BABY AND NEEDS THE MONEY. SO, I THINK THAT MAYBE HE CAN HELP WITH THE PAPER WORK THAT HE DID THE FIRST YEAR TO MAKE UP THE DIFFERENCE. WHAT DO THE REST OF YOU THINK?

C 904 CC77 CINDY (6,906) 6/21/77 2:35 PM+

OK DEBBIE. SUPPOSE YOU'RE RIGHT. BUT HOW DO YOU THINK THIS WILL AFFECT HIS EGO. THE LAST THING WE WOULD NEED IS A MAN WITH AN EGO PROBLEM.

The second striking example of projection is a little more difficult and complex to follow. The context was that it was a very hot day, and users numbers 902, 903, and 904 were in non-air conditioned rooms. In addition, the

trial earlier that day had ended in a computer crash, and the system was still sluggish during the practice period, as a programmer worked on-line to clear away the problem that had caused the crash, before the experimental discussion got under way. The extra tension shown by the experimenters and assistants undoubtedly was apparent to the subjects, and the trial probably should have been cancelled. In any case, what happened was that the practice session showed an unusually high level of complaints and failure of the group to express solidarity. AS the problem solving discussion itself progressed, no progress was made toward consensus. The group started talking about the need for "strong leadership"; even a "tyrant" - Supposedly in the forest ranger situation, but with fairly obvious parallel to their own. There are also explicit references to "heat" and "faulty equipment." This group never did arrive at a decision within the allotted time.

It should also be noted that the "blank" messages from Jack were two of many. He was systematically deleting his entire scratchpad before entering a comment, instead of afterwards. This definitely did not add to the group's feeling that it could work together and reach a decision.

C 907 CC12 JOETTE (2,902) 6/21/77 4:05 PM

TOO BAD THE ROOMS ARE NOT AIR CONDITIONED. I WISH THAT THE SUMMER WAS OVER SINCE I CAN'T TOLERATE HEAT. THE AIR CONDITIONER IN MY CAR ALSO BROKE DOWN SO I HAVE TO PEEL MSELF OUT OF THE CAR EVERYTIME I DRIVE. I'LL STOP COMPLAINING NOW.

C 907 CC17 MARC (5,905) 6/22/77 4:12 PM

THIS IS VERY INTERESTING. I JUST WISH THAT I HAD SOME COMPANY.

C 907 CC18 NANCY (3,903) 6/22/77 4:13 PM

JOETTE, THIS IS ALMOST WEIRD. I HAVE A FEELING THAT IT IS INTENDED FOR US TO BE ANXIOUS. I HAVE A FEELING THAT I MAY HIT THE WRONG KEY AND BREAK THIS THING. ANYWAY. HOW ARE YOU DOING. DO YOU UNDERSTAND WHAT'S GOING ON? IF SO EXPLAIN.

C 907 CC20 BETTY (6,906) 6/22/77 4:15 PM

HELLO JACK, NANCY, MARC AND JOETTE. I AM HAPPY TO BE REMOTELY ACQUAINTED WITH YOU ALL. AS YOU SEE, I DID NOT ADHERE TO THE 75 SPACE LINE LIMIT. I AM ALSO ATTENDING SUMMER SCHOOL HERE IN THE EVENING. JOETTE, I AM SO SORRY THAT THE HEAT HAS MADE YOU SO UNCOMFORTABLE.

C 907 CC27 JACK (4,904) 6/22/77 4:23 PM

C 907 CC29 JACK (4,904) 6/22/77 4:24 PM

C 907 CC31 BETTY (6,906) 6/22/77 4:26 PM

JACK, ARE YOU A STUDENT HERE. I AM FINDING IT DIFFICULT TO GET TO KNOW YOU ALL BECAUSE THE INFO YOU GIVE IS NOT CONNECTED WITH THE PERSON.

.....

C 907 CC53 BETTY (6,906) 6/22/77 4:53 PM

THE PROBLEM SEEMS TO BE THAT THERE WAS NO REAL LEADER OF THE GROUP. THE CHOICE MADE TO HIRE SUCH A COMBINATION OF MEN MADE IT DIFFICULT FOR THEM TO WORK TOGETHER. EVANS MUST TAKE COMPLETE CHARGE UNTIL THE MEN CAN WORK AS A TEAM OR FIRE SOME OF THEM AND HIRE OTHERS.

C 907 CC81 NANCY (3,903) 6/22/77 5:18 PM

I BELIEVE THAT THE PROBLEM LIES IN LACK OF COMMAND. THERE MUST BE A CLEAR LEADER, WHOSE COMMANDS AND/OR DECISIONS ARE UNQUESTIONED. WHEN WE ARE DEALING IN LIFE OR DEATH SITUATIONS, WHERE SECONDS CAN MEAN THE DIFFERENCE BETWEEN SURVIVAL OR DESTRUCTION, THERE IS NO TIME, NO ROOM FOR A DEBATE OVER WHO IS LEADER AND WHO IS NOT. JOE WAS MADE FOREMAN - HIS DECISIONS MUST STAND AS SUCH IN THE FIELD UNLESS EVANS SEES FIT TO RELIEVE OF HIS DUTIES. BILL HAS NO RIGHT JEOPARDIZING LIVES BY MAKING A POWER-PLAY DURING A FIRE.

C 907 CC84 JOETTE (2,902) 6/22/77 5:22 PM

I BELIEVE THAT THE PROBLEM IS MORE COMPLEX THAN MERE DISHARMONY AMONG THE GROUP. THE EQUIPMENT WAS POOR AND DISORGANIZED AND WHO WAS IN CHARGE OF THAT? THE MAIN PROBLEM LIES WITH THE PEOPLE WHO FUND THE EQUIPMENT AND SEE TO IT THAT IT IS KEPT IN REPAIR. THE OTHER PROBLEM IS THAT EVANS DID NOT EXERCISE GOOD CONTROL AND ALSO THAT THE GROUP WAS DOING THEIR JOB EGOISTICALLY RATHER THAN ALTRUISTICALLY. EVERYONE SEEMED TO BE ABLE TO WORK TOGETHER IF THEY COULD IRON OUT THEIR DIFFERENCES AND TO ALSO HAVE A STRONG LEADER. DOES ANYONE DISAGREE? I HAVE NO FURTHER COMMENTS ON THE SITUATION AND THIS IS THE WAY THAT I SEE IT.

C 907 CC92 BETTY (6,906) 6/22/77 5:29 PM

SHALL WE PLEASE TRY TO REACH A DECISION...HERE ARE THE OPTIONS AS I SEE THEM.

1. FIRE JOE
2. FIRE BILL
3. HOLD A MEETING TO PATCH UP THE RIFT  
GET NEW EQUIPMENT  
REPLACE EVANS

SORRY ABOUT THE WAY I ATTEMPTED TO # THE CHOICES CAN WE VOTE PLEASE. XXXXXXXXXXXX  
THE ABILITY TO COMMUNICATE IS SO HAMPERED BY THIS METHOD THAT A VOTE SEEMS LIKE THE MOST EXPEDIENT WAY TO DETERMINE A CONCENSUS.

C 907 CC101 NANCY (3,903) 6/22/77 5:37 PM

I AGREE THAT AN INVESTIGATION SHOULD BE HELD, AND THAT EVANS, WHO WAS JUST INTERESTED IN IMPRESSING HIS SUPERIOR ANYWAY, SHOULD BE REPLACED THIS IS MY FINAL DECISION. AS FAR AS JOE AND BILL ARE CONCERNED IF THEY CAN'T TAKE THE HEAT, GET OUT OF THE KITCHEN.

This group missed the usual display of solidarity during the "practice" period, and seemed unable to effectively tackle the task at hand. It would seem that the projection phenomenon becomes likely when a group has failed to be able to establish satisfactory social relationships, and feels frustrated with their communication channel.

The reason for the increase in subtle communications regarding group processes are not clear. One possibility is that since such communications represent a less direct method of dealing with interpersonal difficulties in a task-oriented group, it may be a way of communicating some of the difficult "emotional" comments usually communicated non-verbally in face to face groups. On the other hand, it may represent frustration at the slower than usual emergence of a leader in computerized conferencing in comparison to participants usual experience in previous face to face groups. Such a process might show up in a more detailed time-phase analysis of the group process. For example, does a computer conferencing group spend more time generating more ideas and opinions on an equal participation basis, thereby increasing the likelihood of a better quality solution before a leader emerges? Perhaps leadership emerges later in computer conferencing. If this is the case, users might be given a means of handling any frustration arising from their expectations of early leadership emergence not being met. They may be forewarned of this likelihood or they may be given the consensus formation aids discussed earlier.

#### Participant's Uncommunicated Behavior

How do new participants in computerized conferencing behave? What do they say and do other than what gets typed into the system? Do they enjoy themselves or are they frustrated and miserable during their first encounter with this new conferencing medium?

Some of this ought to be systematically measured in future experiments. For this experiment, we did place one subject in each group into the experimental room which had one-way mirrors and was wired for sound. For five to fifteen minute periods during each trial, this subject was observed by an experimenter and notes recorded on what they said and on their non-verbal behavior. At this point, all that can be said is that it varies from extreme concentration and seriousness to considerable enjoyment, and that some systematic measurement of this behavior might be included in future studies. All subjects observed seemed to be trying very hard and taking the whole discussion quite seriously. Two excerpts are given below to illustrate the observed behaviour and the questions it raises.

Observation 1 (Monday, 3:30 pm group)

Swings her leg while reading problem; reads it twice. Mumbles some of what she types. Says "I'm talking to myself!" Seems to enjoy messages she gets -- laughs. Then, intent and concentrating. Facial expression shows she does not like someone's comment...then, intently, moves lips silently while typing. Leans very close to keyboard; types a great deal. Smiles as she receives some comments. Then laughs. Then goes back and re-reads some of these comments.

(Note: one implication of this is that any comparison of "speed" of c.c. vs. face to face must allow time for reading some things twice).

Observation 2 Friday, 1:45 pm.

Chews gum, blows bubbles, while reading intently. Laughs at receipt of one message. Pops a bubble. Leans over and re-reads items just received. Types a reply; touch-types but checks accuracy every few letters. Checks watch. Chews gum while reading messages as they print out. Goes back and re-reads one just received. Shakes head, no; again, shakes no. Then deletes scratchpad; pauses and looks back. Then moves chair in; sighs slightly; begins typing.

Would the subject have felt as free to chew and pop bubble gum, or to shake her head vigourously "no", in a face to face group? What seemed to be happening was that subjects did not worry about controlling the overt behaviors which would be discrediting or result in loss of "face" in a "face-to-face" meeting. (See Goffman, 1955, "On Face Work"). Is this one of the reasons why overall satisfaction with the two media is not significantly different, despite the narrowing of communications channels created by restriction to typing and reading? Does computerized conferencing in fact help to free participants of self-conscious concern about their appearance, and free them to concentrate on the cognitive content of what is being sent and received? This may be a significant compensation for the loss of non-verbal cues and would make it important that terminals be located in "private" spaces, rather than in public view.

## Summary

### Methodological and Theoretical Implications of the Pilot Study

Our most important methodological conclusion is that it is indeed possible to conduct controlled experiments with "naive" subjects using computerized conferencing. With only twenty to thirty minutes for instruction and practice, almost all subjects mastered the mechanics of the process and were able to effectively communicate about a complex problem.

Our attempt to use the "procedures" language to more precisely control and administer the experiments did not work. By the time the experiments needed to be run, the language was not capable of handling five participants and a monitor simultaneously without introducing unacceptable delays and error messages. Work is continuing on perfecting the "procedures" language for future experiments.

However, it was found that the regular EIES system worked well. Carrying out the group discussion within a conference was much more satisfactory from a control point of view, than trying to use the message system. The two trials which allowed anonymity showed that this additional feature could be introduced without confusing the subjects or disrupting the flow of discussion within a group.

The system itself behaved reliably and gave adequate response time with five subjects and an experimenter on line in addition to regular "EIES" users carrying on their normal activities. We lost one trial of ten to a "crash"\*, but that does not seem to be an unreasonable amount of redundancy to figure into an experimental design.

We suggest that any future experimental series give training in how to use the computerized conferencing system as a separate session to all subjects. This would allow the omission of those subjects who are unable to perform

---

\*Sudden and total cessation of the computer's operation.

adequately and/or more practice time for the slower learners. It would also remove this source of differential treatment for face-to-face vs. computerized groups.

Further modification or substitution for the Bales IPA codes is advisable if the object of a study is related to the question of what happens to things normally transmitted non-verbally in the face to face condition. It is also suggested that all face to face communications be transcribed into typed copy within a computer conference or notebook (so that it would look the same) prior to coding. This would insure that coders would be given more comparable data for computer conferencing and face to face groups. Thus any obtained differences between computer conferencing and face to face groups could not be attributed to differences in coding procedures.

First priority in our future experiments will be placed upon substantiating the findings we have reported here with a set of trials that is large enough and methodologically "perfect" enough to allow more rigorous statistical analysis.

Some promising substantive areas for further research may be drawn from the exploration of "why" we observed the following differences between the media and whether computerized conferencing designs can be altered to decrease or increase these differences:

- 1) Less quantity of communications exchanged in cc; more time needed to reach a decision.
- 2) Less probability of reaching an unanimous decision on a complex problem in a short (40 minutes) period of time in c.c.
- 3) Less overt agreement, or disagreement: more giving of opinions in c.c.
- 4) Greater equality of participation in c.c.
- 5) Tendencies toward overt sociability in c.c.; towards projections of

the c.c. group's problems onto the task situation being discussed; and towards a "letting down" of public image of face-maintaining behavior when "alone" with one's computer terminal.

As a result of these experiments some of the areas that emerge as being significant for further experimentation are:

- 1) Variability as a function of group size
- 2) Variability as a function of user experience
- 3) Variability as a function of whether anonymous entries are permitted.
- 4) Variability as a function of incorporation of computerized decision aids or structured communication protocols tailored to the problem type.

The last one may greatly impact on the time needed to reach a decision. Can the automated chairperson be fairer than a human leader and heighten equality of participation?

Finally, we recommend that experimentation be expanded to encompass problems of a different type than the Bales human relations cases, and subjects other than college studentss.

## Appendix One

### BALES HUMAN RELATIONS CASE

(On-Line Version Used for Experiments)

#### FOREST RANGER THOMAS EVANS

In December 1974 Forest Ranger Thomas Evans transferred to a district in the eastern part of his state. The new district was relatively small, and in terms of its area, had less equipment and fewer personnel than his former district. The housing for the men was extremely poor, the motor equipment was poor, and the tools inadequate. The ranger's house, however, was brand new, and the surrounding garden was very attractive. The former ranger had let the district run down, and Evans had been asked to come and build it up.

Above all, Evans was anxious to keep the number of fires down to a minimum, and to make a good showing to his new superintendent, Mr. Clark. On the whole, the number of fires in the district had been quite limited in the last ten years due to the terrain and the relative inaccessibility of the area. However, Evans knew that his facilities and organization were not in good enough shape to deal adequately with any greatly increased fire threat, if the coming summer should turn out to be exceptionally dry.

In April, Evans received an application for summer work from Bill Perkins who had worked for him before in his former district. Perkins was about 25 years old, a second-year forestry student at the State Agricultural College, and intended to go into the Forest Service. Prior to his entry in college he had been in the Navy for seven years, and had been wounded in action. He was married, with one child. By the time he got out of the Navy, he had told Evans he felt he had lost enough time, and was anxious to get ahead with his career. He was required by his college course to have so much experience "in the field". Evans was personally fond of Bill, and wanted to see him get ahead in the Forest

Service. He knew Bill was anxious to do a good job, since Evans would send a report about his work to the State College at the end of the summer. The year before, Bill had worked in the office for Evans, as a dispatcher, and Evans felt he was a very rapid learner, and had done a good job. Evans had been particularly pleased since the dispatcher before Bill had been extremely poor. Bill had learned something about the woods from his course work and from his office work with Evans last year, but had not yet done any maintenance in the woods. Evans felt it would be good this year if he could move Bill out of the office and into some actual maintenance work. He decided, in view of the fact that Bill intended to go ahead in the Forest Service and needed the experience, to appoint him as foreman of the maintenance crew. The rank of foreman was equivalent in pay to that of dispatcher, which had been Perkins' former position, so the change of jobs would not involve any demotion for Bill. The crew was small and the job would be simple, consisting mostly in piling brush left by loggers at the side of the forest roads and trails.

One of the other men who wrote early for summer work was Joe Phillips. From his letter of application, Evans learned that Phillips was a fourth-year student at the State University, was 19 years old, and intended to go ahead with graduate work in chemistry, but needed summer work to provide funds. Phillips had worked for the former ranger the past three summers. He worked as a lookout for the first and second year. The third year he worked on a trail maintenance crew and had done some firefighting. When the foreman of the crew quit, toward the end of the summer, he had been the foreman until he returned to school about three weeks later. Evans wrote Phillips that he could use him as a regular worker on the maintenance crew, doing the same kind of work as he had done last year, that he would be glad to have him come.

Labor, it turned out, was scarce, and Evans had some difficulty in getting

further men for the crew. The other three members of the crew were finally recruited from local men who had worked some for the former ranger, but were not highly experienced. One was a deaf boy, named Bob, son of a local minister. He was very strong and willing, but somewhat childish and dependent. Another was Art, a small but wiry and reliable man of about forty, who had been a farm hand most of his life. Finally there was Frank, a mill hand and general laborer, who was the brother-in-law of the former ranger.

As Evans feared, the summer turned out to be dry, and there were several small fires early in the summer. When there was a fire, the maintenance crew turned to fire fighting. Evans was on the job, and none of these small fires proved to be serious enough to call in crews from other districts. About three weeks after a bad thunder storm, however, a sleeping fire which had been started by lightning suddenly flared up. The fire was up about 7500 feet in some alpine fir, and extremely hard to get to. About thirty men were called in, and after the fire had been fairly well subdued all the men except Bill and his crew left. That night the fire got away again, and the men were called back. This time Mr. Clark, Superintendent of the Forest, came in to see what the trouble was. This was quite embarrassing for Evans, especially since he was trying to keep a good fire record, and since in the Forest Service it is a disgrace to have a fire "blow up" on you. Evans maintained to Mr. Clark that "there was just too much fire to control", but wondered whether the inexperience of his men, especially Bill, who was in charge of the crew, had anything to do with it.

When Evans talked to Bill, Bill admitted of course that he was not experienced in fire control, but didn't think this was really to blame for the fact that the fire got away again. He said that a certain amount of time was lost at one point when Joe "took off on his own" and went to work to stop the fire at another place. Bob went along with Joe, and Bill had to go after them to get

them back on the job with him and the other men. He said there had been some difficulty with Joe ever since they started work. Sometimes Joe would be talking to the other men and they would stop talking when he (Bill) came up. Bill said it seemed to him that the crew had been having an awful lot of trouble with equipment, also. Of course the equipment was old, but handles of things got broken, things got misplaced, and all sorts of little things seemed to keep going wrong. It seemed like it was always difficult to get coordinated and get going on a job. Joe was a good man, and did what he was told, but seemed to have some kind of chip on his shoulder. Bill said he had tried kidding him along about one thing and another, but it didn't seem to do much good.

That night Joe came to see Evans and said he wanted to quit unless something was done. He said he felt it was unfair that he should have to work as an unskilled worker on a job where he had been foreman the year before, and then under a man who knew little about the job. He stressed especially the fact that he needed the money badly, and that the difference between the pay of an unskilled worker and that of foreman was important to him. He brought out the fact that actually he more or less ran the crew, and that the men seemed to look to him rather than to Bill as their leader. He said he had taught Bob all he knew about the work last year, and that Superintendent Clark had been pleased that he sort of helped Bob out. When Evans asked him why he thought the fire had gotten away, Joe said that he and the other men thought that if Bill had taken his advice and had put the crew to work on the natural break he and Bob had started to clear, the fire wouldn't have gotten away again. However, Joe said, this was a matter of judgment. The wind had come up suddenly and there was a good deal of fire to hold. If he had been running the crew, he would have not tried to stop the fire where Bill did, but would have tried to stop it ahead at the natural break.

Evans brought out the fact that Bill was an older man than Joe, was a veteran, and also a forestry student who intended to go ahead in the service. He was a kind of investment for the service, and the service would have a good man in Bill later, whereas Joe was only interested in summer work. Joe said he could see a certain amount of sense in that, but just the same he wasn't willing to go ahead working with things organized as they were now. Evans told Joe that he wished he would stay for a day or two until things were under control again, and he had a chance to think things over. Joe said he would stay "till the fire was out, anyway." The interview ended on that indefinite note.

After the interview Evans thought over all the facts of the situation, and felt that he was in a spot regarding his crew for the rest of the summer. He wondered what would be the best thing for him to do.

## Appendix 2:

### SAMPLE RUN OF THE EXPERIMENT

Below is the transcript for one of the two sessions which did not result in consensus about a course of action. The only change that has been made is to delete last names or last initials from the headers.

Note that the group does make some mistakes which seriously hamper communication. One is to forget to erase their scratchpads so that the other participants sometimes had to sit through a second printout of the same material.

(This was not coded a second time in Bales units, however.) The EIES system now automatically deletes scratchpads after a comment has been added, so this would not happen in any subsequent experiments.

The lack of capitalization was probably not as disconcerting to the participants as to the reader of this transcript, since on the "mini-terms" they were using, small letters look like miniature capitals rather than having a different shape.

The mistake of entering "blank comments" will have to be prevented in subsequent experiments either by more emphasis on the use of the plus sign vs. the minus sign in EIES, during the instruction and practice period; or by changing the interface design so that this mistake is not frequently made.

C 905 CCI MONITOR (#9,912) 6/20/77 8:43 PM

Welcome to the Electronic Information Exchange system (E.I.E.S.) This system uses a computer to facilitate written discussions among the members of a group.

There will be four other persons in your group today. First, you will have a practice time in which you learn to compose, send, and receive items in this group conference. Then you will be given some instructions and then a written description of a human relations problem. Subsequently, you will be asked to discuss this problem with the other members of your group, using this system, and to reach a decision on how it may best be solved.

GENERAL INSTRUCTIONS FOR USING THE SYSTEM

- 1) All composing of your items is done in your "scratchpad". In this space, you type in one line at a time. When you have completed a line or an answer to a question you must hit the carriage return key to send it to the computer. (Do not type past space 75 before hitting the carriage return).

TO ENTER YOUR SCRATCHPAD TO COMPOSE AN ITEM, ANSWER 4 TO THE QUESTION, "Conference choice?"

- 2) Always wait for the ? to appear before you begin typing. This says the computer is ready to get something from you. If you start typing before, what you put in will be lost. 2?: for instance, means that it is ready for you to type line 2.
- 3) After you have finished typing in your comment, YOU SEND IT TO THE OTHERS BY TYPING A CARRIAGE RETURN: A + AS THE FIRST CHARACTER ON A NEW LINE, AND ANOTHER CARRIAGE RETURN.

After typing the +, the following questions will be asked, and you are to answer Y ( for yes) or N ( for No).

SIGNATURE (Y/N/PEN)?

Answer Y (Yes) and press RETURN.

OKAY TO SEND? (Y/N)

A Y will send it. An N will leave it there and tell you if there are other items waiting for you, and ask you "Conference Choice?" again.

- 4) To receive items--  
You will be told either that there are "no items waiting" or how many are waiting for you, whenever you come out of your scratchpad.

If there are new items, you will be asked, ACCEPT NEW ITEMS?(Y/N)?  
If you answer Y, they will be printed out for you.

If you answer N, you will be asked "Conference Choice?"  
(The answer to that question is 4, to go to your scratchpad).

There are other parts to this system, but we are not going to use them today.

Whatever you type in stays in your scratchpad until you erase it. To erase your old comment, type \*\* (RETURN) as the first characters on a line.  
example: 1?I have now typed my first line.

If this was the complete message then you would press RETURN

The paper will then advance and the terminal will print 2?

Enter a + and then press RETURN

The printout should be

1?I have now typed my first line.

2?+

Signature (y/n/pen) ?y

OKAY TO ADD?y

ADDED AS: (will tell you conference number of your new item)

This seems very complicated at first, but if you read through your instructions again, and then try answering "4" to conference choice", you will find that you can follow the instructions through and send your first message.

You may send a description of yourself to the others, or talk about something impersonal such as the weather. We ask only that you do not share your impressions of the system at this time.

<BUT FIRST> PLEASE TEAR OFF THESE INSTRUCTIONS AND SAVE THEM

C 905 CC3 KATHLEEN (2,902) 6/21/77 3:44 PM

is there anyone out there listening?

C 905 CC4 JOSEPH (3,903) 6/21/77 3:47 PM

it is a nice day today

C 905 CC5 JUDY (5,905) 6/21/77 3:48 PM

4

Today is the first day of summer and is truly beautiful outside.

C 905 CC6 KATHLEEN (2,902) 6/21/77 3:48 PM

this machine is echoing my answers. are there any other participants who have arrived?

C 905 CC7 JUDY (5,905) 6/21/77 3:50 PM

Yes there is someone out here listening.

C 905 CC8 MONITOR (9,912) 6/21/77 3:52 PM

All five of you are now in the conference. We will practice for twenty to thirty minutes. Please enter a comment when you feel that you are ready to end the practice period and begin the discussion. Otherwise, we will start in thirty minutes at the latest.

## 5. Text Editing

There is no need to try to have perfect typing or spelling on this system, as long as the meaning is clear. However, you may wish to make some corrections to your text. Here are a few simple procedures to try

At any time while typing a line you may do the following:

CTRL and H Keys, Hold down the control Key (CTRL) and hit the H key  
Each backspace "erases" one character.

The following are used by entering them as the first character on a new line.  
Note that each line in your scratchpad is numbered and this is the number you  
use to refer to a line you want to correct or go to.

- \*\* This deletes your whole scratchpad; but the system will ask you if it  
is OKAY to do this before actually doing it.
- =3 This will take you back to line 3 so you can retype it if you wish.
- :- This will cause all the lines in the scratchpad to be printed out so  
you can review what you have typed. Useful if you have made a number  
of corrections.

But first, TEAR OFF THESE INSTRUCTIONS AND SAVE THEM TO READ OVER

C 905 CC9 GINNY (6,906) 6/21/77 3:53 PM

help i am a prisoner in the computer

C 905 CC10 KATHLEEN (2,902) 6/21/77 3:53 PM

i agree, it is a beautiful day for the first day of summer

C 905 CC11 JUDY (5,905) 6/21/77 3:53 PM

I am sitting up here on the fourth floor and feel totally alone  
Is anyone out there ready to have a converstion?

C 905 CC12 JOSEPH (3,903) 6/21/77 3:53 PM

how old are you

C 905 CC13 JOSEPH (3,903) 6/21/77 3:57 PM

does everyone now how to work this computer yet

CC 905 CC14 MONITOR (9,912) 6/21/77 3:58 PM

ONE OF OUR PARTICPANTS IS RUNNING OUT OF PAPER. SO WE WILL PROBABLY HAVE  
TO HAVE A LITTLE LONGER PRACTICE PERIOD THAN USUAL WHILE WE WAIT FOR HIM OR HER  
TO CATCH UP.

C 905 CC15 KATHLEEN (2,902) 6/21/77 3:58 PM

i agree, it is a beautiful day for the first day of summer i am 24 yrs old,  
judy, you are not alone i am on the third floor below you and ready to converse.

C 905 CC16 JUDY (5,905) 6/21/77 3:58 PM

I am 25. How old are you, wherever you are.

C 905 CC17 GINNY (6,906) 6/21/77 4:00 PM

judy you arenot alone lets talk

C 905 CC18 JUDY (5,905) 6/21/77 4:01 PM

Kathy I am glad someone answered me. No, I donot know how to work this computer yet, at least not well enough so that I feel comfortable

C 905 CC19 JOSEPH (3,903) 6/21/77 4:02 PM

i am 19 and on the third floor

C 905 CC20 JUDY (5,905) 6/21/77 4:02 PM

O>K> Ginny, what do you want to talk about? Are you a Psych Major?

C 905 CC21 ELIZABETH (4,904) 6/21/77 4:03 PM

4happy june 21

C 905 CC22 JOSEPH (3,903) 6/21/77 4:03 PM

judy, what are your interests

C 905 CC23 KATHLEEN (2,902) 6/21/77 4:04 PM

does anyone know if this is how a teletype for a wire system in a newsroom works?

C 905 CC24 JUDY (5,905) 6/21/77 4:05 PM

I am sitting up here looking at a poster of two pigs in the mud that says Love makes all things beautiful.

C 905 CC25 GINNY (6,906) 6/21/77 4:05 PM

judy you arenot alone lets talk  
if i had known how little space there was between keys on this terminal i would have cut my nails.

C 905 CC26 MONITOR (9,912) 6/21/77 4:06 PM

YOU ARE ALL DOING VERY WELL.

Whenever you are ready to end the practice period, and begin your problem for today, please enter a comment like "I am ready."

GENERAL INSTRUCTIONS FOR USING THE SYSTEM

- 1) All composing of your items is done in your "scratchpad". In this space, you type in one line at a time. When you have completed a line or an answer to a question you must hit the carriage return key to send it to the computer. (Do not type past space 75 before hitting the carriage return).

TO ENTER YOUR SCRATCHPAD TO COMPOSE AN ITEM, ANSWER 4 TO THE QUESTION, "Conference choice?"

- 2) Always wait for the ? to appear before you begin typing. This says the computer is ready to get something from you. If you start typing before, what you put in will be lost. 2?: for instance, means that it is ready for you to type line 2.
- 3) After you have finished typing in your comment, YOU SEND IT TO THE OTHERS BY TYPING A CARRIAGE RETURN: A + AS THE FIRST CHARACTER ON A NEW LINE, AND ANOTHER CARRIAGE RETURN.

After typing the +, the following questions will be asked, and you are to answer Y ( for yes) or N ( for No).

SIGNATURE (Y/N/PEN)?

Answer Y (Yes) and press RETURN.

OKAY TO SEND? (Y/N)

A Y will send it. An N will leave it there and tell you if there are other items waiting for you, and ask you "Conference Choice?" again.

- 4) To receive items--  
You will be told either that there are "no items waiting" or how many are waiting for you, whenever you come out of your scratchpad.

If there are new items, you will be asked, ACCEPT NEW ITEMS?(Y/N)?  
If you answer Y, they will be printed out for you.

If you answer N, you will be asked "Conference Choice?"  
(The answer to that question is 4, to go to your scratchpad).

There are other parts to this system, but we are not going to use them today.

Whatever you type in stays in your scratchpad until you erase it. To erase your old comment, type \*\* (RETURN) as the first characters on a line.  
example: 1?I have now typed my first line.

If this was the complete message then you would press RETURN

The paper will then advance and the terminal will print 2?

Enter a + and then press RETURN

The printout should be

1?I have now typed my first line.

2?+

C 905 CC38 KATHLEEN (2,902) 6/21/77 4:14 PM

Y

Joe, i have never done anything like this before but i think i am g tting used to it. i flunked typing in high and for the first course so eveyone please forgive my errors. thanks

C 905 CC39 MONITOR (9,912) 6/21/77 4:16 PM

The practice period is now over.

#### INSTRUCTIONS FOR THE GROUP DISCUSSION

**BACKGROUND:** You will be asked to discuss a problem of human relations. The case you will consider has been written up from an actual life situation. The names have been disguised, but otherwise very few changes have been made. The case concerns a person facing a problem in their organization. Assume that you as a group are members of the staff. You have been asked to have a meeting to consider the problem and advise on the following two questions:

- a) Why are the persons involved behaving as they do?
- b) What should be done about it?

Before you start the discussion, each of you will read a summary of the facts about the situation. You will have seven minutes to read your summaries individually. No attempt has been made to decide whether the facts in your summary are relevant and important or not. The aim is to give you a general factual background of the sort you might have as an individual staff member before the meeting starts. At the end of seven minutes we will ask you to replace your factual summaries in the envelope and the assistant will eventually collect them. You will immediately start your meeting. The following three points deal with questions that may occur to you.

1. Generally in discussions people come with factual backgrounds which are the result of their own particular experience. A given person can never be sure that the range of facts he has from his experience is exactly the same as the range of facts known to other participants. This is true of this discussion. Each of you will be given an accurate factual summary of the case, but none of you will actually read the factual summary of anyone else. We specifically intend to leave you uncertain as to whether or not each of you has the same facts. That is why we take back your summaries. You will have to depend upon each other for remembering, putting together, sorting out, and checking the relevant facts. You may take notes if you like.
2. In most discussions where decisions are to be made, the amount of information available is limited. That is true of this discussion. Your summaries, taken together, include all the known facts about the case, but other facts which might be relevant are still unknown. You will have to make your plan on the basis of whatever you can infer or reconstruct about the situation from the limited information available.

3. This group is not supposed to decide merely to shift the responsibility for making a definite plan on to somebody else. You are expected to arrive at the best concrete and realistic plan of action you can in this matter, by discussion and group decision. The recommendation which best represents the agreement of the group as a whole should be summarized when you have reached a decision.

Observation: The comments sent by you will be recorded and coded for later analysis. The identities of all individuals will be kept confidential in any research reports. You will be identified only by your number.

(to be continued)

C 905 CC40 GINNY (6,906) 6/21/77 4:16 PM

i am ready to start whenever everyone else is. i am fascinated by the process.

C 905 CC41 JUDY (5,905) 6/21/77 4:17 PM

How will we know when we are ready to start working with the problem and not just continue talking to one another?

C 905 CC42 JOSEPH (3,903) 6/21/77 4:17 PM

judy, i am an english major who is working for maintenance for the summer

C 905 CC43 MONITOR (9,912) 6/21/77 4:17 PM

(Instructions for the Group Discussion, Concluded)

#### TIME

You will be asked to take only 40 minutes for discussion, after reading the case history. We will occasionally remind you of the time remaining.

We will now wait two minutes to make sure you have had time to read the instructions. If you have any questions, you may ask the circulating assistant.

C 905 CC44 KATHLEEN (2,902) 6/21/77 4:18 PM

I am now ready to begin.

C 905 CC45 ELIZABETH (4,904) 6/21/77 4:21 PM

i dont fwHHapparently i dont know how tro correct a tuypo.

;  
;

C 905 CC46 MONITOR (9,912) 6/21/77 4:22 PM

Please open the envelope now and read the case you are to discuss. We will send a message in seven minutes, when the reading time is over. Whenever you have finished reading the case, you may begin entering your comments into the discussion.

C 905 CC47 JOSEPH (3,903) 6/21/77 4:23 PM

people, i am ready when ever you are

C 905 CC48 MONITOR (9,912) 6/21/77 4:32 PM

Please put the case history back into the envelope, and begin your discussion now if you have not already done so.

Do not forget that you must reach a GROUP DECISION.

C 905 CC49 JUDY (5,905) 6/21/77 4:33 PM

De we want for a cue or do we just start to doHiscuss this problem?

C 905 CC50 JUDY (5,905) 6/21/77 4:35 PM

I think he should have made ZJoe the supervisor and Bill his assistant as Joe had three years experience. Also since Joe is well liked it would help Toms public relations.

C 905 CC51 JUDY (5,905) 6/21/77 4:37 PM

Since Joe had worked for three years on the crew Bill could have learned alot from him and the crew would have more faith in his decissions.

C 905 CC52 GINNY (6,906) 6/21/77 4:38 PM

what happened to last years ranger and did his brother in law have anything to do with the trouble in the group?

C 905 CC53 JUDY (5,905) 6/21/77 4:30 PM

I think I am talking to myself. Is anyone out there?

C 905 CC54 ELIZABETH (4,904) 6/21/77 4:42 PM

but bill applied first, was hired in post before joe reappeared, no

C 905 CC55 KATHLEEN (2,902) 6/21/77 4:42 PM

I think that even though joe is younger he seems to be more respected by the group than bill and he also has more experience, also if he were to leave (joe, that is) it would mean that the crew would be without anyone with much experience and the record of the unit would be poor and the forest would be in danger if another fire broke out.

C 905 CC56 GINNY (6,906) 6/21/77 4:44 PM

Does anyone know what the job of the ranger is and why he was not there to make the decisions about where to work on the fire?

C 905 CC57 JOSEPH (3,903) 6/21/77 4:45 PM

people, i am ready when ever you are  
it is my opinion that the underlying fault of this situation lies with the head  
ranger, evans. he should have realized that bill was inexperienced for the job  
as foreman. it would have been better for the forest service if bill was hired  
as an apprentice or an assistant to joe, for this way the wrong judgement due to  
lack of experience would not cost valuable acreage. also, joe probably would  
not of returned next year, for he would have completed his studies in chemistry;  
thereby bill would have been able to return to the ranger job next year as  
foreman, having the necessary experience. as for the behavior of the other men, i  
chalk it up as being loyal to a friend who they feel has been wrong. we can not  
regard their feelings however, for they are not objective. besides, with my  
first name, how can i not be loyal to joe?

C 905 CC58 KATHLEEN (2,902) 6/21/77 4:46 PM

there was no answer to the question of how much money was really available to  
pay these men. would it be possible to make them co leaders at a reasonable  
salary?

C 905 CC59 ELIZABETH (4,904) 6/21/77 4:46 PM

but bill applied first, was hired in post before joe reappeared  
no  
4how so i get some response

C 905 CC60 GINNY 6/21/77 4:48 PM

Does anyone have the answers to any of my questions? Joe has a good point but  
what do they do at this point? Do they demote bill ?

C 905 CC61 KATHLEEN (2,902) 6/21/77 4:49 PM

we seem top  
we seem to be talking about what should have been done before but we must decide  
what the ranger can do now to remedy the situation

C 905 CC62 GINNY (6,906) 6/21/77 4:50 PM

C 905 CC63 JUDY (5,905) 6/21/77 4:52 PM

Has anyone gotten any of my messages? I have hit a double plus and gotten all  
screwed up.

C 905 CC64 MONITOR (9,912) 6/21/77 4:53 PM

Reminder: You have twenty minutes to reach a group decision. Note that is 20  
minutes from the time printed above.

C905 CC65 KATHLEEN (2,902) 6/21/77 4:53 PM

i do not know what the job of the ranger is and why he did not make the fire

fighting decisions except that i guess he was not on the scene at the critical moment. If future decisions will have to be made by the man in the field he will have to be one with the knowledge to make them so i believe joe is the only proper choice.

C 905 CC66 JOSEPH

people, i am ready when ever you are  
it is my opinion that the underlying fault of this situation lies with the head ranger, evans. he should have realized that bill was inexperienced for the job as foreman. it would have been better for the forest service if bill was hired as an apprentice or an assistant to joe, for this way the wrong judgement due to lack of experience would not cost valuable acreage. also, joe probably would not of returned next year, for he would have completed his studies in chemistry; thereby bill would have been able to return to the ranger job next year as foreman, having the necessary experience. as for the behavior of the other men, i chalk it up as being loyal to a friend who they feel has been wrong. we can not regard their feelings however, for they are not objective. besides, with my first name, how can i not be loyal to joe?  
kathy and ginny, i feel that we should only deal with the information that has been provided for us. if we start foling around with unknowns we will only detract from the situation by confusing it.

elizabeth, i feel that because joe had already worked for the forest service that this entitled him to the job, even though his application was recieved after bills, besides, joe had been promised the job the summer before.

C 905 CC67 JUDY (5,905) 6/21/77 4:54 PM

In order to remedy the current situation Evans should have a conference with both Bill and Joe and discuss their experience with them so that they both understand that Joe is the more experienced and as a career vet Bill would learn alot from Joe if he were his assistant.

C 905 CC68 ELIZABETH (4,904) 6/21/77 4:55 PM

lets assume evans decides he cannot replace bill with joe, discusses problem with bill, consults art, the oplder and sseasoned worker, as first steps before decision final what do you think

C 905 CC69 GINNY (6,906) 6/21/77 4:57 PM

elizabeth-What?

C 905 CC70 KATHLEEN (2,902) 6/21/77 4:59 PM

judy, i agree with you that a conference with both men would bring out to them the fact that joe is most Qualified and that it would be best for the forest service if he were chief. If bill does not understand this it will be hard on the ranger because of their personal friendship but still it is the best thing to do. if bill leaves the unit will not be in as much danger as it will be if joe leaves and if he stays he will gain valuable experience.

C 905 CC71 ELIZABETH (4,904) 6/21/77 4:59 PM

bill wasd hired for the post and joe was hired afterwardss if joe suddenly replacxed bill, bill had gounds for a formal grievance. w3as joe formally promised the job at the end of the preceding summer opr did he simply take it for granted does anyone know

C 905 CC72 JUDY (5,905) 6/21/77 5:00 PM

Art is not a forest worker but a farm hand and seems to have no aspirations to be foreman. Since we have no info saying Bill can not be replaced with Hoe lets just assume that he can be. I think this would be the logicachoice. Joe can you erase your initial message?

C 905 CC73 JOSEPH (3,903) 6/21/77 5:01 PM

people, i am ready when ever you are  
it is my opinion that the underlying fault of this situation lies with the head ranger, evans. he should have realized that bill was inexperinced for the job as foreman. it would have been better for the forest service if bill was hired as an apprentice or an assistant to joe, for this way the wromg judgement due to lack of experiance would not cost valuable acreage. also, joe probably would not of returned next year, for he would have completed his studies in chemistry; thereby bill would have been able to return to the ranger job next year as foreman, having the necessary experiance. as for the behavior of the other men, i chalk it up as being loyal to a friend who they feel has been wrong. we can not regard their feelings however, for they are not objective. besides, with my first name, how can i not be loyal to joe?  
kathy and ginny, i feel that we should only deal with the information that has been provided for us. if we start foling around with unknowns we will only detract from the situation by confusing it.

elizabeth, i feel that because joe had already worked for the forest service that this entitled him to the job, even though his application was recieved after bills, besides, joe had been promised the job the summer before. i feel that two wrongs do not make a right. evans only logical choice is to give joe the foreman job and demote bill to the job of assistant foreman. although this will hurt bills pride, it will help him in the future, for he will gain experiance. i think that consulting art would only complicate the situation, for he is joes friend and will not be objective.

CC 905 CC74 GINNY (6,906) 5:02 PM

The fact is that the fire got away from the firefighters. I was not established if bill had indeed chosen the wrong area to work in. even joe did not actually condemn him. If evans , after making that determination finds that bill did lack judgement then he must remove him and install a more experiance foreman. if however the situation is one of ill will and sour grapes then he should get rid of joe and help bill in learning the ropes of efficient fire fighting. what do you think

CC 905 CC75 MONITOR (9,912) 6/21/77 5:03 PM

You have ten minutes to complete your discussion. When you have finished your

participation, sign off with a --.  
Please stay where you are until an assistant arrives .

C 905 CC76 ELIZABETH (4,904) 6/21/77 5:03 PM

i think evansa cannot replace bill just like that on the grounds of this one incident only if joe was promised the job the summer before, and evans did not know it, that must be cleared up first. if evans hired bill knowing joe had been promised the job hesa pretty dumb

C 905 CC77 KATHLEEN (2,902) 6/21/77 5:04 PM

Elizabeth, I agree that bill might have grounds for a formal grievance but as a friend of the ranger and a man looking for a career in the service he should be willing to compromise and let joe do the job , especially if a co-leadership could be worked out and his salary would not be cut.

C 905 CC78 JUDY (5,905) 6/21/77 5:04 PM

If Bill is not forced to take a pay cut I think he would understand that he has a great deal to gain from working with Joe and would feel it was an opportunity for him to get practical experience with someone who knows. Depending upon budget the salary difference between the two jobs could be split so that Joe received an increase and if necessary Bill a slight decrease.

C 905 CC79 JOSEPH (3,903) 6/21/77 5:08 PM

i am in complete agreement with the positions taken by judy and kathy.

C 905 CC80 JOSEPH (3,903) 6/21/77 5:09 PM

before we have to leave, let me say that it has been a pleasure working with all of you.

C 905 CC81 GINNY (6,906) 6/21/77 5:10 PM

i will go along with judy, kathy and joe for the good of the trees hoping that bill not be lost as a potential career.

C 905 CC(2) JUDY (5,905) 6/21/77 5:10 PM

Elizabeth, even if the incident of the fire had not occurred, Evans would have had to consider the difference in experience of the two men and what would be better for Bills future as far as gaining experience on the job.

C 905 CC93 JOSEPH (3,903) 6/21/77 5:10 PM

has the group reached a decision?

C 905 CC84 ELIZABETH (4,904) 6/21/77 5:12 PM

evans must clarify who is in charge. bill is responsible for heading the group. let evans discuss with him how better the handling of that fire might

have been done, assuming there was any misjudgement in the case; then talk with joe, remind him that he is responsible for working as part of crew with bill, who was hired for the post , and the season just beginning; if he doesnt like it, cant accept the situation and wont cooperate, better he that is joe, quits before the team divides further and thier work suffers

C 905 CC85 JUDY (5,905) 6/21/77 5:12 PM

Have we reached a decision? It has been a pleasure working with all of you. I would love to have one of these at home.

C 905 CC86 GINNY (6,906) 6/21/77 5:12 PM

Does kathlees agree?

C 905 CC87 JOSEPH (3,903) 6/21/77 5:12 PM

elizabeth, have we convinced you?

C 905 CC88 MONITOR (9,912) 6/21/77 5:11 PM

The forty minutes alloted for discussion is now over. You have a five minute "grace period" if you need it to reach a group decision. At that time, the terminal will sign off for you! When you have completed your participation, an assistant will bring you some questions to answer about your experiences in this discussion. Then the whole group will get together with the monitor and assistant for further discussion of your experiences.

C 905 CC89 KATHLEEN (2,902) 6/21/77 5:13 PM

Elizabeth, i think it iwould be useful to bring up your point about yhe mixup in the job promises at the conference but i stick with my previous points and say joe must be the choice. mentioning the mixup might save bills feelings. Am i right to say that so far we have a majority who say that we wish for joe to be chosen as leader but hope to have bill keep a good or equal salary in recognition of his willingness to work and dedication to the service and to encourage him to come back as the leader next y ar when he has more expoerience learned from joe.1

C 905 CC90 GINNY (6,906) 6/21/77 5:15 PM

I agree.

C 905 CC91 JUDY (5,905) 6/21/77 5:16 PM

I agree with Kathys decision and think Bill, as described will be in accord also.

C 905 CC92 JOSEPH (3,903) 6/21/77 5:16 PM

eelizabet, i agree to ,the idea od a conference with bill and evans, for it will show evans just how inexperienced bill really is.

C 905 CC93 GINNY (6,906) 6/21/77 5:17 PM

C 905 CC94 ELIZABETH (4,904) 6/21/77 5:17 PM

im opnly finally beginning to get the hand of this. you are all being senbtimen  
too sentimental.

C 905 CC95 JUDY (5,905) 6/21/77 5:17 PM

C 905 CC96 GINNY (6,906) 6/21/77 5:19 PM

C 905 CC97 JOSEPH (3,903) 6/21/77 5:19 PM

i again agree with judy and kathy. hopefully, ambiguities will be resolved in  
our discussion afterwards.

C 905 CC98 JUDY (5,905) 6/21/77 5:19 PM

Elizabeth about what? Joe has the experience Bill does not, what is sentimental  
about that?

C 905 CC99 JUDY (5,905) 6/21/77 5:21 PM

C 905 CC100 KATHLEEN (2,902) 6/21/77 5:21 PM

I believe i have summed up the decision of a majority of the group in my last  
two statements . I have no further comments unless there are concrete  
x  
there are questions as to what i meant. thank you all i enjoyed this.  
a;



6. The problem was:

: 1 : 2 : 3 : 4 : 5 : 6 : 7 : ff = 3.05  
Completely Neutral Completely cc = 2.75  
Interesting Boring

7. The situation struck me as:

: 1 : 2 : 3 : 4 : 5 : 6 : 7 : ff = 2.93  
Completely Neutral Completely cc = 3.0  
Realistic Unrealistic

8. The issues involved were:

: 1 : 2 : 3 : 4 : 5 : 6 : 7 : ff = 3.0  
Completely Neutral Completely cc = 3.08  
Clear Unclear

III. How satisfactory do you think Computerized Conferencing would be for the following activities? (only asked for cc)

	COMPLETELY UNSATISFACTORY	COMPLETELY SATISFACTORY
9. Giving or receiving information	: <u>1</u> : <u>2</u> : <u>3</u> : <u>4</u> : <u>5</u> : <u>6</u> : <u>7</u> :	
10. Problem solving (3.87)	: <u>1</u> : <u>2</u> : <u>3</u> : <u>4</u> : <u>5</u> : <u>6</u> : <u>7</u> :	
11. Bargaining (3.79)	: <u>1</u> : <u>2</u> : <u>3</u> : <u>4</u> : <u>5</u> : <u>6</u> : <u>7</u> :	
12. Generating ideas (4.65)	: <u>1</u> : <u>2</u> : <u>3</u> : <u>4</u> : <u>5</u> : <u>6</u> : <u>7</u> :	
13. Persuasion (3.9)	: <u>1</u> : <u>2</u> : <u>3</u> : <u>4</u> : <u>5</u> : <u>6</u> : <u>7</u> :	
14. Resolving disagreements (3.52)	: <u>1</u> : <u>2</u> : <u>3</u> : <u>4</u> : <u>5</u> : <u>6</u> : <u>7</u> :	
15. Getting to know someone (3.41)	: <u>1</u> : <u>2</u> : <u>3</u> : <u>4</u> : <u>5</u> : <u>6</u> : <u>7</u> :	
16. Giving or receiving orders (4.87)	: <u>1</u> : <u>2</u> : <u>3</u> : <u>4</u> : <u>5</u> : <u>6</u> : <u>7</u> :	
17. Exchanging opinions (4.92)	: <u>1</u> : <u>2</u> : <u>3</u> : <u>4</u> : <u>5</u> : <u>6</u> : <u>7</u> :	

Comments?

IV. The following questions deal with your participation in the research.

18. Taking part in this research was:

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

FF = 1.65 cc = 2.11

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

: 1 : 2 : 3 : 4 : 5 : 6 : 7 :  
Satisfied Neutral Unpleasant

FF = 2.25 cc = 2.94

20. I feel that the other students took the experiment:

: 1 : 2 : 3 : 4 : 5 : 6 : 7 :  
Seriously Neutral Not Seriously  
At All

FF = 1.65 cc = 2.09

21. I feel that the results of research will be:

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

FF = 1.95 cc = 2.56

22. The research was conducted in a manner that was:

: 1 : 2 : 3 : 4 : 5 : 6 : 7 :  
Competent Neutral Not  
Competent  
At All

FF = 2.11 cc = 2.10

23. Do you agree or disagree with the decision arrived at by the group?

: 1 : 2 : 3 : 4 : 5 : 6 : 7 :  
Strongly Agree Neutral Strongly  
Disagree

FF = 1.84 cc = 2.16

Appendix 4A: Subject Recruitment Form

Participants are needed for an interesting research project in group decision making. It will be conducted by Professors Kenneth Johnson and Roxanne Hiltz of the Upsala faculty, and Dr. Gail Agle.

Each person will be paid \$2.50 per hour for one or two hours time.

Times: June 20-24 1 PM and 3:30 PM

Place: Beck 206 (Sociology Conference Room)

If you would like to participate fill out the form below and return it in person, or drop it in the mail for Ken Johnson, Beck 401.

NAME (please print) \_\_\_\_\_

ADDRESS \_\_\_\_\_

PHONE \_\_\_\_\_

TIMES you can be reached at the above phone number \_\_\_\_\_

WHAT classes are you now attending? \_\_\_\_\_

Resident \_\_\_\_\_ Commuter \_\_\_\_\_

Male \_\_\_\_\_ Female \_\_\_\_\_

How well do you type? \_\_\_\_\_ Not at all

\_\_\_\_\_ Hunt and peck

\_\_\_\_\_ Rough or casual touch typing

\_\_\_\_\_ Good touch typing

Please check the dates and times you would be available to participate.

Monday June 20 \_\_\_\_\_ 1 PM \_\_\_\_\_ 3:30 PM

Tuesday June 21 \_\_\_\_\_ 1 PM \_\_\_\_\_ 3:30 PM

Wednesday June 22 \_\_\_\_\_ 1 PM \_\_\_\_\_ 3:30 PM

Thursday June 23 \_\_\_\_\_ 1 PM \_\_\_\_\_ 3:30 PM

Friday June 23 \_\_\_\_\_ 1 PM \_\_\_\_\_ 3:30 PM

THANK YOU

## Appendix 4B

### Experimental Procedures: Computerized Conferencing

#### Explanation

The instructions were developed and stored in "conference 960", where they could be referred to for review at any time, and could be changed in the evening for distribution and review by the team the next morning. The final modifications are shown here.

C 960 CC104 ROXANNE (120) 6/18/77 10:43 AM

#### The Monitors Role

Review with the assistants the conference number being used that day; which ID will be signed on in each room. List this on the blackboard in 206 and check as each room is filled. As assistants go to plug in and set terminals at NAME? Monitor prepares demo terminal, sets the monitor terminal into the conference for the day.

As each person arrives, Monitor says "Hello, I am Dr. (last name), and I am coordinating the group discussion study today. First of all, I would like to pay you for your participation, and then I will tell you about what we are doing."

Gives person \$5 and has them sign ledger.

Then explains:

Today we are going to have you engage in a new form of group discussion, which involves typing your comments into a computer terminal, and reading the comments of others that are printed out on your terminal. (point) This is a computer terminal. It is very much like an electric typewriter except that it has a few extra keys. Then an assistant will take you to your own terminal, and you will receive instructions about how to use a computer terminal, how to enter your comments into the written discussion, and how to receive the comments of the others when you are ready for them. You will have about 20 minutes to practice sending messages this way to the other members of the group. Then you will receive your problem and begin the actual discussion of how to resolve it. Your job is to reach a group discussion about how to solve that problem, by typing and reading rather than by speaking and listening.

Are there any questions on what we are going to do?

Assistant then takes subject to room.

C 960 CC115 (ROXANNE, 120) 6/22/77 12:18 PM

Sequence of events for monitor, running the experiment.

1. After all five are in the conference (sent at least one message), send C960C105. (Text editing)

Set timer at 25 minutes

2. Send supportive messages and things like reminders on how to delete old scratchpad (if people forget to do this)

Try to send a message which includes the following information.

Note that all comments are numbered sequentially. (A cc number) If you want to make sure that everyone knows which comment you are referring to, you can use its number.

About 15 minutes in, send a comment which includes "Whenever you are ready to end the practice and begin your problem for today, please enter a comment like I am ready to begin."

Send assistants around with cases. They tell subjects, "Please open this when you receive instructions to do so."

3. When all are ready, or max 25 minutes  
Send C960C106, and then right away, C960C107 (Instructions) These include open envelope and begin discussion instructions.

4. Let these print out. Then wait 7 minutes and send C960C111 (reminder to begin discussion).

Send assistants to collect the envelopes and make sure everyone begins.

5. Set timer at 20 minutes. (From above 111 entry) When it rings send C960C112 (20 minute warning.)

6. Timer at ten minutes. Send C960C113 (10 minute warning)

7. Timer at ten minutes. Send C960C114 (End discussion - Five minute grace).  
Send assistants around with questionnaires.

Go to room 405 for de-briefing.

#### Role of the Assistants

C 960 CC109 (ROXANNE, 120) 6/28/77 11:09 AM

#### Role of the roving assistants

Room assignments and conference numbers for the day will be listed on the board in 206.

1. As soon as you arrive, start setting up terminals in all of the proper rooms. Lock doors behind you.

#### Sign-on procedure.

- A. Dial 9-645-5552. Insert phone in terminal (firmly)
- B. Enter number and code (Ex., 902,2)
- C. Accept any waiting private messages.
- D. Erase scratchpad as follows:

Enter +snn

This will put you in line one of the scratchpad.

E. Start procedure to enter subjects's name, as follows:

Enter into line one of scratchpad, ++9,1,(id#),

This will result in a printing out of the "present information. Answer Y to "modify public info" It will print Name? Leave the terminal there until the subject is brought in. Then enter the name for the subject. Leave everything else blank by doing a plus. Then show subject how to use a computer terminal. (See C960 CC95).

Then do +gc (conference number. We will start with 901 and do a new one each session.

As follows +gc901,n,2

What that does is put the person into conference 901, skip the printing of participants, and accept the first two items of instructions. Then leave the person and go get another subject; tell them you will be back to help them with any questions in about five minutes.

The big problem here is if the subjects hit anything besides a + to send a message or a 4 for conference choice. If they do, they will be thrown into initial choice or some conference choice they do not know about, and the assistant will have to get them out of it. Stay available on your floor so that subjects may summon you if they have such problems, or run out of paper, or get disconnected.

1. If they get disconnected; Depress telephone button. Redial 9:-645-5552. Sign on with number and code. Do +GC (90#,N.
2. If they get out of the conference; Do +GC90#,N

If they get into some other conference choice (Like "Comment Numbers?"), Do a - . This should take you to " Conference choice?"

#### TIMING

START is when fifth person is taken to room. Always carry clipboard with cases, questionnaires etc. with you.

1. Leave cases at 10-twenty minutes after start.
2. Collect cases as soon as 7 minute reading period is over.
3. Bring questionnaires as soon as discussion is over.

Speech: I know you probably feel that you have completed your job. But the most important part of the study for us comes next. We want you to answer some questions on your reactions to taking part in the computer: - mediated group discussion. Please answer these as completely as you can. I will be back to collect them from you in a few minutes. And we then will all get together to talk over your experiences.

Then return in 5-7 minutes, collect questionnaires, and escort people to 405 (gathering your two to three people at once).

Instructions for using a computer terminal

This is a computer terminal. It is a lot like an electric typewriter, except that it has some extra keys.

Note that this is the shift key (point and demonstrate). You will have to hold it down in order to type some special symbols, such as + and \*. Now you try it.

This is the "control key" -- in order to do the equivalent of erasing, you will hold it down at the same time as you hit the back space key (demonstrate and have person try it)

Note that the paper does not actually erase; but only the typed-over letter will actually be sent.

Note that up here, the spaces are marked. (point) We ask you not to type a line past space 75 without starting a new line by hitting the carriage return (Point, demonstrate, have person try cr)

Here is how you get the paper to roll up, in case you want to tear something off (Show paper feed).

Here is how to tear off (show)

Please do not try to use any of the other special keys, such as break -- they are not necessary, and they will only cause you difficulty if you use them without knowing what they are for.

Have person practice typing in a few lines. Assistant then sends this as a message to monitor.

Post-Experimental Debriefing Guide

The following were used as debriefing questions and guides:

- (1) What were your reactions to this way of having a group discussion?  
Your impressions, anything you would like to share?
- (2) If all comments are positive/negative try to elicit opposite reactions.  
Also try to elicit comments from all participants.
- (3) Do you think that you reached a group decision? If yes please state it.
- (4) Are there any suggestions about how we could improve the procedures or research? Anything that you feel would be helpful for us to know?
- (5) Are there any questions you would like to ask us?
- (6) Please do not discuss the details of this research with others.
- (7) Possible additional question: Under what conditions do you think this system would be helpful/unhelpful???

REFERENCES:

- Bales, Robert F.  
 1950a "A Set of Categories for The Analysis of Small Group Interaction." American Soc. Rev., 15, 257-263.
- 1950 Interaction Process Analysis: A Method for the Study of Small Groups. Reading, Mass.: Addison-Wesley, 1950.
- 1955 "How People Interact in Conferences." Scientific American, 192, 3, 31-35.
- Bales, Robert F,  
 Fred L. Strotbeck,  
 Theodore M. Mills  
 and Mary E.  
 Roseborough  
 1951 "Channels of Communication in Small Groups." American Soc. Rev. 16, 461-468.
- Chapple, E.A. and M. Arensburg.  
 1940 "Measuring Human Relations: An Introduction to the Study of the Interaction of Individuals." Genetic Psychology Monographs, 32: 3-147.
- Champness, B.  
 1973a "The Assessment of User's Reactions to Confravision: Analysis and Conclusions." London. Communications Studies Group Report E/.73250/CH.
- 1973b "Remote Meeting Table: Preliminary Report of a Questionnaire Study". London. Communications Studies Group Paper W/72310/CH.
- French, R.L.  
 1950 "Verbal Output and Leadership Status in Initially Leaderless Group Discussions." American Psychologist, 5: 310.
- Goffman, Erving  
 1955 "On Face Work: An Analysis of Ritual Elements in Social Interaction." Psychiatry, 18: 213-231.
- Hiltz, Starr  
 Roxanne  
 1975 "Communications and Group Decision Making; Experimental Evidence on the Potential Impact of Computer Conferencing." Newark, N.J.: Computerized Conferencing and Communications Center, NJIT, Research Report Number 2.
- Johansen, Robert  
 1976 "Pitfalls in the Social Evaluation of Teleconferencing Media". Menlo Park, Cal.: Institute for the Future, Paper p-38.

Johansen, Robert  
Robert DeGrasse, Jr.  
and Thaddeus Wilson

1977      Effects on Working Patterns. Group Communications Through  
Computers, Volume 5. Menlo Park, Cal: Institute for the  
Future, Special Report SR-96. Draft dated Nov. 1977.

Norfleet, B.

1948      "Interpersonal Relations and Group Productivity."  
Journal of Social Issues, 2: 66-69.

Pye, Roger and  
Ederyn Williams

1977      "Teleconferencing: Is Video Valuable or Is Audio Adequate?"  
Telecommunications Policy (June): 230-241.

Siegel, S.      Nonparametric Statistics for the Behavioral Sciences.  
1959      New York: McGraw Hill, Inc.

Willard, Don and  
Fred R. Strodbeck

1972      "Latency of Verbal Response and Participation in Small Groups."  
Sociometry, Vol. 35 #1: 161-175.