

VII.C. Group Communication through Electronic Media^{*} Fundamental Choices and Social Effects

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How will a given medium of communication affect the way in which groups of people communicate? What are the most promising near future directions for research considering this question?

Our own incentive for exploring these issues began with a more specific concern about the probable social effects (and utility) of communication through a computerized conferencing system called FORUM, which is now under development at the Institute for the Future. The starting point for our inquiry was to consider computerized conferencing as a medium of communication, just as the telephone and face-to-face conversations may be considered media of communication. Not surprisingly, the criteria for evaluation of a medium of communication typically involve (either consciously or unconsciously) comparison with other media. Since the medium most familiar to the majority of us is face-to-face communication, there is an inherent tendency -for this to become the standard of judgment.

One needs to exhibit great care when doing this, since computerized conferencing and other telecommunications media are not necessarily surrogates for face-to-face communications. It seems more likely that each medium will have its own inherent characteristics which should not be expected to mimic face-to-face patterns. On the other hand, comparison with face-to-face communication is often crucial in order to understand a new medium: While most of the work in this area to date has been applied to conferencing media such as TV and voice systems, some of it has direct bearing on any future work in the computerized conferencing area. For instance, Anna Casey-Stahmer and Dean Havron developed a mathematical ratio to aid in assessing teleconferencing systems [1]. In this study, each system under assessment involved groups of people gathered at stations and communicating with groups at other stations. An analysis was made of the amount of electronically mediated communication between stations and the communication within the face-to-face groups at each site. The point was to look at the ratio of between-station communication over within-station communication. This ratio has offered interesting data in this case, but needs to be used

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with great care in order to avoid the assumption that face-to-face communication is the ideal medium.

In turning to the literature of group communication, however, one does not readily discover general principles or procedures which are easily adopted as "standard." Instead we find a very scattered literature-often parochial and littered with jargon-which is impressive in its lack of coordination. Individual researchers (and often "schools" of thought) provide rich and provocative information within strikingly narrow frames of reference. Also, the social dynamics which have been explored in these research efforts are concentrated almost exclusively on face-to-face communication. As evidence, one finds only six entries dealing with media other than face-to-face among the 2,699-entry, generally acclaimed bibliography on small-group research by McGrath and Altman [2]. Beyond the literature of face-to-face group process research, very little has been done which attempts to apply derived principles of face-to-face group communication to other media.

In 1963 Alex Bavelas offered this summary appraisal of the research in face-to-face communication as it relates to research in electronically mediated group communication:

In consequence, the findings are, in most cases, only remotely related to teleconferencing. The significant contribution of this work lies instead in the methods and techniques of quantitative study that have been developed, and in general hypotheses about social process in terms of which specific propositions relating to teleconferencing may be formulated [3].

Bavelas went on to say: "It appears that published information bearing directly on teleconferencing is practically nonexistent" [4]. Thus it is clear that most of the directly relevant research has been done within the last ten years-with the added comment that Bavelas' observation has not changed radically since the time that he made it.

Certainly the literature of group process is broad and provocative, and the potential for transfers into communication research seems real-though obviously complicated by multiple factors. Alex Reid, while recognizing this fact, offers an optimistic view of near-future possibilities: "There seems every opportunity for a fruitful transfer of both theory and experimental method from social psychology to telecommunications engineering, a transfer that will be particularly valuable as the telecommunications system moves away from simple one-to-one voice communication. toward more sophisticated visual and multi-person systems" [5].

One of the first research efforts which considered teleconferencing directly was done under the auspices of the Institute for Defense Analysis (IDA), beginning in the early 1960s. The focus of this work was on the possible use of such communications media as telephone, teletypewriter, and/or television in international relations. Of special interest was the potential for using teleconferencing in crisis-negotiation situations. This series of studies, which has only recently been released to the general public, can be considered as a kind of methodological forerunner of the work which is described in this article.

The theoretical work done by the IDA is still instructive for research design involving group communication. Figure 1 shows the key elements identified in these

studies. Their approach involved simulated crises in laboratory situations and field trials using different combinations of media. Since another of the purposes of the IDA studies was to "assemble and review information relevant to teleconferences and teleconference research and to draw implications therefrom for the long-range teleconference research program" [6], this seems an excellent starting point in surveying the current situation.

The IDA studies offer findings which are uniquely geared to international crisis situations, but which can also be generalized to some degree. For instance, the speed of communication offered by telemedia was thought to be an advantage, but was later found to have negative effects in those negotiation situations where participants needed time to think before responding [7]. Also, media which encourage rigid behavior patterns (e.g., the teletypewriter, where all communication is via print) were found to increase the need for parallel channels to provide for informal and symbolic exchanges. "It appears, then, that historical biases, formal and stilted language, and a disposition to defend one's position to great lengths are characteristics that are potential drawbacks to effective communications by written message [8]. However, the IDA simulation of a teletype message forwarding system does not allow the extrapolation of these conclusions to the computerized conferencing systems which permit more than two people to interact simultaneously.

Current Research Approaches

The social research which is currently being done with personal communications media can be divided into three, sometimes overlapping, categories: laboratory experiments;

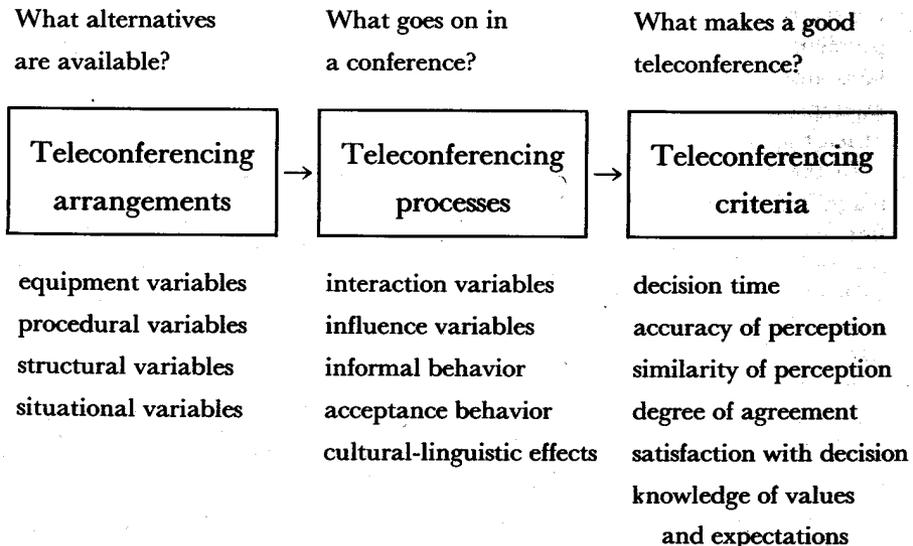


Fig. 1. Typical predictive system for the experimental study of teleconferencing (from IDA teleconferencing studies [9]).

field trials; survey research.

Each of the approaches has certain benefits and weaknesses, some of which we shall try to point out. Also, such an arbitrary division seems necessary as a first step in defining possibilities for comparing results and interpreting the research findings which will become increasingly common over the next few years.

Laboratory Experiments: The most classic of these research approaches arises out of the traditions of experimental psychology. The goal here is the control and manipulation of certain key elements (independent variables), while monitoring the resultant effect on other elements (dependent variables). Because of the problems in monitoring the many variables surrounding a social situation, laboratories are used to establish a controllable environment. From this point, attempts are made to design the laboratory in such a way that it replicates (or at least approximates) the "real world."

In the case of communications research, the problems of control have been magnified. In even the most "simple" instances of interpersonal communication, multiple complexities are always present. A researcher must attempt to isolate the effects of a communications medium from the interrelated effects of such things as group dynamics, personal attitudes, and topical content of the communication. In a situation such as this there is the constant danger of simplifying the "real world" to meet the limitations of the laboratory.

Bell Laboratories has produced much work in communications and information theory [10] and this work has continued, using variations in experimental methodology. The work at Bell Labs is frequently tied to the development of new communications technology. There is, however, a renewed interest in the exploration of basic communications processes - apart from the application of a specific technology. For instance, ongoing work at Bell Labs is now concentrating on the behavioral dimensions of two-person, face-to-face communication, with an eventual goal being the development of a procedure for comparing and evaluating different media of communication. This work is strengthened by interesting applications of statistical techniques (particularly multidimensional scaling) to the unique characteristics of interpersonal communication through electronic media [11].

In 1970 the Communications Studies Group (CSG) was founded in London, England, with direct support from the Civil Service Department and the Post Office [12]. CSG has now become a major center of telecommunications research, using a style begun with a base in laboratory experiments and mathematical modeling. CSG has also begun exploration of attitudes toward various communications media - a dimension of communications research which has been largely neglected. The experiments done by CSG are, of course, considered within the context of actual problems and planning in the English government.

Several general conclusions from CSG's Final Report (September 1973, Vol. 1) provide an overview of some current results:

?? Two criteria characterize tasks whose outcome is likely to be affected by medium of communication: the task must necessitate interaction and must be such that personal relationships are relevant to the outcome. Thus communication involving negotiation or interpersonal relations between the

participants forms areas of sensitivity. Information exchange and problem solving were two important purposes for which the outcome, in two-person tasks, was found to be insensitive to variation in the medium of communication.

?? Attitudes toward media are dependent on the tasks for which they are being used.

?? A substantial number of business meetings which now occur face-to-face could be conducted effectively by some kind of group telemedia (usually not merely the telephone) [13].

As can be seen, the conclusions are quite general at this point, but CSG also has a growing amount of data on particular experimental situations.

Alphonse Chapanis at the Johns Hopkins University has been doing laboratory research "aimed at discovering principles of human communication that may be useful in the design of conversational computers of the future" [14]. Though his facilities are quite limited at this point, Professor Chapanis has added much toward identification of dependent variables for evaluating communication patterns in laboratory settings. To date, his experiments have been exclusively centered on two-person communication and experimental tasks which have a defined solution. His plans, however, are to move into group experiments with more open-ended experimental tasks.

Chapanis has done a series of laboratory experiments comparing audio, handwritten, teletypewritten, and face-to-face communication. The tasks were carefully selected to be credible "real-world" situations, but the two communicators were always identified as "seeker" and "source." Thus the experiments actually use information-seeking and information-giving tasks [15]. In this test environment, the results showed that the oral media (audio and face-to-face) were clearly much faster for solving the test problems than were handwriting and typewriting. Much more information could be passed back and forth in the oral modes. (Also, a general finding has been that level of typing skill per se has little effect on the generally slower communication time.) These conclusions suggest that nonverbal communication media offer a more restricted environment than do the more common oral media. Replication studies which broaden the group and task components of the Chapanis work seem crucial for the near future, however, if these results are to be accepted on a more general level.

It should be noted that laboratory experiments involving communication process have typically concentrated on two-person communication, with clearly defined tasks. (The limitations of this approach are discussed later in this article.) Thus, time to solution of the task is often a major criterion. Also, the inherent problems of simulating the "real world" in a laboratory are especially intense when trying to facilitate a "natural" communication process in an artificial environment. There is rarely any continuity in this environment, meaning there is no prior communication or follow-up to the actual communication situation being evaluated. These factors raise validity questions about the experimental approach, though the approach certainly has its appealing aspects (e.g., higher degree of control and ability to isolate key factors).

Field Trials: In order to clarify the distinction between laboratory and field experiments, it seems most appropriate to touch briefly upon the theoretical characteristics of a quasi experiment:

There are many natural social settings in which the research person can introduce something like experimental design into his scheduling of data collection procedures (e.g., the *when* and to whom of measurement), even though he lacks the full control over the scheduling of experimental stimuli (the *when* and to whom of exposure and the ability to randomize exposures) which make a true experiment possible. Collectively, such situations can be regarded as quasi-experimental designs [16]."

For our purposes here, field experiments are defined as explorations of actual "real-world" situations with a minimum of experimental manipulation. In this' sense they are quasi-experiments, though considerations such as randomized' sampling are usually not involved. Thus, in general, some of the techniques of the laboratory are applied under less controlled circumstances.

Such a field experiment in electronically mediated group communications was performed at Carleton University (Ottawa, Canada) under the auspices of the Department of Communications, Canada. Jay Weston and Christian Kristen were the principal investigators in this exploratory attempt at developing "appropriate methodologies and measures for evaluating the behavioral effects and effectiveness of broadly defined teleconferencing systems" [17]. The Weston-Kristen effort involved direct comparison of three communications media (face-to-face, mediated video plus graphic video, and mediated audio plus graphic video), which were used as a basic part of the pedagogy in a human communications course. Thus, the experiment was actually done as part of the students' normal academic program, as they participated in the group-conferencing sessions. The data were then gathered from self-reporting questionnaires, analysis of verbatim transcripts, and analysis of split-screen videotapes of the sessions. Of course, the techniques for performing these analyses are in some cases rather undeveloped and exploratory in themselves (e.g., content analysis of transcripts and videotapes). However, our research has revealed very few comparable efforts at analysis of group communication through alternate media. Thus this effort should become an important prototype.

Our own work at the Institute for the Future has been moving toward a field experiments model in the analysis of the social effects of computerized conferencing [18]. These experiments take a somewhat different tack, since they begin with the task of developmental work on this new medium of communication-while still striving for established criteria which can be used to compare computer teleconferencing with other media. With a developing medium, research problems are further complicated, since the results will almost certainly vary as the characteristics of the medium evolve. (In fact, the results of tests will actually influence this evolution.) Also, one of our supporting grants comes from the National Science Foundation to explore the potential for using computerized conferencing to improve interaction among experts. Not surprisingly, it is difficult to explore "expert interaction" in laboratories, since one of the major characteristics of "expertness" is the availability of personal resources (files,

MEASURES OBTAINED BY:

		HUMAN ANALYSIS	
		HUMAN/COMPUTER COMBINATION	User evaluation of system operation (e.g., inter-views, attitude scales, etc.)
COMPUTER	AUTOMATION	CPU* usage/conference Connect time/CPU usage Connect time/conference Disk access Cost in CPU, core, disk/ conferee System response time	Self-evaluation of FORUM sessions User evaluation of system operation Bales' indices from "Interaction Process Analysis" Direct access to resources Indirect access to resources Generalized status index Index of control over situation Directiveness of control Familiarity with computers Typing ability Age Expectations of FORUM Attitudes toward group Attitude toward task
INDIVIDUAL	Inputs/conferee Errors/conferee Commands/conferee Editing commands/conferee User response times Length of comments # of private messages sent and received # of anonymous messages Amount of connect time/ conferee Sequence of errors Words per entry	Communication patterns Analysis of content Attention profile Psycholinguistic measures Semantic differential Adjective checklist Free association Type-token ratio Rate of verbal output Tense analysis	Categorization of prior and subsequent comments Index of difficulty of communication (Bales) Index of expressive/malintegrative behavior (Bales) Index of total differentiation (Bales) Contingency analysis "Survey of Organizations" approach (CRUSK) Communication patterns Affective language Attention profile Achievement of end results References to previous inputs Psycholinguistic measures Word frequency measures Topic classification Overall subjective evaluation
GROUP	Inputs/conference Errors/conference # of each type of error Command requests/con- ference Editing commands/con- ference Time between each input Length of comments # of private messages # of anonymous messages Amount of connect time/ conference Sequence of errors		

MEASURES APPLIED TO:

Fig. 2. Categorization of measurement techniques for analysis of computer conferences (Institute for the Future).

library, etc.) - even assuming that we could convince experts to come into a laboratory setting. Thus the experimental problems surrounding the development of new media add greatly to the already pressing problems of group research using electronic media.

The research design for the above project began with the gathering of folklore about the new medium, since we really didn't even know what questions to ask without biasing reactions. Then the approach gradually became more systematic, working toward the field experiments model. Thus our procedure moved from gathering anecdotal information to field experiments with defined user groups and systematic collection of results using multiple measures of effectiveness primarily user reaction and attitudes, content analysis where appropriate, and analysis of communications patterns [19]. (See Fig. 2.)

Another example of the field experiment approach is that applied by the British Columbia Telephone Company in their initial tests of the Confravision system for video conferencing. This system, given the same name as that used by the British Post Office, provides live television links between two conference rooms located in Vancouver and Victoria. Under the direction of Anders Skoe, a process for initial field experiments was developed and implemented before the system was to be made generally available. These field experiments involved selected types of users who were representative of those expected to use the system. The evaluation procedure employed the following techniques: preexperiment interview; live observation during the test with report by independent consultant; posttrial questionnaire (based on the "Teleconference User Opinion Questionnaire" developed by Communication Studies Group); questionnaire/interview some weeks after test session [20].

In this way the British Columbia Telephone Company group hoped to begin assessing the behavioral impact of the medium on the people who would be using it. Also, this behavioral goal was linked to initial technical tests of the 'system and longer-range socioeconomic forecasts.

An important characteristic of field trials is the ability to run tests over a longer period of time. Thus the test itself becomes more credible, since it is conducted with a sense of continuity and integration with everyday experiences. One example of such a field trial is that being conducted by the New Rural Society Project in Stamford, Connecticut. In this trial, two banks located in Stamford and New Haven are connected via an audio conferencing system, with a studio at each location. The time period for the trial is six months, and a battery of questionnaires was developed to assess both expectations of *the* system and reactions at various points in time.

The field trial approach, then, attempts to apply experimental *research* procedures to the degree which they can be effectively used in the "real world." Though the controls are limited, the goals are to gather a maximum amount of systematic data in actual group communication situations. These field trials can vary from quasi-experiments, which have a higher degree of control over variables, to the more open-ended kinds of field trials.

Survey Research: The basic tools of survey research are the old reliables (?): questionnaires and interviews. In communications research of this sort, however, unique problems are added to the routine dilemmas of the survey researcher. For

instance, subjects might be asked to evaluate their needs for media which they have not yet experienced. Still,, the techniques of survey research remain the most basic of the social sciences, and can be used creatively to gather information on both reactions to existing media and speculations about future needs.

A good example of survey techniques in telecommunications research is found in the study by Dean Havron and Mike Averill, which had as its goal "to develop a plan and instrument for a survey of needs of Canadian Government managers for teleconference facilities and equipment" [21]. This goal was pursued by designing a questionnaire which was administered to potential teleconference users, asking them a series of questions related to their present conferencing style and the possibilities for employing teleconferencing. The specific strategy of the questionnaire was to ask the respondents about a meeting they attended recently which required travel on the part of some group members. From this base, respondents were then asked to project what (if any) teleconferencing facilities could be used to conduct a future meeting of the same sort.

A similar project was directed by James Kollen of Bell Canada [22]. Kollen focused on existing travel patterns between Montreal, Quebec City, Ottawa, and Toronto. A questionnaire was administered to businessmen traveling between these cities, with the goal of determining why respondents felt they needed to travel (rather than use alternate communications media) to achieve their objectives. In this case, the overall purpose of the project was to explore the possibilities for substituting electronic communication for travel in interurban exchanges.

Dean Havron, with Anna E. Casey-Stahmer, was also involved in a project which used survey techniques to assess existing telecommunications systems [23]. In an effort to establish a general approach to research in teleconferencing, they developed a grid to classify teleconferencing system dimensions and characteristics through information gathered in interviews with actual users. Also involved were a series of interviews with users of four existing tele conferencing systems.

The techniques of survey research are certainly relevant to the social evaluation of communications media, and are frequently employed-even in more controlled situations such as those mentioned earlier in this article. Figure 3 summarizes the various research approaches described earlier.

Isolating Key Elements in Mediated Group Communication

The basic research approaches outlined here adopt different methodologies for approaching common research problems. In efforts to assess any communications medium, however, some comparison with other media (usually with face-to-face) is typically assumed and is certainly of central importance. Yet in order to make such comparisons, a duplicate series of techniques is less important than commonality in the research philosophy which prefaces the choice of methodology. In fact, any of the general approaches outlined in this article could be justified as valid tactics, and methods which cross these suggested categories may also be appropriate. The problem in comparison comes in the adoption of a general taxonomy which can be employed across media in various group communications situations.

<u>DOMINANT RESEARCH STYLE</u>		<u>RESEARCH GROUPS</u>										
		Inst. for Defense Analyses Studies	Communications Studies Group	Bell Labs (Murray Hill)	Chapanis	Human Sciences Research	Bell Canada	British Columbia Telephone	Weston/Kristen	New Rural Society	A T & T	Institute for the Future
CONTROLLED LABORATORY EXPERIMENTS												
QUASI-EXPERIMENTS (less control of variables)												
DIRECTED FIELD TRIALS												
OPEN - ENDED FIELD TRIALS												
SURVEY RESEARCH (not arranged by researchers)												
MODELS												

NOTE: The classifications shown, here represent our perception of the dominant research styles of various groups which have been active at some time.

No doubt there will be some overlap in the categories.

Fig. 3. Summary of approaches.

The taxonomy which we are suggesting would simply frame the most fundamental questions which must be asked in order to assess a particular communication situation involving any group. These questions must apply across media (including face-to-face) and they must be flexible enough to encourage development of a broad range of research techniques.

The existing taxonomies of group process, however, tend to be oriented toward dyadic communication (only two persons), and extrapolation from dyadic patterns to group patterns of communication seems to be questionable. The principles simply cannot be assumed to be transferable, though they certainly should not be ignored.

Our own examination of the literature reveals that perhaps the most useful taxonomy was developed in the context of the recently declassified teleconferencing studies by the Institute for Defense Analyses [24] which were mentioned earlier. These studies examined the possibilities for using various kinds of teleconferencing systems in international crisis communications of the sort typical of NATO. Thus their efforts focused on the careful evaluation and comparison of various teleconferencing systems in relation to the peculiar characteristics of crisis negotiations (e.g., translation problems, time constraints, etc.). The key variables were divided into independent variables (e.g., teleconference arrangements, dimensions of crises, and social determinants), intervening variables (e.g., interaction process), and criterion variables (e.g., group satisfaction and group outcome) [25].

Our own attempt to construct a taxonomy of this sort is similar to the IDA effort, but attempts to be more precise and does not assume the crisis orientation. Also, our taxonomy of elements does not attempt to incorporate the dynamic aspects of the communication. Through this does, of course, need to be analyzed, the taxonomy merely attempts to isolate the elements in a communication situation before the interpersonal personal process begins.

The taxonomy (shown in Fig. 4) is arranged to suggest a varied weighting among five key factors. None of the factors will be completely discrete. For instance, if members of a given group have a very high need to communicate, they are more likely to make appropriate efforts to gain access to the chosen medium-even if it is difficult to use or unfamiliar to them. Conversely, however, familiarity with a particular media is likely to be a very important factor in choice of that media, unless some other factor becomes more important.

The problem in constructing a taxonomy of this sort is making it flexible enough to include all options, while still keeping its utility in terms of decision making. The taxonomy should provide basic advice about such things as choice of media when a series of options are available. For instance, Rudy Bretz has constructed a taxonomy of communications media which divides them into eight classes according to the coding process which is being employed for sending messages (e.g., audio/motion/visual, audio only, print only, etc.). Having established this taxonomy, he then traces the necessary decision points in making a choice of the simplest medium available to fill a specific instructional need [26]. When viewed within the context of the general taxonomy of group communication suggested in this article, the decision is based within the sections labeled Medium of Communication

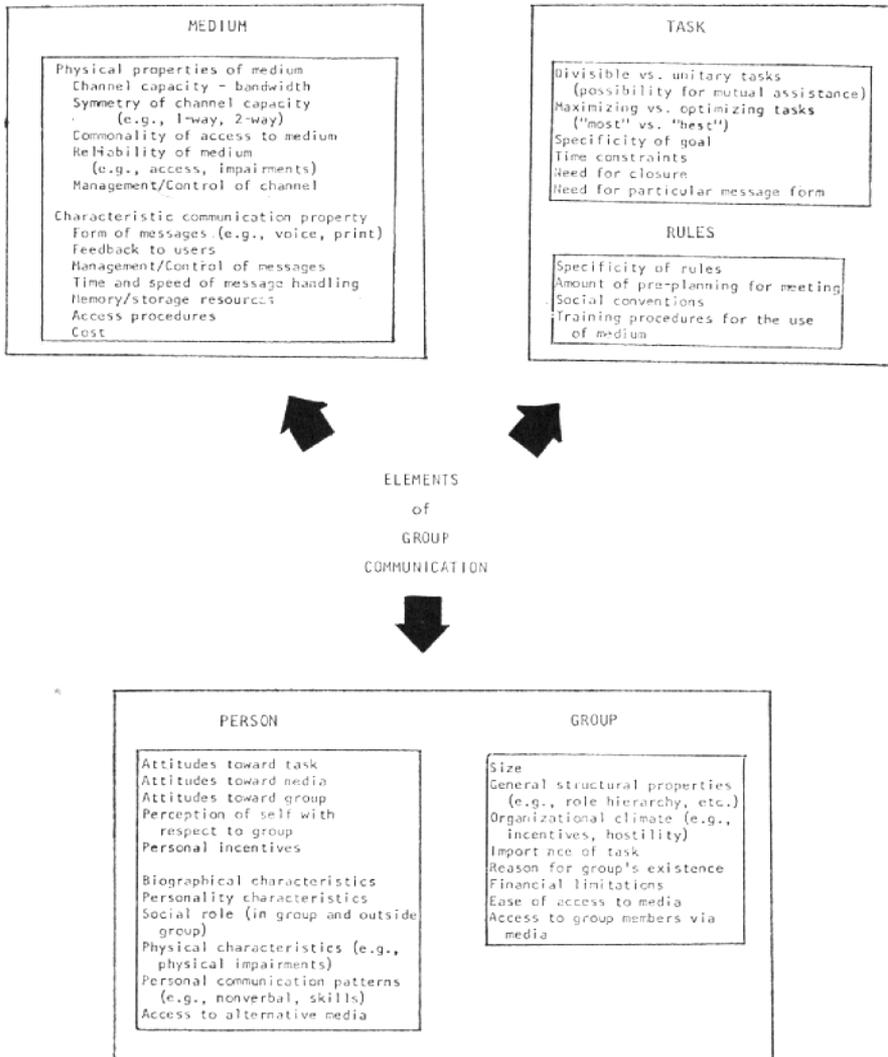


Fig. 4. Identification of elements in a group communication situation (before process actually begins).

and Task. The dimensions of Individual, Group/Aggregate, and Rules for Conduct are thus not included in the Bretz taxonomy.

The question, of course, is determining the most fundamental data needed to make the best possible decision. The Bretz taxonomy moves away from generality in order to develop specific sequence of questions and typologies. This process seems inevitable, though the actual choice of fundamental factors remains debatable.

Another approach to selection of media for instruction was developed by C. Edward Cavert [27]. This is a very usable technique which operates from a matrix showing available media on one axis, with a modification of Bloom's taxonomy of learning on the other axis. (The latter is a generally accepted technique for classifying types of learning, from note memorization to ability to apply knowledge in new contexts.) Cavert then suggests that each available medium be matched to the level of learning with which it seems most appropriate, and that the overall media strategy of a school involves a distribution of available media across types of learning. Thus he has developed a simple technique for assessing the general choices of media for various needs within some overall design.

Another basic taxonomy, which differs somewhat in its approach to media, is that developed by Fred Lakin [28]. This taxonomy functions like a kind of coding sheet, which includes a general format for classification and possible exceptions. Though this approach is not yet developed for choice among media, it represents a good general format which is quite practical in doing initial classifications of media.

As was mentioned previously, the existing taxonomies of group process and most experimental data concerning communication process are based on two-person communication. Even though a number of experiments and field trials have been categorized as "group" communication, most of these teleconference systems have dealt with the interconnection of two face-to-face groups (i.e., where an individual is in face-to-face contact with his own group and in contact via electronic media with a single distant group) [29].

With the exception of experiments involving conference telephone [30], little consideration has been given to the theoretical (i.e., in terms of taxonomy) or behavioral aspects of group interaction solely by means of a teleconferencing medium. This situation is analogous to the three-body or n-body problem in physics, in which description of two-body interactions does not reveal anything about three-body or n-body interactions.

Similarly, little research besides the communication network studies by persons such as Bavelas or Smith and Leavitt has dealt with any of the behavioral or theoretical aspects of the n-body problem of communications.

Future research with computer-assisted media such as FORUM demands investigation of this n-body problem, since the typical scenario includes several users, each connected to others by means of a terminal. The peculiarities of computer conferencing do not allow a facile transfer of theoretical or behavioral findings to other media due to differences in (a) time and synchronicity of interaction, and (b) the code (i.e., typewritten text) used for communication. Since it seems evident that the interaction of three or more individuals by means of different electronic media is affected by the limits and constraints of technology and human engineering, the

problems of nbody communications should be a high priority subject for future investigation.

Another technological consideration in studying group interaction via electronic media is "medium memory"; that is, the capability of a medium to produce a record of an interaction which is available to the user. Information theory and communication theory have often dealt with "channels with memory," but this has been only on a technological/engineering basis. The various *behavioral* aspects of "medium memory" (e.g., its presence or absence, its availability to users, the extent of the record, etc.) may produce significant effects in the use and perception of teleconferencing media and thus must be examined in future research.

The question of taxonomies is frustrating, while still remaining basic to any hope for exchange of evaluations of various media. In pursuit of this goal, a small workshop was held at the Institute for the Future in February of 1974. One of its goals was to agree upon a general taxonomy for the assessment of group communication, with an emphasis on electronic media [31]. The workshop group was intentionally kept very small in order to promote maximum interaction, and thus was not inclusive of all persons doing key research in this field. However, it was hoped that this initial face-to-face workshop would build the basis for broader exchange of research approaches and results in a more continuous manner (probably using some telecommunications media).

An earlier draft of the elements shown in Fig. 2 was used as a basis for the workshop discussion of taxonomies. Our interpretation of the reactions expressed at that time is that the chart of elements identifies the basic issues-but doesn't deal with the vital factor of communication process. Though this was not the purpose of the chart, it is intended that the elements be used within a larger analysis of communication over time. It seemed that all the workshop participants were agreed that a sense of movement-including some analysis of before and after the actual meeting-was perhaps the most crucial need in current media research. Research methods have tended to be too static, and must somehow develop an ability to consider dynamic factors in group process.

Such a realization prompted several specific suggestions for the near future of research. One key suggestion was that our methodology must draw more heavily from fields such as anthropology, since the kind of input which is needed moves beyond the realm of traditional social-psychological research. It was also decided that a core set of questions (not a "universal questionnaire") should be developed and made available to anyone concerned with evaluating group communication situations. These questions could have an important effect on the ability to compare research results across media. Other methods of continued exchange among researchers were suggested, and specific conferences using the FORUM teleconferencing system have now begun.

Conclusion

The approaches outlined in this article all attempt various forms of systematic appraisal of media, using a range of formality. In the field of telecommunications, systematic evaluation of social effects has not been a broadly accepted practice. Rather, there has been a strong tendency toward initial expenditures on technology, with social impact

analysts used only in later stages of implementation-and then only sparingly. The almost nonexistent literature on the sociology of the telephone is a prime example of what has now become a norm in the field of telecommunications. Thus, the approaches presented in this article represent a variety of techniques which-even when considered as a group-may amount to an (as yet) insignificant input to the future of telecommunications research. The range of activities described here, though, suggests that interest in social implications of telecommunications media is both growing and increasing in sophistication. As these techniques become more effective-and assuming that communications channels *within* the various research communities continue to develop-there is a hope for offering more intelligent answers to questions of media usage. The mysteries of human communication will remain dominant, but the ability to choose a complementary medium of communication seems likely to improve as the inherent "messages" of various media become known and more effectively directed.

References

1. Anna E. Casey-Stahmer and M. Dean Havron, *Planning Research in Teleconference Systems*, Human Sciences Research Institute (November 1973).
2. Joseph E. McGrath and Irwin Altman, *Small Group Research* (New York: Holt, Rinehart & Winston, 1966).
3. Alex Bavelas, *Teleconferencing: Background Information*, Research Paper P-106, Institute for Defense Analyses (1963), p. 4.
4. *Ibid.*, p. 12.
5. Alex Reid, *New Directions in Telecommunications Research*, a report prepared for the Sloan Commission on Cable Communications (June 1971).
6. Gerald Bailey, Peter Nordlie, and Frank Sistrunk, *Teleconferencing. Literature Review, Field Studies, and Working Papers*, Research Paper P-113, institute for Defense Analyses (October 1963), p. 2.
7. *Ibid.*, p. 5.
8. W. Richard Kite and Paul C. Vity, *Teleconferencing: Effects of Communication Medium, Network and Distribution of Resources*, Study S-233, Institute for Defense Analyses.
9. Bailey, Nordlie, and Sistrunk, *op. cit.*, pp. 1-19.
10. E.g., Claude E. Shannon and Warren Weaver, *The Mathematical Theory of Communications* (Urbane, Illinois: University of Illinois Press, 1949).
11. See J. Douglas Carroll and Myron Wish, "Multidimensional Scaling: Models, Methods, and Relations to Delphi," Chapter VI, C, of this volume.
12. Communications Studies Group is a part of the joint Unit for Planning Research of University College, London, and the London School of Economics.
13. Communications Studies Group; *Final Report, September 1973, Vol. 1*, a report submitted to Management Services Division of the Civil Service Department and the Long Range Studies Division of the Post Office, p. 2.
14. Alphonse Chapanis, "The Communication of Factual Information Through Various Channels," *Information Storage and Retrieval* 9, p. 215.
15. The classification of tasks is an essential problem in the research of media for group communication. Though no standard typology has yet been adopted by the entire field, the Communications Studies Group has developed one framework called Description and Classification of Meetings (DACOM). Eleven types of meeting tasks are identified, including tasks such as information exchange, problem-solving, conflict of

interest, etc. Bell Labs at Murray Hill, New Jersey, has also done some work in this area and there is a standard typology of tasks which was developed at Harvard. Some agreement on typologies of task will be an important factor in data exchange among researchers in the future.

16. Donald T. Campbell and Julian C. Stanley, *Experimental and Quasi-Experimental Designs for Research* (Chicago: Rand McNally, 1963).
17. J. R. Weston, *Teleconferencing and Social Negentropy*, presented to International Communication Association, Montreal, Quebec (April 1973), p. 8. See also, J. R. Weston and C. Kristen, *Teleconferencing: A Comparison of Attitudes, Uncertainty and Interpersonal Atmospheres in Mediated and Face-to-Face Group Interaction*, The Social Policy and Programs Branch, Department of Communications, Ottawa, Canada (December 1973).
18. Computer teleconferencing is a medium of communication where people "talk" through typewriter keyboards connected to a central computer-often through a large computer network. The participants communicate in standard English, with the computer acting as a connecting device and storing the information in the form specified for the conference. The group may be large or small, and may be present simultaneously or whenever each individual prefers. This medium was first conceived by Dr. Murray Turoff, now at New Jersey Institute of Technology.
19. See *Group Communication through Computers*, Vols. 1 and 2, Institute for the Future (Summer, 1974). Volume 2 describes the current techniques being used in the analysis of FORUM conferences.
20. Personal correspondence from Anders Skoe, Sociological Analyst, British Columbia Telephone Company, September 25, 1973.
21. M. Dean Havron and Mike Averill, "Questionnaire and Plan for Survey of Teleconference Needs among Government Managers," prepared for the Socio-Economic Branch, Department of Communications, Canada, Contract OGR2-0303 (November 30, 1972), p. 1.
22. See James H. Kollen, "Transportation-Communication Substitutability: A Research Proposal," Bell Canada (February 1973).
23. Casey-Stahmer and Havron, op. cit.
24. Bailey, Nordlie, and Sistrunk, op. cit.
25. Ibid., p. 14.
26. Rudy Bretz, *The Selection of Appropriate Communication Media for Instruction: A Guide for Designers of Air Force Technical Training Programs*, Report R-601-PR, the Rand Corporation (February 1971), pp. 30ff.
27. See C. Edward Cavert, *Procedures for the Design of Mediated Instruction*, State University of Nebraska Project (1972).
28. See Fred Latin, *Media for a Working Group Display* (Fred Latin, 218 Waverley St., #C, Palo Alto, California 94301).
29. For instance, the Canadian Department of Communication Audio-Graphic System, Bell Canada Conference TV, and the First National City Bank Audio-Video Teleconferencing System, all described in Casey-Stahmer and Havron, op. cit. See also, Communications Studies Group, *The RMT Teleconference System*, P/72024/RD (1972).
30. See Communications Studies Group, *Progress in Current Experiment*, W/71132/CH (1971); Communications Studies Group, *Bargaining at Bell Laboratories*, E/71270/CH (1971); and Casey-Stahmer and Havron, op. cit.
31. The participants in this workshop were: Garth Jowett, Department of Communications, Canada; Lee McMahon, Bell Laboratories; Martin Elton, Communications Studies Group; Jay Weston, Carleton University; Christian Kristen, University of Montreal; Robert

Johansen, Richard Miller, and Jacques Vallee, Institute for the Future; George Jull and James Craig, Communications Research Center, Canada; Mike Averill, National Film Board of Canada; Tony Niskanen, Arthur D. Little, Inc.; and Dean Havron, Human Sciences Research, Inc.