

ARI Research Note 88-04

AD-A191 807

SELECTION AND EFFECTS OF CHANNELS  
IN DISTRIBUTED COMMUNICATION AND DECISION MAKING TASKS:  
A THEORETICAL REVIEW AND A PROPOSED RESEARCH PARADIGM

Stephen Reder and Nancy Faires Conklin  
Northwest Regional Educational Laboratory

for

Contracting Officer's Representative  
Judith Orasanu

BASIC RESEARCH LABORATORY  
Michael Kaplan, Director

DTIC  
SELECTED  
FEB 23 1988  
S D  
AH



U. S. Army

Research Institute for the Behavioral and Social Sciences

February 1988

Approved for public release; distribution unlimited.

# U. S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES

A Field Operating Agency under the Jurisdiction of the  
Deputy Chief of Staff for Personnel

EDGAR M. JOHNSON  
Technical Director

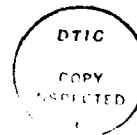
WM. DARRYL HENDERSON  
COL, IN  
Commanding

Research accomplished under contract  
for the Department of the Army

Northwest Regional Educational Laboratory

Technical review by

Dan Ragland



Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

This report, as submitted by the contractor, has been cleared for release to Defense Technical Information Center (DTIC) to comply with regulatory requirements. It has been given no primary distribution other than to DTIC and will be available only through DTIC or other reference services such as the National Technical Information Service (NTIS). The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other official documentation.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ARI Research Note 88-04	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Selection and Effects of Channels in Distributed Communication and Decision-Making Tasks: A Theoretical Review and a Proposed Research Paradigm		5. TYPE OF REPORT & PERIOD COVERED Interim Report May 86 - May 87
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Stephen Reder and Nancy Faires Conklin		8. CONTRACT OR GRANT NUMBER(s) MDA903-86-C-0171
9. PERFORMING ORGANIZATION NAME AND ADDRESS Northwest Regional Educational Laboratory 101 S.W. Main Street, Suite 500, Portland, Oregon 97204		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 2Q161102B74F
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Research Institute for the Behavioral and Social Sciences, 5001 Eisenhower Avenue, Alexandria, VA 22333-5600		12. REPORT DATE February 1988
		13. NUMBER OF PAGES 41
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) - -		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE - -
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) - -		
18. SUPPLEMENTARY NOTES Judith Orasanu, contracting officer's representative		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Decision Making Cognitive Psychology Decision Theory Decision Tasks		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This research note examines the relationships between the communication patterns of decision groups and the nature and results of their decision processes. It looks at the selection of particular channels and channel effects, as well. A review of research indicates that no satisfactory theoretical framework has yet been developed which accounts for the often strategic and tactical nature of communication channel selection. An initial theory is outlined, establishing quantifiable relationships among causally linked (OVER)		

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

ARI Research Note 88-04

20. Abstract (continued)

> sets of variables: 1) characteristics of the decision group (size, structure, and spatial dispersion), 2) characteristics of the decision task (nature of the decision, perceived organizational significance, time available, and available communication channels), 3) channel selection(s) made by the group, 4) structural and content characteristics of the messages produced, 5) decisions reached, and 6) perceived characteristics of the decision process.

*Response to Decision making, Cognitive Psychology  
Decision making*

## INTRODUCTION

As human organizations continue to grow and evolve in the post-industrial era, they need to make more frequent and faster decisions to respond to changing environmental demands. Writing more than a decade ago, Herbert Simon (1973) predicted that "In the post-industrial society, the central problem [facing business] is not how to organize to produce efficiently ... but how to organize to make decisions -- that is, to process information." In the ensuing decade, other scholars of organizational development have confirmed Simon's predictions. Huber (1981, 1984) among others has suggested that post-industrial organizations will exhibit an increasing tendency to make more frequent, more rapid and more complex decisions. Huber characterizes the post-industrial knowledge environment in which organizations must operate as being qualitatively different in two important respects: the geometric rate at which the knowledge base grows and the adoption of high technology means for distributing its contents. Huber argues that to operate effectively in such an environment, the post-industrial organization (whether military or industrial) will need to develop innovative forms of (1) communication and computing technologies, (2) decision group structures and technologies, and (3) decision process management.

As communication and decision making functions become increasingly important characteristics of organizations, critical theoretical and practical questions arise about the effects of alternative organizational structures, information sources and communication channels on the effectiveness of organizational decision making. These issues become

even more significant as organizations increasingly adopt automated communications technologies such as electronic mail and teleconferencing systems and incorporate these new capabilities into their decision support systems (Sprague 1980; Huber 1981; O'Reilly 1982; Kull, 1982; Daft and Lengel 1983, 1985; Lyman 1985).

There are two closely linked reasons why these computer-mediated communication capabilities heighten the significance of the foregoing issues of organizational design and effectiveness: First, decision-making groups have traditionally selected communication modes that were either (1) synchronous and spatially non-distributable (face-to-face conversation); (2) asynchronous and spatially distributable (written mail); or (3) synchronous and spatially distributable (telephony). The advent of computer-mediated (tele)communication adds a fundamentally new type of channel to the mix: Electronic mail and conferencing are asynchronous or synchronous, but spatially distributable. As many authors (e.g., Kochen, 1978; Hiltz and Turoff, 1978, 1981; Black, Levin, Mehan and Quinn, 1983; Reder and Conklin, 1984; Conklin and Reder, 1984; Severinson Eklundh, 1986) have noted, the unique constellation of channel features characterizing computer-mediated communication (CMC) suggests the potential for new forms of group communication to evolve. Closely linked to this possibility is the potential for new processes of group decision making to emerge, particularly among spatially distributed groups. Although definitive empirical research on these matters is still limited, several researchers have suggested that use of CMC not only permits spatially distributed groups to communicate more easily, but in some cases also more effectively, improving, for example, the quality of decisions reached (Johnson-Lenz, Johnson-Lenz and Scher, 1978; Hiltz and

Turoff, 1982; Mattox, 1983). If this indeed proves to be the case, new decision group structures, decision support technologies and decision process management techniques could be developed to improve the decision making capability of spatially distributed groups and organizations.

Several lines of research must converge to address these important issues of organizational design and communication and decision making processes. Research on organizational information processing must clarify the alternative ways organizations monitor and acquire information from the external environment (cf. March and Simon, 1958; O'Reilly, 1982) and disseminate it internally for decision making. More needs to be known about the tradeoffs among decision groups' use of different information sources, communication channels and decision making procedures. Cost benefit and cost effectiveness studies are needed to examine the tradeoffs among these factors on group decision making. Particular attention needs to be paid to how variables such as the spatial distribution of the decision making group and the decision time available to them condition the tradeoffs among their use of alternative information sources and communication channels (Short, Christie and Williams 1976; Mintzberg, Raisinghani & Theoret, 1976; Holland, Stead and Leibrock 1976; Huber 1981; O'Reilly 1982; Daft and Lengel 1985).

#### A Paradigm to Study Channel Selection and Channel Effects

A research paradigm developed below suggests one critical line of inquiry for this agenda. The paradigm examines how decision groups select particular communication channels (e.g., face-to-face (FTF) conversation, telephone, electronic messaging, etc.), how the channel utilized by the group affects the nature of their communicative and

decision making activity, and the effects these relationships have on the outcomes of the decision process. The unit of analysis is a given group engaged in a given decision task. Three facets of group behavior must be systematically examined: (1) channel selection: what variables (i.e., the characteristics of the group and of the decision task) influence the group's selection of particular channels for communication at specified points of the decision making process; (2) channel effects: how does the particular channel selected affect the group's communication (i.e., the content and structure of messages) and decision process, and (3) task outcomes: how do the foregoing variables affect the explicit decision made by the group (termed here the decision outcome) and group members' implicit evaluations of the decision (termed here the process outcome(s)) -- the perceived quality of the decision and decision process, the extent of consensus or disagreement generated, the perceived fairness of the process, etc. Both decision outcomes and process outcome need to be considered because effective overall organizational decision making may require a mix of both positive decision outcomes and positive process outcomes. Long-term organizational effectiveness may depend not only on making effective operational and strategic decisions, but on making many of those decisions in ways that generate sufficient levels of consensus, maintain sufficient degrees of organizational loyalty, avoid disrupting organizational structure, and so forth.

#### Previous Research

There has been considerable research within the disciplines of social psychology, linguistics and communication, and organizational science that bears on these matters. In reviewing this literature, a number of



theoretical and empirical paradigms will emerge. Each offers some important insights on some issues, and empirical research conducted in each paradigm has produced findings that are suggestive of what ought to be examined more closely in the present investigation. At the same time, each approach will be seen to be sharply limited in terms of its applicability to the dynamics of channel selection and effects in the decision making activities of modern organizations.

A considerable amount of research has been conducted on the differential effects of using alternative communication channels. (In this regard, we are concerned here, of course, only with the decision group's use of interactive media, not with its use of broadcast or mass media.) Comprehensive reviews of research comparing interactive communication channels are available elsewhere (Short, Williams & Christie, 1976; Williams 1977, 1978; Fowler and Wackelbarth 1980; Heimstra 1982; Rice and Associates, 1984). Most of this research has been conducted through one of two empirical methods: (1) controlled laboratory experiments, in which pairs or small groups of subjects perform assigned tasks under experimentally manipulated conditions of communication; or (2) interviews and surveys about individuals' communication patterns, attitudes toward alternative communication channels and perceptions of the relative utility of the alternative channels for group conferences and other tasks. The earlier studies, of course, typically focussed on comparisons of FTF and audio teleconferencing/telephony (with or without two-way video links); more recent studies have included, if not emphasized, CMC in the interactive communication channels being compared.

There is not sufficient space available to review the research in detail. Nevertheless, a number of important generalizations have emerged and several significant conclusions can be drawn. One major area of agreement among the many experimental and survey-based studies is that observed channel effects depend critically on the nature of the collective task. Tasks that are generally cooperative in nature and tasks that demand relatively low levels of interpersonal involvement have tended to be insensitive in laboratory experiments to the communication medium through which they are conducted. This result has been obtained consistently for a wide variety of information transmission, opinion exchange and cooperative problem solving tasks. On the other hand, tasks that are essentially conflictual in nature or require relatively high degrees of personal involvement exhibit channel effects in laboratory experiments (Short, Williams & Christie, 1976; Williams 1977, 1978). Differences among alternative channels in such constructs as their degree of "social presence" (Short, Williams & Christie, 1976) or "richness" (Bodensteiner 1970; Daft and Lengel 1983) have correlated reasonably well with the channel effects observed in the laboratory. A variety of effects has been consistently reported for "interpersonal" or conflict related tasks. For example, channels low in "social presence" or "informational richness" relative to FTF conversation are consistently found in "interpersonal" or "conflict-related" tasks to carry language patterns that are more argumentative, more depersonalized, narrower in focus and more task-oriented (Stephenson, Ayling and Rutter 1976; Weston, Kristin and O'Conner 1975; Williams 1977). Channel effects similar to these have been found in comparisons of OMC and FTF conversation as well (Rice and Associates 1984; Kiesler, Siegel and McGuire 1984; Kiesler, Zubrow, Moses and Geller 1985; Love and Rice 1985).

Williams (1977) reviews several studies which found some closely allied channel effects on task outcomes: FTF conversation is associated with "softer" bargaining, more easily reached agreement, and decisions based more on the personalities and personal influence of the participants, whereas use of channels having lower "social presence" is associated with harder bargaining, greater difficulty reaching agreements, and decision outcomes based more on the merits of the case than on the personalities and interpersonal influence of the participants. Williams also cites experimental data which suggest that use of channels having lower "social presence" may increase the disruption of established hierarchies within the group and alter the social processes involved in developing group solidarity.

Rice and Associates (1984) recently reviewed experimental studies of channel effects in both "task management" and "human relations" types of activities conducted via FTF or OMC. Once again, channel effects depend strongly on the nature of the task: no consistent effects are identified for "task management" activities, whereas a broad array of channel effects are identified for the "human relations" tasks. In controlled experiments involving "human relations" activities, FTF communication exhibits a number of characteristic differences from OMC: FTF is associated with more frequently expressed disagreement but also more easily reached agreement; FTF is associated with more soliciting of others' opinions, with higher levels of tension but also higher amounts of relief from tension, and with greater solidarity than is observed in OMC. Stated more generally, FTF involves a greater proportion of "socio-emotional" content, whereas OMC a greater proportion of "task-oriented" content (Rice and Associates 1984).

Surveys of users' attitudes toward and perceptions of the suitability of alternative channels for communication exhibit a generally parallel task dependency. Participants (and experimental subjects) in teleconferencing were asked to rate the suitability of various channels used as substitutes for FTF conversations or meetings. Strong interactions are typically found between the given task and rating differences for accomplishing the task through different channels. For tasks such as getting to know someone, bargaining or negotiating with others, or discussing sensitive topics, FTF conversation is typically rated as being preferable to alternative channels, being more "personal" and "friendlier." On the other hand, for a wide variety of "task management" activities, differences in channel ratings are non-existent or even reverse, so that audio-teleconferencing, CMC or written communication may be preferred to FTF conversation (Champness 1972; Short, Williams & Christie, 1976; Albertson 1977; Williams 1978; Fowler and Wackerbarth 1980; Rice and Associates 1984).

There have been numerous theoretical explanations suggested for the observed patterns of channel effects (Williams 1977; Rice and Associates 1984; Fulk and Van Tassel 1985). To a considerable extent, the various theories concur in assuming that the locus of channel effects is intrinsic in the media themselves; the theories differ primarily with respect to the particular characteristic seen as critically differentiating the channels. Three examples illustrate the range of such theories: (1) theories based on differences in the intrinsic bandwidth and overall communicative efficiency of the channels -- although such explanations can in principle account for some interaction between task and channel, they cannot readily account for results such as

those found by Morley and Stephenson (1970) and others that the relative advantage of FTF over other channels depends sharply on the strength of a side's "case" in a negotiating task; (2) theories based on differences among the channels' capacities to carry nonverbal cues -- such explanations have generally misconceived the ways in which nonverbal cues are incorporated into discourse and thus fail to predict, for example, that turn-taking is often better controlled in telephone conversations than in FTF discourse; and (3) theories based on differences in the perceived social immediacy or intimacy of the channels -- although such theories account for many of the extant results, they fail to predict significant findings such as Short's (1973) discovery that attitude change (measured as a dependent variable in controlled experiments) is greater as a result of using the more "impersonal" channels.

Despite such uncertainties, the foregoing lines of research offer some significant generalizations pertinent to issues being considered here. The nature of the decision group's task can be expected to interact sharply with the differential effects of using alternative communication channels. Such interactions have consistently shown up in experimental and survey data sets. The interactions appear regularly in several types of dependent variables of interest here: patterns of language use, decision outcomes, and process outcomes. A deeper understanding of the interactions among task, communication channel and outcome would greatly facilitate the design of more effective organizational structures, decision-support systems and communication technologies. Although the research reviewed offers a good starting point, there are formidable theoretical and methodological reasons why its findings cannot be usefully generalized from the laboratory

experiments and field surveys to ongoing behavior in organizational settings.

There are several major points to be made in this regard. First, the laboratory experiments typically have had very low ecological validity with respect to the communicative and decision making behavior of most organizationally-based groups. Two significant features shared by most of the experiments are of concern: the subjects who functioned as a dyad or small group in the experiment typically were (1) unknown to one another and (2) not equally familiar and experienced with the experimentally manipulated communication channels. There is considerable evidence (some of which comes from these same experimental studies) that channel effects in group communication are sensitive to the extent of familiarity and solidarity among the individuals involved. Since members of organizationally-based decision groups tend to know (and communicate with) one another considerably more than do members of randomly formed groups of subjects, there is more than an academic possibility that results won't generalize from the latter contexts to the former.

The subjects' lack of equal familiarity with the communications channels used in the experiment is also problematic. In many cases their performance (or reactions to) using FTF conversation was compared with that using, for example, audio teleconferencing or OMC. There is much anecdotal evidence and some systematic data indicating that individuals and groups learning to use a new communications technology (e.g., electronic mail) utilize it differently while they are learning or habituating to it than they do after mastering its use (Finn 1985). Many students participating in the experiments reviewed reported feeling relatively strange or uncomfortable using unfamiliar channels for

conducting group tasks. It is thus difficult to determine whether observed behavioral differences result from differences in channel characteristics (as many authors conclude) or differences in users' familiarity with the media.

The second major limitation in the body of previous research is that the theoretical framework underlying much of the experimental and survey work has been one of channel equivalence or substitutability rather than one of channel specialization. Most of the theoretical and empirical inquiry has dwelt on testing the null hypothesis of channel equivalence rather than progressing to vital issues of channel selection, whose consideration is also critical for addressing issues of organizational design, decision-support systems, and training needs. The channel equivalence framework models the use of alternative channels strictly in terms of their psychological and communicative equivalence (and hence substitutability); given the equivalence of two channels for a particular category of tasks, their use is determined by such factors as their relative costs and accessibility (Short, Williams & Christie, 1976). Such models often predict no tradeoffs between channels which are not equivalent. Williams (1977) has stated the limitations of the framework very succinctly (and note that he was one of its chief architects):

One can only be sure that the transfer of a type of face-to-face meeting to a telecommunications medium has no disadvantages if one is sure that there are no psychological differences in communicating over these two media. This is equivalent to trying to prove the null hypothesis, a logically impossible exercise. (p. 974)

There is a limited range of useful applications of such models; they are particularly useful in cost benefit calculations of the tradeoffs in substituting telecommunications for face-to-face meetings, the original

target application of this framework (Reid 1971). Such models encounter great difficulty, however, trying to account for the channel selection decisions that occur in organizational settings on a daily basis precisely because the alternative channels are not equivalent. The phenomena of channel selection and channel switching within organizations reflect a degree of functional specialization among the channels: although each may be used nearly exclusively for some communicative purposes or tasks, other communicative purposes or tasks or contexts are in domains in which there may be considerable functional overlap among several channels. One need only think of the pattern of communicative activity in one's own office setting to appreciate the significance of such functional specialization. There are usually some matters that are communicated exclusively in writing as a formal memo, whereas other matters may be discussed only face-to-face. And there usually are some activity domains in which communicative events may transpire through one of several alternative channels (e.g., phone, FTF conversation, an informal note, etc.).

To model channel selection and effects in complex organizational environments, then, their overall communicative economy must be considered. The characteristics of communicative events, including the channels through which they take place, are determined in highly patterned ways. Two bodies of research in linguistics and communication suggest avenues for assessing — and differentiating — channel selection and channel effects: (1) sociolinguistic and conversational analysis and (2) studies of code selection and modality constraints.

Sociolinguists and conversational analysts have developed techniques for observing and interpreting natural conversation, building on models



of discourse structure from the philosophy of language (e.g., Searle 1970, Grice 1975, Gordon and Lakoff n.d.) and literary text analysis (e.g., Halliday and Hassan 1976, Halliday 1972, Brown and Yule 1983, Stubbs 1983, Van Dijk 1982). They have built up from close observation of the minutiae of language (e.g., intonation, pronunciation, grammatical forms, gestures) to the major structures creating cohesion in extended discourse (e.g., reference among sentences and speech events, conventions for opening and closing speech events, topic and speaker turn-taking patterns), isolating linguistic structure factors from socially conditioned speech norms and mapping the overlap and intersections of language and social variables.

Searle and others established a fundamental distinction among speech act types by analyzing the conversational impact of two classes of verbs: those which have locutionary content (i.e., are propositional in content; assert facts) and those which have illocutionary force (i.e., involve what is accomplished by what is said or assert speaker intent). Working with texts of naturally occurring communications, sociolinguists have extended these two fundamental speech act types to describe a wide variety of language features that have illocutionary force, that serve to shape, restrain, and refigure what is said to create the cultural and interpersonal impact of talk. Labov (1966, 1972), Gumperz (1982), Ervin-Tripp (1964), Philips (1983), Heath (1983) and others have shown that speakers select among a variety of illocutionary options in order to create interactional effects, linguistically encoding, for example, level of comfort or solidarity, role relations, and attitude toward the topic of conversation.

While the exact articulations of these affective factors are culturally determined, the dimensions of the illocutionary acts are universally present in human interaction (e.g., Goffman 1971, Gumperz 1982). Labov (1966), for example, demonstrated that variations in New York City natives' and in-migrants' informal pronunciations of certain words are highly correlated with the speaker's attitude toward living in the city and sense of solidarity or antagonism toward other ethnic and economic groups in the metropolis. He also found that changes in the pronunciation of these sociolinguistic variables when speakers carefully monitor their speech (as opposed to using a casual conversational style) are closely related to their level of self-esteem and personal confidence. Conversational analysts have also developed powerful predictive models for sociolinguistic variables in discourse structure. Sacks, Schegloff and Jefferson (1978) posit an ordered array of communicative event types, ranging from informal conversation, which is internally managed through a step-by-step allocation of speaker turn-taking and turn-length, to ceremonial discourse, which is externally managed, in which turns and turn-length are almost entirely preallocated.

In a few promising studies these micro- and macro-analyses of speaker manipulation of sociolinguistic variables have been successfully correlated with social psychological analyses of interpersonal interaction. Morris and Hopper (1980), for example, have applied the model for conversational turn-taking developed by Sacks, Schegloff, and Jefferson and others to demonstrate how inferiors and superiors use specific linguistic conventions to repair conversational conflicts by constructing new conversational conventions which permit discourse to proceed despite disagreement. D'Andrade and Wish (1985) found that

speech act categories correlated with Bales' (1958, 1951) Interactional Process Analysis features in an experimental study using videotaped family conversation. Labov and Fanshel (1977) were able to differentiate and confirm the content and affect of therapeutic discourse, predicting the therapist's assessments with transcript analyses based on speech act and sociolinguistically derived linguistic categories. In a study closer to issues being considered here, Anderson (1983) devised an ad hoc list of "decision making task codes" which bear a strong similarity to Searle's illocutionary verbs to analyze the National Security Council Executive Committee's deliberations during the Cuban missile crisis; his transcript analyses led to a model of crisis decision-making.

These sociolinguistic and conversational studies are extremely promising for the analysis of the decision process. They point to specific, empirically testable variables in message texts that can be used to index participants' levels of comfort with, involvement in, and confidence about the group communication and decision-making process.

A second body of communication research provides a direct link between sociolinguistic variables and the channel selection and effects questions posed in this study. Modality, or in the terms of this research, communication channel, has been studied on the two channels of speech and writing. Chafe (1982), Ochs (1979), Olson (1975) and Olson and Hilyard (1978) Tannen (1979, 1982a, 1982b), Redeker (1984) represent the substantial body of research investigating, analytically and empirically, the differences in language structure and interactional convention that co-vary with literacy and orality. Oral texts tend, in this analysis, to exhibit involvement (Chafe; paralleling Ochs's "informal", Olson's "rhetorical" style), while written texts are characterized by

integration. (Chafe; Ochs's "formal", Olson's "logical"). These are synthetic constructs, representing communication as varying over a continuum of styles indexed by varying rates of occurrence of specific linguistic features. Written communications, for example, are richer in complex sentence structures, nominalizations, and participles. Oral communications are rich in direct quotation, parallelisms, turn-taking monitoring devices, and emphatic particles. Significantly, these researchers associate oral and literate styles with characteristics of the spoken and written media as channels for communication. Written communication is designed for distribution, often to an unknown or unnumbered audience; it is pre-plannable; it is re-readable; it lacks feedback confirmation from its recipient. Oral communication exploits feedback and monitoring from participants; uses rhythm, repetition, and stress to create emphasis and underline structure; and makes use of deictic and referential pointers that are fluid within the communicative event.

Studies of alternation between dialects, speech styles, and languages (e.g. Gumperz 1982, Gumperz and Hernandez 1972) find that such linguistic code selection is a regularly patterned and predictable sociolinguistic variable, just as are the wide range of choices such as pronunciation, intonation, and turn-taking. Thus the same social and cultural constraints that cause a speaker to select, e.g., "gonna" instead of "going to" or "Let's dig in" instead of "I call this meeting to order" also condition the choice of language among bilinguals. The specific features that characterize oral and written modalities have also been found to be significant variables in code selection studies, suggesting that the far broader base of known sociolinguistic variables may be used to study channel selection and channel effects in group decision making.

We propose that the use of sociolinguistic variables will effectively measure the features and functions of messages produced through the various communication channels during decision task process.

Generalizing from existing research into sociolinguistic variation, such measures will more accurately reflect the social and linguistic constraints on individuals' communication than the subjective reports and reactions used heretofore. In particular, analysis of the contextual determinants of sociolinguistic variation in the message texts will place communication channel choice behavior in a continuum with other psychological and organizational variables and will isolate for analysis the often confounded phenomena of channel selection and channel effects.

The introduction of sociolinguistic analysis into the study of communication channel analyses of distributed decision making offers an opportunity to address a variety of questions current in the study of organizational decision making. Based on existing research, reasonable hypotheses predict that:

- o Channel selection is specialized by task characteristics
- o Channel selection and effects are specialized by group characteristics
- o Channel selection depends on perceived stage of the decision process
- o Sociolinguistic analysis can characterize channel effects that enhance or impede group decision making for a variety of task and group characteristics.
- o Channel selection will be a significant predictor of decision outcome and process outcome even with task and group characteristics held constant
- o Interactions will occur between the spatial dispersion of the decision group and other group and task characteristics, such that channel selection behavior will condition the effectiveness of distributed decision making

## TESTING THE PARADIGM: A STUDY IN PROGRESS

As an example of how this approach can be used in research, a project in progress will be described.

### Overall Method

Intensive field studies of group communication and decision making patterns are being conducted in two organizational settings, chosen to offer both the ready access and cooperation needed for the study and to provide a theoretically informative contrast in organizational context. The contrast should reveal how organizational context influences and is influenced by the phenomena of channel selection and channel effects.

### Site Selection

Two large organizations will be studied. They must have well-established use of CMC among geographically remote offices, so that the effects of spatial distribution on communication and decision-making processes can be observed. Each must permit ongoing access to selected decision groups throughout the organization and cooperate in gathering various types of data. The two-site strategy will permit contrast of channel selection and effects within distinct organizational decision making contexts.

The first field site -- currently being studied -- is a large engineering and manufacturing company with major facilities at several locations within a 25 mile radius in an urban area and sales offices across the country and throughout the world. One particular product group within the company is serving as the chief focus of study. The

product group, like others within the company, includes its own management, engineering, manufacturing, finance, marketing and sales staff. The group is primarily based in one physical location; several key staff, however, are based at another location about 20 miles away because of their need to collaborate with other related work groups. Regular communication takes place between staff at these two locations, through travel and telecommunication (telephone, electronic mail, facsimile and courier delivery of written materials).

A variety of work groups and decision groups has been identified within this product group. The communication and decision-making behavior of these groups will be the primary units of observation and analysis, as described elsewhere in this paper. Significant contrasts exist among these work and decision groups in terms of size, spatial dispersion, needs to communicate for accomplishing specific tasks, and the nature of the decisions which they routinely make.

A suitably contrasting second site will be selected as the research in the first setting nears completion.

#### Initial Field Work

Initial field work will focus upon organizational analysis, tracing the structure of routine and formalized decision making and the circumstances and procedures for the creation cross-unit decision groups such as task forces and special committees. Structured interviews with key decision makers will be conducted to identify the site's communication and problem solving structures following Mintzberg's (1973) model and analyses developed in behavioral and organizational theory (e.g., March and Shapira 1982) to locate and query these individuals.

Significant effort is being devoted to situating the researchers in the site and taking on an open, participant-observer role in the organization (e.g., Conklin and Reder 1984, Kanter 1976) and an active role in using its communication channels.

This period of familiarization will produce an organizational analysis and final specifications of task-, social- and communication-structure criteria for selecting decision groups and tasks for detailed study. This information will not only inform choices about the decision groups and tasks to sample for inclusion in the more structured phase of the field study (see below), but will provide the research team with more indepth information and a network of close social contacts that may prove invaluable later for assistance interpreting events in terms of how they are perceived by employees, the "natives" of the organization. Such inside perspectives on decision making and communication patterns, in particular, will provide a means for validating tentative interpretations of empirical relationships apparent in the more formally collected data.

#### Formal Data Collection

Formal data collection in each site is being designed to provide broad, representative information for model-based analysis of channel selection and channel effects.

-----  
Figure 1 here  
-----

Figure 1 illustrates the proposed framework for data collection and analysis in each site. Each box in the diagram represents a set of observable variables. The leftmost box represents the unit of analysis,



a given decision group paired with a given decision task to perform. The independent variables of the study are the characteristics of the given decision group and of the given decision task.

- o Decision groups. The characteristics of decision groups to be measured include their size and hierarchical structure, their organizational status (e.g., an operational department, a task force, an ad hoc committee), group members' familiarity with each other and the extent of their spatial dispersion. The decision group will be operationally defined to exclude individuals who act as experts or consultants at one or more stages of the decision process rather than as core group members (Huber 1984).
- o Decision tasks. Decision task characteristics to be examined include the nature and organizational significance of the decision to be made, the time available for making the decision, and the availability of various channels as communication resources for making the decision (e.g., ready access to terminals for OMC, funds for traveling to FTF meetings). Decision task identification will generally follow the model of strategic decision making proposed by Mintzberg, Raisinghani, and Theoret (1976) (see Figure 2), as critiqued and tested by Nutt (1984),

-----  
Figure 2 here  
-----

Anderson (1983) and March (1981). This research will begin study at the second stage of the Mintzberg et al model, i.e., after a decision imperative has been recognized, a decision group identified and a decision process initiated. Assessment of task features and task stage will be conducted, as in those studies, querying participants' perceptions of their charge, access to resources (time, expertise, financing, etc.), complexity and significance of the decision, placement of the decision group in organizational structure, and progress through the decision process. An empirically tested model such as the Description and Classification of Meetings (DACOM) taxonomy (Connell 1974) will be used to guide the participant interview process.

- o Decision outcome and process outcomes. The rightmost box in the diagram represents the outcomes of the decision-making process, including what was described above as the decision outcome and the process outcomes. These are dependent variables in the framework. The decision outcome will be measured from decision group members' post-process ratings of the quality of the decision reached by the group. Process outcomes will also be assessed from participants ratings and evaluations at the end of the decision process. The literature review above indicated a number of process outcome variables that should be examined. These include participants' perceptions of the group process, the extent to which consensus or

disagreement was established, the perceived fairness of the process, and the extent for which individual members support the decision reached.

- o Message characteristics. The middle boxes in the framework in Figure 1 represent components of the groups' communication activities during the course of a given decision task. In most cases, of course, a series of communicative events takes place during a given decision process. Typically, scheduled FTF events may take place at critical stages in the process, with numerous communications on a variety of channels and among sub-sets of the decision group intervening. It is crucial to maintain a clear distinction between channel selection and message characteristics, in order to study their intersection.

For purposes of sampling channel selection and analysis, Gumperz, Kaltman, and O'Connor's (1984) three-level model of interactional units as composed of speech acts (universal, basic assertion or interaction units), communication tasks (intermediate, recurrent, general interactive intentions), and communicative events (culturally specific, time-bound units of communication activity) will be used, with assessment of decision task stage tied to each communicative event boundary, as determined by language analysis.

Message samples will be gathered from those communications among core decision group members about the decision task. Messages on each communication channel will be evaluated using analyses from sociolinguistics and discourse and conversational analysis, including turn-taking structure (Sacks, Schegloff, and Jefferson 1978; Fisher 1984; Morris and Hopper 1981, speech acts, reference, and intentionality (Searle 1969; Labov and Fanshel 1977; Fillmore 1971; Cicourel 1980; Dore 1977; Kraut and Higgins 1984; Grice 1975; Wish, D'Andrade, and Goodnow 1980; D'Andrade and Wish 1985), textual structure (Halliday and Hasan 1976; Shuy 1982; Brown and Yule 1983; Stubbs 1983; code selection constraints (Lambert 1967; Gumperz 1982; Lakoff 1982; Shimanoff 1980; Freedle and Duran 1979), and modality constraints (Chafe 1982; Tannen 1979, 1982a, 1982b; Redeker 1984; Fillmore 1977; Olson and Hilyard 1982; Olson 1977; Ochs 1979).

Affective factors in messages will also be evaluated using interactional process analyses. Interviews and exercises will focus on participants' perceptions about group communication strategies, group social process, progress through the task stages and quality of decision outcome. In addition, participants will listen to and read selected samples from decision group communications and their reactions and interpretations will be recorded. These procedures will follow the work of Wish, Deutsch and Kaplan (1976), Wish, D'Andrade, and Goodnow (1980) and D'Andrade and Wish (1984) who have established the correlation of speech act analyses of communicative texts with bipolar scales of perceptions of interpersonal relations (from Bales 1951, 1958), applying their empirical procedures to other discourse variables and to channel selection factors, and Labov and Fanshel (1977), Dore (1977), and Gumperz (1982), who have

successfully applied sociolinguistic variables to predict and, with participants (and, in Gumperz' case, in experimental settings), to reconstruct extended interactional texts.

- o Channel Selection. Procedures for sampling channel selection will be created for all communication channels: Written documents, formal and informal, will be collected through monitoring of the office mail system and direct intervention in personal exchanges of hard copy documents. Electronic messages will be sampled through automated collection programs keyed to the group members' addresses; interruptive queries of users may also be introduced into the OMC system.

Phone and FTF will be observed within groups in which a researcher has established a participant role and permission will be sought to directly monitor and audio record selected formal and informal verbal interactions. On a sampled basis, group members will maintain logs of their interactions in all channels. Samples transcribed from verbal communications and document texts will be subjected to close linguistic analysis. For a sample encounter researchers will conduct process queries and exercises during and immediately following the interaction and at decision process stages.

#### Data Analysis and Modeling

The diagram of Figure 1 was designed not only as a frame for data sampling and aggregation, but also as a structural model for multi-stage least squares regression. Arrows in the diagram correspond to assumptions made about causal ordering. Decision group and task characteristics are assumed to be known and fixed throughout the course of the decision-making task. There certainly are occasions when the nature of the decision task or the composition of the decision group changes midstream; such cases will be excluded from the data analysis (on the basis of answers to suitable screening questions in the post-decision questionnaires filled out by group participants). Thus the independent variables of group and task characteristics are assumed to be logically prior to the remaining variables in the model.

The arrow from the Channel Selection to the Message Features box represents the assumption that choice of communicative channel can

causally affect the characteristics of the message sent through the channel (e.g., a decision to speak to someone by phone rather than sending a letter may impact the verbal message involved); the lack of a reciprocal arrow leading from the Message Features box to the Channel Selection Box reflects a strong assumption made that causal effects in that direction do not occur. The temporal ordering of the events is the primary reason for making that assumption: it is assumed that the message is not produced in advance of the decision of how to send it. Although there surely are cases in which, for example, a written message is produced before deciding how to send it (e.g., by postal mail, special courier or electronic mail), we will systematically exclude such events from the data set. We are not interested in this particular study in channel choices that reflect decisions about how to deliver or route already existing messages.

The arrows leading from the Channel Selection and Message Features boxes to the Decision Outcome/Process Outcomes box again reflect assumptions about the causal and temporal ordering of the events involved. As noted earlier, measures in the Decision Group/Decision Task and Decision Outcome/Process Outcomes boxes are punctuate measures at given points in time. The measures of Channel Selection and Message Features boxes, however, are aggregated over variable numbers of intervening communicative events. Nevertheless, some disaggregation and testing of sequential effects may be in order, since the methods described will "tag" individual communicative events with characteristics such as the reported decision process stage at which the particular event occurred, the members of the decision group participating in the event, and so forth.

If the foregoing assumptions are made, the path coefficients for the arrows in the model can be ascertained through standard multi-stage linear regression techniques. Since a number of variables are involved in each of the model's boxes, factor analytic and canonical correlation techniques will be used to reduce the number of variables in the models being tested.

This model will be used to examine many interesting theoretical and practical issues concerned with the relationships among decision group and task characteristics, channel selection and channel effects in spatially distributed communication and decision making. There is not room to discuss the full range of issues that will be addressed, but they do fall into several natural clusters that can be mentioned briefly. First, interactions between spatial distribution and decision characteristics should be clearly drawn. Of particular interest are combinations of independent variables where task significance is high, timelines are short, and groups are spatially distributed. Crisis situations, of course, often fit into this prescription. Although it is not expected that much data will be collected during true crisis situations, observed trends in communication and decision-making patterns as situational parameters approach the characteristics of crisis situations should prove quite valuable.

Of broad theoretical interest are questions about how channel selection behavior fits into group decision-making. Strong interactions are expected between the characteristics of the group, the nature of the task and the channel selection behavior that individuals will display. Social strategies for persuasion and social control, in particular, should be evident in the channel choices that individuals exhibit.

Language patterns should also reflect these interactions, but should not disappear after channel effects are held constant statistically. That is, group and situational influences on an individual's verbal behavior are predicted even after the effects of those variables on channel choices are taken into account.

## REFERENCES

- Anderson, Paul A. (1983). Decision making by objection and the Cuban missile crisis. Administrative Science Quarterly, 28, pp. 201-22.
- Bales, Robert Freed. (1970). Interaction process analysis. New York: Addison-Wesley.
- Bales, Robert Freed. (1951). Personality and interpersonal behavior. New York: Holt Rinehart & Winston.
- Black, S., Levin, J. A., Mehan, H., & Quinn, C. N. (1983). Real and non-real time interaction: Unraveling multiple threads of discourse. Discourse Processes, 6, 59-75.
- Brown, Gillian, & Yule, George. (1983). Discourse analysis. Cambridge: Cambridge University Press.
- Cartwright, D., & Zander, A. (1968). Group dynamics: Research and theory. New York: Haper & Row.
- Chafe, Wallace L. (1982). Integration and involvement in speaking, writing, and oral literature. In Deborah Tannen (Ed.) Spoken and written language: Exploring orality and literacy. Norwood, NJ: Ablex.
- Cicourel, Aaron V. (1974). Cognitive sociology: Language and meaning in social interaction. New York: The Free Press.
- Cicourel, Aaron V. (1980). Three models of discourse analysis: The role of social structure. Discourse Processes, 3, pp. 101-32.
- Clark, H., & Marshall, C. (1981). Definite reference and mutual knowledge. In A. Joshi, I. Sag, & B. Webber (Eds.), Elements of discourse understanding. Cambridge: Cambridge University Press.
- Conklin, Nancy Faires, & Reder, Stephen M. (1984). The economy of communicative work: A channel analysis of electronic mail usage. In Robert W. Taylor (Ed.), Proceedings: IEEE First International Conference on Office Automation. Silver Spring, MD: IEEE Computer Society Press, pp. 63-72.
- Connell, S. (1974). Office communications survey. London: University College, Communication Studies Group Paper No. P/74067/CN.
- Coulthard, Malcolm. (1977). An introduction to discourse analysis. London: Longman Group Limited.
- Cyert, R. M., Dill, W. R., & March, J. G. (1958). The role of expectations in business decision making. Administration Science Quarterly, 3, pp. 307-430.

- D'Andrade, Robert G., & Wish, Myron. (1985). Speech act theory in quantitative research on interpersonal behavior. Discourse Processes, 8, pp. 229-59.
- Daft, R., & Lengel, R. (1985). A proposed integration among organizational information requirements, media richness and structural design. Management Science, in press.
- Daft, Richard L., & Lengel, Robert B. (1983, May). Information richness: A new approach to managerial behavior and organization design (TR-ONR-DG-02). Department of Management, Texas A&M University.
- Delbecq, Andre L., & Van de Ven, Andrew H. (1971). A group process model for problem identification and program planning. Journal of Applied Behavioral Science, 7(4), 466-92.
- Delbecq, Andre L., Van de Ven, Andrew H., & Gustafson, David H. (1975). Group techniques for program planning: A guide to nominal group and delphi processes. Glenview, IL: Scott, Foresman and Company.
- Dore, J. (1977). Children's illocutionary acts. In Ray O. Freedle (Ed.), Discourse comprehension and production. Hillsdale, NJ: Erlbaum.
- Edinger, Joyce A., & Patterson, Miles L. (1983). Nonverbal involvement and social control. Psychological Bulletin, 93(1), 30-56.
- Fulk, Janet, & Van Tassel, Joan. (1985, May). Nonverbal communication in electronic messages. Paper presented at the International Communication Association Annual Conference, Honolulu.
- Fillmore, Charles. (1971). Santa Cruz lectures on deixis. Bloomington, IN: Indiana University Linguistics Club.
- Fillmore, Charles J. (1979). On fluency. In C. Fillmore, D. Kempler, & W. S.-Y. Wang (Eds.), Individual differences in language ability and language behavior. New York: Academic Press.
- Finn, T. Andrew, & Stewart, Concetta M. (1985, May). An introduction to videotex technology and services, and its adaptation for the management of organizational information. Paper presented at the International Communication Association Conference, Honolulu.
- Finn, T. Andrew. (1985, May). A comparison of organizational uses of voice and electronic (text) messaging systems. Paper presented at the International Communication Association Annual Conference, Honolulu.
- Fisher, Sue. (1984). Institutional authority and the structure of discourse. Discourse Processes, 7, pp. 201-24.



- Fowler, Gene D., & Wackerbarth, Marilyn E. (1980). Audio teleconferencing versus face-to-face conferencing: A synthesis of the literature. The Western Journal of Speech Communication, 44, 236-252.
- Freedle, Roy, & Hale, Gordon. (1979). Acquisition of new comprehension schemata for expository prose by transfer of a narrative schema. In Roy O. Freedle (Ed.), New directions in discourse processing.
- Garfinkel, H. (1967). Studies in Ethnomethodology. Englewood Cliffs, NJ: Prentice-Hall.
- Givon, Talmy (Ed.). (1979). Discourse and syntax. New York: Academic Press.
- Goffman, Erving. (1971). Relations in public: microstudies of the public order. New York: Harper & Row.
- Goffman, Erving. (1974). Frame analysis. New York: Harper & Row.
- Gordon, David, & Lakoff, George. (n.d.). Conversational postulates (Contract No. GS-2939). Washington, DC: National Science Foundation.
- Grice, H. P. (1975). Logic and conversation. In P. Cole & J. Morgan (Eds.), Syntax and semantics. New York: Academic Press.
- Gumperz, John J. (1972). Bilingualism, bidialectalism, and classroom interaction. In Courtney B. Cazden, Vera P. John & Dell Hymes (Eds.) Functions of language in the classroom. New York: Teachers College Press, Columbia University.
- Gumperz, John J. (1982). Discourse strategies. Cambridge: Cambridge University Press.
- Gumperz, John J., & Tannen, Deborah. (1978). Individual and social differences in language use. In W. Wang and C. Fillmore (Eds.), Individual differences in language ability and language behavior. New York: Academic Press.
- Gumperz, John J., Kaltman, Hannah, & O'Connor, Mary Catherine. (1984). Cohesion in spoken and written discourse: Ethnic style and the transition to literacy. In Deborah Tannen (Ed.) Coherence in spoken and written discourse.
- Gutek, Barbara A., Bikson, Tora K., & Mankin, Don. (1984). Individual and organizational consequences of computer-based office information technology. In Stuart Oskamp (Ed.), Applied social psychology (annual 5). Beverly Hills, CA: Sage.
- Halliday, M. A. K. (1972). Towards a sociological semantics (working paper numero 14, serie C). Urbino, Italy: Universita di Urbino, Centro Internazionale, di Serniofice e di Linguistica.

- Halliday, M. A. K., & Hasan, Ruqaiya. (1976). Cohesion in English. London: Longman.
- Hambrick, Donald C. (1981). Environment, strategy, and power within top management teams. Administrative Science Quarterly, 26, pp. 253-76.
- Heath, Shirley Brice. (1983). Ways with words: Language, life, and work in communities and classrooms. Cambridge, MA: Cambridge University Press.
- Heath, Shirley Brice. (1980). The functions and uses of literacy. Journal of Communication, 30, 123-33.
- Heimstra, G. (1982, Spring). Teleconferencing, concern for face, and organizational culture. In M. Burgoon (Ed.), Communication yearbook 6. Beverly Hills, CA: Sage, 874-904.
- Hiltz, Starr Roxanne, & Turoff, Murray. (1978). The network nation. Reading, MA: Addison-Wesley.
- Hiltz, Starr Roxanne, & Turoff, Murray. (1981). The evolution of user behavior in a computerized conferencing system. Communications of the ACM, 24(11), 739-51.
- Hiltz, Starr Roxanne, Turoff, Murray, & Johnson, K. (1985). Disinhibition, deindividuation and group process in computerized conferences in a large corporation. Newark, NJ: New Jersey Institute of Technology Computerized Conferencing and Communications Center.
- Hiltz, Starr Roxanne, Turoff, Murray, & Johnson, Kenneth. Disinhibition, deindividuation, and group process in computerized conferences: A field experiment comparing pen name and real name conferences. Upsala College, Department of Sociology.
- Holland, Winford E., Stead, Bette Ann, & Leibrock, Robert C. (1976, November). Information channel/source selection as a correlate of technical uncertainty in a research and development organization. IEEE Transactions on Engineering Management, EM-23(4), pp. 163-7.
- Huber, George P. (1981, June). The nature of organizational decision making and the design of decision support systems. MIS Quarterly, 1-10
- Huber, George P. (1982). Decision support systems: Their present nature and future applications. In Gerardo R. Ungson, & Daniel N. Braunstein (Eds.), Decision making: An interpersonal inquiry. Boston, MA: Kent Publishing Company.

- Huber, George. (1982, February). Organizational information systems: Determinants of their performance and behavior. Management Science, 28(2), pp.138-55.
- Huber, George P. (1984, August). The nature and design of post-industrial organizations. Management Science, 10(8), pp. 928-951.
- Huber, George P., Ullman, Joseph, & Leifer, Richard. (1979). Optimum organization design: An analytic-adoptive approach. Academy of Management Review, 4(4), pp. 567-78.
- Jefferson, Gail. (1972). Side sequences. In David Sudnow (Ed.), Studies in social interaction. New York: Free Press.
- Johansen, Robert, & DeGrasse, Robert. (1979, Summer). Computer-based teleconferencing: Effects on working patterns. Journal of Communication, 29(3), 30-41.
- Johnson-Lenz, P., Johnson-Lenz, T., & Scher, J. M. (1978). How groups can make decisions and solve problems through computerized conferencing. Bulletin of the American Society for Information Science, 4(5), 15-7.
- Kanter, Robert Moss. (1977). Men and women of the cooperation. New York: Basic Books.
- Kerr, E., & Hiltz, Starr Roxanne. (1982). Computer-mediated communication systems. New York: Academic Press.
- Kiesler, Sara, Siegel, Jane, & McGuire, Timothy W. (1984, October). Social psychological aspects of computer-mediated communication. American Psychologist, 39(10), pp. 1123-34.
- Kiesler, Sara, Zubrow, David, Moses, Anne Marie, & Galler, Valerie. (1985). Affect in computer-mediated communication: An experiment in synchronous terminal-to-terminal discussion. Human-Computer Interaction, 1, pp. 77-104.
- Kochen, M. (1978). Long-term implications of electronic information exchanges for information science. Bulletin of the American Society for Information Science, 4(1), 22-23.
- Kraut, Robert E., & Higgins, E. Tory. (1984). Communication and social cognition. In Robert S. Wyer, Jr., & Thomas K. Srull (Eds.), Handbook of social cognition (vol. 3). Hillsdale, NJ: Erlbaum.
- Kull, David J. (1982, May). Group decisions: Can computers help? Computer Decisions, 14(5).
- Labov, William. (1966). The social stratification of English in New York City. Washington, DC: Center for Applied Linguistics.

- Labov, William. (1972). The transformation of experience in narrative syntax. Language in the inner city. Philadelphia: University of Pennsylvania Press.
- Labov, William, & Fanshel, David. (1977). Therapeutic discourse: Psychotherapy as conversation. New York: Academic Press.
- Lakoff, Robin Tolmach. (1982). Persuasive discourse and ordinary conversation, with examples from advertisting. In Deborah Tannen (Ed.) Analyzing discourse: Text and talk (pp. 24-42). Washington, DC: Georgetown University Press.
- Lambert, Wallace E. (1963). Psychological approaches to the study of language. Modern Language Journal, 47, 114-21.
- Lambert, Wallace E. (1967). A social psychology of bilingualism. Journal of Social Issues, 23(2), 91-109.
- Lawler, Edward E., III. (1977). Adaptive experiments: An approach to organizational behavior research. Academy of Management Review, 2(4), 576-85.
- Love, Gail, & Rice, Ronald E. (1985, May). Electronic emotion: Socioemotional content in a computer-mediated communication network. Paper presented at the International Communication Association Annual Conference, Honolulu.
- Lyman, John. (1985, April 22). Distributed problem solving (ARI Contract No. MDA903-84-C-0355). Los Angeles, CA: University of California, School of Engineering and Applied Science.
- Mankin, Don, Bikson, Tora K., & Gutek, Barbara. (1984). Factors in successful implementation of computer-based office information systems: A review of the literature with suggestions for OBM research. Journal of Organizational Behavior Management, 6(3), 1-20.
- March, James. (1981). Footnotes to organizational change. Administrative Science Quarterly, 26, pp. 563-77.
- March, James, G., & Shapira, Zur. (1982). Behavioral decision theory and organizational decision theory. In Gerardo R. Ungson, & Daniel N. Braunstein (Eds.), Decision making: An interpersonal Inquiry. Boston: Kent.
- Martin, James. (1981). Telematic society: A challenge for tomorrow. Englewood Cliffs, NJ: Prentice-Hall.
- Mattox, Addie. (1983, May). Office automation to enhance productivity in an R&D environment. Munchner Kreis Congress.
- Mehan, Hugh. (1979). Learning lessons: social organization in the classroom. Cambridge: Harvard University Press.

- Mintzberg, Henry. (1973). The nature of managerial work. New York: Harper & Row.
- Mintzberg, Henry, Raisinghani, Duru, & Theoret, Andre. (1976, June). The structure of "unstructured" decision processes. Administrative Science Quarterly, 21, pp. 246-75.
- Morris, G. H., & Hopper, R. (1980). Remediation and legislation in everyday talk: How communicators achieve consensus. The Quarterly Journal of Speech, 66, 266-74.
- Nutt, Pam C. (1984). Types of organizational decision processes. Administrative Science Quarterly, 29, 414-50.
- O'Reilly, Charles A., III. (1982). Variations in decision makers' use of information sources: The impact of quality and accessibility of information. Academy of Management Journal, 25(4), 756-71.
- Ochs, Elinor. (1979). Planned and unplanned discourse. In Talmy Givon (Ed.), Discourse and syntax (51-80). New York: Academic Press.
- Ochs, Elinor. (1979). Social foundations of language. In Roy O. Freedle (Ed.) New directions in discourse processing. Norwood, NJ: Ablex.
- Olson, David R. (1977). From utterance to text: The bias of language in speech and writing. Harvard Educational Review, 47(3), pp. 257-81.
- Olson, David R., & Hildyard, Angela. (1978). Literacy and the specialization of language: Some aspects of the comprehension and thought processes of literate and non-literate children and adults. In N. Warren (Ed.) Cross-cultural studies in psychology, vol. 2. London: Academic Press.
- Oskamp, Stuart (Ed.). (1984). Applied social psychology annual (vol. 5). Beverly Hills, CA: Sage.
- Payne, John W., Laughunn, Dan J., & Crum, Roy. (1984, November). Multiattribute risky choice behavior: The editing of complex prospects. Management Science, 30(11), 1350-61.
- Philips, Susan Urmston. (1983). The invisible culture: Communication in classroom and community on the Warm Springs Indian Reservation. New York: Longman.
- Pike, Kenneth L. (1967). Language in relation to a unified theory of the structure of human behavior. The Hague: Mouton.
- Redeker, Gisela. (1984). On differences between spoken and written language. Discourse Processes, 7, pp. 43-55.

- Reder, Stephen M. (1977). Some functional relations between speaking and writing among the Vai of West Africa. New York: The Rockefeller University (Ph.D. dissertation).
- Reder, Stephen M. (1981). The written and the spoken word: Influence of Vai literacy on Vai speech. In S. Scribner & M. Cole (Eds.), The psychology of literacy: A case study among the Vai. Boston, MA: The Harvard University Press.
- Reder, Stephen. (1984). Functional literacy in the automated workplace 1984 annual report. Portland, OR: Northwest Regional Educational Laboratory.
- Reder, Stephen M., & Conklin, Nancy Faires. (1984). Some issues in electronically mediated communication. Paper presented at the Special Session "Computers in Our Schools," Fifth Annual Ethnography in Education Research Forum. Philadelphia.
- Reder, Stephen M., & Conklin, Nancy Faires. (1984, March 30). Some issues in electronically mediated communication. Paper presented at the Fifth Annual Ethnography in Education Research Forum at the University of Pennsylvania.
- Rice, R. E. & Associates. (1984). The new media: Communication, research and technology. Beverly Hills, CA: Sage.
- Sacks, Harvey, Schegloff, Emanuel A., & Jefferson, Gail. (1978). A simplest systematics for the organization of turn taking from conversation. In Jim Schanken (Ed.), Studies in the organization of conversational interaction. New York: Academic Press.
- Schlegloff, Emanuel A., & Sacks, Harvey. (1973). Opening up closings. Semiotica, 289-327.
- Searle, John R. (1970). Speech acts: An essay in the philosophy of language. Cambridge, MA: Cambridge University Press.
- Severinson Eklundh, Kerstin. (1986). Dialogue process in computer-mediated communication: A study of letters in the COM system. Stockholm: Departments of Theme Research - Communication Studies, Linkoping University.
- Shimanoff, Susan B. (1980). Communication rules: Theory and research. Beverly Hills, CA: Sage.
- Short, John, Williams, Ederyn, & Christie, Bruce. (1976). The social psychology of telecommunications. New York: John Wiley & Sons.
- Shuy, Roger W. (1982). Topic as the unit of analysis in a criminal law case. In Georgetown University Roundtable on Language and Linguistics, 1981, Deborah Tannen (Ed.) Analyzing discourse: Text and talk (pp. 24-42). Washington, DC: Georgetown University Press.

- Steinfeld, C. (1985). The social dimensions of computer-mediated communications. In M. McLaughlin (Ed.), Communication yearbook 9. Beverly Hills, CA: Sage.
- Steinfeld, Charles W. (1985, May). Explaining task-related and socio-emotional uses of computer-mediated communication in an organizational setting. Paper presented at the International Communication Association Annual Conference, Honolulu.
- Stubbs, Michael. (1983). Discourse analysis. Chicago: University of Chicago Press.
- Tagiuri, R., & Petrullo, L. (Eds.). (1958). Person perception and interpersonal behavior. Stanford, CA: Stanford University Press.
- Tannen, Deborah. (1982). The myth of orality and literacy. In William Frawly (Ed.) Language and Literacy (pp. 37-50). New York: Plenum Press.
- Tannen, Deborah. (1982). Oral and literate strategies in spoken and written narratives. Language, 58(1), 1-21.
- Tannen, Deborah. (1979). What's in a frame? Surface evidence for underlying expectations. In Roy O. Freedle (Ed.) New directions in discourse processing. Norwood, NJ: Ablex.
- Turoff, Murray. (1978). The EIES experiment: Electronic information exchange system. Bulletin of the American Society for Information Science, 4(5), 9-11.
- Ungson, Gerardo Rivera, Braunstein, Daniel N., & Hall, Phillip D. (1981). Managerial information processing: A research review. Administrative Science Quarterly, 26, 116-34.
- Vallee, Jacques, Johansen, R., & Spangler, K. (1975). The computer conference: An altered state of communication. The Futurist, 1975, 9(6), 116-21.
- Vallee, Jacques. (1984). Computer message systems. New York: McGraw-Hill.
- Van de Ven, Andrew H. (1980). Problem solving, planning and innovation. Part I: Test of the program planning model. Human Relations, 33(10), pp. 771-40.
- Van Dijk, Teun A. (1982). Episodes as units of discourse analysis. In Georgetown University Roundtable on Languages and Linguistics, 1981, Deborah Tannen (Ed.), Analyzing discourse: Text and talk (pp. 24-42). Washington, DC: Georgetown University Press.
- Weiser, Ann. (1975). Conversational strategies: A study in the pragmatics of language. Unpublished doctoral dissertation, University of Chicago.

- Williams, Ederyn. (1977). Experimental comparisons of face-to-face and mediated communication: A review. Psychological Bulletin, 84(5), 963-76.
- Williams, Ederyn. (1978). Social and psychological factors. Journal of Communication, 28, 125-31.
- Wilson, C., & Williams, E. (1975). Watergate words: A naturalistic study of media and communication. Unpublished communications studies group paper.
- Wish, Myron, D'Andrade, R. G., & Godnow, J. E. II. (1980). Dimensions of interpersonal communication: Correspondences between structures for speech acts and bipolar scales. Journal of Personality and Social Psychology, 30(5), 848-60.
- Wish, Myron, Deutsch, Morton, & Kaplan, Susan J. (1976). Perceived dimensions of interpersonal relations. Journal of Personality and Social Psychology, 33(4), 409-20.



APPENDIX 1

Figures 1 and 2

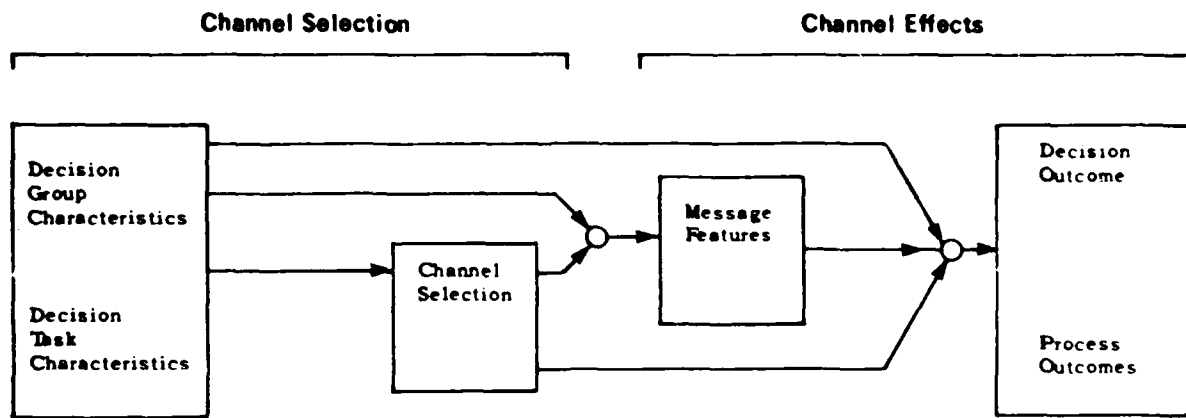


Figure One: Model of Communicative Events in Distributed Decision Process

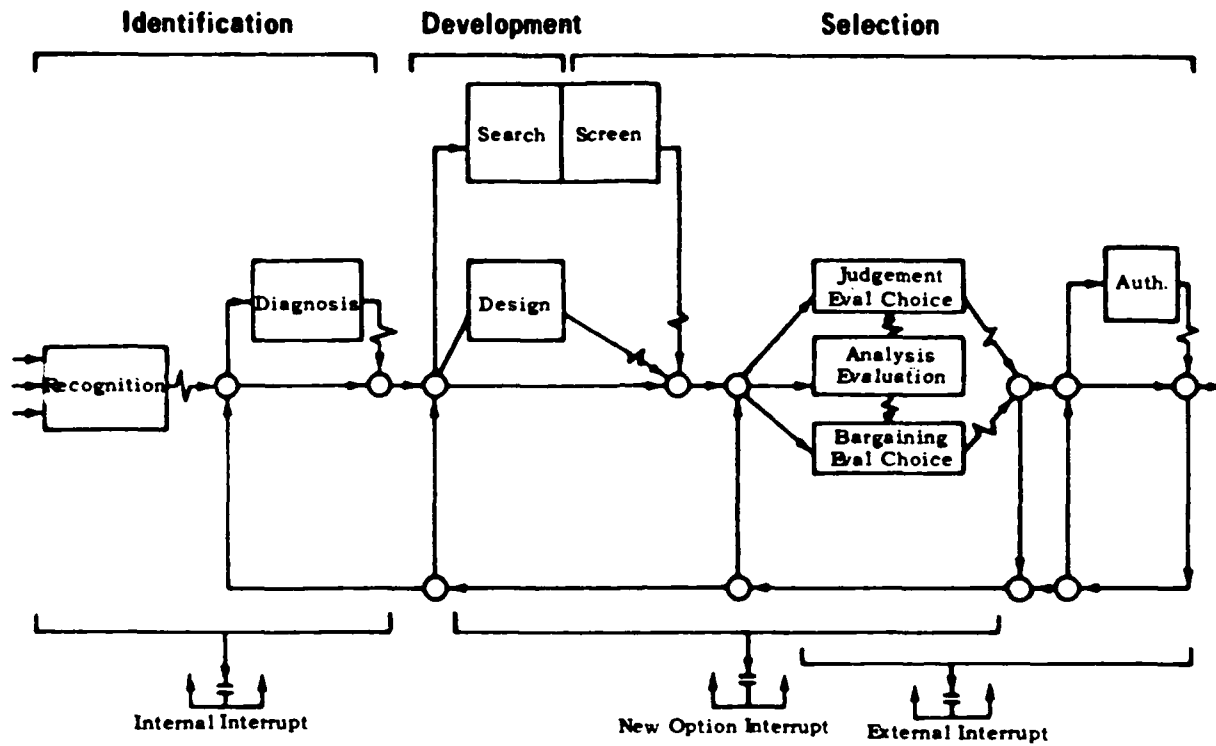


Figure Two: Model of strategic decision process, adapted from Mintzberg, Raisinghani, and Theoret (1976).