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Organizations As Information Processing Systems

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Technical Report Series

The Relationship Among Message Equivocality, Media Selection, and Manager Performance: Implications for Information Support Systems

Richard Daft
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Organizations as Information Processing Systems

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THE RELATIONSHIP AMONG MESSAGE EQUIVOCALITY, MEDIA SELECTION, AND MANAGER PERFORMANCE: IMPLICATIONS FOR INFORMATION SUPPORT SYSTEMS

Abstract

A field study of 95 middle-level and upper-level managers was undertaken to explain top managers' selection of communication media. The findings indicate that media vary in their capacity to convey information cues, and that media richness is correlated with message equivocality. Managers prefer rich media for equivocal communications and less rich media for unequivocal communications. The data suggest that high performing managers are more sensitive to the relationship between message equivocality and media richness than low performing managers. Implications for managers' use of information systems and electronic media are discussed.
Keywords: Communication media, Equivocality, Information processing, Managerial communication, Managerial performance, Media richness, Media selection, Uncertainty
Designers of management information systems and new electronic communication systems have been wrestling with a similar problem—the tendency for managers, especially senior managers, to not make full use of these systems. The literature suggests that successful information systems are used more readily in lower level operations than in support of top manager decision-making [34]. Executives spend a large proportion of their time communicating through traditional face-to-face and group discussions despite the existence of sophisticated communication modes such as teleconferencing, computer conferencing and electronic mail.

We propose that the problem confronting the use of these systems has a common cause—the nature of senior management work. The purpose of this paper is to present a theory that explains the relationship between the content of managerial communications and media selection. A model is proposed that can help determine when face-to-face or other communication media are appropriate. The research findings suggest that face-to-face communications have special ability to inform the types of decisions made by senior managers. Perhaps more important, the findings indicate that high performing managers have the ability to match communication media to the communication task at hand. High performing managers intuitively understand that face-to-face communication is needed for unstructured communications and written modes work best for more routine communications.

Recent Developments in Decision Support and Communication Systems
Decision Support Systems (DSS) have been suggested as a possible solution to the problem of why management information systems (MIS) fail to support top
level management decision-making. Recognizing that top managers deal with novel problems and unstructured rather than structured decisions, the MIS literature suggests that DSS aim to support these unstructured decisions \[16, 46, 34\]. Sprague \[46\] defined the following characteristics of DSS: 1) aimed at unstructured problems; 2) use models or analytic techniques combined with traditional data access and retrieval; 3) are user friendly and interactive; and 4) emphasize flexibility and adaptability to change. The argument is that competent DSS professionals, working with managers, can change unstructured decisions and problems to structured ones by breaking the problem into subproblems and developing problem-solving models. Although this argument is attractive, other researchers recognize that DSS may not solve the problem. Martin and Powers \[30\] employed a critical success factor approach to develop a description of executives' information needs. He determined that much of the information needed by executives was both subjective and qualitative, and therefore difficult to provide through formal MIS. Robey and Taggart \[40\] argued that computers can effectively model analytical left brain functions. But, it is unlikely that right brain activities such as intuition can be successfully modeled by computer systems. Harris and Brightman \[17\] reported that the lack of completely specified goals makes it difficult to model the cognitive tasks of managers who have unstructured work profiles.

Alavi \[27\], after conducting in-depth interviews with executives regarding their decision support needs, concluded that DSS must be capable of handling complexity, uncertainty reduction, and conflict resolution. Executives reported that their decision-making difficulties involved 1) conflicting objectives and criteria; 2) the need to make decisions without sufficient information; 3) high complexity; 4) problems of estimating impact; 5) time pressure; 6) lack of clear, measurable objectives; 7) determining what
information is relevant; and 8) communicating with the people involved. In addition, Sprague [46] suggested that because many top level decisions are made in groups, DSS must support "interdependent" decisions, not simply the decisions of a single executive at a computer terminal.

A related problem involves managers' use of communications technology, sometimes called the "new media" [38]. Traditional communication channels such as memos, telephone, and face-to-face have the potential to be supplemented with or replaced by electronic messaging, video displays, and teleconferencing. Initially the need for face-to-face communications was expected to diminish as new media took over, contributing to managerial efficiency and effectiveness. Workers were expected to stay at home and be linked to the office by electronic media [10]. Teleconferencing was predicted to reduce managerial travel, and to decentralize decision-making [27]. However, these expectations have not been met. Executives continue to prefer oral, face-to-face communication for much of their work. Distributed environments have not occurred as quickly as some experts had imagined [27]. Computer terminals are used to allow employees to work extra hours at home, not to move the workplace to the home. The availability of teleconferencing and other electronic media have not reduced travel or face-to-face communications [22]. Trauth, Kwan, and Barber [50] suggested that a major challenge for future research in this area is to discover factors that influence the successful incorporation and acceptance of new communication technologies in organizations.

Theory Development

Background and assumptions

Our approach to the study of why managers process information as they do is
based on several assumptions. The most basic assumption is that organizations are, above all, human interaction systems. Information is conveyed through symbols and language systems that are used to interpret situations and adjust behavior. Information is exchanged to accomplish internal tasks, to coordinate diverse activities, and to interpret the environment. Information acquires meaning and value as it is processed and transferred along formal and informal organizational networks.

Second, human social systems are extraordinarily complex, far more complex than lower level machine or biological systems [3, 36]. Many issues are fuzzy and ill-defined. Although many situations can be considered patterned and orderly, others are ambiguous and unstructured. For these situations, alternatives cannot be identified, data cannot be obtained or objectively evaluated, and outcomes are unpredictable [4, 52]. A distinguishing feature of human social systems is the presence of ambiguity. To survive, organizations must develop information processing mechanisms capable of coping with ambiguous, unstructured problems.

Third, organizational information processing goes beyond what an individual does [18, 81]. A distinguishing feature of organizational information processing is sharing. Organization members develop a shared system of meaning. Typically, information processing and decision making at the organization level involves several interdependent managers who converge on a similar interpretation and agree on a decision. Because decisions are frequently made by coalitions, information processing at the organizational level must bridge disagreement and diversity, a process quite distinct from the cognitive processing of an isolated individual.
Uncertainty and equivocality

To understand the nature of organizational information processing, it is necessary to disentangle basic causes of information processing in organizations. Research in organizational theory and organizational communication suggests there are two influences on information processing, the traditional concept of uncertainty and a more recent idea called equivocality.

Uncertainty: Traditionally, information processing has been conceptualized in terms of its role in reducing uncertainty. Uncertainty has come to mean the absence of information [31, 45, 15]. In a narrow sense, as information increases, uncertainty decreases. Galbraith [14] defined uncertainty as "the difference between the amount of information required to perform the task and the amount of information already possessed by the organization."

Organizations that face high uncertainty acquire information, perhaps through data bases or decision support systems, to decrease that uncertainty and solve problems. In a situation of uncertainty, managers are able to ask questions and obtain answers. The organization can be structured to help managers reduce uncertainty through management information systems, periodic reports, rules and procedures, or group meetings. The response to uncertainty is to find answers through the acquisition and analysis of data.

Equivocality: In contrast, the concept of equivocality means ambiguity, the existence of multiple and conflicting interpretations about an organizational situation [52, 7]. Equivocality often means confusion, disagreement and lack of understanding. Managers are not certain what questions to ask, and if questions are posed there is no store of objective data to provide an answer. Managers may have to spend time thinking about what to do, search beyond current data bases, or rely upon accumulated experience and judgment. For
example, Mintzberg, Raisinghani and Theoret [33], examined twenty-five organizational decisions. In most cases, they did not find textbook "uncertainty" where alternatives could be defined and information obtained. Instead, they found decision-making under ambiguity. Little data were available. Managers had to interpret the situation from vague cues and negotiate a solution.

Equivocality will be high when managers' frames of reference differ or when the topic is ambiguous. A manufacturing manager may have a difficult time understanding the perspective of a management information specialist. An ambiguous problem may be perceived differently by managers from different functional departments. Emotion-laden messages often are personal and subjective, and therefore open to misinterpretation. In these cases, a common perspective does not exist and shared meaning must be established before mutual understanding can occur.

A major difference between uncertainty and equivocality is in the information processing response of managers. Uncertainty leads to the acquisition of data. However, when confronted with an equivocal issue, managers must develop a common grammar to interpret the event. Equivocality leads to the exchange of subjective views among managers to define the problem and resolve disagreements. The organizational response is to enact a solution rather than to find a solution in external data [6, 8]. The organization reduces equivocality by pooling opinions and overcoming disagreement. This leads to a shared understanding and social agreement about the correct response. The response to equivocality comes from within the management group in the form of defining what events mean and enacting a solution.

We propose that equivocality is the barrier confronting management information
systems and new media. Equivocal situations are novel and nonrecurring. Equivocal situations require hunches, discussion and social support. Management information support systems are based on the assumption of what we have defined as uncertainty; a belief that problems can be defined, decomposed, and solved through objective analysis. Equivocality is an information problem that is difficult to resolve with technology and databases. In this study we propose that media available to managers vary in their capacity to handle equivocality. Various media available to managers will be explored to understand the role of media in equivocality reduction.

Media channels
The next question is, "How can information processing accommodate equivocality?" Communication media available to managers (e.g., memos, telephone, computer printout, face-to-face) are expected to differ in their ability to facilitate understanding when events are equivocal. Media can be characterized as high or low in "richness" based on their capacity to facilitate shared meaning [5, 48]. A rich medium facilitates insight and rapid understanding. Media typically available to managers are organized in a hierarchy in Figure 1. The Figure 1 hierarchy ranks media channels in terms of their capacity for processing equivocal information and incorporates four media classifications: (1) face-to-face, (2) telephone, (3) addressed documents, and (4) unaddressed documents.

The richness of each medium is based upon a blend of four criteria:
1. **Feedback.** Instant feedback allows questions to be asked and corrections to be made.

2. **Multiple cues.** An array of cues may be part of the message, including physical presence, voice inflection, high context, body gestures, words, numbers, and graphic symbols. Rutter and Stephenson [44] found a critical difference in media to be the number of social cues available. They also found media could be characterized by their overall "cuelessness."

3. **Language variety.** Language variety is the range of meaning that can be conveyed with language symbols. Numbers convey greater precision of meaning than does natural language. Natural language can be used to convey understanding of a broader set of concepts and ideas [9].

4. **Personal focus.** A message will be conveyed more fully when personal feelings and emotions infuse the communication. Some messages can be tailored to the frame of reference, needs, and current situation of the receiver.

Face-to-face is considered the richest communication medium. Face-to-face communication allows rapid mutual feedback. A message can be adjusted, clarified, and reinterpreted instantly. Other forms of communication, such as memos, do not allow for timely adjustments and refocusing of the message. Feedback is essential to resolve an issue that is ambiguous or in dispute [52, 26]. Laboratory research on group decision-making has shown that large initial differences of opinion readily converge into a shared position via face-to-face compared to computer mediated communication [24]. Face-to-face also allows the simultaneous communication of multiple cues. Head nods, smiles, eye contact, tone of voice, and other nonverbal behavior can be used to regulate, modify, and control the communication exchange. Face-to-face communication also uses high variety natural language. Face-to-face communication also is personal and conveys emotion.
The telephone medium is somewhat less rich than face-to-face. Feedback capability is fast, but visual cues and body language are filtered out. Individuals rely on language content and audio cues such as tone of voice to convey messages and reach understanding. The telephone medium is personal and uses natural language which makes it relatively high in richness capacity.

Addressed written communications such as letters, notes and memos are lower still in media richness. Feedback is slow. Only written information is conveyed, so voice cues are absent and visual cues are limited to those on paper. A few additional cues can be communicated through choice of stationery, and the formality of language. Addressed documents can be tailored to the individual recipient and personalized. For example, a personal note can be written at the bottom of a formal letter. Thus written communications are more personal and somewhat richer than standard documents or bulletins.

Formal, unaddressed documents are lowest in richness. Examples are fliers, bulletins and standard quantitative reports. These communications often utilize numbers that are useful in communicating quantifiable information, but do not have the information carrying capacity of natural language [9]. Fliers and bulletins fall in this category because they communicate simple, objective information to a wide audience. They are not focused toward any individual.

The equivocality/richness match

The point of this theoretical discussion is that for effective communication to occur, the richness of the medium should match the equivocality of message content. When the communication concerns well-defined issues and information, equivocality is low. Precise written or quantified data can be communicated
through media low on the richness hierarchy. On the other hand, highlyequivocal messages demand rich media, such as face-to-face, to facilitateunderstanding and the emergence of a common perspective and understanding.

The proposed relationship between media richness and message equivocality isillustrated in Figure 2. Communications along the Figure 2 diagonal wouldreflect a match between medium and message. The medium would have sufficientcapacity to enable sender and receiver to attain mutual understanding. Anequivocality/richness mismatch may explain communication and decision-makingfailures. Standard computer reports applied to equivocal problems will notaccommodate the subjective nature of these problems. The data oversimplifythe problem and crucial cues may be lost. Moreover, face-to-face media maynot be suited to objective, well-understood problems. Face-to-face discussionmay contain unnecessary, surplus meaning. Multiple cues can overcomplicatethe communication and distract the receiver's attention from the routinemessage.

Insert Figure 2 about here

Hypotheses

The discussion above has argued that the concept of equivocality influencescommunication processes in organizations. We have proposed that problems ofambiguity, subjectivity, and different frames of reference cannot be resolvedsimply by analyzing objective data. Managers respond to equivocal events bydiscussing the problem among themselves, defining or enacting a solution, andby acquiring social support. Equivocal communications cannot be handled bythesame procedures used to reduce "uncertainty" because data are not
available and problems are not analyzable. Managers thus will use face-to-face communications when equivocality is high.

The basic proposition to be tested is that organizational information processing is characterized by a positive relationship between equivocality as defined above and the richness of the medium selected. This relationship is in the following hypothesis.

_Hypothesis 1:_ Managerial information processing will be characterized by a positive relationship between message equivocality and media richness.

As an auxiliary hypothesis, we propose that equivocality explains the apparent preference for oral versus written media described by Mintzberg [32] and others [28, 21, 19, 23]. A large portion of managerial work may be spent coping with equivocal situations, which would explain the preference for oral media. However, when equivocality is low, managers are expected to prefer written media.

_Hypothesis 2:_ Managers will select oral media for communication episodes high in equivocality and written media for communication episodes low in equivocality.

Finally, we propose that these relationships will hold more strongly for high performing managers. Managers spend eighty percent of their time communicating [32]. Communication effectiveness and hence managerial effectiveness may be related to whether media are selected to fit messages. Difficult, equivocal messages should be handled through the face-to-face medium. However, managers would find it efficient to use written media when messages are straightforward and convey objective data. If the logic of the
relationship between equivocality and media richness is correct, then managers who select the appropriate medium for the message are expected to be rated as high performing.

**Hypothesis 3:** Managers who are sensitive to the relationship between equivocality and media richness are more likely to be rated as high performers.

**Research Method**

Data to test the above hypotheses were collected as part of a larger study of patterns of media use in a large petrochemical company. In a pilot study, lengthy interviews were conducted with a convenience sample of general managers. The interviews were structured around the Critical Success Factor (CSF) technique [42, 41]. Managers were asked to identify key areas of responsibility and performance, called CSFs. The CSF provided a concrete referent in the manager's experience about which the interviewer could identify information needs and the communication activities associated with meeting those needs. The goal was to learn about communication incidents and media used by managers. One outcome of the pilot study was identification of a list of communication media typically used by managers.

The second step was to develop a sample of communication incidents based on actual managerial work. Based on additional interviews, over 200 incidents of managerial communications were recorded. The interview procedure asked managers to describe recent incidents in which they used various media. This is the critical incident technique developed by Rosenbloom and Wolik [43] and subsequently employed by Dewhirst [11]. After eliminating repetition and overlap, 60 incidents representative of managerial communications were selected for the final data collection.
The equivocality of each incident was rated by 30 judges. The panel was composed of 17 management faculty members and 13 practicing managers. The concept of equivocality, including ambiguous content and different frames of reference, was explained to each judge and a written definition was provided. The average equivocality rating for the judges was then computed for each incident. Example incidents and the judges’ ratings are as follows: (1 = low equivocality, 5 = high equivocality).

1. To give your immediate subordinate a set of five cost figures that he requested last week. (equivocality = 1.74)

2. To let a new worker know that he is doing an excellent job and that you are pleased. (equivocality = 2.16)

3. To explain to your new secretary how you want your phone calls handled. (equivocality = 2.41)

4. To persuade one of your peers to stay with your firm and to turn down an attractive job with another firm. (equivocality = 3.44)

5. To get an explanation from a peer in another department of a complicated technical matter in which you have little formal training or experience. (equivocality = 4.25)

For the next step of the study, a sample of 95 managers in the petrochemical company was asked to select the medium of communication they would use for each of the 60 incidents. Media included letters, face-to-face, fliers, memos, telephone, and public address systems. These managers did not have access to “new media,” so these media were not included in the questionnaire. The 95 respondents had not participated in earlier parts of the research. Respondents were given instructions for completing the instruments, and they were requested to indicate which of ten media they would use to send or
receive each message. Media in addition to the six of interest were included to disguise the underlying model. An example of how each incident was presented in the questionnaire is below.

You are faced with the following communication tasks. Select the medium you would use in each case by marking "X" in the appropriate box.

The purpose of the Communication Task is:

1. To give your immediate subordinate a set of five cost figures that he requested last week.

<table>
<thead>
<tr>
<th>Letter</th>
<th>Face-to-Face or Meeting</th>
<th>Flyer/Bulletin</th>
<th>Formal Memorandum</th>
<th>Single Purpose Report</th>
<th>Telephone</th>
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<tr>
<td>Note</td>
<td>Public Address System</td>
<td>Standardized Document or Report</td>
<td>Telegram</td>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

Responses from these questions provided the data base to test whether media of higher richness were selected for equivocal communications.

Management performance: The petrochemical company maintained an extensive and sophisticated performance evaluation system for management personnel [12]. The company's performance evaluation system distributed manager performance ratings from high to low on a normal curve. The company could not provide performance data on all 95 managers because of the time required for this task. However, the personnel director agreed to provide data on 30 managers. These data were provided following the initial analysis of the relationship between media richness and equivocality. The media selection pattern for each manager was analyzed. The 15 managers who displayed the largest correlations between media richness and message equivocality were assigned to a "media sensitive" group. The 15 managers showing the weakest correlations between media richness and message equivocality were assigned to a "media insensitive" group. Media insensitive managers selected media almost randomly without regard to message content. These 30 managers provided a blind experiment
because managers were assigned to the two groups without any knowledge of their performance. Any difference in performance ratings would be based solely on how managers matched media to message equivocality.

Data analysis: For analysis purposes, media were grouped into four categories: face-to-face, telephone, addressed documents, and unaddressed documents. Communication incidents also were grouped into four categories representing low to high equivocality. The four categories are parallel to the four media classifications and enable the data to be presented in tabular form.

Results

Hypothesis 1 predicted a positive relationship between media richness and message equivocality. The data pertaining to this hypothesis are shown in Table 1. As equivocality increases, the percentage of respondents preferring richer media also increases. For communications rated low in equivocality, only 13.5 percent of the respondents preferred the face-to-face medium. This percentage increases to 84.1 percent when equivocality is high. By contrast, 62.4 percent of the respondents preferred a written, addressed medium for messages low in equivocality, but only 10.8 percent selected this medium for communications high in equivocality. A Chi-Square test (p < .001) between equivocality and media selection indicates support for Hypothesis 1. The findings suggest that rich media are preferred for communications high in equivocality, where ambiguity and different frames of reference are involved. Media low in richness are preferred for communications that are unequivocal—the content is clear and participants have similar frames of reference.
The media were combined into written and oral categories to test Hypothesis 2. These data are illustrated in Figure 3. Figure 3 provides visual support for the relationship between media richness and equivocality. For low equivocality communication episodes, only 32.1 percent of respondents preferred oral media. Managers selected written media the majority of the time (67.9 percent) when equivocality was low. The preference for oral media increased to 88.7 percent for high equivocality communication episodes. These data provide empirical support for the hypothesis that oral media are preferred when it is difficult to achieve understanding between managers. When understanding is easier to achieve managers prefer written media. The fit between equivocality and media disagrees with the observation that managers prefer oral communication for sending and receiving all messages [32]. The Figure 3 findings suggest that managers don't prefer oral media for all communications, but that managers select media depending upon the nature of the communication. Both oral and written media are selected, depending on the message.

Hypothesis 3 proposed that media selection would be related to manager performance. Correct media selection is expected to be related to communication effectiveness, and hence to manager performance. The 15 managers in the media sensitive group were compared to the 15 managers in the
media insensitive group. Table 2 summarizes the findings. In the media
sensitive group, 13 of the 15 managers were rated as high performers on the
internal corporate rating scale. In the media insensitive group, only 7 of
the 15 were considered high performers. A Chi-Square test of the relationship
between media selection pattern and performance indicates support for
Hypothesis 3. Explaining differences in manager performance has typically
been a difficult research problem [51]. The pattern in Table 2 suggests that
media selection patterns of executives may be a component of performance,
perhaps because high performing managers know how to communicate effectively.

Insert Table 2 about here

Discussion and Implications
A puzzlement in the research literature concerns the failure of senior
managers to make full use of management information systems and new
communication media. The purpose of this paper was to address this concern by
introducing the concept of equivocality and studying whether it helps explain
managerial communication behavior. Managers often must communicate about
ambiguous, novel problems that cannot be easily quantified, and for which data
are not available. Each manager may have a different opinion or perspective
on an equivocal issue. To solve problems characterized by equivocality,
managers must enact an interpretation through interaction with others. Face-
to-face communication provides the multiple cues, rapid feedback, and social
support needed to reduce equivocality. The findings supported the theory that
equivocal messages are communicated through richer media.

However, the findings do not suggest that managers always prefer rich media.
Managers are under time pressure to be efficient information processors. The findings suggest that a manager's job contains a mix of routine and nonroutine elements. The managers in our study selected media both low and high in richness. Indeed, they displayed a preference for notes, memos, and standard documents for communications low in equivocality. Managers rated as high performers were sensitive to the different media requirements.

Although the research did not incorporate new media, the findings help explain why managers appear to not fully utilize information systems and electronic media. The assumption that all management problems can be broken down and solved with technology may be incorrect. Equivocal issues can be approached from multiple perspectives, choices may be unclear, disagreement may exist, and it may not even be possible to identify the exact managers influenced by the problem. Moreover, the assumption that written media or electronic substitutes can replace face-to-face communications is not correct for many management communications. While the face-to-face medium is weak and inefficient for processing data or resolving objective problems, it is a powerful medium for transferring multiple cues, enabling rapid feedback among several managers, and attaining social support for enacting solutions to equivocal problems.

Since media characteristics determine their capacity to facilitate manager understanding, the application of new media can perhaps be tailored to match richness capacity to management's information needs. For example, Steinfield and Fulk [48] proposed that videoconferencing is somewhat less rich than face-to-face, but has greater information capacity than the telephone. Videoconferencing has full video and audio capabilities, and feedback is fast. Some cues such as body language and nonverbal messages are restricted. The
important regulating features of mutual gaze are filtered out [1, 49].

Teleconferences have also been found to be less emotional in tone than face-to-face communications [53]. Dutton, Fulk, and Steinfield [13] suggest that teleconferences are better suited to the exchange of explicit information than to emotional conflict, bargaining, and negotiation.

Electronic mail has characteristics similar to telephone or written memos [48]. Electronic mail has the capacity for rapid feedback and it can quickly reach a large, geographically dispersed audience. Computer messaging systems have been found to be appropriate for exchanging discrete information and staying in touch. However, many cues, such as eye contact, voice and body language are filtered out. Electronic mail is considered inappropriate for exchanging confidential information, resolving disagreements, getting to know someone, or negotiating [47, 39].

Additional research will be required to determine if the relationship between equivocality and media richness requirements holds in settings where new media are implemented. One way to increase utilization is for designers to support management's need for multiple cues, discussion, and social consensus rather than try to force managers into media not appropriate to their needs. The strength of traditional MIS is the ability to provide rapid and inexpensive data. Newer developments, based upon an understanding of equivocality, will help managers deal with unstructured, ambiguous problems. For example, Huber [20] suggests the Group Decision Support System (GDSS) as a way to apply new media to highly equivocal situations. This system provides face-to-face discussion and access to data bases. This system provides personal CRTs for each participant in a group meeting along with a public display screen visible to all group members. Each member has the capacity to think and work
individually with software and extant data bases, while exchanging ideas with others through verbal discussions and a public display screen. Feedback among members is fast, and social support can be obtained. Data to handle explicit questions are provided by the computer terminal available to each participant. This information design is ideal for decision situations that are complex, require data formulations and reformulations, but also require equivocality reduction and social support.

An important problem for future research is to develop methods of analysis that will determine which aspects of managerial communication and decision-making are amenable to technological support and which are not. This approach should not assume that all management problems are objective and can be decomposed and supported by hard data. For example, Decision Support System (DSS) designers help managers define their jobs more objectively, structure and formalize the procedures they employ, and segregate those aspects of the decision process that can be automated [29]. However, highly equivocal aspects of managerial work cannot and should not be defined objectively. The subtle messages, such as whether R&D managers are truly committed to a new technology, or whether other executives will likely support a course of action, are not easily transmitted through media other than face-to-face.

In conclusion, the research in this paper has attempted to explore why managers select a medium for communication. Organizations contain a mix of information requirements. The well-defined coexists with the ambiguous, the routine with the nonroutine. Communication situations may have high or low equivocality and require media of varying degrees of richness. Media low in richness are appropriate for the efficient communication of objective data to support routine decisions. Rich media are used for the resolution of
subjective issues that involve divergent perspectives. The important point is that organizations require a number of information approaches. Electronic media can be evaluated and applied with respect to their richness capacity, and new forms of electronic media may be discovered that further increase capacity. Application of the right medium to the situation is the key. For senior managers, the information system should have the flexibility to accommodate information from both formal and informal systems and to utilize both rich and non-rich media.
References


Figure 1. Hierarchy of Media Richness.

- High
  - Face-to-Face
  - Telephone
- Written, Addressed Documents (note, memo, letter)
- Unaddressed Documents (flier, bulletin, standard report)
- Low
Figure 2. Relationship Between Media Richness and Message Equivocality for Effective Communications.
Figure 3. Message Equivocality and Oral versus Written Media Preferences.
Table 1. Relationship Between Message Equivocality and Media Richness.

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<th>Medium 2 &lt; E ≤ 3 (N)</th>
<th>High 3 &lt; E ≤ 4 (N)</th>
<th>Very High 4 &gt; E ≤ 5 (N)</th>
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<td>18.3 (271)</td>
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<td></td>
<td>100 (1098)</td>
<td>100 (1478)</td>
<td>100 (2215)</td>
<td>100 (649)</td>
</tr>
</tbody>
</table>

\( aE = \text{equivocality} \)

Chi-Square = 1099.13; p = .001
Table 2. Relationships Between Media Selection and Performance Ratings for 30 Managers.

<table>
<thead>
<tr>
<th>Performance</th>
<th>Media Insensitive Managers</th>
<th></th>
<th>Media Sensitive Managers</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>% No.</td>
<td></td>
<td>% No.</td>
<td></td>
</tr>
<tr>
<td>High Performing</td>
<td>47 (7)</td>
<td></td>
<td>87 (13)</td>
<td></td>
</tr>
<tr>
<td>Low Performing</td>
<td>53 (8)</td>
<td></td>
<td>13 (2)</td>
<td></td>
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<tr>
<td>Total</td>
<td>100 (15)</td>
<td></td>
<td>100 (15)</td>
<td></td>
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</tbody>
</table>

Chi-Square = 5.4; p = .02
LIST 1
MANDATORY

Defense Technical Information Center
ATTN: DTIC DDA-2
Selection and Preliminary Cataloging Section
Cameron Station
Alexandria, VA 22314

Library of Congress
Science and Technology Division
Washington, D.C. 20540

Office of Naval Research
Code 4420E
800 N. Quincy Street
Arlington, VA 22217

Naval Research Laboratory
Code 2627
Washington, D.C. 20375

Office of Naval Research
Director, Technology Programs
Code 200
800 N. Quincy Street
Arlington, VA 22217

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Office of Naval Research
Detachment, Pasadena
1030 East Green Street
Pasadena, CA 91106
Deputy Chief of Naval Operations
(Manpower, Personnel, and Training)
Head, Research, Development, and
Studies Branch (OP-01B7)
1812 Arlington Annex
Washington, DC 20350

Director
Civilian Personnel Division (OP-14)
Department of the Navy
1803 Arlington Annex
Washington, DC 20350

Deputy Chief of Naval Operations
(Manpower, Personnel, and Training)
Director, Human Resource Management Division
(0P-15)
Department of the Navy
Washington, DC 20350

Chief of Naval Operations
Head, Manpower, Personnel, Training
and Reserves Team (Op-964D)
The Pentagon, 4A478
Washington, DC 20350

Chief of Naval Operations
Assistant, Personnel Logistics
Planning (Op-987H)
The Pentagon, 5D772
Washington, DC 20350
LIST 3
NAVMAT & NPRDC

NAVMAT

Program Administrator for Manpower, Personnel, and Training
MAT-0722
800 N. Quincy Street
Arlington, VA 22217

Naval Material Command
Management Training Center
NAVMAT 09M32
Jefferson Plaza, Bldg #2, Rm 150
1421 Jefferson Davis Highway
Arlington, VA 20360

Naval Material Command
Director, Productivity Management Office
MAT-00K
Crystal Plaza #5
Room 632
Washington, DC 20360

Naval Material Command
Deputy Chief of Naval Material, MAT-03
Crystal Plaza #5
Room 236
Washington, DC 20360

Naval Personnel R&D Center
Technical Director
Director, Manpower & Personnel Laboratory, Code 06
Director, System Laboratory, Code 07
Director, Future Technology, Code 04
San Diego, CA 92152-6800

Navy Personnel R&D Center
Washington Support Office
Ballston Tower #3, Room 171
Arlington, VA 22203-1923

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LIST 4
MEDICAL

Naval Hospital
Psychology Department
San Diego, CA 92134

Commanding Officer
Naval Submarine Medical
Research Laboratory
Naval Submarine Base
New London, Box 900
Groton, CT 06349

Commanding Officer
Naval Aerospace Medical
Research Lab
Naval Air Station
Pensacola, FL 32508

Naval Medical R&D Command
Program Manager for Human
Performance (Code 404)
National Naval Medical Center
Bethesda, MD 20014

Wilkins Biomedical Library
Naval Health Research Center
P.O. Box 85122
San Diego, CA 92138-9174
LIST 5
NAVAL ACADEMY AND NAVAL POSTGRADUATE SCHOOL

Naval Postgraduate School
ATTN: Chairman, Dept. of Administrative Science
Department of Administrative Sciences
Monterey, CA 93940

U.S. Naval Academy
ATTN: Chairman, Department of Leadership and Law
Stop 7-B
Annapolis, MD 21402

Superintendent
ATTN: Director of Research
Naval Academy, U.S.
Annapolis, MD 21402
LIST 6

Commanding Officer
Organizational Effectiveness Center
Naval Training Center
San Diego, CA 92133-9000

Commanding Officer
Organizational Effectiveness Center
Naval Submarine Base New London
P.O. Box 81
Groton, CT 06349

Commanding Officer
Organizational Effectiveness Center
Naval Air Station
Mayport, FL 32228

Commanding Officer
Organizational Effectiveness Center
Pearl Harbor, HI 96860

Commanding Officer
Organizational Effectiveness Center
Naval Base (Bldg. NH-46)
Charleston, SC 29408

Commanding Officer
Leadership & Organizational Effectiveness School
Naval Air Station Memphis
Millington, TN 38054-5099

Commanding Officer
Organizational Effectiveness Center
1300 Wilson Boulevard, rm 114A8
Arlington, VA 22209
Commanding Officer
Organizational Effectiveness Center
5621-23 Tidewater Drive
Norfolk, VA 23509

Commander
Organizational Effectiveness Center
5621 Tidewater Drive
Norfolk, VA 23509

Commanding Officer
Organizational Effectiveness Center
Naval Air Station Whidbey Island
Oak Harbor, WA 98278-9000

Commanding Officer
Organizational Effectiveness Center
Box 23
FPO New York 09510

Commanding Officer
Organizational Effectiveness Center
Box 60
FPO San Francisco 96651

Commanding Officer
Organizational Effectiveness System, Pacific
Pearl Harbor, HI 96860

Commanding Officer
Organizational Effectiveness System, Atlantic
5621 Tidewater Drive
Norfolk, VA 23509

Commanding Officer
U.S. Navy Organizational Effectiveness System, Europe
FPO New York 09510

Commanding Officer
U.S. Navy Organizational Effectiveness Center
Box 4
FPO Seattle 98762-2920
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NAVY MISCELLANEOUS

Naval Military Personnel Command
HRM Department (NMPC-6)
Washington, DC 20350

Dr. Ann O'Keefe
Naval Military Personnel Command
(NMPC-6Q)
Washington, DC 20350

Commander
Naval Training Equipment Center
(Code 1 - Resource Center)
Orlando, FL 32813

Commanding Officer
ATTN: TIC, Bldg. 2068
Naval Training Equipment Center
Orlando, FL 32813

Chief of Naval Education & Training (N-22)
Naval Air Station
Pensacola, FL 32508

Chief of Naval Technical Training
ATTN: Code D17
NAS Memphis (75)
Millington, TN 38D54

Navy Recruiting Command
Director, Recruiting Advertising Dept.
Code 43
801 North Randolph Street
Arlington, VA 22203

Naval Weapons Center
Code 094
China Lake, CA 93555
Headquarters, U.S. Marine Corps
Code MFI-20
Washington, DC 20380

Headquarters, U.S. Marine Corps
ATTN: Scientific Adviser,
Code RD-1
Washington, DC 20380

Director
Education Center (E 032B)
MCDEC
Quantico, VA 22134-5050

Commanding Officer
Education Center (E031)
MCDEC
Quantico, VA 22134

Marine Corps Command and
Staff College
Education Center
Quantico, VA 22134
LIST 9
OTHER FEDERAL GOVERNMENT

Defense Advanced Research
Projects Agency
Director, Cybernetics
Technology Office
1400 Wilson Blvd, Rm 625
Arlington, VA 22209

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Defense Intelligence School
Washington, DC 20374-6111

Dr. Brian Usilaner
GAO
Washington, DC 20548

School Management Unit
National Institute of Education
1200 19th Street, N.W.
Mail Stop 17
Washington, DC 20208

National Institute of Mental Health
Division of Extramural Research Programs
5600 Fishers Lane
Rockville, MD 20852

Information Analyst
Center for Studies of Minority Group
Mental Health
Parklawn Building, Rm 11-94
5600 Fishers Lane
Rockville, MD 20857

Chief, Personnel Policy Analysis Branch
U.S. Coast Guard (G-P-1/2)
Washington, D.C. 20593

Social and Developmental Psychology
Program
National Science Foundation
Washington, D.C. 20550
Dr. Earl Potter
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U.S. Coast Guard Academy
New London, CT 06320

Division of Industrial Science
& Technological Innovation
Productivity Improvement Research
National Science Foundation
Washington, D.C. 20550

Douglas B. Blackburn, Director
National Defense University
Mobilization Concepts Development Center
Washington, D.C. 20319

Chairman, Dept. of Medical Psychology
School of Medicine
Uniformed Services University of
the Health Sciences
4301 Jones Bridge Road
Bethesda, MD 20814
LIST 10
ARMY

Headquarters, FORSCOM
ATTN: AFPR-HR Ltc. Sellards
Ft. McPherson, GA 30330

Army Research Institute
Field Unit - Ft. Leavenworth
P.O. Box 290
Leavenworth, TX 66048

Technical Director (3 copies)
Army Research Institute
5001 Eisenhower Avenue
Alexandria, VA 22333

Head, Department of Behavior Science and Leadership
U.S. Military Academy, New York 10996

LTC. Frederick J. Manning
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Walter Reed Army Institute
Washington, DC 20307-5100

Army Military Personnel Command
Attn: DAPC-OE
200 Stovall Street
Alexandria, VA 22322

Army Research Institute
Attn: PERI-SF (Mr. Dennis Leedom)
5001 Eisenhower Avenue
Alexandria, VA 22333

Commandant
USA OECs
Attn: ATXW-RMA-S
Ford Ord, CA 93941-7300
LIST II
AIR FORCE

Air University Library
LSE 76-443
Maxwell AFB, AL 36112

Head, Department of Behavioral Science and Leadership
U.S. Air Force Academy, CO 80840

Major Robert Gregory
USAFA/DFRL
U.S.A.F. Academy
Colorado Springs, CO 80840-5941

A. R. Fregley
AFOSR/NL
Building 410
Bolling Air Force Base
Washington, DC 20332-6448

Technical Director
AFHRL/MT
Brooks AFB
San Antonio, TX 78235

AFMPC/MPCYPR
Randolph AFB, TX 78150
LIST 12
MISCELLANEOUS

Australian Embassy
Office of the Air Attaché (S3B)
1601 Massachusetts Avenue, N.W.
Washington, D.C. 20036

British Embassy
Scientific Information Office
Room 615
3100 Massachusetts Avenue NW
Washington, DC 20008

Canadian Defense Liaison Staff,
Washington
ATTN: CDRD
2450 Massachusetts Avenue, N.W.
Washington, DC 20008

Commandant, Royal Military
College of Canada
ATTN: Department of Military
Leadership and Management
Kingston, Ontario K7L 2W3

National Defense Headquarters
ATTN: DPSRSC
Ottawa, Ontario K1A OK2
Sequential by Principal Investigator

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