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Implications for Information Systems**



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# Message Equivocality, Media Selection, and Manager Performance: Implications for Information Systems

**By: Richard L. Daft**  
Department of Management  
Texas A&M University  
College Station, Texas 77843

**By: Robert H. Lengel**  
College of Business  
Division of Management  
University of Texas at San Antonio  
San Antonio, Texas 78284

**By: Linda Klebe Trevino**  
Division of Organizational Behavior  
Pennsylvania State University  
State College, Pennsylvania 16802

## Abstract

*A field study of middle- and upper-level managers was undertaken to explain managers' selection of communication media. The findings indicate that media vary in their capacity to convey information cues. Managers prefer rich media for ambiguous communications and less rich media for unequivocal communications. The data suggest that high performing managers are more sensitive to the relationship between message ambiguity and media richness than low performing managers. Implications for managers' use of information systems and electronic media are discussed.*

**Keywords:** Communication media, information processing, managerial performance, information systems, computing milieu.

ACM categories: H.1.1, H.1.2

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Designers of both management information systems and the new electronic communication systems have been wrestling with a similar problem—the tendency to underutilize the system, especially by senior management. The literature suggests that successful systems are used more readily in lower level operations than in support of top manager decision making [28]. Similarly, 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 problems delaying increased use of these systems involve the nature of senior management work. The purpose of this paper is to examine the relationship between the content of managerial communication 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 communication has a special ability to communicate 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 communication works best for more routine communications.

## Research Problem

Decision support systems (DSS) have been developed to support top level management decision-making. Recognizing that top managers work with novel problems and unstructured rather than structured decision environments, DSSs aim to support these unstructured decisions. Sprague [37] characterized DSSs as: 1) designed to deal with unstructured problems; 2) using models or analytic techniques combined with traditional data access and retrieval; 3) user friendly and interactive; and 4) flexible and adaptable. The argument is that a DSS can provide some structure to an unstructured decision environment by breaking the problem into subproblems

and developing problem-solving models, though the DSS may not solve the problem.

Other research, however, questions whether executives' decisions can be structured with information systems. Martin and Powers [24] employed a critical success factor approach to develop a description of executives' information needs. They determined that much of the information needed by executives was both subjective and qualitative, and therefore difficult to provide through formal information systems. Robey and Taggart [31] 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. Harris and Brightman [14] reported that the lack of completely specified goals makes it difficult to model the cognitive tasks of managers who have unstructured work profiles.

Alavi [2] conducted in-depth interviews with executives regarding their decision support needs and concluded that DSSs must be capable of handling complexity, reducing uncertainty, and resolving conflict. Executives reported that their decision-making difficulties involved 1) conflicting objectives and criteria; 2) the need to make decisions without sufficient information; 3) 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 [37] suggested that because many top level decisions are made in groups, DSSs must support "interdependent" decisions, not simply the decisions of a single executive at a computer terminal. Thus, demands on DSS are high and there is a question about whether they can be expected to assist many of the decisions made by managers.

A related problem involves managers' use of communications technology sometimes called the "new media" [29]. 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 predicted to stay at home and

be linked to the office by electronic media [8]. Teleconferencing was predicted to reduce managerial travel, and to decentralize decision-making [22].

These predictions have not come true. 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 [22]. Home 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 [19].

The research problem to be studied here is why managers often prefer face-to-face communications for problem solving and decision making. Although information systems are not the focus of this research, the examination of managerial communication behavior may help pinpoint factors that influence the successful incorporation and acceptance of new communication technologies in organizations [41]. The implication of the findings for information technology will be discussed in the concluding section.

## Theory Development

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 tasks, to coordinate diverse activities, and to interpret the environment. Information acquires meaning and value as it is processed and transferred through formal and informal networks.

Second, human social systems are extraordinarily complex, far more complex than machine systems. 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 [43].

A distinguishing feature of human social systems is the presence of ambiguity. To survive, individuals and organizations must develop information processing mechanisms capable of coping with an ambiguous, unstructured environment.

Third, organizational information processing goes beyond what an individual does [6, 15]. 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 involve 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* [13, 25, 36]. In a narrow sense, as information increases, uncertainty decreases. Galbraith [12] 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 respond to uncertainty by acquiring information and analyzing data. In a situation of uncertainty, managers are able to ask questions and obtain answers. The organization can be structured to reduce uncertainty through periodic reports, rules and procedures, or group meetings.

**Equivocality:** In contrast, equivocality means *ambiguity*, the existence of multiple and conflicting interpretations about an organiza-

tional situation [5, 43]. 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 databases, or rely upon accumulated experience and judgement. For example, Mintzberg, Raisinghani and Theoret [27], examined 25 organizational decisions. Most decisions did not involve 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. 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. 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 [4, 6]. 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 the new media. Equivocal situations are novel and nonrecurring. Equivocal situations require hunches, discussion and social support. Conventional information systems are based on what we have defined as uncertainty; a belief that problems can be de-

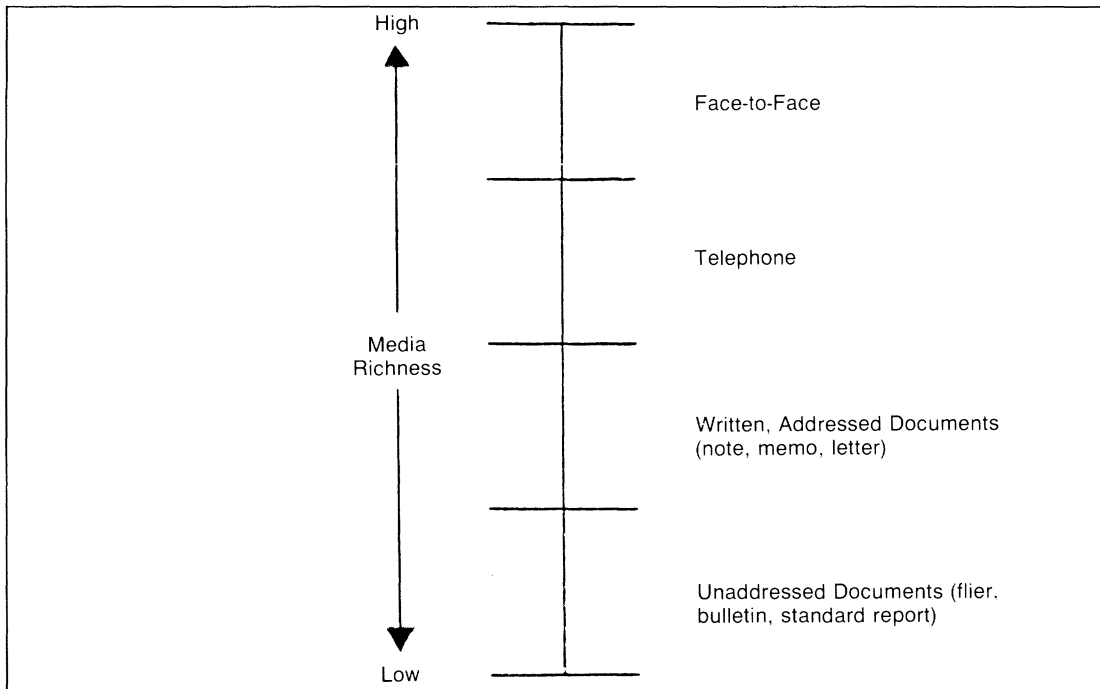


Figure 1. Hierarchy of Media Richness.

efined, decomposed, and solved through objective analysis. Equivocality, as an information problem, is difficult to resolve with technology. In this study we propose that media 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

Communication media differ in their ability to facilitate understanding. Media can be characterized as high or low in "richness" based on their capacity to facilitate shared meaning [3, 39]. 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, body gestures, words, numbers, and graphic symbols. Rutter and Stephenson [35] found a critical difference in media to be the number of social cues available and characterized different media by the 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 [7].
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 rein-

terpreted instantly. Other forms of communication, such as memos, do not allow for timely adjustments and refocusing of the message. Laboratory research on group decision making has shown that initial differences of opinion converge more readily into a shared position via face-to-face compared to computer mediated communication [21]. 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 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 rich.

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. 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 point of this theoretical discussion is that for effective communication to occur, the richness of the medium should match the level of message ambiguity. When the communication concerns well-defined issues and infor-

mation, equivocality is low. Precise written and quantified data can be communicated through media low on the richness hierarchy. On the other hand, highly equivocal messages demand rich media to facilitate understanding and the emergence of a common perspective and understanding.

The thesis of this article is that media richness and message equivocality are positively related in management communications. In other words, managers are expected to select media that match the equivocality in a message. Moreover, an equivocality/richness mismatch may explain communication and decision-making failures. Standard computer reports applied to equivocal problems will not accommodate the subjective nature of these problems. The data oversimplify the problem and crucial cues may be lost. Moreover, face-to-face media may not be suited to objective, well-understood problems. Face-to-face discussion may contain unnecessary, surplus meaning. Multiple cues can overcomplicate the communication and distract the receiver's attention from the routine message.

## Hypotheses

The discussion above has argued that the concept of equivocality influences communication processes in organizations. We have proposed that problems of ambiguity, subjectivity, and different frames of reference cannot be resolved simply by analyzing objective data. Managers respond to equivocal events by discussing the problem among themselves, defining or enacting a solution, and by acquiring social support. Equivocal communications cannot be handled by the same 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:

**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 [26] and others [16, 18, 20, 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 80% of their time communicating [26]. Communication effectiveness, and hence managerial effectiveness may be related to whether media are selected to fit messages. 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. The study involved several steps. First, lengthy interviews were conducted with a convenience sample of general managers. The interviews were structured around the Critical Success Factor (CSF) technique [32, 33]. Managers were asked to identify key areas of responsibility and performance, called CSFs. The CSFs 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. 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 [34] and subsequently employed by Dewhirst [9]. 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).

In the third 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 shown 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.

Letter	Face-to-Face or Meeting	Flier/Bulletin	Formal Memorandum	Single Purpose Report	Telephone
Note	Public Address System	Standardized Document or Report	Telex/Telegram	Other	

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

During the fourth step, overall performance was evaluated for 30 managers in the sample. The petrochemical company maintained a performance evaluation system that has been the basis of academic research and is considered to be accurate and valid [10, 42]. The company's performance evaluation system distributed manager performance ratings from high to low on a four-point scale. The company would 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, based on whether they were considered high (top two categories) or low (bottom two categories) performers. 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 equiv-

ocality were assigned to a "media insensitive" group. Media insensitive managers selected media almost randomly without regard to message content. The distribution of the 30 managers was skewed toward the high end of the scale with 20 managers considered high performing and 10 low performing. Despite the distribution, however, data on the 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.

The final step was 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. 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 2. Figure 2 provides visual support for the relationship between media richness and equivocality. For low equivocality communication episodes,



**Table 1. Relationship Between Message Equivocality and Media Richness.**

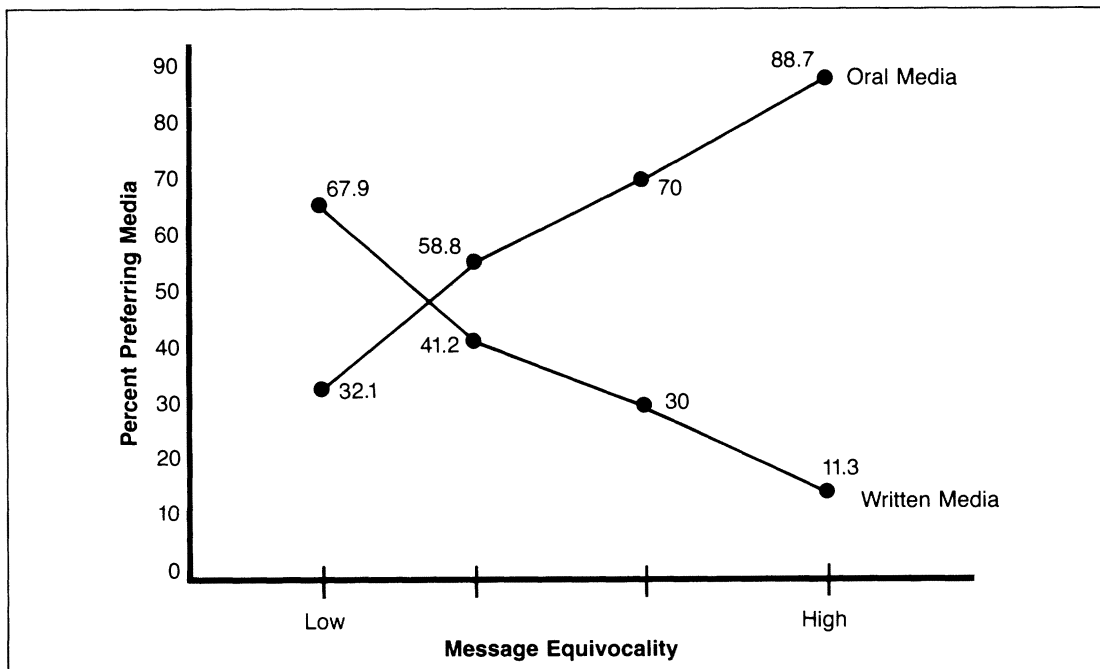
Communication Medium	Low		Message		Equivocality		High	
	1	2	3	4	5			
	%	(N)	%	(N)	%	(N)	%	(N)
Face-to-Face	13.5	(148)	40.5	(598)	60.6	(1342)	84.1	(546)
Telephone	18.6	(203)	18.3	(271)	9.4	(208)	4.6	(30)
Addressed Documents	62.4	(683)	40.5	(598)	28.4	(628)	10.8	(70)
Unaddressed Documents	5.5	(60)	0.7	(11)	1.7	(37)	0.5	(3)
	100	(1098)	100	(1478)	100	(2215)	100	(649)

chi-square = 1099.13; p = .001

only 32.1 percent of respondents preferred oral media. The preference for oral media increased to 88.7 percent when communications were high in equivocality. 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 [26]. The Figure 2 findings sug-

gest that managers don't prefer oral media for all communications, but that managers select media depending upon the nature of the communication.

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 find-



**Figure 2. Message Equivocality and Oral versus Written Media Preferences.**

**Table 2. Relationships Between Media Selection and Performance Ratings for 30 Managers.**

Performance	Media Insensitive Managers		Media Sensitive Managers	
	%	No.	%	No.
High Performing	47	(7)	87	(13)
Low Performing	53	(8)	13	(2)
Total	100	(15)	100	(15)

chi-square = 5.4; p = .02

ings. 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. 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.

### Discussion and Implications

Although this research did not incorporate new media, the findings help explain why managers do 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 so-

cial support for enacting solutions to equivocal problems.

While managers in our study selected media both low and high in richness (and indeed displayed a preference for media low in richness for communications low in equivocality), highly rated managers displayed sensitivity to the different media requirements.

Since media characteristics determine their capacity to relate a common understanding, the application of new media can perhaps be tailored to match richness capacity to communication needs [39]. For example, 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, 40]. Teleconferences are less emotional in tone than face-to-face communications and thus may be better suited to the exchange of explicit information than to emotional conflict, bargaining, and negotiation [11, 44].

Electronic mail has many characteristics similar to telephone or written memos, because it also has the capacity for rapid feedback and it can quickly reach a large, geographically dispersed audience [39]. Computer messaging systems have been found to be appropriate for exchanging discrete information and staying in touch. However, 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 [30, 38].

Additional research will be required to determine if the relationship between equivocality and media richness 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. 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 [17] suggests group decision support systems (GDSSs) as a way to apply new media to highly equivocal situations. These systems provide face-to-face discussion and access to databases. Each participant in a group meeting has an individual CRT along with the public display screen visible to all group members. Each member has the capacity to think and work individually with extant databases, while exchanging ideas with others through verbal discussions and the public display screen. Feedback among members is fast, and social support can be obtained. This information exchange 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, 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. 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, this article explores 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 non-

routine. 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.

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### About the Authors

**Richard L. Daft** is Hugh Roy Cullen Professor of Business Administration at Texas A&M University. He has published five books and numerous articles in journals such as *Administrative Science Quarterly*, *Academy of Management Journal*, *Management Science*, and *Academy of Management Review*. His research interests are in the areas of organization theory, organizational information processing, organizational innovation, and strategy implementation. He is an associate editor of *Administrative Science Quarterly*.

**Robert H. Lengel** is Assistant Professor in the Division of Management and Marketing, University of Texas at San Antonio. He received his Ph.D. from Texas A&M University,

and is currently doing research on the topics of leader impact on organizations, symbolic meaning of organizational media, and the relationship between managerial media selection and performance. He has published in *Research on Organizational Behavior* and *Management Science*, and is a member of the Academy of Management.

**Linda Klebe Trevino** is a doctoral candidate in management at Texas A&M University. Her research interests are in the areas of managerial communication, ethical decision making, and management succession processes. She is a member of the Academy of Management and has published in *Academy of Management Review*.