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Susan T. Kinney
Wake Forest University

Richard T. Watson
University of Georgia

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THE EFFECT OF MEDIUM AND TASK ON DYADIC COMMUNICATION

Susan T. Kinney
Babcock Graduate School of Management
Wake Forest University

Richard T. Watson
Terry College of Business
University of Georgia

ABSTRACT

A controlled laboratory study examined dyadic communication in face-to-face, telephone, and computer mediated text modes using high and low equivocal tasks. The dependent variables were decision time, consensus, change and communication satisfaction. The study failed to support media richness theory. While the findings support the hypothesis that decision time varies as a function of medium, they do not support similar hypotheses for consensus change and communication satisfaction. No support for hypothesized differences in decision time and consensus change as a function of the interaction of medium and task was found. However, there were consistent significant differences in all dependent measures based on task.

1. INTRODUCTION

Organizational communication is increasingly affected by new technologies. While face-to-face communication remains popular, advancements in communication technologies offer an increasingly sophisticated array of choices to support remote interactions. The transmission of information through a communication medium, however, may change the meaning of the message.

When people interact face-to-face, they have both visual and auditory sensory channels to receive and send information — a communication "rich" environment. As individual components of a sensory channel are reduced (as with noise interference) or as a channel is eliminated (as with the telephone), the communication becomes "leaner." Face-to-face communication is typically considered the richest form of communication, followed by video, voice, and written communication in that order. Interactive media (telephone, synchronous e-mail) are regarded as richer than static media (memos, asynchronous e-mail) (Daft and Lengel 1984).

Communication technologies, at the simplest social levels, are designed to support dyadic (two person) communication (Panko and Kinney 1992). Most organizational meetings are small and 40 percent of all meeting time is spent in dyadic communication (Panko 1992a). The impact of a dyadic relationship can involve more intensity than one finds in larger groups. Becker and Eseem (1942) distinguish a dyad from a group of two by virtue of the intimacy and length of time of the relationship. They note that individuals enter into dyadic relationships to satisfy needs for harmonious relationships. Indeed, this emotional capacity of a dyad is what lures individuals away from larger group participation and back into dyadic interactions despite the strength of larger groups to better handle complexity and rationality (Rustin 1971). Rather than viewing these relationships as counterproductive to the functioning of the organization, Argyris (1962) contends that these interpersonal relationships strengthen the organization. He states that organizational competence is a function of both intellective competency (the things that organizations do) and interpersonal competency (the authenticity of interpersonal relationships). Therefore, a focus on dyads inherently requires a close examination of the interactional components that influence the overall communication process. In the process of studying dyadic communication, researchers can introduce variability in the form of communication media.

Communication content and purpose varies with the functional level of the employees. At the managerial level, content of communication may be heavily weighted by equivocality (Mintzberg, Raisinghani and Theoret 1976). Managers make decisions without hard facts and find it necessary to depend on vague cues to interpret situations. The further effect of media on the degree of communication equivocality is not yet clear.

While the additional choices in communication media offer individuals and teams more flexibility, the appropriate choice of technology to fit the task, the situation and the people are generally not clear. A medium can enhance or distort the intended message. Each channel has characteristics that make it appropriate in some situations and not in others. This focus on fit raises several questions.

1.1 What Is the Effect of Media Richness on Dyadic Communication?

This question addresses both effectiveness and efficiency issues. Focusing on the task related outcomes in a decision making interaction, can one expect changes in decision quality and decision time relative to the choice of medium used to support communication? Looking at communication outcomes from the interpersonal perspective raises questions about how a medium affects participant's thoughts, feelings, and behavior relative to that person's interaction with their partner.

1.2 What Effect Does the Type of Task Have on Mediated Dyadic Communication?

Does one communication medium better support resolution of complex tasks while a different one proves to be more functional when the task is simple? Does high medium richness contribute to better, faster decisions when used with high equivocal tasks as theorized and get in the way of problem resolution with low equivocal tasks?

These questions were addressed in the context of dyadic decision making in a controlled laboratory experiment. While decision making is a relatively small part of an individual's work day (Panko 1991), other activities occur in a decision making interaction that constitute a larger part of work-related communications (e.g., information seeking and giving, problem solving, discussion, and negotiation) (Panko 1992b). Decision making tasks, therefore, afford the opportunity to not only observe communication in the context of many general business activities, but also to provide objective measurable outcomes relative to the decision.

2. THEORY AND MODELS

2.1 Media Richness

This paper uses as its foundation the predominant theory on media choice in organizational studies today, the media richness theory[1] of Daft, Lengel, and colleagues. Looking at the issue of communication, initially from an organizational perspective, Daft and Lengel (1986) assert that organizations process information in order to reduce uncertainty and equivocality. Uncertainty is defined as the absence of information. They define equivocality as ambiguity, the existence of multiple and conflicting interpretations about an organizational situation. For the past decade, Daft and Lengel, in collaboration with others (Daft and Macintosh 1981; Daft, Lengel and Trevino 1987; Daft, Sormunen and Parks 1988), have been developing and testing their model of media richness through field studies of managers' media usage. Proposed determinants of media richness include the availability of instant feedback, the capacity of the medium to transmit multiple cues, the use of natural language, and the personal focus of the medium (Trevino, Lengel and Daft 1987). Daft and colleagues propose that communication channels vary along a continuum in the extent to which they are able to bring together different frames of reference, simplify issues, or facilitate learning in a given time interval. Face-to-face communication is the richest medium, followed by telephone, synchronous e-mail, asynchronous e-mail, and other forms of written communication. Media richness research also reportedly shows a relationship between effective management and choice of medium. Effective managers are reported to use a rich medium (such as face-to-face) to convey highly ambiguous information, and to choose a lean medium (such as a memo) for routine, non-ambiguous tasks.

2.2 Technology Effects

While some communication models start with a theoretical position on communication and then build a structure that includes consideration for technologies (communication driven), a large body of research exists that makes no assumption about communication per se but examines the effects of technology on communication outcomes (technology driven). These early telecommunication studies focused primarily on the technical costs, efficiencies, and capabilities of electronic support for dispersed groups. The difficulty with trying to summarize these studies is that both task and technology vary along a number of continuua. Despite McGrath's (1984) well defined circumplex model of group task types, a task that does not cross multiple domains, or that does not vary as a function of the characteristics of the group, is difficult to find. Poor quality transmissions (a technological weakness) also introduce unmeasured, extraneous 'noise' into the results of some of the studies. For example, studies comparing face-to-face communication with technology supported dispersed groups have been inconsistent relative to decision quality, decision time, and choice shift (Rice 1984; Siegel et al. 1986), likely due to task differences.

Some researchers found audio supported groups spend less time at simple tasks than face-to-face groups (Birrell and Young 1982), while others, using different tasks, found just the opposite (Chapanis et al. 1972). Audio communication has been shown to be a more effective approach when the task is simple but becomes less useful with difficult tasks (Johansen, Vallee and Spangler 1979). In their summarization of research on audio only support versus face-to-face meetings, Fowler and Wackerbarth (1988) found that audio-only communication is less productive, produces more hostility, takes more time and is undesirable for complex tasks.

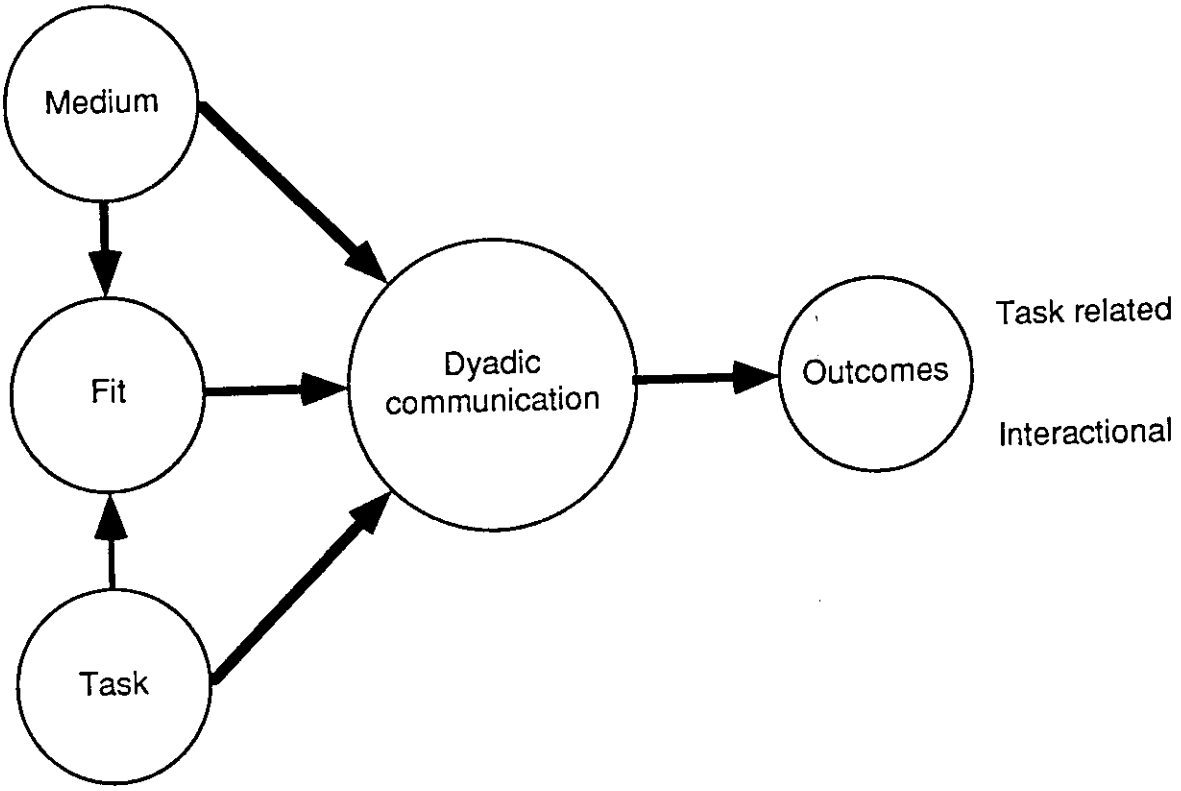


Figure 1. Conceptual Model

In their research with computer-mediated groups (no audio or video support), Siegel et al. (1986) found that proximal groups took less time to reach decisions than did dispersed groups. Hiltz, Johnson and Turoff (1986) noted increased amounts of communication in proximal groups, with both proximal and dispersed groups making equally good decisions. Keyboards consistently have been noted to slow down communication time (Chapanis 1988).

Attitude measurements have generally reflected that individuals prefer face-to-face meetings to those mediated via telecommunications. Considerable variation in attitudes, however, has been more a function of the type of meeting (task) than of medium (Christie and De Alberdie 1985). For example, the management of technical information is greatly facilitated by computer conferencing (Vallee and Askevold 1975). Research supports that some messages are more persuasive when presented in writing as opposed to verbal presentation (Johansen, Vallee and Spangler 1979).

3. THE CONCEPTUAL MODEL AND HYPOTHESES

For this study, a simple model was used to clearly assess a limited number of important variables (see Figure 1). Overall, the model shows that dyadic communication is affected not only by the medium through which communication occurs and the task that elicits the communication, but also by the fit between task and medium. The communication itself is a process that includes the words themselves, the timing of the responses, the nonverbal as well as verbal communication, and the emotional content of the communication. The outcomes of the process are both task related (e.g., effectiveness and efficiency) and interactional (emotions and behaviors). This model is not meant to be all inclusive, intentionally excluding individual and social differences. The model's design is to test explicitly media richness theory in a laboratory setting.

3.1 Hypotheses

3.1.1 Decision Time

Researchers have frequently demonstrated that time increases as channel richness decreases. Fowler and Wackerbarth (1988) noted that audio groups spend more time maintaining group organization than do face-to-face groups. Verbal communication rates are higher, and solutions reached faster, in meetings employing a voice channel rather than written text (Sheffield 1989). In research with computer-mediated groups (no audio or video support), Siegel et al. (1983) found that proximal groups took less time to reach decisions than did dispersed groups. Communication support that requires keyboarding, such as electronic mail (Chapanis 1988), has been shown to increase decision time with dispersed groups.

H1. Decision time varies as a function of medium.
H1a. Decision time is higher in text-supported dyads than in audio-supported dyads.
H1b. Decision time is higher in audio-supported dyads than in face-to-face dyads.

3.1.2 Change in Consensus

Consensus is defined as general agreement or harmony. Individuals enter group tasks with either predefined opinions as to how the task should be completed or, at least, predispositions toward specific ways of completing the task. One of the functions of the group process is to resolve these differing viewpoints in order to use the resources of all group members in coming to a final agreement. While consensus is not always necessary for the resolution of a task, unanimity of decision increases the chances of cooperation in both the process and the commitment to subsequent courses of action. Unanimity in thinking is facilitated by an environment in which participants can both accurately transmit their position to other group members and gather information about each other in order to understand how the others perceive the situation. Remp (1974) found that meeting members reported more interpersonal influence in face-to-face meetings than audio and felt less pressure to go along with group opinions and positions in audio meetings. According to information richness theory, the optimal environment for supporting consensus is face-to-face with each decreasing step in richness hampering this movement toward shared thinking. Watson (1987) found higher levels of post-meeting consensus in groups with no computer support as compared to proximal computer supported groups.

H2. Change in consensus varies as a function of medium.
H2a. Change in consensus is higher in face-to-face dyads than in audio-supported dyads.
H2b. Change in consensus is higher in audio-supported dyads than in text-supported dyads.

3.1.3 Communication Satisfaction

Communication satisfaction is a broad term that encompasses many different emotional responses and behaviors such as agreement in thinking, cooperativeness, sensitivity to one's partner and communication openness (Hoskins 1988). A number of these behaviors are believed to occur more frequently in richer contexts. What is referred to as coalition formulation and "we" feelings are more likely to develop within face-to-face and video groups than between groups linked by audio (Thomas and Williams 1975). Cooperative responses increase as the communication media linking interactants increase in communication richness (Wichman 1970).

Other components of communication satisfaction seem to flourish in the leaner environment of computer communications. Kerr and Hiltz (1982) note that the leanness of computer communication increases the focus on the words themselves as cues to the emotional content of the interaction and may lead to higher levels of sensitivity and kindness. Computer conferencing can support self-presentation and emotional subtleties (Vallee and Johansen 1974), enhance candor (Hiltz and Turoff 1978), and strengthen personal interaction (Vallee et al. 1978). Despite the disparity in findings for the seemingly related concepts of cooperativeness, openness, and sensitivity, this study adopted a position in keeping with media richness theory.

H3. Communication satisfaction varies as a function of medium.
H3a. Communication satisfaction is higher in face-to-face dyads than in audio-supported dyads.
H3b. Communication satisfaction is higher in audio-supported dyads than in text-supported dyads.

3.1.4 Task Characteristics

Task type accounts for up to 50 percent of the variation in group performance with the use of group support systems (Poole, Siebold and McPhee 1985), and is a significant factor in many studies of communication media (Fowler and Wackerbarth 1988; Johansen, Vallee and Spangler 1979; Westrum 1972). Information richness theory is explicit on how one dimension of task, equivocality, relates to media richness. This theory argues that low equivocal tasks are best resolved through the leanest channels; rich channels provide communicators with too much information and with superfluous messages. In contrast, high equivocal tasks require a rich environment in order to facilitate the movement toward shared meaning and consensus; lean media impede effective communication for highly equivocal tasks.

H4. Decision time varies as a function of medium and task.
H4a. Decision time increases as communication richness decreases with high equivocality tasks.
H4b. Decision time decreases as communication richness decreases with low equivocality tasks.

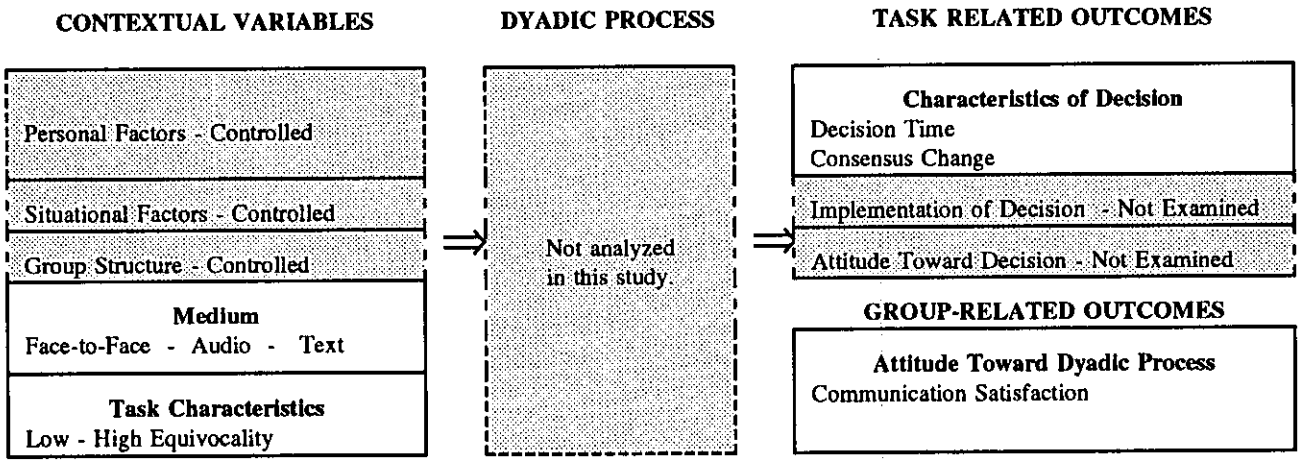
H5. Consensus change varies as function of medium and task.
H5a. Consensus change decreases as communication richness decreases with high equivocality tasks.
H5b. Consensus change increases as communication richness decreases with low equivocality tasks.

4. METHOD

4.1 A Framework for Analysis of Mediated Dyadic Process

A revised dyadic version of Pinsonneault and Kraemer's model (1989) for organizing variables that affect mediated group processes, activities and outcomes, shows how each of these factors are addressed (see Table 1).

Table 1. Framework for Mediated Dyadic Decision Making



Key: Shaded areas represent factors that were either controlled or not examined in this study.

4.2 Independent Variables

This study employed a two-factor, mixed design (medium x task) with repeated measures on the second factor. The order of task exposure was counterbalanced. Each subject was randomly assigned to a dyad, each dyad was randomly assigned to one medium, and each dyad completed both tasks.

4.2.1 Medium

The study focused on face-to-face communication, audio communication (telephone), and computer mediated text communication (synchronous electronic mail). Subjects in the face-to-face treatment met for the first time (as partners) in the treatment room. Dyads in the voice treatment were connected via telephone, and dyads in the computer-mediated text condition were connected through electronic mail. Partners in both treatments were placed in separate rooms. The electronic mail software provided subjects with a split screen for simultaneous communication. Each subject's keyboard entries were projected on their half of the screen, and both screens were visible to both subjects at all times.

4.2.2 Task

Daft and Lengel consider type of task to be crucial in effectively understanding and using media richness theory. In their model, tasks are distinguished based on the degree of equivocality they each contain. The tasks in this study were selected to vary on equivocality with control for complexity. The low equivocality task was a straightforward, impersonal activity that required dyads to agree on solutions for four mathematical and four verbal problems drawn from recent Graduate Record Exams. For most subjects, this task can also be described as having high uncertainty because the formulas for computing the answers were likely to have been unknown to them.

The high equivocality task was the Foundation Task, chosen by virtue of the absence of any one "correct" answer. This task (developed by Watson 1987) required subjects to decide on the allocation of philanthropic funds among six competing projects. The task had no one best answer; subjects had to express and resolve differing viewpoints. (Both tasks can be obtained from the authors.)

4.3 Dependent Variables

The most obvious outcome of a decision making interaction is the decision itself. Decisions are typically measured in terms of efficiency (time) and effectiveness (quality). Because quality cannot be measured with the high equivocal task (who is to say which allocation is 'best'), consensus was used as an alternative measure of quality for both tasks. Consensus increases member commitment to the decision, and commitment increases the likelihood of successful implementation of the decision (Watson 1987). Post-treatment consensus cannot be considered separate from the influence of pre-treatment consensus, however, so change in consensus is examined as the variable of interest.

4.3.1 Decision Time

Decision time was the time required to complete the entire decision making process. Using a stop watch, timing started when the subjects were told to begin each task and stopped when they announced that they had finished the task. No time limits were imposed.

4.3.2 Consensus Change

All subjects completed each task three times: individually, directly prior to the meeting (pre-treatment); together, to form a joint decision (treatment); and individually, directly following the treatment when each member was again asked to state their personal position on the decision (post-treatment). These data were used to calculate pre- and post-meeting consensus. The change in consensus was a measure of how well a treatment supported collaboration. The computations for consensus on the low equivocality task are based on Cohen's Kappa, a coefficient of agreement for nominal scales (Cohen 1960). The mathematical process used to calculate consensus change for the low equivocality task can be found in Kinney (1992) and the process for the high equivocality task in Watson (1987).

4.3.3 Communication Satisfaction

Communication satisfaction was measured by nineteen questions in a seven-point Likert scale format (Hecht 1978). A Cronbach's alpha of 0.93 satisfies Nunnally's (1978) criteria for reliability of this measure. The questions elicited information regarding the subject's perceptions of communication openness, agreement in thinking and behavior, cooperativeness, sensitivity to partner, and overall enjoyment with the communication process. The tool shows high correlation ($p < .0001$) with four other instruments measuring individual components of communication satisfaction (Kinney 1992).

4.4 Subjects

Subjects were drawn from an undergraduate organizational communication class at a large state university. Of the original 240 subjects, 234 completed the study. Subjects were randomly assigned to the six treatments. Cell size varied from thirty-eight to forty.

4.5 Procedures

The study consisted of six phases: Computer-Mediated Text Training, Pre-test (both tasks individually), Task 1 (as a dyad), Post-test (individually), Task 2 (as a dyad), and Post-test (individually). All subjects received one hour of computer-mediated text and keyboard training. At a separately scheduled time, subjects completed the remaining five phases in an average of 1.5 hours.

5. RESULTS

5.1 Statistical Methods

The major statistical techniques used to analyze the experimental data were analysis of variance (ANOVA), hierarchical analysis of variance (HANOVA), and the Tukey-Kramer HSD multiple comparison method. The conditions of homogeneity of variance, independent samples, and normality of error term were met for the data used in both ANOVA and HANOVA calculations. In some cases, data were transformed prior to analysis to meet these conditions.

5.1.1 Analysis of Variance

Dependent variables were measured at either the individual or the dyadic level. For the two task-related variables, decision time, and consensus change, where measurement was necessarily dyadic, the proper statistical method was ANOVA. Communication satisfaction was measured for the individual and analyzed using HANOVA. HANOVA uses individual data with respect to the individual nested within the dyad and the dyad nested within the treatment. This approach has three conditional requirements: the measurement of the dependent variable must be derived from individual data where the individual is part of a larger group and the groups are nested within treatments, the individual scores must be independent of each other (i.e., individual response on the measurement tool is not determined by the response of the dyadic partner), and dyadic influence has not been controlled (Miranda, Watson and VanOver 1990). This approach offers significantly more statistical power than the use of dyadic means where the degrees of freedom are limited (halved) by the number of dyads in the experiment and a larger sample size is required to achieve sufficient statistical power (Anderson and Ager 1978).

5.2 Manipulation Checks

All subjects responded to six questions, designed to assess their perceptions of the equivocality of the tasks as defined in media richness theory (Daft and Macintosh 1981). The results show that subjects clearly distinguished the high equivocality task as being more equivocal ($\mu = 24.12$) than the low equivocality task ($\mu = 12.18$) ($p < .0001$). However, the subjects also perceived that the low equivocality task was more difficult ($\mu = 8.16$) than the high equivocality task ($\mu = 5.34$) ($p < .0001$), a factor we had hoped to control.

5.2.1 HYPOTHESES H1 and H4: Decision Time

Hypothesis H1 states that decision time varies as a function of medium. Table 2 shows the results of the measurement of decision time for each treatment. A natural log transformation was used to bring the data into compliance with ANOVA requirements. ANOVA shows a main effect for medium ($p < 0.0001$), thus supporting H1. The Tukey-Kramer HSD indicates that the mean decision time for text supported dyads ($\mu = 24.54$) was significantly higher than for audio dyads ($\mu = 9.57$), supporting H1a. However, the

Table 2. Experimental Results

Means [Standard Deviations]					Main Effects		Interaction
Med/Task	Face to Face	Voice	Text	Med Means	Medium	Task	MedxTask
					Probability	Probability	Probability
Time					< 0.0001	< 0.0001	ns
LO EQ	10.5 [4.9]	11.6 [5.7]	28.5 [11.4]	16.9			
HI EQ	7.0 [5.4]	7.6 [4.1]	21.9 [13.2]	12.1			
Task	8.7	9.6	25.2				
Consen					ns	< 0.0001	ns
LO EQ	0.7 [0.3]	0.8 [0.3]	0.7 [0.4]	.7			
HI EQ	0.5 [0.3]	0.4 [0.3]	0.4 [0.3]	.4			
Task	.6	.5	.6				
Satis					ns	< 0.05	ns
LO EQ	5.3 [.7]	5.4 [.7]	5.6 [.6]	5.4			
HI EQ	5.5 [.7]	5.5 [.7]	5.5 [.7]	5.5			
Task	5.4	5.5	5.6				* < 0.0001

Key: Med = Medium; Time = Decision Time; Consen = Change in Consensus; SATIS = Communication Satisfaction; LO EQ = Low Equivocality Task; HI EQ = Hi Equivocality Task; ns = not significant; * Individual[Medium]; shaded areas represent non-hypothesized relationships.

mean time for audio-supported dyads was not significantly higher than for face-to-face (μ = 8.74); thus, H1b was not supported. Results show no significant interaction effects ($p < 0.77$); thus, H4 and its correlates were not supported. ANOVA indicates a main effect for task ($p < 0.0001$). The low equivocality task (μ = 16.85) took significantly longer than the high equivocality task (μ = 12.14).

5.2.2 HYPOTHESES H2 and H5: Change in Consensus

Hypothesis H2 states that change in consensus varies as a function of medium. Table 2 shows the results of the assessment of consensus change for each treatment. HANOVA shows no main effect for medium ($p = 0.23$); thus, H2 and its correlates were not supported. No significant interaction effects were noted ($p = 0.12$); thus, H5 and its correlates were not supported. HANOVA indicated a main effect for task ($p>0.0001$). Consensus change was significantly greater for the high equivocality task (μ = 0.72) than for the low equivocality task (μ = 0.40).

5.2.3 HYPOTHESIS H3: Communication Satisfaction

Hypothesis H3 predicts that communication satisfaction will vary as a function of medium. Table 2 shows the results of the measurement of satisfaction for each treatment. HANOVA shows no main effect for medium ($p = .43$); thus, H3 and its correlates were not supported. HANOVA indicates a main effect for task ($p = 0.04$). Communication satisfaction was significantly higher for the high equivocality task (μ = 5.5) than for the low equivocality task (μ = 5.4) ($p = .04$) . HANOVA also shows significant findings on dyad nested in the medium, indicating a significant variation of dyadic means within medium. However, because equality of variance by medium exists, it follows that the dyad[medium] variance exists to similar degrees within each of the three media.

6. DISCUSSION

The results of this study are surprising, even to the authors who considered that some of the earlier findings did not always fit personal experiences with mediated communica-

tion. While the findings support the hypothesis that decision time varies as a function of medium, they fail to support similar hypotheses for consensus change and communication satisfaction. No support for hypothesized differences in decision time and consensus change as a function of the interaction of medium and task were found. Consistent significant differences, however, (not hypothesized) were found in all dependent measures based on task.

Decision time was found to vary as a function of medium, and was found to be higher in text- supported dyads than in audio-supported dyads. The average time to complete a single task was twenty-five minutes for the dyads communicating through the computer as compared with an average of nine minutes for the face-to-face condition and ten minutes for the telephone condition. Decision time was not found to be significantly longer in audio-supported dyads than in face-to-face dyads (H1b). This finding supports Chapanis (1988) who suggested that the absence of voice is the cause of the increase: people can talk faster than they can write or, in this case, keyboard.

What is also possible, however, is that at least part of the increase in time is related to an increase in the number or complexity of the words as individuals attempt to compensate for the absence of non-verbal or voice cues in non-voice modes. In other words, people may automatically adjust for leaner media by increasing the richness of the words themselves. While this possibility is logically appealing, one similar study (Sheffield 1989) found that the audio group generated six times as many statements and engaged in 67 percent more problem solving behaviors (information exchange and heuristic trial and error) in 60 percent of the time.

Consensus change was not found to vary as a function of medium. Regardless of the medium through which partners were communicating, the average change in consensus stayed the same. Media richness theory would predict that consensus change would be greatest with richer media because it better facilitates movement toward shared thinking. Media richness also would predict that computer-mediated dyads would be more likely to revert to their original positions when tested separately because the medium was too lean to easily support resolution of equivocality. Indeed, the text-only subjects would be expected to become frustrated with the time and effort needed to come to agreement, and either just give up or agree solely for the benefit of completing the study. Based on other studies that have found that opinion change was greater after audio conversations than after face-to-face (Short 1972; Young 1974; Winer 1962), audio was predicted to have the highest consensus change of all. In this study, however, no difference was found. The next finding may offer a partial explanation.

While consensus change was not found to vary as a function of medium and task, a statistically significant effect for task (not hypothesized) was found. The final answers of the subjects for the low equivocality task reflect a greater movement toward a similar position than for the high equivocality task. This finding is explainable by the more logical orientation of the low equivocality task versus the value orientation of the high equivocality task. All subjects showed a greater tendency to maintain their original position on the latter task, regardless of medium and dyadic agreement. On the low equivocality task, however, the partners worked through the problems together, came up with solutions, and were likely to adopt the new joint decisions as their own in the posttreatment testing.

Communication satisfaction was not found to vary as a function of medium. The average mean score for communication satisfaction was 5.5 (on a seven point scale with 6.0 indicating "Generally Agree" and 5.0 indicating "Agree a Little"). Subjects' ratings indicated that they tended to agree that the communication was satisfying, regardless of medium. A task effect (not hypothesized) with higher satisfaction ratings for the high equivocality task was also found. These differences were noted only in the face-to-face and voice conditions, but also were great enough to register an interaction effect.

Predictions of communication satisfaction came from research on agreement in thinking, cooperativeness, sensitivity, and communication openness. Prior research as well as media richness theory predicted that agreement in thinking would be stronger when communication occurred through richer environments (Sinsening, Reed and Miller 1972) and that cooperativeness would be greater when subjects perceived physical proximity (LaPlante 1971). The media richness test failed. Other studies gave the advantage to the leaner media. Sensitivity to partner (Kerr and Hiltz 1982) and communication openness (Hiltz and Turoff 1978) would have been predicted to be more pronounced in computer-mediated communications. These results were also not duplicated. Could the differences be the result of different measures of these variables, different tasks, different media, and/or different subjects?

Overall, this study failed to support media richness theory. A number of challenges to the validity of the design, however, must be addressed. While media richness theory is based on interviews with managers about hypothesized media choices in given communication scenarios, this study used college business majors in a simulated business setting. In practice, the theory is generalized to apply to the rational match between communication needs and available media choices to achieve the most effective communication for any organizational employee. As such, the use of student subjects should not, therefore, invalidate the legitimacy of the theory. Furthermore, one can argue that these students are more familiar with and flexible regarding use of new technologies, such as computer-mediated communications, than are many current managers.

An argument can also be made that the artificiality of the situation (media choice imposed) would lead subjects

(irrespective of whether they are students or employees) to try harder to make inadequate media functional as opposed to a work situation where the employees would have a choice of medium. While this argument is defendable, this position can be viewed as a strength of the medium. The results suggest that if users try hard enough, they can overcome medium limitations. This is not to say that the medium-task match is ideal, but that given an absence of choice, the medium can be effectively and efficiently used. Employees' medium choices in organizations may indeed be a result of preference or habit, rather than of functionality.

Another source of invalidity might be the use of zero history groups communicating for short periods. The use of unfamiliar dyads interacting for brief periods, however, can be supported as a collaborative unit that occurs naturally on a continuum of working business partnerships. While some tasks necessarily entail larger groups working for long periods to solve complex tasks, many other business requirements or phases in a project are best handled through relatively brief contacts (Galegher and Kraut 1990).

A third concern is the selection of tasks. The tasks were selected with great care to vary solely on the dimension of equivocality. To this end, we were unsuccessful as we inadvertently created tasks that also varied on complexity. Rather than weakening the study design, however, this may be perceived as having strengthened it. The results clearly show significant differences for task on each dependent variable. The subjects took longer to do the more difficult, low equivocal task, moved toward consensus to a greater degree, and were less satisfied with their communication. These results suggest that degree of difficulty rather than equivocality influenced the differences. Furthermore, this study supports the numerous studies cited earlier that state that a medium's influence is mediated by task.

The basic design of this study supports further research into the area of media richness. Audio recordings and captured screens permit the content analysis of the word usage to determine how the process itself varied by treatment. Gender differences and personality measures taken during the study can be examined for relationships with process and outcomes.

Steps can also be made to move the study closer to real world applications. Additional tasks can be included in the design to search for patterns of behaviors associated with specific task dimensions. The number of meetings per dyad can be increased to facilitate the development of interpersonal relationships between dyadic partners. Other media can be included as treatments. Gender differences can be specifically addressed. Subjects can be matched with partners from different countries to further examine the effects of cultural differences on mediated communication.

The authors consider this paper to be more of an endorsement for computer-mediated communication than a dispute of media richness theory. We agree that there are many times when face-to-face is preferable to a leaner communication medium for all of the reasons the theory states. When it is necessary or desirable to use electronic mail, however, the leanness of the medium does not necessarily have to be considered a handicap to the communication process. The authors believe that the continued study of media richness at the micro-level is warranted and useful for further developing the theory.

7. REFERENCES

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8. ENDNOTES

1. The movement from the use of the term "information richness" (Daft and Lengel 1986) to the term "media richness" (Daft, Lengel and Trevino 1987) was accomplished with little fanfare. However, this leaves open the possibility that the richness of the information itself can be modified to adapt to the medium as opposed to being a slave to the medium.