An Inefficient Choice: An Empirical Test of Media Richness and Electronic Propinquity

THESIS

Presented in Partial Fulfillment of the Requirements for the Degree Master of Arts in the Graduate School of The Ohio State University

By

Ted Michael Dickinson

Graduate Program in Communication

The Ohio State University

2012

Master's Examination Committee:

Dr. Jesse Fox, Advisor

Dr. Brandon van der Heide
Copyrighted by

Ted Michael Dickinson

2012
Abstract

Media richness theory is frequently cited when discussing the strengths of various media in allowing for immediate feedback, personalization of messages, the ability to use natural language, and transmission of nonverbal cues. Most studies do not, however, address the theory’s main argument that people faced with equivocal message tasks will complete those tasks faster by choosing interpersonal communication media with these features. Participants in the present study either chose or were assigned to a medium and then timed on their completion of an equivocal message task. Findings support media richness theory’s prediction; those using videoconferencing to complete the task did so in less time than those using the leaner medium of text chat. Measures of electronic propinquity, a theory proposing a sense of psychological nearness to others in a mediated communication, were also tested as a potential adjunct to media richness theory’s predictions of medium selection, with mixed results.

Keywords: media richness, electronic propinquity, media selection, computer-mediated communication, nonverbal cues
Vita

June 1996 .................................................. Cabell Midland High School

2001 ............................................................ B.A. Journalism, Marshall University

2010 to present ................................. Graduate Teaching Associate, School of

Communication, The Ohio State University

Fields of Study

Major Field: Communication
Table of Contents

Abstract..................................................................................................................................................... ii

Vita............................................................................................................................................................ iii

Table of Contents ..................................................................................................................................... iv

List of Tables ........................................................................................................................................... vi

Introduction .............................................................................................................................................. 1

Media Richness Theory ............................................................................................................................. 2

  Prior Studies Involving Media Richness ............................................................................................... 4

  Criticism of Media Richness .................................................................................................................... 6

Electronic Propinquity Theory.................................................................................................................. 8

  Prior Tests Involving Electronic Propinquity ..................................................................................... 10

Hypotheses .................................................................................................................................................. 13

Method Sample ....................................................................................................................................... 16

  Procedure ............................................................................................................................................. 16

  Measures ............................................................................................................................................. 19

Results ....................................................................................................................................................... 21

Discussion ................................................................................................................................................. 24
Limitations ............................................................................................................. 28

Conclusion ........................................................................................................... 30

References ............................................................................................................ 32

Appendix: Stimulus and Measurement Scales ...................................................... 36
List of Tables

Table 1. Correlations Between Partner’s Communication Skill, Propinquity, and Communication Satisfaction

................................................................. 35
Introduction

Media richness theory (Daft & Lengel, 1984; Daft & Lengel, 1986) is one of the most frequently cited theories of computer-mediated communication; Google Scholar lists its two foundational articles as having a combined 6,430 citations as of October, 2011. Few studies, however, have been directed at testing the theory’s major proposition that choosing certain media allow the transmission of equivocal messages faster than others.

The present study tests this major proposition, improving upon prior experimental studies of media richness by including a manipulation of media choice. The study also tests propositions of electronic propinquity theory, a theory of media selection based on affect towards a medium and communication skill (Korzeny, 1978; Walther & Bazarova, 2008). Possible relationships between these two theories are also explored.
Media Richness Theory

Daft and Lengel’s (1984, 1986) media richness theory is born out of a combination of organizational communication and the cues-filtered-out tradition of computer-mediated communication (see Walther, 2010, for a review). The theory ranks media on a continuum of richness, or “the ability of information to change understanding within a time interval” (Daft & Lengel, 1986, p. 560). This ability is determined by the medium’s abilities to transmit nonverbal cues, express content in natural language, enable immediate feedback, and enable personalization (Daft & Lengel, 1986).

The capacity to transmit nonverbal cues, occasionally referred to as bandwidth, is the medium’s ability to convey any method of communication other than word choice. This may include body or facial movements, vocal inflection, or even display of a communicator’s environment (Walther & Parks, 2002).

Natural language refers to any commonly used “ordinary” language intended for written or oral communication with others. Natural language is distinguished from formal or artificial languages that have been developed for a special purpose, such as algebraic notation or a computer programming language (Daft & Wiginton, 1979).

Immediate feedback refers to the medium’s capacity for multi-directional communication with little or no time delay. This capability allows a message receiver to have his or her interpretation of a message immediately checked by the message source (Daft & Lengel, 1986). A synchronous medium (one which allows message transmission
in more than one direction simultaneously) would rank higher on this characteristic than an asynchronous one. In fact, manipulating synchronicity of a medium has been used as a manipulation of media richness in empirical studies (Dennis & Kinney, 1998).

Personalization refers to the medium’s capacity for allowing a message source to tailor a message to suit an individual recipient. This is connected both to immediate feedback and to the size of the audience; a medium that lacks bidirectionality may leave a message source guessing as to whom his or her audience will be, and larger audiences reduce the message source’s ability to personalize the message to any individual audience member (Walther & Parks, 2002).

Face-to-face communication is ranked as the richest form of communication due to all four of these factors. A vast array of both physical and auditory nonverbal cues are observable, including microexpressions (facial expressions that typically last less than $1/10^{th}$ of a second) that may not be visible over a low-framerate video connection (Matsumoto & Hwang, 2011). As face-to-face communication typically involves a dyad or small group and is conducted using an ordinary language, the capacity for personalization and natural language is present. Immediate feedback is also possible as the audience can respond using the same medium without delay (Walther & Parks, 2002). At the lower end of the scale would be something like a printed numerical spreadsheet. There are no perceivable physical or vocal cues from the message source. There is little ability to personalize information based on the audience, and natural language has been replaced by numbers. There is no capacity for the spreadsheet’s intended audience to
offer immediate feedback through the same medium; in fact, there may not be any apparent route for supplying feedback to the message source.

Media richness theory argues that “richer” media allow communicators to complete equivocal message tasks faster. Daft and Lengel (1986) initially defined equivocality as “the existence of multiple and conflicting interpretations about an organizational situation” (p. 556). In a managerial context, equivocality means that managers have no clear answers to their questions and will frequently have to draw their own conclusions based on judgment (Daft & Lengel, 1986). This definition conceptually separates equivocality from uncertainty; whereas uncertainty focuses on a lack of sufficient information that can be remedied by collecting additional data, equivocality is resolved through communication and compromise to agree on a shared meaning where no objectively correct answer exists (Daft, Lengel, & Trevino, 1987; Walther & Parks, 2002). One possible example of a high-equivocality task is discussing benefits of the acquisition of one company by another. Even with an objective store of information on financial status, merger costs, and other relevant factors, the decision-making process would involve information that is potentially speculative or quickly changing, such as stock values. A “correct” answer cannot be derived from this data, thereby separating the situation from one of mere uncertainty.

Prior Studies Involving Media Richness

Most prior studies of media richness have focused on the perceived usefulness of a medium or the likelihood that it will be used for a specific task. These studies have shied away from operationalizing the primary result of rich media as proposed by the
theory: allowing a communicator to “overcome different frames of reference or clarify ambiguity” to quickly complete an equivocal message task (Daft & Lengel, 1986, p. 560).

Markus (1994) employed media richness theory to hypothesize that higher-level executives in an organization would be more likely to engage in equivocal message tasks, and therefore prefer telephones or small face-to-face meetings over “leaner” media such as e-mail. An analysis of media used by staff across the organization found that vice presidents sent more e-mails than lower-level management. Markus provides anecdotal examples of vice presidents successfully using e-mail for equivocal tasks; however, no statistical analysis of such success is presented. The author also avoids addressing the issue of whether using richer media would have resulted in the tasks being completed faster (Markus, 1994).

Rice (1993) performed a secondary analysis of data from six other surveys asking workers at various organizations their opinions on the appropriateness of various media for ten different communication goals. These goals included lower-equivocality tasks such as information exchange as well as high-equivocality tasks of resolving disagreements. Results between sites were difficult to compare; some of the surveys operationalized appropriateness as a binary yes/no variable whereas others used a 5-point Likert-type scale. No data on whether richer media resulted in faster task completion was collected in any of the surveys.

A 1991 survey focused primarily on perceptions of the richness of electronic mail as predictors of use and perceived usefulness. Whereas the two endpoints of the richness
spectrum were accurately predicted (spreadsheets containing only numeric data at the low end, and face-to-face communication at the high end), other media (telephone, e-mail, and handwritten text) were closely grouped together. Although not enough information is provided to determine whether the differences between telephone, e-mail, and written text are statistically insignificant, the authors state these findings suggest individual rankings of media richness perceptions can vary. Although the study established a connection between perceived richness and perceived usefulness, no empirical measure of efficiency was used (Schmitz & Fulk, 1991).

In one of a few studies directly testing media richness theory’s argument regarding task completion time, Dennis and Kinney (1998) assigned dyads to either videoconferencing or text-only chat and presented them with tasks varying in equivocality across conditions. Those in a high-equivocality condition were asked to pool data on hypothetical student applications to a university and rank the prospects from best to worst, while others were assigned the low-equivocality task of answering standardized test questions on math and logical reasoning. Findings established that those performing tasks through videoconferencing completed their tasks faster than those using text chat. Task equivocality did not moderate the relationship between media richness and performance, however; although the theory predicts that rich media should accelerate the completion of equivocal tasks more than non-equivocal ones, no such effect was found (Dennis & Kinney, 1998).

Criticism of Media Richness
Walther and Parks (2002) illustrate what they believe to be the failings of these prior studies on media richness:

Despite media richness theory's problems, it is also apparent that the research to date has not directly tested the underlying claim of the theory. The fundamental claim is that if users select richer media for equivocal messages, then their efficiency will be greater. Researchers who have asked respondents what they might use or have assigned users to tasks and media in order to assess perceptions or effectiveness have not addressed that proposition. … The basic proposition remains untested. (p. 534)

Although Walther and Parks cite the Dennis and Kinney (1998) study, mentioning its apparently disconfirming findings, they are unclear as to why the study should not be considered a proper test of the theory. The lack of medium selection in the study is a possible explanation.

Dennis and Kinney (1998) posit that the most likely explanation for their findings is that media richness theory cannot adequately explain modern technology:

Media richness theory may be a useful theory for the “old” media, such as letters and memos, whose levels of feedback and cues are far below those of the “new” media tested in this study. The new “lean” media may be just rich enough to enable users to successfully communicate for moderately equivocal tasks. (p. 269)
Electronic Propinquity Theory

Even if media richness theory can accurately predict the efficiency of various media for completing equivocal tasks, it does not account for how affect towards a medium or existing communication skill with a medium can predict media selection. A second theory, originally proposed by Korzenny (1978) and recently updated by Walther and Bazarova (2008), offers some of these predictions.

Korzenny’s (1978) electronic propinquity theory does not attempt to predict efficiency using any particular media, as with media richness theory. The theory instead focuses on a sense of “the psychological distance between communicators or the degree of perceived closeness of another person or group” (Korzenny & Bauer, 1981, p. 481). Electronic propinquity theory offers six major predictors of the effects of media and communicator characteristics on psychological nearness, as well as 15 corollaries describing relationships between these predictors.

First, media with a higher perceived bandwidth will cause greater propinquity. Bandwidth in this sense entails not only the technological sense, in terms of amount of data transferred over a time unit, but also in the capacity for the transmission of nonverbal cues (Korzenny, 1978). The key distinction between this proposition and bandwidth as discussed in media richness theory is that propinquity theory treats bandwidth as a subjective measure of the user’s perceptions of bandwidth, whereas media
richness theory argues that bandwidth is an objective measure (even though no method of measurement is provided).

Second, more complex information will result in lower propinquity. As the perceived complexity of the information that needs to be transmitted increases, the number of senses that may need to be activated to convey that information increases. In cases of an “overload” of complexity, communication may become so task-focused that other interpersonal contact is crowded out (Korzenny, 1978).

Third, greater perceived mutual directionality will result in greater propinquity. “Mutual directionality” here is analogous to the capacity for immediate feedback in media richness theory: those who can receive immediate feedback on their performance feel closer to those they are conferring with (Korzenny, 1978).

Fourth, greater communication skills will result in greater propinquity. Korzenny (1978) includes this proposition arguing that previous studies of media choice omitted the potential confound that people at that time were less experienced with the media they were being asked to use in experiments. It should be noted that, whereas the other five propositions rely on communicators’ perceptions, this proposition is distinct in that it relies on a communicator’s actual skill with a medium, rather than his or her perceived self-efficacy.

Fifth, the perceived imposition of rules on communication reduces propinquity. Korzenny (1978) argues that imposing rules on communication, whether implicit or explicit, can prevent those involved from using their skills to their fullest potential. Korzenny uses the example of a subordinate talking to a supervisor on the phone. The
subordinate may believe his superior is not understanding the information, and therefore he needs to repeat it to her several times. He may refrain from doing so, however, for fear of implying that he believes the superior is stupid. This violation of a perceived rule against insulting a superior restricts the subordinate from most efficiently achieving his goals, thereby making the communication less successful and hurting the “connectedness” between parties (Korzenny, 1978).

Sixth, the perceived reduction of available choices in media channels increases propinquity. When only one method of communication is available for a task, people will find it satisfactory largely because they must. When presented with a choice of media for completing a task, people will assume that high perceived propinquity will be required, and will therefore choose the medium which will require the least effort, or that with which they are most skilled (Korzenny, 1978).

Prior Tests Involving Electronic Propinquity

In the initial test of propinquity theory, groups of six participants were presented with information on two fictitious job candidates and asked to reach a consensus on which one should be hired. Some groups were face-to-face in the same room, whereas others were split into two groups in separate rooms with either a video or audio-visual connection. A post-task survey was then administered; although the exact wording of that survey is not available, the authors state the items were based on a magnitude scale of 0 to 100 and intended to measure psychological propinquity and communication satisfaction (Korzenny & Bauer, 1981).
The results of this study failed to support most of the major propositions of electronic propinquity theory. Although feedback was found to positively predict propinquity as predicted, no significant link was established between propinquity and bandwidth, information complexity, or communication skills. The level of communication rules was found to positively predict propinquity, opposite the theory’s prediction of a negative relationship. The proposition of media choice restriction was not tested, as all participants were assigned to a specific medium for the task (Korzenny & Bauer, 1981).

After this study, the theory was largely ignored until 2008, when Walther and Bazarova identified methodological problems with the original study. Even in the mediated group conditions, face-to-face communication was still happening between the three-person subgroups. The post-task measurements were unclear in scope, such that it was possible a participant was rating propinquity for all five colleagues, making it difficult to separate ratings for face-to-face colleagues with those in the other room. Also, no interaction effects were tested in the original study despite the derived corollaries listed by Korzenny (1978) explicitly identifying such effects. The more recent test upheld the major hypotheses advanced by Korzenny, namely that the effect of bandwidth on propinquity was insignificant when users did not have a choice of medium or when faced with simple tasks (Walther & Bazarova, 2008).

Electronic propinquity theory has also been used to explain results of a survey in which phone usage was found to be a significant predictor of higher-quality relationships between college students and their parents, whereas other media such as email, text
message, social networking sites, and even face-to-face communication did not. The authors posited that phones were the preferred medium because they simultaneously provide a close connection and allow the student to maintain independence by providing “just the right amount of closeness” (Gentzler, Oberhauser, Westermann, & Nadorff, 2011, p. 73).

The effect of phone usage on relationship quality was replicated in a survey of college students reporting general gratifications from using various forms of media for conversation. The authors used electronic propinquity theory to accurately predict that participants would report greater gratifications from cell phone use than e-mail, instant messaging, or landline telephone use. The authors claim the cell phone’s ease of accessibility, as well as its greater capacities for transmitting cues and immediate feedback, led to these results (Ramirez, Dimmick, Feaster, & Lin, 2008).

Electronic propinquity theory is not directly contradictory with media richness theory. Media richness theory is silent on predictions regarding communication satisfaction, whereas propinquity theory makes no effort to predict that any one medium will allow its users to complete a given task faster than another. The proposed study intends to test the fundamental predictions of both theories simultaneously, while also exploring whether these two seemingly disparate theories may be related.
Hypotheses

With modern computer hardware, a user may access multiple forms of communication with varying degrees of richness, including text-based communication and videoconferencing. Both of these modes can be employed by the use of Skype, a freely available program for personal computers and mobile devices (Skype, 2011).

Most modern forms of interpersonal computer-mediated communication have roughly equal capacities for use of natural language and personalization. Capacities for immediate feedback vary; text-based chat and messaging typically require the user to complete an entire message and press the enter key before any transmission is made, whereas videoconferencing transmits constantly during an interaction. There are also substantial differences between media in the transmission of nonverbal cues. Videoconferencing allows for transmission of audible cues such as vocal inflection and visible cues such as facial expression that are not available in text chat. Therefore, media richness theory argues that videoconferencing should be able to change understanding faster than those using text chat. This hypothesis is intended as the direct test of media richness theory as described by Walther and Parks (2008).

H1a: Those using videoconferencing will reach a consensus on an equivocal message task in less time than those using text chat.
H1b: There will be a moderating effect of choice on task completion time such that choosing videoconferencing will reduce task completion time more than choosing text chat.

Media richness theory and electronic propinquity theory approach the concept of bandwidth differently. Media richness theory considers bandwidth as a fixed feature of a particular medium, whereas electronic propinquity theory treats a person’s perception of bandwidth as a major predictor. Electronic propinquity theory claims those who perceive they are using higher-bandwidth media should experience greater propinquity than those who perceive they are using lower-bandwidth media; thus, differences in both the fixed features of the media and perceptions of those differences should be investigated.

H2a: Those using videoconferencing will report a greater amount of propinquity than those using text chat.

H2b: Perceived richness of the medium used will be a positive predictor of propinquity.

Electronic propinquity theory also states that as the availability of other media choices increases, propinquity will decrease.

H3: Those who were assigned to a specific medium will report greater propinquity than those who were provided a choice of medium and selected the same medium.

Korzenny (1978) presents electronic propinquity as a mediator of the connection between skill with a medium and communication satisfaction.
H4: There will be a positive relationship between communication skill and communication satisfaction.

H4a: Propinquity will have a unique, positive mediating effect on this relationship.

Electronic propinquity theory does not make direct predictions regarding communication efficiency. However, due to certain characteristics associated with propinquity (perceived richness, communication skill, and imposition of communication rules), it may still influence task completion time.

H5: After controlling for medium used, there will be a unique effect of propinquity on task completion time such that higher levels of propinquity will result in faster task completion.
Method

Sample

Participants were recruited from undergraduate communication courses at a large public university in the Midwestern United States, and were offered extra credit in exchange for their participation. Demographic information was collected from 30 women and 20 men placed into conversation dyads used in the analysis. All participants were between the ages of 18 and 26, with a mean age of 20.12 years ($SD = 1.76$). Participants were asked to rank on a 5-point scale their fluency with English reading ($M = 4.60$, $SD = .88$), writing ($M = 4.72$, $SD = .76$), and speaking ($M = 4.64$, $SD = .90$).

Four dyads were omitted from the analysis due to procedural issues. Two dyads were omitted due to participants ignoring directions in a survey, whereas two other dyads were omitted when participants failed to notify the researcher that they had completed the task, instead continuing in discussion unrelated to the task. The remaining 25 dyads were included in the analysis. These included 12 participants in the assigned-text condition, 14 participants in the assigned-video condition, 18 participants in the chose-text condition, and 6 participants in the chose-video condition.

Procedure

Three participants were scheduled per time period. Each participant was presented with the equivocal task selected for the study:
“Consider a scenario in which a friend of yours has been offered a job. Your friend will need to leave the university before completing his or her degree to take the job. Come to a consensus with your conversation partner on the minimum salary your friend would need to be offered before you would recommend that he or she leave the university and take the job. Please keep your conversation focused on this task and be prepared to defend your decision.”

This judgment task was altered from Cornelius & Boos (2003) to suit an American university. A judgment task of this nature has no objectively correct answer; obtaining a consensus on such a question requires communication of individual subjective information (Cornelius & Boos, 2003; Straus, 1999).

In sessions where all three participants arrived on time, participants received the task description on paper and asked to check a box corresponding to their preferred medium for completing the task: either videoconferencing or text chat. In sessions where all three participants chose the same medium, a random number generator was used to randomly select a participant who was thanked for their time and dismissed. In sessions where one participant chose a different medium from the other two, that participant was dismissed. No data other than their choice was collected from the dismissed participants.

Up to the last week of the data collection period, this choice process resulted only in text chat being chosen; in no instances did two of three participants during a session choose videoconferencing. A decision was made to employ an inducement similar to those employed in cognitive dissonance studies (see Blanton, Cooper, Skurnik, & Aronson, 1997 for an example) to choose video chat. Participants were informed that a
large number of students who had already completed the study had chosen text chat, and were asked to consider selecting videoconferencing to help with the experiment. If the participant expressed an interest in videoconferencing, they were asked to check the corresponding box on the form as confirmation. This inducement was attempted in four sessions. In three sessions, at least two of the three participants agreed to select videoconferencing, thereby forming all three dyads in the chose-video condition. In a fourth, the participants still selected text chat.

In sessions where only two participants arrived, the participants only saw the description of the task on a computer screen, and were randomly pre-assigned to complete the task through one of the two available media.

Participants were asked if they were clear on the task before initiating the conversation. The researcher established the connection between the two computers using Skype, either through the “video call” or text option depending on condition. Participants were instructed to notify the researcher when they had completed the task, but were not told their task completion time was being measured.

Identical computer configurations were used in all conditions. In the videoconferencing sessions, participants communicated using webcams of the same make and model, as well as headphones to minimize audio distractions or the possibility of participants hearing one another other than through the computer connection.

Task completion time was measured to the nearest second with a digital stopwatch, beginning as soon as the participants began typing or speaking, and ending as
soon as one of the participants notified the researcher that the task was completed. Participants were then instructed to complete the post-task survey.

After completing the survey, all participants completed a two-minute typing test using TypingMaster, a freely available typing test program for Microsoft Windows operating systems. The participant’s words per minute and accuracy percentage were recorded, and then the participant was debriefed and dismissed from the study area.

Measures

**Efficiency.** Efficiency was primarily measured as the amount of time required to reach a consensus, in total seconds ($M = 725.16, SD = 688.72$). A 5-item, 7-point Likert-type scale of efficiency adapted from Simon (2006) was included in the post-task survey as an additional efficiency measure. This scale focuses on perceptions of the medium as assisting or hindering in performing the given communication task. The scale variable was calculated by averaging the responses to each item ($M = 4.98, SD = 1.32, \alpha = .83$).

**Propinquity.** Propinquity was measured during the post-task survey with the prompt “Consider the task you just completed. On each line below, select the option you think best describes your connection to your partner while you were working on this task.” This question was followed by five semantic differential items with five options each: distant-nearby, close-far, together-separate, proximal-remote, and disconnected-connected. This semantic differential scale is identical to that employed by Walther and Bazarova (2008). “Distant-nearby” and “disconnected-connected” were coded 1-5 from left to right; the other three items were reverse-coded. The scale variable was created by averaging the responses to each semantic pair ($M = 3.56, SD = .91, \alpha = .87$).
**Communication skill.** Communication skill was measured using Cupach & Spitzberg’s (1981) rating of alter-competence scale (Perotti & DeWine, 1987). This 24-item scale rating a partner’s communication skill was chosen over a self-report scale to reflect electronic propinquity theory’s treatment of “communication skill” as separate from its other propositions, in that a communicator’s self-perception is less important than an external measure. Each item was presented with a 7-point Likert-type scale; the scale variable was created by averaging the responses to each item ($M = 5.25$, $SD = .78$, $\alpha = .93$).

**Communication satisfaction.** Communication satisfaction was measured using the same scale employed by Dennis & Kinney (1998), the Communication Satisfaction Inventory (Hecht, 1978). This scale consists of 19 items using a 7-point Likert-type scale. The scale variable was created by averaging the responses to each item ($M = 4.79$, $SD = .75$, $\alpha = .84$).
Results

A 7-point, 3-item scale taken from Dennis and Kinney (1998) was employed as a manipulation check to determine equivocality of the message task, with higher values indicating higher degrees of equivocality ($M = 6.26$, $SD = .82$, $\alpha = .80$). This mean was significantly higher than the midpoint of the scale, indicating a high degree of task equivocality, $t(49) = 18.36, p < .001$ two-tailed.

Perceived richness of the medium used was measured using a 7-point, 7-item scale with higher values indicating higher perceived richness ($\alpha = .81$). Text ($M = 4.01$, $SD = .88$) was reported lower in perceived richness than video ($M = 5.83$, $SD = .75$). This difference was found to be significantly different and in the expected direction indicating that participants were aware of the affordances of each medium, $t(44.97) = -7.86, p < .001, d = 2.23$.

Hypothesis 1a predicted a main effect of medium on task completion time, such that those who used videoconferencing would complete the task in less time than those who used text chat. Participants using videoconferencing ($M = 264.7$ seconds, $SD = 346.9$) completed the task in less time than those who used text chat ($M = 1032.13$ seconds, $SD = 692.0$). This main effect of medium on task completion time was significant, $t(45.19) = 5.18, p = .001$ two-tailed, $d = 1.40$. Therefore, Hypothesis 1a was supported.
Additional analysis showed that although differences in the mean task completion time between the assigned-text and chose-text conditions were insignificant, those who chose video chat completed the task significantly faster ($M = 98.3$ seconds, $SD = 25.1$) than those who were assigned to video chat ($M = 336.0$ seconds, $SD = 396.8$), $t(13.24) = 2.23, p = .004$ two-tailed, $d = .85$. However, a test of the interaction effect between medium and allowance of choice on task completion time using Hayes’ (2012) PROCESS module for SPSS was not significant, $b = -.008, t(13.24) = -.045, p = .96$. Therefore, Hypothesis 1b was not supported.

Hypothesis 2a predicted a main effect of medium on propinquity, such that those using videoconferencing would experience higher propinquity than those using text chat. Although those using videoconferencing reported greater propinquity ($M = 3.78$, $SD = .81$) than those using text chat ($M = 3.41$, $SD = .96$), this difference was not significant, $t(45.10) = -1.45, p = .15$. Therefore, Hypothesis 2a was not supported.

Hypothesis 2b predicted a positive effect of perceived richness on propinquity after controlling for medium. Perceived richness was found to be a significant positive predictor of propinquity, even after controlling for medium, $b = .41, t(49) = 2.75, p = .008$, adjusted $R^2 = .14$. Therefore, Hypothesis 2b was supported.

Hypothesis 3 predicted that participants choosing a medium would experience lower propinquity than those assigned to the same medium. Those who chose text reported higher propinquity ($M = 3.50$, $SD = 1.03$) than those who were assigned text ($M = 3.28$, $SD = .86$), however this difference was not significant, $t(26.49) = -.62, p = .54$ two-tailed. Those who chose video reported lower propinquity ($M = 3.63$, $SD = 1.05$)
than those who were assigned to video \((M = 3.84, SD = .72)\), however this difference was also not significant, \(t(7.11) = .44, p = .67\) two-tailed. Therefore, Hypothesis 3 was not supported.

Hypothesis 4 predicted a positive relationship between perception of partner’s communication skill and satisfaction with the dyadic communication, whereas Hypothesis 4a predicted that propinquity would have a positive, mediating effect on this relationship. Perception of partner’s communication skill, propinquity, and satisfaction with the dyadic communication were all found to be significantly, positively correlated with each other. See Table 1. A regression analysis showed partner’s communication skill as a significant predictor of communication satisfaction, \(b = .66, t(49) = 6.434, p < .001\). Propinquity was not found to be a significant predictor of communication satisfaction in a model including partner’s communication skill, \(b = .13, t(49) = 1.43, p = .16\), adjusted \(R^2\) change = .01.

The proposed indirect effect of propinquity on the relationship between partner’s skill and communication satisfaction was tested using Hayes’ (2012) PROCESS module for SPSS with 10,000 bootstraps. The confidence interval for this analysis ranged from - .04 to .26; as 0 was bounded by the confidence interval, no significant indirect effect was detected. Therefore, while Hypothesis 4 was supported, Hypothesis 4a was not supported.

In a regression analysis including medium and demographic variables including age and language fluency as covariates, propinquity was not found to be a significant predictor of task completion time, \(b = -114.0, F(6,42) = 5.58, p = .26\), adjusted \(R^2\) change = .001. Therefore, Hypothesis 5 was not supported.
Discussion

The present findings indicate mixed support for media richness theory’s major predictions and support for one of the major propositions of electronic propinquity theory. Another major proposition of electronic propinquity theory regarding availability of media choices was not supported.

The main effect of medium on completion time for an equivocal task as found in Hypothesis 1 here was correctly predicted by media richness theory: those who used the medium with greater capacities for transmission of non-verbal cues and immediate feedback completed the task faster than those who used a “leaner” medium. However, the moderating effect of choice on the relationship between medium and efficiency as suggested by Walther and Parks (2002) was not found to be significant. Along with Dennis and Kinney’s (1998) findings showing no support for a moderating effect of task equivocality on completion time, these findings call into question media richness theory’s unique contributions to understanding computer-mediated communication. Other theories such as Walther’s (1992) social information processing theory similarly predict the main effect of medium on task completion time without additional moderating effects.

Hypothesis 2 investigated the potential effects of communication media on propinquity. Whereas media richness theory treats a medium’s traits as static, electronic propinquity theory’s derived corollaries indicate that perceptions of a medium’s capacity for bandwidth and mutual directionality can change based on variables such as skills of
the communicators, information complexity, and presence of channel choice. Hypothesis 2b supports electronic propinquity theory’s propositions that these perceptions are positively associated with propinquity even after controlling for medium.

Hypothesis 3 is one of the first known experimental attempts to offer participants a choice of medium as a test of electronic propinquity theory’s proposition that increasing the number of media choices available reduces propinquity. This hypothesis was not supported, possibly in part due to the inducement to select videoconferencing; participants presented with the inducement may have felt like they had less of a choice in which medium to select. The possibility also exists of a question order effect; participants were presented a question immediately after performing the task asking them which medium they would choose if they needed to complete the task again, before the propinquity measure was taken. This question may have alerted participants to the presence of other media choices, confounding the effect of the choice manipulation on the propinquity measure. Any replication of the present study should move this question to a later part of the post-task survey and include a manipulation check to measure whether participants believe they had a sufficiently free choice of the media available.

An open-ended question prompted participants to explain why they selected a given media for completing the equivocal message task. These responses were evaluated using deductive thematic analysis, coding for semantic content (see Braun & Clark, 2006, for a description). Responses were coded by a single coder for unique thoughts during two separate coding sessions, yielding a single-coder reliability of .92. The two most common themes among those selecting text chat were the ability to think about or review
a response before sending it, and apprehension about conversing with a stranger through videoconferencing or face-to-face. Three comments claimed a higher level of familiarity with text chat than video chat. Two comments stated that they believed the task was sufficiently simple to be addressed through text chat.

One individual response to this question reflected a possible advantage of text-based communication over videoconferencing for completing an equivocal task: “I feel that text chat would be easier in this situation because I can go back and read what has already been said multiple times.” This affordance of text-based communication is not frequently mentioned in studies of media richness or propinquity; removing the ability to review prior parts of the conversation could serve as a manipulation in a future study investigating effects on propinquity or task completion efficiency.

Post-task, participants were asked to select a medium they would use if asked to complete the task again and prompted in an open-ended question for their reasoning. Options included face-to-face communication, videoconferencing, audio-only chat, text chat, and handwritten messages. Among those who selected text chat, more than half (11 of 18) still expressed a preference for text chat. Responses to the open-ended question were coded for unique thoughts during two separate coding sessions, yielding a single-coder reliability of .88. The most prevalent theme among those still preferring text chat involved the expectation for an instant response involved with voice-based or video-based communication. Future investigation may include exploring a possible connection between preference for text-based communication and willingness to self-censor (Hayes, Glynn, & Shanahan, 2005).
Another theme among those who still preferred text chat mirrored the pre-task responses: apprehension about conversing with a stranger through video chat. Media richness theory’s origins in organizational communication literature emphasizes an importance on the workplace, where those involved in a message task are likely to have prior interaction with each other through richer media (or face-to-face). Further investigation may determine if extent of prior interaction alters media choice for completing such a task.

Six of the 18 preferred face-to-face communication if asked to complete the task again, and one selected voice chat. The most common themes expressed by these participants were ease of communication (including difficulty in using Skype) and the ability to perceive nonverbal cues omitted from text-based conversation, one of the four major components of “richer” media as described by media richness theory.

Hypothesis 4, which proposed a direct relationship between perception of the other participant’s communication skill and communication satisfaction, was supported. However, propinquity was not found to have a significant mediating effect on this relationship. This finding is particularly concerning as Korzenny and Bauer (1981) propose that electronic propinquity theory serves just such a role: mediating the relationship between the various predictors of propinquity and satisfaction with a particular communication. There is currently no known study which has established this mediating relationship; Korzenny and Bauer’s (1981) findings on this relationship were insignificant, whereas Walther and Bazarova (2008) treated communication satisfaction and propinquity as separate dependent variables without testing mediating relationships.
between them. Further testing is required to determine whether propinquity serves such a mediating relationship or whether it should be treated as a separate outcome variable unique from communication satisfaction.

Hypothesis 5 attempted to extend propinquity theory’s propositions beyond communication satisfaction to determine if propinquity could serve as a predictor of completion time for an equivocal task. This hypothesis was not supported. Some of the major predictors of propinquity, especially communication skill and perceived bandwidth, could plausibly influence task completion time; however, propinquity is primarily a measure of perceived connectedness with others in a mediated communication. Such a feeling of connectedness could contribute to an interest in more personal discussion, negatively influencing completion time for a specific equivocal task such as that employed in the present study.

Limitations

The sample population for the present study consisted entirely of undergraduate college students. Other studies have identified this demographic as generally preferring text-based communication through mobile; even those below the mean on frequency of texting employ it more often than other forms of mediated communication (Skierkowski & Wood, 2012). Including a wider range of age and education demographics may reveal levels of skill with text-based communication and patterns of media choice other than those observed in the present study.

Additional limitations include the low number of participants and unbalanced distribution of participants between cells due to the choice manipulation. The present
study analyzed data from 50 participants, with cells ranging from 6 to 18 to participants. Further studies should not only increase the number of participants but consider alterations to the choice manipulation to account for the sample population’s strong preference for text chat, such as providing videoconferencing as an alternative to a medium other than text.

Open-ended response questions were not directly based on prior studies and were coded by a single coder. Such methods do not allow for tests of reproducibility among coders or measuring accuracy against existing coding schemes (Krippendorff, 1980), however these questions were not directly involved in any hypothesis tests.

The requirement that three participants be present for the choice condition necessitated a non-random assignment of conditions. The choice condition was run in all cases where all three scheduled participants arrived at the study area, whereas the assigned-text and assigned-video conditions were employed at random when only two participants arrived.

In the choice condition, participants indicated their preference for text chat or videoconferencing by checking a box on a paper form. The same form was used for all participants, with text chat listed first. This order affected selection for at least one participant, who stated a preference for text chat because it was “the first box my pen reached.” Any replication of this study should randomize presentation of the available media to mitigate order effects.
Conclusion

One of the goals of the present study was to directly test the fundamental assertion of media richness theory which Walther and Parks (2002) claimed had not been tested: “if users select richer media for equivocal messages, then their efficiency will be greater” (p. 534). The present study’s findings supported one of these two assertions: whereas those who used a richer medium completed the equivocal message task presented in less time than those who used a “leaner” medium, there was no moderating effect of the presence of choice on completing the task.

The present study also directly tested some of the basic propositions of electronic propinquity theory, a lesser-known theory linking qualities of a medium and communication skill to communication satisfaction. These hypotheses had mixed results, with one major proposition supported and another not supported. Although methodological issues may have introduced confounds into the results, it is also possible that electronic propinquity theory, which predates most modern forms of computer-mediated communication, lacks the parsimony required to be easily tested. The theory lists six direct predictors of propinquity, but also includes 15 derived corollaries regarding relationships between those predictors. The original test failed to support even the major propositions, and Walther and Bazarova (2008) acknowledge that their study “obtained statistically significant interactions more often than main effects” (p. 642).
Further testing of electronic propinquity theory is warranted to determine whether it should be retained, possibly with simplifications.

Whereas media richness theory correctly predicted the main effect of medium on task completion time, it did not predict the pattern of choice exhibited by participants, nor did it predict the presence of media choices on efficiency. Electronic propinquity theory provides some clues for why people may choose a less efficient medium; those who chose text felt just as close to their partners as those who chose video. When people feel more comfortable with a given medium and feel no less connected to their peers, it appears they may be willing to tolerate inefficiency. Thus, there may be a place for a once-forgotten theory of media selection alongside one of the most-cited theories of computer-mediated communication.
References


Skype (Version 5.5) [Computer software]. Luxembourg, Luxembourg: Skype.


Table 1. Correlations Between Partner’s Communication Skill, Propinquity, and Communication Satisfaction

<table>
<thead>
<tr>
<th></th>
<th>Skill</th>
<th>Propinquity</th>
<th>Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Propinquity</td>
<td>.51**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Satisfaction</td>
<td>.77**</td>
<td>.51**</td>
<td>1</td>
</tr>
</tbody>
</table>

**p < .001, two-tailed
Appendix: Stimulus and Measurement Scales

**Pre-task survey**

Today we will be studying how people use various media to complete complex tasks. You and a conversation partner will be presented with a task to complete. You will converse with your partner through one of several different media.

But first, we would like to ask you to answer some questions about yourself.

What is your age? (open-ended)

How frequently do you use the following? (1=Never, 2=Once a month or less, 3=Two to four times a month, 4=Two or more times a week, 5=Daily)

Using personal computers in general
Using video chat on a personal computer
Using audio chat on a personal computer
Using text-only chat on a personal computer

On a scale of 1 to 7 (1 being none and 7 being extensive), how would you rate your level of skill with:

Using personal computers in general
Using video chat on a personal computer
Using audio chat on a personal computer
Using text-only chat on a personal computer
**Task**

Now you and a conversation partner will be asked to cooperate on a task. Please read the task carefully before proceeding.

Consider a scenario in which a friend of yours has been offered a job. Your friend will need to leave the university before completing his or her degree to take the job. Come to a consensus with your conversation partner on the minimum salary your friend would need to be offered before you would recommend that he or she leave the university and take the job. Please keep your conversation focused on this task and be prepared to defend your decision.

(For non-choice conditions:) To complete this task, you will be conversing with your partner (through video chat on the computer/through text-only chat on the computer).

(For choice conditions:) To complete this task, you will be choosing a medium through which to converse with your partner. You may choose (video chat or audio chat).

Now that you know what medium you will be using to complete this task, you will begin shortly. Please read the task again and let the researcher know that you are ready so that (the connection to your partner can be established/you can be led to the room where you will converse with your partner.)

Consider a scenario in which a friend of yours has been offered a job. Your friend will need to leave the university before completing his or her degree to take the job. Come to a consensus with your conversation partner on the minimum salary your friend would need to be offered before you would recommend that he or she leave the university and take the job. Please keep your conversation focused on this task and be prepared to defend your decision.
Post-task

Now that you have completed this communication task, we’d like to ask you some more questions.

Preferred medium

Other participants in this study have completed the same task you have using one of the below media. Assuming you had your choice of any of the below media, which one would you have most preferred for completing this task?

Face-to-face communication

Video chat

Audio chat

Text-only chat

Handwritten messages

Why would you have preferred to use this medium? (open-ended)

Perceptions of efficiency (* to be reverse coded)

Consider the medium you just used to interact with your partner. On a scale of 1 to 7, 1 being strongly disagree and 7 being strongly agree, rate the following statements:

This mode of communication slowed us down. *

This mode of communication made the task easier.

This mode of communication is an efficient way to complete this task.

This mode of communication facilitated our partnership in working on the task.

This mode of communication did not help us to perform this task. *

(from Simon, 2006)

Propinquity
Consider the task you just completed. On each line below, select the box you think best describes your connection to your partner while you were working on this task.

Distant  _  _  _  _  _  _  _  _  Nearby
Close    _  _  _  _  _  _  _  _  Far
Together _  _  _  _  _  _  _  _  Separate
Proximal _  _  _  _  _  _  _  _  Remote
Disconnected _  _  _  _  _  _  _  _  Connected

(Scale from Walther & Bazarova, 2008)

**Communication satisfaction (** to be reverse coded)**

Consider the interaction you just had with your partner. On a scale of 1 to 7, 1 being strongly disagree and 7 being strongly agree, rate the following statements:

I had something else to do. *
Nothing was accomplished. *
I did not enjoy the interaction. *
The interaction went smoothly.
We each got to say what we wanted.
I was very satisfied with the interaction.
I felt that we could laugh easily together.
I was very dissatisfied with the conversation. *
We talked about something I was not interested in. *
I would like to have another interaction like this one.
The other person genuinely wanted to get to know me.
I felt like I could talk about anything with the other person.
The other person showed me that he/she understood what I said.
The other person expressed a lot of interest in what I had to say.
The other person let me know that I was communicating effectively.
The other person did not provide support for what he/she was saying. *
During the interaction I was able to present myself as I wanted the other person to view me.
The other person changed the topic when his/her feelings were brought into the interaction. *
The other person frequently said things which added little to the interaction. *
(From Hecht, 1978; Dennis & Kinney, 1998)

**Rating of alter-competence ( * to be reverse-coded)**

Consider the interaction you just had with your partner. On a scale of 1 to 7, 1 being strongly disagree and 7 being strongly agree, rate the following statements regarding your partner:
The other person was versatile.
The other person was sympathetic.
The other person ignored my feelings. *
The other person was trustworthy.
The other person was awkward in conversation. *
The other person was adaptable.
The other person paid attention to the conversation.
The other person understood me.
The other person lacked self-confidence.*
The other person was a likable person.
The other person could easily put him/herself in another person’s shoes.
The other person gave positive feedback.
The other person spoke too rapidly.*

The other person was polite.

The other person had an accurate self-perception.

The other person was a good listener.

The other person spoke too slowly. *

The other person was supportive.

The other person would be easy to confide in.

The other person trusted me in the conversation.

The other person’s facial expressions were excessively blank and restrained. *

The other person was sensitive.

The other person was cooperative.

The other person was respectful.

(Cupach & Spitzberg, 1981; Perotti & DeWine, 1987)

**Manipulation check – Equivocality (* to be reverse coded)**

Consider the task you were just asked to complete. On a scale of 1 to 7, 1 being strongly disagree and 7 being strongly agree, rate the following statements:

The information needed to complete this task can be found in books. *

The rules and criteria for solving this problem are clear and can be found in books. *

Different people could have different opinions about the best solution for this task.

The information needed to solve this task can be interpreted differently by different people.

More than one reasonable solution exists for the problem faced in this task.

(adapted from Dennis & Kinney, 1998)

**Perceived richness**
Consider the medium you just used to complete this task. On a scale of 1 to 7, 1 being strongly disagree and 7 being strongly agree, rate the following statements.

I was able to quickly receive feedback from my partner.

I was able to talk with my partner using my own words.

I was able to learn from my partner by seeing his body language.

I was able to learn from my partner by hearing his tone of voice.

I was able to change the way I was conversing with my partner to suit his or her needs.

I was unable to receive any feedback from my partner while I was talking. *

I was unable to communicate using anything other than words. *