Transforming a Lean CMC Medium into a Rich One: An Empirical Investigation in Small Groups

Wei Huang  
National University of Singapore

Kwok-Kee Wei  
National University of Singapore and City University of Hong Kong

Richard Watson  
University of Georgia

Lawrence Lim  
National University of Singapore

Robert Bostrom  
University of Georgia

Follow this and additional works at: http://aisel.aisnet.org/icis1996

Recommended Citation  
http://aisel.aisnet.org/icis1996/19

This material is brought to you by the International Conference on Information Systems (ICIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ICIS 1996 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.
TRANSFORMING A LEAN CMC MEDIUM INTO A RICH ONE: AN EMPIRICAL INVESTIGATION IN SMALL GROUPS

W. Huang
National University of Singapore

K. K. Wei
National University of Singapore and City University of Hong Kong

R. T. Watson
University of Georgia

L. H. Lim
National University of Singapore

R. Bostrom
University of Georgia

Abstract

Media richness theory is a well known theory in media adoption and use. In recent years, it has gone through much empirical examination; however, some aspects of the theory still remain largely untested. In the current study, we investigated a core premise of the theory that there exists an inherent and fixed lean-rich continuum of communication media. Our results indicated that media richness was not inherent and fixed as assumed by media richness theory. Instead, with the social constructions shared among communicators, such as the shared group goals generated in this study, a lean CMC medium could be transformed into a rich one, so that rich information could be conveyed through this supposedly lean CMC medium.

1. INTRODUCTION

Media richness theory (Daft and Lengel 1984; 1986; Daft, Lengel and Trevino 1987; Trevino, Daft and Lengel 1990; Trevino, Lengel and Daft 1987) claims that there exist fixed and objectively definable rich or lean properties for all communication media. Based on this fundamental core premise (Contractor and Eisenberg 1990; Lee 1994; Markus 1994), the match between media richness and task proposes that rich media improve performance for tasks with high equivocality (multiple interpretations of information) and lean media increase performance for tasks with high uncertainty (lack of information). According to this theory, face-to-face is the richest medium and computer-mediated communication (CMC) (Kinney and Dennis 1994) such as email (Markus 1994) is a relatively lean medium.

The findings of several research studies have cast some doubts on media richness theory. Some researchers (e.g., Markus 1991; 1994; Rice and Love 1987) found that a lean communication medium such as email could and has been used to convey rich information in many organizations, while other researchers (e.g., Kinney and Watson 1992; Kinney and Dennis 1994) found that matching media with task characteristics (equivocality or uncertainty) did not increase task performance. As a result, media richness may not be fixed and objective, but may be socially defined (e.g., Contractor and Eisenberg 1990; Schmitz and Fulk 1991) and affected by organizational context or social construction (SC) (Lee 1994). These arguments about socially constructed media richness question the core premise of media richness theory that media richness is fixed and objective. In
fact, this premise and some other related issues remain largely untested in empirical research. In the current study, we explore
the issues of whether media richness is fixed and objective and whether social construction (SC) impacts media richness.

In section 2, we briefly review related prior research and derive a conceptual research model for this study. In section 3, we
formulate hypotheses and present the research methodology. In section 4, we report research results. In section 5, we discuss
the research findings.

2. BRIEF REVIEW AND CONCEPTUAL RESEARCH MODEL

Markus (1991; 1994) presented evidence in organizations that a lean email medium was often used and able to convey rich
information. Several other researchers (e.g., Hiltz and Turoff 1978; Kiesler, Siegel and McGuire 1984; A. Phillips 1983; S.
R. Phillips 1988; Rice and Love 1987; Steinfield 1985; Turoff et al. 1993) also found that, in organizations, email was quite
consistently used in conflict resolutions and negotiations that require exchange of rich information. This could not be well
explained by media richness theory.

Based on the evidences collected by Markus (1991), Lee interpreted how email was able to convey rich information in an
organization through the hermeneutic process in terms of distanciation, autonomization, social construction, appropriation, and
enactment. In this hermeneutic process, one key element is the social construction (SC) of which the meaning of the
communicated text is a manifestation or artifact. Organization members are not purely recipients of the textual message of
e-mail but, more importantly, they can enact richer meanings relative to and beyond the message through the social construction
standing behind it (Lee 1994). In this way, rich meanings of the message can be conveyed to the recipient through email.

Lee’s theoretical explanations are mainly articulated from the hermeneutics perspective. More theoretical analyses may still
be needed before media richness can be fully understood and one comprehensive media richness theory (either a modified and
extended version or a completely new one) can be widely accepted. Symbolic interactionism (e.g., Blumer 1969; Cooley 1902;
Dewey 1922; Hall 1987; Maines 1977; Mead 1934) seems another good theoretical perspective for exploring this issue. It posits
that communication in organizations can be considered as interaction through which people generate and assign meanings to
things (including the communication medium itself). Messages that are transmitted through a medium and the medium itself
can be regarded as symbols whose meanings are always multiple and ambiguous (Lyytinen 1987; Stamper 1987), varying in
time, social contexts, and interactions. From this perspective, anything in an organization can be seen as a symbol. Symbol and
its meaning always change and thus nothing in an organization is fixed. Media richness would be at least partially subjective
and socially constructed rather than objective and fixed (Fulk et al. 1987), and media choice and media use are socially
influenced (Contractor and Eisenberg 1990; Fulk, Schmitz and Steinfield 1990). In social interactions, organization members
exchange different viewpoints, get to understand each other’s preferences, mind-sets, needs, and frames of references, and
thus generate shared SCs (or symbols) that establish new meanings to things (including medium) in an organization. Therefore,
shared SC plays an important role in generating and assigning new meanings to communication media (and other things) in
an organization. Meanings or perceptions of communication media would be different to the organization members who possess
shared SCs with each other than to those who do not. The organization members with shared SCs, unlike those without shared
SCs, may perceive a lean medium as a rich one, because rich information of and beyond the message transmitted by the lean
medium could be enacted from the shared SCs (Lee 1994). For example, the symbol :-), commonly accepted and used in the
email user community, reflects such a shared SC among communicators; it symbolizes rich information of happiness, likeness,
relax, humor, and so forth. In this way, the shared SCs established in social interactions may enact new and rich meanings
relative to the text messages transmitted through a supposedly lean medium, and the lean medium may be regarded as being
transformed into a rich one. Prior research also suggested that people who knew each other quite well might be able to convey
rich information in a very lean medium through their shared experiences (Kinney and Dennis 1994; Sproull and Kiesler 1986)
that reflect shared SCs.

In summary, the above theoretical analysis from the perspective of symbolic interactionism suggests that for communicators
without shared SC, media richness perceptions (or meanings) would be predictable using the media richness theory; on the other
hand, for communicators with shared SC, media richness perceptions (or meanings) may be altered so that a lean medium such
as CMC could convey rich information. Hence, a conceptual model can be derived, as shown in Figure 1.
3. HYPOTHESES AND RESEARCH METHODOLOGY

3.1 Hypotheses

Because media richness and social presence are often connected with each other (Rice 1992; Zmud, Lind and Young 1990), the hypotheses will focus on these two variables. Media richness refers to the ability for medium to change understanding in a given time interval (Daft and Lengel 1986). Social presence refers to the degree to which a medium facilitates awareness of the other person and interpersonal relationships during interaction (Short, Williams and Christie 1976).
The following hypotheses are mainly based on the conceptual model in Figure 1 and the theoretical discussion on symbolic interactionism in section 2. The hypotheses are captured graphically in Figure 2.

In groups without shared SC, members would perceive media richness based on what is predicted by the media richness theory, i.e., face-to-face is the richest medium while CMC is a lean medium. Further, social presence theory is the basis for the derivation of media richness theory (Zmud, Lind and Young 1990) and a greater degree of media richness is in general associated with a higher social presence (e.g., Rice 1992). Therefore:

**H1a** Without shared SC, media richness will be perceived to be greater in groups communicating using face-to-face medium than in groups communicating using CMC medium.

**H1b** Without shared SC, social presence will be perceived to be higher in groups communicating using face-to-face medium than in groups communicating using CMC medium.

(referring to Figure 2, point B > A)

With shared SC in groups, for each text message transmitted by CMC, the shared SC standing behind the text message may symbolize and enact new and rich meanings for the message, thereby transforming CMC into a richer medium. Therefore:

**H2a** Using CMC medium, media richness will be perceived to be greater in groups with shared SC than in groups without shared SC.

**H2b** Using CMC medium, social presence will be perceived to be higher in groups with shared SC than in groups without shared SC.

(referring to Figure 2, point C > A)

### 3.2 Research Methodology

The research adopted a 2*2 factorial design, as shown in Table 1. The independent variables were communication media (face-to-face versus CMC) and shared SC (presence versus absence). The dependent variables were media richness and social presence. CMC groups used the SAGE system (a Macintosh version of the SAMM system) for communication and group members were segregated using partitions so that they could not see and talk to each other.

<table>
<thead>
<tr>
<th>Communication Media</th>
<th>Face-to-face</th>
<th>CMC</th>
</tr>
</thead>
<tbody>
<tr>
<td>With shared SC</td>
<td>12 groups</td>
<td>12 groups</td>
</tr>
<tr>
<td>Without shared SC</td>
<td>12 groups</td>
<td>12 groups</td>
</tr>
</tbody>
</table>

### 3.2.1 Task

The task adopted in this study was the Problem of Geographic Diversification (Chidambaram, Bostrom and Wynne 1991), which required groups, based on given background information, to choose the most suitable country (or countries) for business diversification. No correct answer existed for this task. Group members were asked to make decisions based on their own preferences and frames of reference, while considering the impact of political turmoil, racial discrimination, national macro-economic features, and other social factors in each country on business diversification. Hence, group members had to resolve
Transforming a Lean CMC Medium into a Rich One

differences in personal preferences and frames of references before reaching a group decision. As inferred from the media richness theory, such high equivocality embedded in the task should call for the use of a rich communication medium that facilitates rich information exchange. The adoption of this task can therefore help to investigate whether a lean CMC medium is capable of conveying rich information under the condition of shared SC.

3.2.2 Shared SC

A shared SC in a group was generated by asking group members to define and generate shared group goals. Two factors were considered when choosing shared group goals as surrogates of the shared SC. The first one was the factor of time. Other possible shared SCs such as group interpersonal relationships and group norms generally need much more time to be formed and established, whereas shared group goals can be defined and generated within a limited time period. Second, for some group social constructions, such as interpersonal feelings and relationships, one may know more than one can express. The meanings of these SCs are therefore more or less subtle and are normally difficult to be clearly stated. Further, the extent of such subtleties may vary among group members because some members likely state the feelings and relationships more clearly than others. On the other hand, the subtleties could be largely reduced or minimized in shared group goals because, in general, group goals can be clearly defined and stated by group members.

Group goal is an objective or end result that a group seeks to achieve and a status of affairs that people value and toward which people work (Johnson and Johnson 1987). From the research literature, group goal can be classified as achievement goal and maintenance goal (Cartwright and Zander 1968). Achievement goal refers to the major outcome or product that the group intends to produce (Hirokawa 1988; Poole 1983). Group maintenance goal refers to the maintenance or strengthening of the group itself (Blake and Mouton 1978; Dieneresch and Liden 1986; Hosking 1988). Because task needs (achievement goals) and socio-emotional needs (maintenance goals) exist in and are equally important to any group (e.g., Blake and Mouton 1978; Cartwright and Zander 1968; McGrath and Hollingshead 1994), groups were asked to define both achievement and maintenance goals in this study.

Group members possess multiple individual and group goals since members normally belong to multiple groups at the same time (McGrath 1990). Because of differences between what some individuals want and need, and what other members of a group want and need (Schultz 1992), these individual and group goals may not be compatible (Galegher and Kraut 1990). Hence, goal and thus group conflicts likely exist. In this study, group members were first asked to define and exchange individual goals. Starting with individual goals, members discussed and arrived at a set of group goals. This procedure allowed group members to align and reconcile incompatible individual and group goals (Culbert and McDonough 1980), and group goals emerging from individual goals could be really shared by group members (Senge 1990). Further, the group goals generated in this way were not only really shared, but also socially constructed because they were generated in the social interactions of conflict, alignment, and reconciliation among individual goals and group goals. Consequently, these shared group goals may enact and symbolize rich information of the goals and needs of both each individual member and the group, and the conflicts and alignment of different individual goals and group goals. Moreover, group goal itself is defined as an end result or target that a group values, works for, and seeks to achieve, and further, it can shape and direct the group’s behaviors and attitudes in its task activities (Locke and Latham 1990). Hence, the shared group goals likely shape, interpret, and make sense of the members’ communication messages and behaviors when groups are asked to accomplish a task in meetings. All these are well in accordance with the symbolic interactionism perspective.

3.2.3 Subjects

Subjects were 240 second-year undergraduates in a large university recruited from a core information system course. The split between males and females was almost even. Course credits were given for their participation in the experiment. Subjects were randomly assigned to five-member ad hoc groups and the four conditions shown in Table 1. Random assignment helped to reduce the likelihood that a group formed in this way possessed social constructions beforehand. Most groups in this experiment reported in the post-meeting debriefings that most of them did not know the others at all, while a few of them were only familiar with other members’ names or faces but did not know each other well. Hence, groups in the experiment could be
generally regarded as ad hoc groups without common history, and thus shared SCs were unlikely to have existed among group members.

3.2.4 Experimental Procedures

The total amount of time allowed for both conditions of presence and absence of shared SC was the same, with groups in the shared SC condition required to generate shared group goals during the initial part of the meetings. All groups were asked to follow the same procedure to perform the task of the Problem of Geographic Diversification: generating alternatives; discussing the alternatives; choosing the optimal alternative(s) by ranking; filling in post-meeting questionnaires; having a post-meeting debriefing. This procedure was adopted from Chidambaram, Bostrom and Wynne.

3.2.5 Manipulation Check

A manipulation check for shared group goals was presented using the questionnaire proposed by Larson and LaFasto (1989) (alpha=.92). The groups with the shared SC were found significantly different from the groups without the shared SC (F=1177.25, p<.01). The manipulation was thus considered successful.

Dependent variables were measured using questionnaire instruments: media richness (eight items, alpha=.85, drawn from Kinney and Dennis) and social presence (four items, alpha=.88, drawn from Short, Williams and Christie). The alpha scores, which were all greater than .70, indicated that the constructs had sufficient reliability (Nunnally 1978). Appendix 1 provides the detailed questions in these instruments.

4. RESEARCH RESULTS

The descriptive statistics on media richness and social presence are shown in Tables 2 and 3. Note that media richness was reversely scaled: the lower the score of media richness, the richer the medium. Results of ANOVA tests are shown in Table 4.

Table 2. Means (Standard Deviations) of Media Richness

<table>
<thead>
<tr>
<th>Media Richness</th>
<th>Face-to-face Medium</th>
<th>CMC Medium</th>
</tr>
</thead>
<tbody>
<tr>
<td>With Shared SC</td>
<td>3.67 (0.41)</td>
<td>3.56 (0.31)</td>
</tr>
<tr>
<td>Without Shared SC</td>
<td>3.63 (0.31)</td>
<td>4.39 (0.49)</td>
</tr>
</tbody>
</table>

Table 3. Means (Standard Deviations) of Social Presence

<table>
<thead>
<tr>
<th>Social Presence</th>
<th>Face-to-face Medium</th>
<th>CMC Medium</th>
</tr>
</thead>
<tbody>
<tr>
<td>With Shared SC</td>
<td>3.96 (0.24)</td>
<td>4.03 (0.42)</td>
</tr>
<tr>
<td>Without Shared SC</td>
<td>3.44 (0.36)</td>
<td>2.94 (0.46)</td>
</tr>
</tbody>
</table>
Transforming a Lean CMC Medium into a Rich One

Table 4. ANOVA Test Results

<table>
<thead>
<tr>
<th>DEPENDENT VARIABLES</th>
<th>Medium Level (ML)</th>
<th>Group Structure (GS)</th>
<th>Interaction (ML*GS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media Richness</td>
<td>F = 8.41 p = .0058*</td>
<td>F = 12.23 p = .0011*</td>
<td>F = 14.68 p = .0004*</td>
</tr>
<tr>
<td>Social Presence</td>
<td>F = 3.88 p = .0551</td>
<td>F = 54.82 p = 0.0000*</td>
<td>F = 7.07 p = .0109*</td>
</tr>
</tbody>
</table>

* p < .05

Significant interaction effects were found for both dependent variables in Table 4. An in-depth analysis of the interactions is required since the interpretation of an interaction effect takes precedence over the interpretation of a main effect (Kepple 1982). This in-depth statistical analysis was tested by using Tukey-Kramer’s multiple comparison approach. The positive value of (Abs(Dif)-LSD) means a significant difference (Kramer 1956; Tukey 1953).

H1a stated that, in groups without shared SC, face-to-face medium would be perceived richer than CMC medium; the hypothesis was supported [(Abs(Dif)-LSD) = .33*]. H1b stated that, in groups without shared SC, social presence would be greater in face-to-face medium than in CMC medium; the hypothesis was also supported [(Abs(Dif)-LSD) = .18*].

H2a stated that, using the CMC medium, the presence of shared SC would lead to a greater perceived media richness than the absence of shared SC; the hypothesis was supported [(Abs(Dif)-LSD) = .40*]. H2b stated that, using the CMC medium, the presence of shared SC would lead to a higher perceived social presence than the absence of shared SC; the hypothesis was also supported [(Abs(Dif)-LSD) = .68*].

Some other interesting results of the ANOVA test were:

1. The CMC medium with shared SC was perceived to be as rich as the face-to-face medium without shared SC [(Abs(Dif)-LSD) = -.36*] (referring to Figure 2, points C and B).
2. Social presence was perceived to be higher in groups using CMC medium with shared SC than in groups using face-to-face medium without shared SC [(Abs(Dif)-LSD) = .18* and Table 2] (referring to Figure 2, point C > B).
3. In groups with shared SC, CMC medium was perceived to be as rich as face-to-face medium [(Abs(Dif)-LSD) = -.32*] (referring to Figure 2, points C and D),
4. In groups with shared SC, social presence in CMC medium was perceived to be as high as in face-to-face medium supported [(Abs(Dif)-LSD) = -.34*] (referring to Figure 2, points C and D).

5. DISCUSSION AND IMPLICATIONS

In this study, we have two main findings. First, under the condition of no shared SC, face-to-face medium was richer than CMC medium, as predicted by the media richness theory. This suggests that media richness theory may still be valid in newly established groups. Second, under the condition of shared SC, CMC medium was transformed into a richer one, and was generally perceived as rich as face-to-face medium. This suggests that media richness would be socially involved and media richness theory may not be valid in well established groups or organizations with stable shared SCs.

Our research findings suggest the possible distinction between physical and logical media richness in communication. Physical media richness is directly linked with physical media per se, which is objective and fixed as defined by media richness theory. Logical media richness is subjective and socially constructed as described by the analysis of symbolic interactionism in...
section 2, and is related not only with physical media, but also with shared SCs and organizational contexts. Logical media richness can include paralinguistic cues within textual message such as using certain capitalization, punctuation, and idioms or slang for expressing emotions (Turoff et al. 1993) and symbolic cues (Trevino, Lengel and Daft 1987). Hence, logical media richness can well explain situations where social symbols may generate new and rich meanings to textual email messages. The differentiation of these concepts of media richness are in line with Weick’s differentiation of technologies (1979; 1990); Weick indicated that technologies reside in two intersection arenas: the physical and the mental. Further, the existence of the two concepts also complies with the essence of the symbolic interactionism perspective that “Human society [including the object of communication media] as we know it could not exist without minds and selves” (Mead 1934).

In newly established organizations, shared SC is unlikely to exist. Hence, participants would primarily perceive physical media richness in communication rather than logical media richness. As a result, the perceptions of media richness would be strongly affected by the objective and fixed characteristics of physical media; media richness would be mainly in accordance with the predictions of media richness theory. In well established organizations, shared SCs likely exist. Hence, participants would be able to perceive the logical dimension of media richness. As a result, the perceptions of media richness would be strongly affected by the subjective and socially constructed features of communication media; media richness would not be perceived in line with the predictions of media richness theory. Therefore, incorporating the concepts of physical and logical media richness into media richness theory could extend the theory, so that it may be applicable to both newly established and well established groups and organizations and explain the inconsistent research results of prior empirical and field studies.

In general, media richness theory can be analyzed in three aspects (Valacich et al. 1994): (1) users’ perceptions of media richness, (2) media choice by users, and (3) task performance by task-medium fit. This study only focused on the first aspect which is the fundamental basis for the other two theoretical aspects. Hence, how the proposed concepts of physical and logical media richness can integrate with the other two theoretical aspects should be another important research issue in the future.

5.1 An Attempt to Reconcile Prior Research Findings

Only recently has media richness theory gone through empirical testing (Valacich et al. 1994). The literature shows that there are only a few published controlled empirical tests of media richness theory. Kinney and Watson studied the effect of medium and task on dyadic communication without directly measuring media richness. Valacich et al. used student groups without a history to test task-medium fit hypotheses, which were drawn from the media richness theory. They found that media richness and social presence tended to be perceived in line with predictions of the media richness theory. Chidambaram and Jones (1993) did not measure media richness but measured social presence in their study using student groups without a history. Their finding was generally in line with media richness theory that face-to-face groups had greater social presence than dispersed groups. Kinney and Dennis directly examined media richness, again using student groups without a history. Their research findings showed that face-to-face medium was perceived as richer than CMC medium in terms of multiplicity of cues and immediacy of feedback, which are media’s objective and fixed characteristics. In summary, in student groups without a history, shared SCs were unlikely to exist. According to the extended media richness theory, physical media richness, rather than logical media richness, would be primarily perceived. Hence, media richness in these empirical research studies varied according to the predictions of media richness theory — in line with the *extended* media richness theory as well.

On the other hand, previous field research findings (e.g., Hiltz and Turoff 1978; Kiesler, Siegel and McGuire 1984; Markus 1991, 1994; A. Phillips 1983; S. R. Phillips 1988; Rice and Love 1987; Steinfield 1985; Turoff et al. 1993) can also be explained by the *extended* media richness theory. These research studies were conducted in well established organizations or their departments. Shared SCs likely existed and functioned as social symbols to enact rich information from email messages. As a result, logical media richness, rather than physical media richness, would be primarily perceived so that lean media such as email could be used to convey rich information for conflict resolutions and related activities.
5.2 Conclusion

The extended media richness theory posits that media richness perceptions may be directly influenced by shared SCs. Since media richness, media choice, and media use are closely related, the latter two may also be affected by shared SCs. In which case, media choice and media use may involve more than finding a match between medium and task, and involve complex social interactions among physical media, human participants, and dynamic organization contexts. The extended theory would serve to provide clues for further research on these important issues.

6. ACKNOWLEDGMENT

Professor A. Dennis provided the two instruments for measuring media richness and social presence. The Associate Editor and anonymous reviewers gave constructive comments on the early draft of this paper. The authors would like to thank them for their suggestions.

7. REFERENCES


Transforming a Lean CMC Medium into a Rich One


Tukey, J. “A Problem of Multiple Comparison.” Mimeographed manuscript of 396 pages, Princeton University, 1953.


APPENDIX 1: QUESTIONNAIRE ITEMS

Starred items (*) were reverse scored.

**Media Richness:** All items were seven-point Likert scales anchored by 1 “strongly disagree” and 7 “strongly agree.” High scores indicate low presence of measured construct.

1. The communication condition under which we communicated helped us to better understand each other. *
2. When we disagreed, the communication conditions made it more difficult for us to come to agreement.
3. The communication condition under which we were communicating slowed down our communications.
4. When we disagreed, our communication environment helped us come to a common position. *
5. The conditions under which we were communicating got in the way of our sharing of opinions.
6. I could easily explain things in this environment. *
7. The communication conditions helped us communicate quickly. *
8. There were ideas I couldn’t easily communicate to my partner because of the communication conditions.

**Social Presence:** Seven-point Semantic Differential Scale.

1. Human versus Mechanical *
2. Unsociable versus Sociable
3. Personal versus Impersonal *
4. Cold versus Warm

**Shared Group Goals:** All items were four-point scales anchored by 1 “false,” 2 “more false than true,” 3 “more true than false,” and 4 “true.”

1. There is a clearly defined need – a goal to be achieved or a purpose to served - which justifies the existence of our group.
2a. Our purpose is noble and worthwhile.
2b. Our goal represents an opportunity for an exceptional level of achievement.
2c. Our goal challenges individual limits and abilities.
3. There are clear consequences connected with our group’s success or failure in achieving our goal.
4. Our goal is compelling enough that I can derive a worthwhile sense of identity from it.