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Communication Media and Intersubjectivity in Small Groups

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ABSTRACT

Prior research suggests that computer-mediated communication (CMC) may impede groups' intersubjective social construction of meaning. However, little is yet known about the intermediary processes that promote such intersubjectivity. Based on sociological and organizational theories of meaning and communication, we propose three such processes: signification, comprehension, and emotional contagion.

In a laboratory experiment, findings provide preliminary support for the proposed salience of the three intermediary processes to intersubjectivity. The direct effect of CMC on intersubjectivity was initially negative. Following the addition of the three mediational processes, this effect was positive, though insignificant. Thus, the three intermediary processes collectively account for the negative effect of CMC on intersubjectivity. Specifically, results indicate that the effects of CMC on all three processes were negative and that signification and comprehension had positive effects on the intersubjective social construction of meaning. Implications of these findings for ongoing research on meaning in electronically-mediated communication are considered.

Keywords

CMC, Intersubjectivity, group communication, meaning, consensus.

INTRODUCTION

Modern society has been characterized as more concerned with mastery than with meaning (Giddens, 1991). The need for attention to meaning is particularly salient in our current information era, where information is now the last bastion of competitive advantage (e.g., Stewart, 1999). Information and communication technologies make this resource more accessible than it has been in the past to face-to-face and virtual teams (e.g. Huber, 1990). However, in order to leverage information, we need to be able to imbue it with meaning. Yet little research exists that explores the impact of computer-mediated communication (CMC) on the creation of intersubjective or interactively-constructed meaning.

The purpose of this research is therefore to explore the effects of CMC on the process of creating intersubjective meaning through the sharing and reconciliation of individual perspectives. Specifically, it seeks to understand whether, and in what manner, CMC impacts groups' ability to achieve intersubjectivity. In a recent investigation of the effects of CMC on intersubjectivity, CMC was found to enhance the breadth of topics discussed in teams, but inhibit their depth of discussion (Miranda and Saunders, 2003). Furthermore, while broad discussions enhanced decision quality, deep discussions did not; in fact, prolonged discussions detracted from quality decisions. Thus, the critical issue appears to be whether or not the group is actually able to reconcile its disparate perspectives, not the group's ability to have deep discussions (Miranda and Saunders, 2003). In this paper, we examine the ideas of broad and deep discussion in terms of more primitive signification, the representation of entities within the context of the communication, and comprehension processes (Eco, 1979). In order to investigate the reconciliation process, we investigate a third intermediary process – viz., emotional contagion. Such emotional contagion may be viewed as indicative of a team's reconciliation of its disparate perspectives. Additionally, we operationalize intersubjectivity and assess the mediating role of the dimensions social absorption: signification, comprehension, and emotional contagion in the intersubjective social construction of meaning.

This paper therefore seeks to answer the following questions. First, how does CMC affect our ability to socially absorb information? Second, how does such absorption relate to intersubjectivity? In the following sections, we define the concepts of social absorption and intersubjectivity and review relevant literature. Next, we develop our research model and

hypotheses. Finally, we present and discuss the results from an empirical study of the effects of computer-mediated communication on absorption and meaning.

MODELING THE EFFECTS OF CMC ON THE SOCIAL CONSTRUCTION OF MEANING

The derivation of meaning is necessarily intersubjective, i.e., it involves reconciling differing perspectives that derive from our respective biographical situations (Schutz, 1997). A biographical situation is defined as the aggregation of our current observations, and our past experiences and institutional frames, i.e., culturally-derived values, beliefs, and assumptions. Meaning, according to Schutz, is a result of intersubjective interpretation. For Weick (1995), meaning is the product of a creative process: it is the "invention that precedes interpretation" (p. 14). It is the process of bracketing elements of one's biographical situation in response to a trigger or cue that one encounters. Borrowing from Schutz, Weick sees sensemaking as inherently intersubjective. It involves a constant negotiation or reconciliation of different biographical situations.

Below, we consider the social absorption processes that culminate in intersubjectivity in teams and the effects of CMC on these processes. Our proposed research model is summarized in Figure 1.

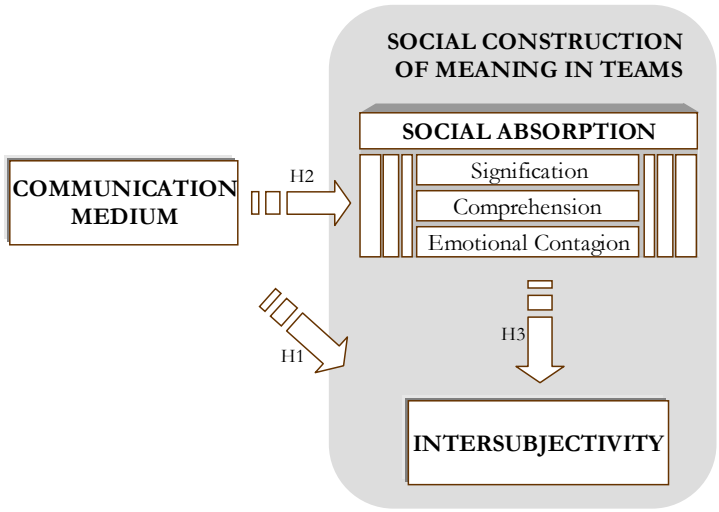

Figure 1. Research Model

Intersubjectivity

Intersubjectivity refers to the cognitive models culminating from reconciliation of the disparate biographical situations of team members. In undertaking such reconciliation of disparate models, team members implicitly compare and adjust their individual models (Miranda and Saunders, 2001). Thus, intersubjectivity is manifest in the changes in team members' cognitions. The more team members are able to absorb each other's biographical situations, i.e., understand others' perspectives and reconcile them with their own, the greater will be the levels of intersubjective meaning within the team.

Intersubjectivity inherently entails "interdependence between individuals that occurs during the act of communication" (Rutkowski and Smits, 2001: 69). Research has indicated a tendency for CMC to inhibit such interdependence (e.g., Straus and McGrath, 1994). This inhibition of interdependence derives from the low social presence of the medium that curtails reciprocal interaction and feedback (Short et al., 1976).

H1: CMC will have a negative effect on intersubjectivity.

Social Absorption

Intersubjectivity as a change process can be understood in terms of cognitive and emotional processes (Fiol and O'Connor, 2002). Intersubjective meaning is the culmination of individuals' absorption of others' subjective models such that each individual's revised model is enhanced with the experiences and values of multiple others in addition to one's own. As per

Weick (1995), such absorption is an inherently creative process. To better understand this process, we draw from the economic literature on the creation of value. The creation of economic value is believed to occur via processes of *exchange* and *combination* (Moran and Ghoshal, 1999). Similarly, the creative production of intersubjective meaning, which is valuable because it leverages teams' diversity, entails the exchange and combination of biographical situations. As with tangible resources, such exchanges and combinations serve to facilitate the creation of value by making resources available where they can best be leveraged toward routine or novel combinations (Moran and Ghoshal, 1999). Such value enhancements are visible in the application of richer perspectives that are appropriate to a particular situation, e.g., a different cultural venue, and in richer decisions.

Just as the exchange of tangibles entails one party giving and another receiving, the exchange underlying social absorption necessitates both the transmittal and reception of individuals' subjective models (Miranda and Saunders, 2003). In other words, exchange requires one party to *signify* or represent their mental models. In fact signification, as a necessary component of social absorption, is a critical antecedent to intersubjectivity (Fiol and O'Connor, 2002). Absorption also requires that team members *comprehend* what has been signified.

The process of reconciling or combining disparate individual models can then be constrained, where a group model is dictated by dominant individuals, or unconstrained, where individuals freely and creatively reconcile individual models to derive intersubjective meanings (Habermas, 1989). These contrasting discourse processes of domination versus reciprocal influence are analogous to economic processes of *capturing* rather than *creating* value. Whereas the former is inherently competitive, the latter is collaborative and energizing (Brandenburger and Nalebuff, 1996). A diffusion of shared positive affect or *emotional contagion* is reflective of such creative combination (e.g., Estrada et al., 1997). Social absorption differs from other processes that result in shared mental models such as groupthink. Groupthink implies uncritical acceptance of another's perspective and a disparity in the levels of cognitive shift in individuals' mental models. Social absorption implies a cognizant revision of individuals' mental models.

Signification

Signification is the representation of entities within the context of the communication (Eco, 1979). Signification by individuals engaged in sharing their biographical situations is a necessary precursor to intersubjectivity. Because of its facility for simultaneous and anonymous contributions, CMC facilitates the sharing of information and perspectives in teams (Miranda and Saunders, 2003). Research has demonstrated that, absent complementary support structures, CMC can inhibit appropriation signification processes (Olesen and Myers, 1999).

H2a: CMC will result in higher levels of signification.

In that the representation of disparate biographical situations introduces team members to novel information and perspectives, it will tend to induce cognitive change.

H3a: Signification will have a positive impact on intersubjectivity.

Comprehension

In order for a communication of biographical situations to be completed, team members must comprehend the situations being signified. Because of the volume of transmissions that occur, transmissions are frequently not received as members are more intent on contributing rather than processing information and perspectives (Miranda and Saunders, 2003). Inundation with information destroys meaning (Garbriel, 1995). Furthermore, the low social presence of the medium precludes the interactive feedback necessary to evoke comprehension (Short et al., 1976). This explains why some have found that when faced with the time constraints typical of synchronous meetings, CMC inhibits information exchange in teams (e.g. McLeod, 1997; Hightower and Sayeed, 1996; Hollingshead, 1996).

H2b: CMC will result in lower levels of comprehension.

An understanding of the information and perspectives communicated by other members of one's team will encourage team members to recreate their own cognitive models.

H3b: Comprehension will have a positive impact on intersubjectivity.

Emotional Contagion

Emotional contagion is the development of shared positive affect in teams (Doherty, 1997). This is reflective of combined perspectives because as team members are able to reconcile their disparate perspectives, they will perceive greater similarity and develop positive affect (Byrne, 1971). When communication is conducted via electronic media, textual communication dominates and the transmission of nonverbal cues is reduced (Short et al., 1976). While textual cues may facilitate the conveyance of ideas, conveying emotions is highly dependent on nonverbal cues: "Because of the importance of these nonverbal cues, direct interpersonal contact is important for the transmission of emotions in groups" (Barsade, 2002: 645). Emotional contagion necessitates subconscious, implicit transmission though facial expressions and mimicry (Kelly and Barsade, 2001; Barsade, 2002). CMC impedes such expressive communication (Galegher and Kraut, 1994). The net result of this depletion of expressive non-verbal cues from electronic communication is a lower likelihood of emotional contagion.

H2c: CMC will result in lower levels of emotional contagion.

Should the contagion of positive affect be lacking, creative combination of disparate individual perspectives is less likely to have occurred. Emotional energy helps teams mobilize change (Fiol and O'Connor, 2002) inherent in intersubjectivity. Positive emotional contagion further facilitates individuals' modification of their cognitive models by reducing conflict and increasing cooperation among group members (Barsade, 2002).

H3c: Emotional contagion will have a positive effect on intersubjectivity.

RESEARCH METHODS

The effects of communication technology on absorption and meaning were assessed in a controlled experimental setting. Study participants were drawn from an Operations Management class. Participants were assigned to groups based on their availability. Each group was randomly assigned to one of the two communication conditions. Each group met once for a two-hour period, during which they completed the assigned task and responded to a questionnaire. The size of the groups was three or four members. The disparity in size had no effect on any of the study variables (t-test results: signification – $t=0.304$, $p=0.583$; comprehension – $t=0.060$, $p=0.807$; emotional contagion – $t=0.856$, $p=0.358$; consensus change – $t=0.888$, $p=0.349$).

There were two experimental conditions in this study coded as a binary variable with face-to-face groups coded as 0 and groups that use computer-mediated communication coded as 1. There were 9 groups in the face-to-face condition and 10 groups in the computer-mediated condition. The dependent variables were social absorption and intersubjectivity and the level of analysis was the group. Absorption was assessed using self-report measures. Intersubjective meaning was assessed through consensus change. The following sections describe the experimental conditions and measures.

Computer-Mediated vs. Face-to-Face Communications

Groups in the computer-mediated communication condition interacted with each other solely via a web-based electronic forum. The forum provided the following features: structured agenda, simultaneity, electronic recording, and enhanced information processing. Groups were trained to use the technology at the start of the session using a practice task. Groups in the face-to-face condition interacted with each other directly. They were not provided with access to computer technology during the experimental session.

Experimental Procedures

Upon arriving at the study site, group members were introduced to each other and allowed a 15-minute interval to get to know each other. Thereafter, each subject in the computer-mediated communication condition retired to his or her workstation that served to simulate a distributed work environment. Experiment administrators ensured that the groups interacted solely via the electronic communication media, and did not verbalize to each other.

Subjects were instructed to read the task description and associated information and individually rank the alternatives. They were asked to justify their rankings, recounting all data, experiences, and values that influenced their ranking on a decision justification sheet. There was no discussion up to this point. Subjects then began to interact with their team face-to-face or via the computer, as per their assigned condition. After all alternatives had been discussed, the groups reviewed their information and others' comments. Following this discussion period, groups were required to arrive at a group ranking of the alternatives. Subjects were then asked to individually rank the alternatives once more and complete the decision justification sheet once more. Subjects completed the survey instrument, were debriefed and allowed to leave.

Task

The Foundation task was used in this study (Watson et al., 1988). The task required groups to allocate limited funds to competing philanthropic organizations with conflicting goals and values. The task has been described as a fuzzy, judgment, or cognitive-conflict task, in which group members' differing values and judgments are brought to bear.

Each team made a total of seven allocation decisions. On each of these decisions, subjects were asked to allocate a hypothetical amount (ranging from $10,000 to $10,000,000) across six competing projects that were described. These six projects presented to the subjects on each allocation decision represented six different values – theoretical values, economic values, aesthetic values, social values, political values, and religious values.

Teams made the first five of these allocations individually, assigning funds across the specified projects based on their individual preferences. The third of these five decisions represented a baseline decision. They submitted these five allocations to experimenter and then proceeded to the sixth allocation decision. On the sixth decision, they were required to allocate the assigned funds as a team, requiring them to reconcile their individual preferences. This funds and projects available on this decision were comparable to those on the third individual allocation made by subjects, i.e., the baseline decision.

Once they had submitted this team decision to the experimenter, they were asked to make a seventh allocation decision individually. Again, these funds and projects were the same as those presented to the subjects on the baseline individual and the team decisions. This process allowed the experimenters to ascertain individuals' baseline preferences, compare these preferences with the group's position and thereafter determine whether the group discussion had evoked a change in subjects' individual preferences.

Dependent Variables

The dependent variables of interest in this study were social absorption and intersubjectivity. These are discussed below.

Social Absorption

This was assessed via a self-report instrument. The instrument consisted of three multi-item, 5-point Likert scales that assess each of the three proposed dimensions of social absorption. A review of the literature on information exchange did not yield appropriate scales or items for measuring the dimensions of social absorption. However, this literature review was useful in understanding the construct domains for signification, comprehension, and emotional contagion constructs, and for the subsequent development of the scales created for this study. Items, factor loadings, and scale reliabilities appear in Table 1.

VARIABLE/ITEM		LOADINGS/RELIABILITY		
		F1	F2	F3
Signification				Cronbach's α=0.7143
1.	I was able to express my opinions regarding the problem	0.0710	0.0436	0.7770
2.	My team-mates were able to share their thoughts regarding the problem with the group.	0.3850	-0.0363	0.6090
3.	I was able to share my thoughts regarding the problem with the group.	-0.1230	0.0691	0.8560
Comprehension (Reversed-scored)				Cronbach's α=0.7480
1.	It took a while for my team-mates to understand what was being said.	-0.8740	0.1070	-0.0795
2.	It was difficult to understand what people were trying to say.	-0.8160	-0.0772	-0.0137
Emotional Contagion				Cronbach's α=0.7149
1.	I found myself feeling the same way that some of my team-mates initially did.	0.4660	0.5100	-0.0884
2.	People in my group felt very similarly as we got further into the meeting.	0.0694	0.8500	-0.1400
3.	I feel good about our meeting today.	0.0105	0.6320	0.2400
4.	My team-mates felt good about our meeting today.	-0.0969	0.7950	0.1600

Table 1. Absorption Measures and Exploratory Factor Analysis

While the signification and comprehension scales were simple aggregates in the analysis, the composite score for emotional contagion was computed as follows: items 1 and 2 were aggregated separately, as were items 3 and 4; then the two sets of items were then multiplied to provide the aggregate score for this scale. Comprehension, emotional contagion, and signification explained 38%, 15%, and 10% of the variance in social absorption respectively.

Intersubjectivity

Intersubjectivity, as manifest in the cognitive change in teams, was operationalized as consensus change, i.e., the difference between the level of consensus within the group prior and following the group discussion (see Watson et al., 1988). Thus, a high intersubjectivity or consensus change score would indicate that individuals within a team adjusted their initial perspectives a great deal following the team discussion of the competing projects.

RESULTS

A total of 73 subjects participated in the study. Of these, 40 (54.8%) were female, and 33 (45.2%) were male. Participants reported an average age of approximately 25.5 years. Two (2.7%) participants reported that they were sophomores, 16 (21.9%) reported that they were juniors, 47 (64.4%) reported that they were seniors, two (2.7%) were on a second degree, and 6 (8.2%) did not report their year in school. Participants represented 8 different majors from the College of Business. Table 2 summarizes the descriptive statistics and Table 3 reports the bivariate correlations among study variables.

VARIABLE	CONDITIONS			
	FACE-TO-FACE		COMPUTER-MEDIATED	
	Mean	SD	Mean	SD
Signification	1.45	0.57	1.97	0.75
Comprehension	4.57	0.60	3.68	0.80
Emotional Contagion	3.66	2.00	6.18	3.17
Consensus Change (Intersubjectivity)	0.37	0.24	0.18	0.16

Table 2. Descriptive Statistics

	Signification	*Comprehension*	*Emotional Contagion*	*Consensus Change*
CMC	-0.371*	-0.535*	-0.429*	-0.431*
Signification	1.000	0.380*	0.404*	-0.357*
Comprehension		1.000	0.369*	-0.480*
Emotional Contagion			1.000	-0.226
Consensus Change				1.000

*p<0.05

Table 3. Bivariate Correlations

Data was analyzed using the partial least squared (PLS) technique (Lohmöller, 1989). This is a structural equation modeling technique that enables simultaneous estimation of measurement and path models, without the data assumptions inherent in methods such as LISREL or EQS (Lohmöller, 1989; Wold, 1982). It is therefore very suitable to the analysis of small data sets typical of communication research. The measurement model is represented in the weights for each of the absorption components summarized in Table 4 – excluding emotional contagion, which was computed as a product of the average of two subscales.

	WEIGHT	STANDARD ERROR	t-STATISTIC
Signification			
Item 1	0.4501	0.0582	7.80*
Item 2	0.5075	0.0906	5.61*
Item 3	0.2487	0.0869	2.96*
Comprehension			
Item1	0.5743	0.0504	11.46*
Item 2	0.4910	0.0319	15.41*

*p<0.05

Table 4. Social Absorption Measurement Model

The results of the structural equation model tested are presented in Figure 2 (Study Results). Path coefficients are represented as beta weights, and are comparable to standardized regression coefficients in multiple regression. The multiple R^2 values for each endogenous variable in the model are presented, along with the significance of the coefficient. Multiple R^2 values in PLS may be interpreted in the same fashion as they are in traditional regression analysis. They indicate the proportion of variance in an outcome variable explained by other variables in the path model presumed to impact it. The explained variance for signification, knowledge transfer, and emotional contagion were found to be significant; the explained variance for changed understanding was not.

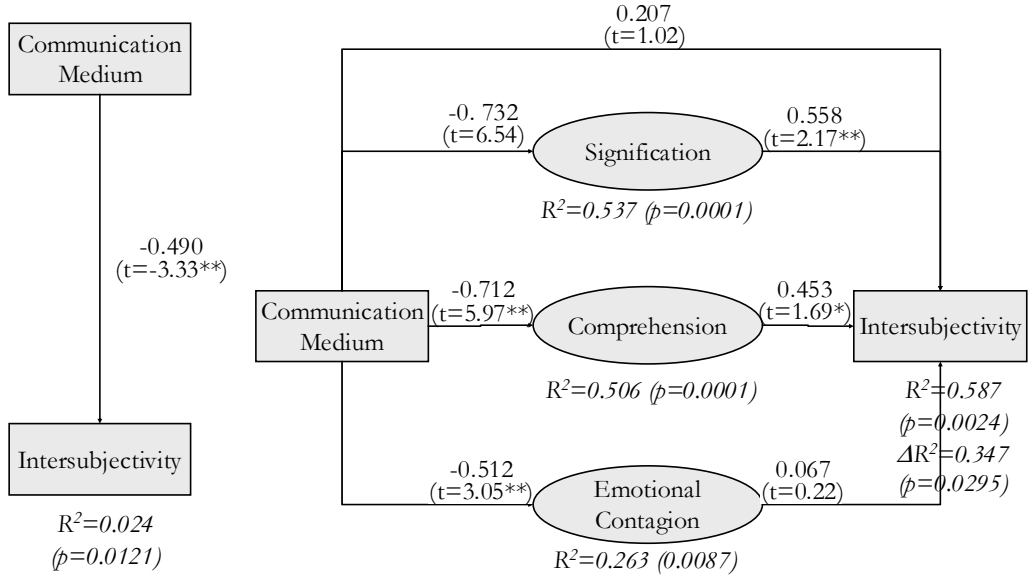

Figure 2. Study Results

In Part A of Figure 2, i.e., the base model, we note the anticipated negative effect of CMC on intersubjectivity, supporting hypothesis 1. Upon the introduction of the social absorption constructs into the model though (Part B of Figure 2), the effect of CMC on intersubjectivity is no longer significant, in fact, changes direction. Thus, the social absorption constructs proposed appear to be valuable in understanding the negative effect of medium upon intersubjectivity. As per Asher (1983), the direct and indirect effects of CMC on intersubjectivity were investigated to confirm the mediational role of social absorption. The results of this analysis are presented in Table 5 and suggest that signification and comprehension were particularly important in mitigating the negative effects of CMC on intersubjectivity.

EFFECT	SIZE
Direct effect of CMC	0.2070
Indirect effect of CMC via social absorption via	-0.7653
Signification	-0.4085
Comprehension	-0.3225
Emotional contagion	-0.0343
Total effect of CMC	-0.5582

Table 5. Summary of Effects of Communication Media on Intersubjectivity

From Figure 2, we also note partial support for hypotheses 2 and 3. CMC had the predicted negative effects on comprehension and emotional contagion, but counter to our expectations, had a negative effect on signification too. While signification and comprehension each had strong positive effects on intersubjectivity, the effect of emotional contagion was insignificant.

DISCUSSION

This study investigated the effects of CMC on intersubjectivity via intermediate social absorption processes. The results of the study supported the premise that CMC tends to abridge teams' intersubjectivity. However, this effect was completely accounted for by the social absorption construct introduced. Nonetheless, two unexpected emerged. First, contrary to the indications of earlier research (e.g., Miranda and Saunders, 2003), CMC was found to have a *negative* effect on signification. A possible reason for this negative effect lies in our operationalization of signification. While prior research assessed the extent of communication through objective counts of messages posted, signification was assessed here using a self-report metric, which was subject to post-hoc reconstruction by respondents. Given the negative effect of CMC on comprehension, subjects in the CMC condition were liable to negatively reconstruct their signification efforts too. Another possible explanation for these disparate findings lies in the differences in the connotation of signification vis-à-vis posting messages. In that signification refers to teams' ability to share their opinions and thoughts on the assigned problem, it entails more than simply posted messages, wherein non-verbal signifiers are absent.

Second, the effect of emotional contagion was not found to be significant. Again, one possible explanation was that the metric used was not discriminatory enough to ascertain a relationship between emotional contagion and intersubjectivity. However, the presence of the anticipated effect of CMC on emotional contagion belies this conclusion. A more plausible explanation is therefore that we have inadequately modeled the path between emotional contagion and intersubjectivity. Rather than emotional contagion being reflective of the attainment of combined perspectives, it may actually be an antecedent of combined perspectives. For example, research has demonstrated that positive affect is associated with improved performance on decision-making tasks, where individuals tended to use more data and request additional information more frequently (Staw and Barsade, 1993). Positive affect is also associated with improved information processing and creative problem solving (Estrada, et al., 1997; Barsade, 2002). Thus, an intermediate – and unassessed – construct, i.e., creative combination, may be required to better explain the relationship between emotional contagion and intersubjectivity. A final issue in regard to emotional contagion is that the construct itself is inadequately understood and bears further investigation (Wright and Doherty, 1998).

While the research findings on the negative effects of CMC on social absorption may appear discouraging for practitioners interested in utilizing CMC for the support of virtual teams, it is important to note that past research suggests the emergence of more effective technology usage over time (e.g., Chidambaram, 1996). As teams develop a history with each other and with their use of technology, the otherwise lean CMC medium can be expanded, thereby permitting the richer communication that facilitates social absorption (Carlson and Zmud, 1999). In the short run too, social absorption can be promoted via the implementation of complementary team structures such as facilitation, training, and structured agendas. Practically, our findings should therefore be interpreted in the light of this possibility. Further research should investigate the phenomenon of social absorption over time and attempt to determine when, and using what mechanisms, CMC-supported teams are able to overcome the limitations of the medium vis-à-vis social absorption.

Finally, computer-mediated communication is not a singular phenomenon; instead, users have access to a diverse range of communication tools. It is very likely that different tools impact users' social absorption processes differently. Subjects in this study had access to three types of tools – an unrestricted brainstorming tool, a topic commenter tool that allowed subjects to comment on each specific project they were evaluating, and an allocation tool that allowed subjects to individually

iterative through allocation of funds across the projects until they attained consensus. While this version of the paper does not consider the effects of differences in usage of these three tools, this is an important consideration for future research.

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