The Death of Distance?: The influence of computer mediated communication on perceptions of distance

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Abstract
The expectation that information and communication technologies lead users to transcend the constraints of physical separation has been expressed as the death of distance. Perceptions of distance – the psychological distance – significantly influence how individuals evaluate events and objects. As computer mediated communication technologies allow individuals to interact as easily with those who are remote as with those who are proximate, how do they influence the psychological distance from remote others? And as these technologies are increasingly employed even in interactions with physically proximate others, how does this influence perceived distances? The results suggest that computer mediated communication technologies significantly reduce the psychological distance of remote others.

Keywords: Psychological distance, construal level, attribution, computer-mediated communication, IT impacts

Résumé
Psychological distance significantly influences how individuals evaluate events and objects. Do computer-mediated communication technologies in fact reduce psychological distance as has been claimed? Our results suggest that computer-mediated communication technologies do significantly reduce the psychological distance of remote others, but there is no evidence that they change the psychological distance from nearby others.
Introduction

One of the powerful consequences of the widespread adoption and use of computer mediated communication (CMC) is believed to be the world becoming “smaller.” Accounts consistently highlight that CMC technologies such as email, video, audio or text chat, list-servers and bulletin boards create informational environments that enable the bridging of distances among individuals and groups. The expectation that information and communication technologies lead users to transcend the constraints of physical separation has been expressed as the death of distance (Cairncross 2000).

Perceptions of distance and proximity have very powerful and far-reaching influences on perceptions, judgment and behavior. A considerable body of research in social psychology has demonstrated that people are much more likely to have relationships with others who are physically proximate while they are less likely to do so with those who are even a short additional distance away (e.g., Hays 1984; McKenna and Bargh 2000). Physical distance also plays a role in the quality of interpersonal relationships. Research in the social sciences suggests that increases in physical distance between individuals and groups are inversely linked to factors such as interpersonal liking, enjoyment and communication frequency (Wilson et al. 2005). The classic work of Allen (1984) was the earliest study in the management literature to highlight physical proximity as an important determinant of information sharing in organizations (Allen 1984) and linking such proximity to greater informal contact and more effective information and knowledge sharing. Variations of this argument theme are echoed in a variety of contexts in the literature on organizational innovation (Von Hippel 1988; Ganesan, Malter and Rindfleisch 2005), new product development teams (Clark and Fujimoto 1990) and software development (Carmel and Agarwal 2001). Overall, the premise that computer mediated technologies can bridge the divide caused by distance has long been accepted and has almost become axiomatic.

However, this view incorporates some untested assumptions regarding the factors influencing individuals’ evaluations of distance and proximity. Just because CMC technologies allow users to interact as easily with those who are remote as with those who are proximate, does it follow that the perception of distance for the two is similar? This is an important issue that has surprisingly received very little attention in prior literature. The gap is critical since perceived distance is a key cognitive construct influencing a wide range of perceptions as well as behavior. A lack of clarity regarding the influence of CMC on perceived distance reflects an important missing link in relating CMC use to patterns of behavior. In this paper, we focus on this issue that has significant implications for understanding individual and group behaviors in contexts of computer-mediated communication.

Prior research in social psychology identifies psychological distance as the key construct in examinations of individual and group behaviors linked to distance and proximity. At the same time, the instruments to measure the construct have been flawed, showing unsatisfactory qualities in terms of reliability and validity (Dow 2000). Direct measures (i.e., estimating directly the overall psychological distance using a Likert-type scale) have been criticized as weak indicators in terms of content and construct validity. This research contributes to overcoming this drawback using two complementary theoretical perspectives – Construal Level Theory and Attribution Theory – to develop valid measures with which to examine the influence of CMC technology use on psychological distance.

In the following section, we first review construal level and attribution theories which are relevant for conceptualizing psychological distance. We then discuss perceptions of physical distance in a computer-mediated context and present a framework for examining the moderating effects of technology upon the perception of distance. In the next section, we describe the research design and the key results. Finally, we discuss the implications of computer-mediated interactions for individual and group-decision making situations.

Psychological Distance and Construal Level Theory

Construal Level Theory (CLT) highlights psychological distance as influencing how individuals represent information. A key determinant is whether primary, essential characteristics or secondary, peripheral characteristics of events and objects are used as the basis of evaluation by individuals. High-level construals involve abstract, decontextualized and global features that convey the essence of information, whereas low-level construals involve more concrete, contextual, and local features. In turn, these mental representations have a variety of important consequences for judgments and behaviors (Liberman, Sagristano, and Trope 2002). CLT suggests that individuals construe psychologically distant events using higher-level categories while they interpret psychologically proximate events based on lower level, concrete details (Trope and Liberman 2003).
The difference between low and high level construal can be illustrated in differing views of two children playing catch with a ball in a backyard. A low-level construal of this activity would include such details as the age of the children, the color of the ball, and the temperature outside. In contrast, a high-level construal of this activity would be “having fun.” The high-level construal disregards the unique features of the event and involves an implicit decision about which features are central to the event and which are peripheral. A higher-level construal omits features that are perceived as less important to the abstract construct. At the same time, this decontextualization links the activity with a more general set of events, bringing in new meaning and definition that is not included in the low-level representations.

Construal Level Theory focuses on this fundamental distinction and suggests that distant objects and events are represented in a more abstract, structured, high-level manner than near objects and events. Interpretations of proximate actions emphasize the means by which an action is performed, while interpretations of distant actions emphasize the ends for which an action is performed. This reflection of psychological distance is consistent with prior research that views psychological distance as a broad construct that comprises a variety of dimensions such as spatial distance, temporal distance, social distance and hypotheticality (Bar-Anan, Lieberman and Trope 2006). A wide range of recent work suggests that the construal-level effect is uniform across the different dimensions of psychological distance.

**Temporal Distance:** The construal of actions is significantly influenced by temporal distance with future events being viewed in more abstract terms than events closer in time. Participants in one study (Liberman and Trope 1998) made decisions (e.g., whether to attend a guest lecture) that they were told would occur in either the near or distant future. The experimental situations differed in the desirability of the outcome (e.g., how interesting the lecture was – a high level issue to be considered in the judgment) and its feasibility (e.g., how convenient the timing of the lecture was – a lower level, concrete issue). The results revealed that with greater temporal distance, the effect of desirability increased (more focus on higher-level attributes of the situation), whereas the effect of feasibility decreased (less focus on lower-level attributes). When outcomes were desirable, they were more attractive at a greater temporal distance even when they were hard to obtain. However when outcomes were less desirable, they were less attractive with distance, even if they were easier to obtain.

**Hypotheticality:** The effects of psychological distance based on hypotheticality (variations in probability) are similar. For example, in a study by Todorov, Goren and Trope (2007), participants were provided a series of promotional campaigns that were either high in desirability and low in feasibility (e.g., receiving 10 free CDs at an inconvenient location) or low in desirability and high in feasibility (e.g., receiving 1 free CD at a convenient location). Under high probability (low distance condition), participants were told that if they signed up for the campaign, they were almost certain to receive a voucher for the company’s products. Under low probability (high distance condition), they were told that they would have about a 1 in 100 chance of receiving a voucher. Results were similar to the effect of temporal distance: Under low probability, participants preferred the high desirability/low feasibility option over the low desirability/high feasibility option; whereas, under high probability, they preferred the low desirability/high feasibility option over the high desirability/low feasibility option. Thus, desirability (a higher level attribute) was increasingly weighed over feasibility (lower level attribute) as psychological distance linked to probability increased.

**Social Distance:** Liviatan, Trope, and Liberman (2006) examined construal effects related to similarity, one form of social distance. Individuals view others less similar to themselves as more socially distant while others similar to themselves are viewed as socially nearer. The results of the study indicated that dissimilar targets’ actions are represented in higher level terms than similar targets’ actions. Also, participants’ preference for superordinate (higher level construal emphasizing the ends) relative to subordinate action identifications (lower level construal emphasizing the means) was greater for a dissimilar other than for a similar other.

**Physical Distance:** The effects of physical distance are analogous – with higher level, more abstract reasoning associated with greater physical distance. In a study by Fujita, Henderson, Eng, Trope and Liberman (2006), students at NYU’s Washington Square campus watched a video of two students interacting and provided a written description of the activity in the video. In the spatially near condition, participants believed that the individuals in the video were NYU students studying at the Washington Square campus in New York City; in the spatially distant location, participants believed that the individuals in the video were NYU students studying at an NYU study-abroad location in Florence, Italy. Participants who believed that the characters in the video were located in a spatially distant location used more abstract language in describing the events in the film than those who believed the protagonists were located in a spatially near location. For instance, an angry negative response by one character to
another would be interpreted by distant viewers as evidence that the individual was bad tempered (abstract, global judgment) while the same action would be interpreted by proximate viewers as the individual merely disagreeing with the other person's opinion (specific finer grained judgment). CLT suggests that interpretations of general trends embed high-level abstract judgments about how the future will manifest itself. In contrast, deviations from trends are perceived through low-level, concrete interpretations of exceptions to the rule. As a result, participants in the spatially distant condition are more likely to base their impressions on general trends than on deviations from general trends, whereas participants in the spatially near condition do not make this distinction and base their impressions on specific elements of situations.

As demonstrated here, a rich conceptualization of psychological distance and its constituent dimensions represents a significant opportunity for CMC research to investigate the effects of distance in computer mediated contexts. We believe that a simpler view of distance solely in terms of the physical distance between individuals has obscured the variety of complex effects information technologies have introduced in contexts of computer mediated communications.

To allow for a broader view of psychological distance, we draw on construal level theory (CLT), and argue that the nature of psychological distance perceived by individuals in computer-mediated contexts influences how people interpret situations and behave. Psychologically distant objects and events are likely to be represented by higher-level construal categories that involve abstract, decontextualized and global features that convey the essence of information. In contrast, psychologically proximate objects and events are represented by lower level construal categories that involve more concrete, contextual, and local features. We therefore suggest the following proposition and corollaries regarding construal in computer mediated contexts consistent with CLT:

**P1:** The construal of objects and events perceived as more psychologically distant will be characterized by abstract and decontextualized features when compared to the construal of more psychologically proximate objects and events that will be characterized by more concrete, context-specific and detailed features.

**P1a:** The construal of psychologically distant objects and events will be characterized by abstract and decontextualized features.

**P1b:** The construal of more psychologically proximate objects and events will be characterized by concrete, context-specific and detailed features.

### Psychological Distance and Attribution Theory

Attribution theory provides another theoretical lens to assess psychological distance since prior research provides evidence that psychological distance influences how individuals infer others’ attitudes (Henderson et al., 2006). Attribution theory suggests that correction (i.e., what situational constraints may have caused the action?) is less automatic than the two preceding sequential processes: categorization (i.e., what is the actor doing?) and characterization (i.e., what trait does the action imply?) (Gilbert, Pelham and Krull 1988). Gilbert et al. provide evidence that cognitive load intensifies the tendency to make dispositional rather than situational attribution. In line with attribution research, Kelly and Michela (1980) identify a relationship such that high cognitive loads associated with distant events tend to hinder perceivers from being involved with correction processes, resulting in dispositional attribution. On the other hand, low cognitive loads associated with near conditions involve correction processes and lead to higher consideration of situational constraints. Although the research in this area has generally focused on the effect as arising with changes in spatial distance, the same reasoning applies to the other dimensions of psychological distance as identified in the previous section: temporal distance, social distance, and hypotheticality.

Dispositional attribution differences thus can be used as an indicator of psychological distance. Following this reasoning, Henderson et al. (2006) examine whether predictions of another’s behavior are based more on personal dispositions (e.g., attitude inference) than on specific situational constraints when behavior purportedly occurs in a more distant location. Henderson et al.’s results demonstrate that increased spatial distance yields a greater tendency to rely on dispositional attribution. Specifically, participants are more likely to discount the influence of situational constraints when representing inferences about a spatially distant rather than nearby information source.

We therefore suggest the following proposition regarding attributions in computer mediated contexts consistent with attribution theory:
P2: The attributions regarding objects and events perceived as more psychologically distant will be characterized by a greater reliance on dispositional rather than situational features when compared to the attributions of more psychologically proximate objects and events that will be characterized by situational rather than by dispositional features.

There has been little prior research focused directly on perceptions of distance between events or targets of cognition in contexts of computer mediated communications. However, the effect of CMC on spatial distance, one of the four dimensions of psychological distance, has been the subject of considerable theorizing in prior research. It is only recently that we see some evidence of researchers focusing on other dimensions such as temporal distance being considered in this stream of work (O'Leary and Cummings 2007). Our research uses the relationships identified in the above two propositions to address psychological distance as separate from physical distance and to examine directly the impacts of CMC on psychological distance.

Essentially, the key questions we examine are:

a) What is the difference in the perceived distance for spatially distant objects and events between conventional contexts and computer-mediated contexts?

b) How does this difference, observed when objects and events are spatially distant, compare to the difference for spatially proximate objects and events?

Perceptions of Physical Distance in Computer Mediated Contexts

We examine the consequences of electronic communication enabled by the Internet upon psychological distance using the measures provided by construal level and attribution theories as captured by Propositions 1 and 2. Technology is posited to play a moderating role in individuals’ perceptions of distance, as illustrated by Figure 1. The nature of the moderation is captured by the death of distance view on computer-mediated communications that expresses the folk wisdom captured at the start of our paper. It focuses on the variety of ways in which interactions are facilitated and suggests that individual perceptions of their distance with physically remote others in computer-mediated contexts can be reduced to the levels experienced in contexts of physical proximity. Technology is seen as creating a context where physical distance ceases to be a significant deterrent or hurdle in enabling coordination and collaboration between spatially separated individuals and groups (Johnson, Siripong and Brown 2006). Computer-mediated communication technologies are viewed as allowing participants to believe that others are ‘almost there’, a view supported by studies suggesting that media provide varying levels of social presence that can approach the physical proximity inherent in face-to-face communication to differing extents (Rice 1993). Comparisons of face-to-face and computer-mediated environments indicate that computer-mediated groups increase in several relational dimensions over time to more positive levels and that these levels approximate those of face-to-face groups (Walther and Burgoon 1992).
There has been no prior study that directly examined the level of perceived distance between subjects in computer-mediated contexts and how they compare to perceptions in conventional contexts. Consistent with the large body of evidence that motivated Propositions 1 and 2, in the absence of technology-based interaction, increased spatial distance influences psychological distance. The increased psychological distance leads to higher level, more abstract mental representations (Proposition 1), and to more dispositional (rather than situational) attributions (Proposition 2). Thus, the propositions, reflecting prior research, support the following hypothesis:

Hypothesis 1. In the absence of technology-based interaction, psychological distance increases as the spatial distance increases.

Hypothesis 1a. In the absence of technology-based interaction, as spatial distance increases, individuals will form a higher-level construal of the actions occurring during that event.

Hypothesis 1b. In the absence of technology-based interaction, as spatial distance increases, individuals in the constrained condition will make more dispositional attribution in attitude inference than situational attribution.

Technology is posited to play a moderating role in individuals’ perceptions of distance by reducing psychological distance and bringing measures in the spatially distant conditions closer to those in the spatially near conditions. For construal measure this should manifest as an interaction between physical distance and technology-based interaction. As described by Hypothesis 1a and Proposition P1, physical distance is expected to lead to higher-level, more abstract construal when technology is not present. However, with technology present in the social interaction, this effect of physical distance upon construal should dissipate or disappears.

In terms of dispositional attribution, we hypothesize that, in the presence of technology-based interactions in a spatially distant condition, the tendency to rely on dispositional attribution is reduced or may no longer exist. Dispositional attribution is associated with cognitive factors involved with information processing toward distant targets, and technology-based interaction reduces the cognitive load in judgments. If the moderating effects of technology-based interaction are true, then the dispositional attribution in the situationally constrained conditions will be lowered, getting closer to the levels of dispositional attribution in the unconstrained conditions.

Hypothesis 2. Technology-based interaction moderates psychological distance between actual and perceived distance, leading to a significant spatial distance \( \times \) email interaction.

Hypothesis 2a. In the spatially distant conditions, technology-based interaction will reduce the difference between actual distance conditions in terms of construal.

Hypothesis 2b. In the spatially distant conditions, technology-based interaction will reduce the dispositional attribution differences in the constrained condition between actual distance conditions.

In summary, our arguments suggest a) that psychological distance increases as the spatial distance increases in conventional contexts and b) that computer-mediated interactions moderate this relationship. Based on the “death of distance” view, we expect computer-mediated interactions will reduce the perceived psychological distances in spatially distant situations.

**Method**

**Participants**

One-hundred-and-four students (46 women, 58 men; age: M= 21.86, SD = 4.6) at the University of Minnesota participated in the study. They were solicited by presentations in classes and through notices on the school bulletin board and were paid a fixed fee of $10 for an approximately 30 minute session. The participants were randomly assigned to eight conditions.

**Procedure**

The experiment was conducted in multiple sessions in the school's computer lab. Participants completed tasks individually at their own pace. Participants were briefed and acquired familiarity with the user interface of the
experiment by responding to a series of demographic questions that were provided in multiple screens. Once these initial questions were completed, subjects were sequentially presented the two experimental tasks. More details of the experimental stimuli in the experiments are provided in the Appendix.

**Task 1:** In Task 1, we used a $2 \times 2$ between-subjects experimental design, manipulating the spatial distance between persons (near or far) and computer-mediated interactions (present or not present). Computer-mediated interaction was operationalized as email interaction. The experimental procedure was adapted from Fujita, Henderson, Eng, Trope and Liberman, (2006), dealing with the hypothetical situation of a student helping a fellow student move into a new apartment.

In the task, participants played the role of a student on a new-student welcoming committee who had volunteered to help a new student (of the same sex) move into an apartment, either at the University of Minnesota’s Minneapolis campus (near condition) or at the University of Minnesota’s study abroad program in Barcelona (distant condition). The experimental material (e.g., pronoun of male or female) was adaptively changed to match each subject’s gender.

The information content about the new student was the same in both the control and email conditions, but the information was displayed either as a bulletin board posting (control condition) or as email messages from the new student (email condition). After reading the materials, participants in the control group were instructed to write a couple of paragraphs on what they would discuss at the meeting the next day with respect to the new student’s moving plan. In the email condition, participants were asked to write an email response concerning the next day's moving plan.

The participants then completed the 14-item Behavioral Identification Form (BIF) (Table 1). The BIF is a validated instrument that assesses the level of construal (from concrete to abstract) based on subjects’ choices among alternatives options of expressing commonly performed actions. For example, the BIF presents actions (e.g., “reading”), each followed by two statements of the activity, one corresponding to the high-level action identification that specifies why one acts (e.g., “gaining knowledge”), and the other corresponding to the low-level action identification that specifies how one acts (e.g., “following lines of print”).

<table>
<thead>
<tr>
<th>Item</th>
<th>Low construal</th>
<th>High construal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Making a list</td>
<td>Writing things down</td>
<td>Getting organized</td>
</tr>
<tr>
<td>Reading</td>
<td>Following lines of print</td>
<td>Gaining knowledge</td>
</tr>
<tr>
<td>Measuring a room for carpeting</td>
<td>Using a yardstick</td>
<td>Getting ready to ready to remodel</td>
</tr>
<tr>
<td>Cleaning the house</td>
<td>Vacuuming the floor</td>
<td>Showing one’s cleanliness</td>
</tr>
<tr>
<td>Painting a room</td>
<td>Applying brush strokes</td>
<td>Making the room look fresh</td>
</tr>
<tr>
<td>Paying the rent</td>
<td>Writing a check</td>
<td>Maintaining a place to live</td>
</tr>
<tr>
<td>Locking a door</td>
<td>Putting a key in the lock</td>
<td>Securing the house</td>
</tr>
<tr>
<td>Climbing a tree</td>
<td>Holding on to branches</td>
<td>Getting a good view</td>
</tr>
<tr>
<td>Brushing teeth</td>
<td>Moving a brush around in one’s mouth</td>
<td>Preventing tooth decay</td>
</tr>
<tr>
<td>Traveling by car</td>
<td>Following a map</td>
<td>Seeing countryside</td>
</tr>
<tr>
<td>Washing clothes</td>
<td>Putting clothes into the machine</td>
<td>Removing odors from clothes</td>
</tr>
<tr>
<td>Resisting temptation</td>
<td>Saying “no”</td>
<td>Showing moral courage</td>
</tr>
<tr>
<td>Eating</td>
<td>Chewing and swallowing</td>
<td>Getting nutrition</td>
</tr>
<tr>
<td>Having a cavity filled</td>
<td>Going to the dentist</td>
<td>Protecting your teeth</td>
</tr>
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</table>

The dependent variable in this task, *psychological distance* was operationally defined as the level of action identification, a validated measure in construal level theory (Trope and Liberman 2003; Vallacher and Wegener 1987) assessed using the BIF. Low-levels of identification (e.g., “following lines of print” representing the activity...
of “reading”) for BIF items were coded as “0,” while responses indicating high-level identification (e.g., “gaining knowledge” representing the activity of “reading”) were coded as “1.” The item scores were summed to create an index ranging from zero to fourteen of the levels of perceived psychological distance.

Task 2: We adapted Task 2 from the essay analysis exercise developed by Henderson et al. (2006). Participants were provided an essay discussing the addition of men’s soccer as an intercollegiate sports program at the University of Minnesota. The four groups in Task 1 were each split, creating eight groups for Task 2 according to a 2 × 2 × 2 between-subjects design. The essay was suggested as being written by the student mentioned in Task 1 – either from Minneapolis (near condition) or Barcelona (far condition). Thus, the spatial distance between persons (near or far) and computer-mediated interactions (present or not present) factors were carried over from Task 1. The added factor of situational constraint (unconstrained vs. constrained) was manipulated by the instructions given about the essay writer. In the constrained condition, participants were informed that the essay writer was instructed to write an essay in support of adding a men’s soccer program. In the unconstrained conditions, the subject was informed that the essay writer was instructed to express his/her own view of adding a men’s soccer program. (The unconstrained conditions were included to verify correspondence of our design with prior results. This correspondence was found. Since the responses in these conditions are not directly relevant to the issues in this paper, we do not discuss them further.)

After reading the essay, participants predicted the writer’s attitude-related behaviors using three questions: “In conversation with his or her friends, how likely do you think the writer would express views in favor of adding a men's soccer program at the University?”, “How likely is the writer to express attitudes that favor adding the soccer program if he or she were interviewed by the University's student newspaper?” and “If students had a chance to vote on the issue, how likely is the writer to vote in favor of the men's soccer program?” Participants responded on a 7-point Likert scale, anchored at 1 (not at all likely) and 7 (very likely). The dependent variable was an index of essay-consistent attitude inference created by averaging responses to the three items. This index reflects the extent to which participants ignore available information to make dispositional attributions – a feature associated with greater psychological distance. Details of the experimental material used in Task 1 and Task 2 are provided in the Appendix.

Results

Construal

In the control condition with the absence of email interaction (information provided in bulletin board posting format), participants who imagined the event occurring at a spatially distant location indicated higher-level construals than participants in the near condition (Figure 2a, t(47) = -2.41, p = .02). This is consistent with prior research where tasks were administered using paper and pencil (Fujita et al. 2006), and provides a validation of the experimental procedures and instruments, in support of Hypothesis 1a.

The moderating effect of email interaction affecting psychological distance was analyzed by a 2 (spatial distance: near vs. far) × 2 (email vs. control) between-subjects ANOVA. The interaction effect between psychological distance and email interaction was significant, F (1, 100) = 5.77, p-value = .018. In the presence of email interaction, there was no significant difference between the near and far conditions (t(47) = -0.94, p > .05). Furthermore, in the distant condition, participants indicated significantly lower levels of construal in the email condition than in the control condition (t(44) = 2.18, p = .04). The results provide support for Hypothesis 2a. The level of psychological distance is lower in email interactions across distance than in the control condition, consistent with the “death of distance” view.
Dispositional attribution

In the control condition, the judgments about the constrained writer (the target being instructed to write in favor of adding the men's soccer program) led to essay-correspondent attitude inferences to a greater degree when the writer was spatially distant than when the target was spatially near (Figure 2b, \(t(21) = -2.89, p = 0.01\)), supporting Hypothesis 1b. This result is consistent with Henderson et al.'s (2006) study, which validates the current study.

The index of the participants’ essay-correspondent attitude inferences was analyzed using a 2 (spatial distance: near vs. far) × 2 (presence of email interaction) between-subjects ANOVA. The two-way interaction between spatial distance and email interaction was significant (\(F(1, 46) = 3.19, p = 0.081\)). In support of Hypothesis 2b, the email condition showed no significant differences in attitude inferences among participants who formed judgments about a constrained writer who was spatially distant (Mean = 5.615, SD = 1.539) versus near (\(t(18) = 0.24, p = 0.81\)). Furthermore, in the distant condition, participants in the email condition indicated marginally significantly lower essay-correspondent attitude inferences than in the control condition (\(t(16) = 1.83, p = 0.086\)). Thus, the results parallel those for construal, showing the same pattern and supporting the same conclusions.

Discussion

The diffusion of computer-mediated interaction has been indicated as overcoming the barriers of physical separation and aiding coordination, collaboration and interpersonal relationships among non-collocated individuals. A literature has emerged on the influence of computer-mediated communication on geographic dispersion (Kiesler and Cummings 2002; Hinds and Mortensen 2005; O’Leary and Cummings 2007; Fuller, Hardin and Davison 2007), but it does not directly measure its consequences on psychological distance and interpersonal relationship. The study presented here examines the psychological distances perceived by individuals in contexts with and without computer-mediated interactions with a target. The results indicate that computer-mediated interactions do indeed reduce the psychological distance between individuals and remote others. Interestingly, the results suggest that computer-mediated interactions lead individuals to perceive the psychological distance of a physically distant target to be no different than for a physically proximate target. Overall, the study presented here addresses the direct research question of whether IT plays a moderating role on perceived interpersonal distance. One of key contributions was to apply construal and dispositional attribution as theory-grounded, validated measures of psychological distance.
A necessary condition for examining the impact of computer-mediated interaction on psychological distance was the replication of previous findings using these measures based on construal and attribution theories. Consistent with the past research, both measures of psychological distance in this study were sensitive to physical distance in the control condition (information exchange occurring in a bulletin board posting format rather than through personalized email messages as in the experimental condition). In the control condition, psychological distance increased as spatial distance increased, replicating the findings of past research that used paper-and-pencil administrations of the instruments.

The replications in our experimental setting provide evidence of the validity of the effect of CMC interactions on psychological distance in the study. In the email condition, the effect was consistent with the death of distance view, providing direct substantiation of what has been folklore to date and providing converging evidence that CMC interactions reduce psychological distance from remotely located targets.

The effect under the current conditions might not generalize to all settings. One feature of the current study was that the communication was not, and had no possibility of being, face-to-face. While previous literature in IS addressed the possibility that face-to-face communication in collocated work can have more advantages over CMC interaction in distributed work with synchronous CMC technologies such as web conferencing (Olson and Olson 2000), our study focuses on measuring the impact of computer-mediated interaction and does not attempt to compare collocated work with remote work. In many organizational settings, including Open-Source projects and dispersed teams, face-to-face communication is costly or unfeasible.

Since email and other CMC technologies are commonly also used to interact with close friends or between colleagues who are in close spatial proximity, this leads to the question: what effect do CMC interactions on distance perceived by an individual when the person at the other end is proximate? Surprisingly, there is little understanding of how CMC affects the perceptions of distances under these conditions.

Our results also suggest an interesting possible view on the role of computer-mediated communications in influencing the perceived distance when participants are near rather than far. Although not statistically significant, the numerical values of perceived distance for proximate others are greater where there is computer-mediated interaction (average psychological distance in the email condition = 8.88 in Figure 2a and 5.733 in Figure 2b) than when interactions occur through conventional means (average psychological distance in the control condition = 8.04 in Figure 2a and 5.476 in Figure 2b). If this pattern is shown to be reliable when physically proximity becomes increasingly near, this would point to computer-mediated interactions having the effect of moving the other farther away when the target of communication is proximate. This would be interesting contrast to our research that corroborates the opposite effect of bringing the other closer when a target is remote. This effect of CMC technologies may be analogous to the commonly understood effects of looking through different ends of a telescope. While a view through the eyepiece brings distant objects closer, a view through the other end may make proximate objects seem far away.

While there has been no specific examination of the issue, some of the findings of prior research associated with the social cues filtered perspective in such interactions may provide some clues regarding the phenomenon. In a distributed team context, a shared context enabled by technology-based communication is shown to reduce the likelihood of misunderstandings due to missing contextual information (Hinds and Mortensen 2005). However, when proximity is very close, IT may have an opposite reaction. Extreme forms of behavior are observed more frequently in CMC settings than in interactions without technology mediation (Sproull and Kiesler 1986) and individuals are more direct in communicating negative feedback and bad news in CMC interactions (Sussman and Sproull 1999) than in interpersonal interactions. From the perspective of CLT, these observations are consistent with individuals engaging in more abstract construal and taking a less context-sensitive view of others, features characteristic of greater psychological distance (Fujita et al. 2006). This issue needs to be examined in future research.

The influence of CMC technologies on the distance perceived from proximate and remote individuals is still a largely unexamined issue and a study of more facets of the influence are likely to yield greater insights. The current study highlights this as an important area for further inquiry and begins to fill the gap in our knowledge of these important issues.
References


Stimuli used in Task 1

1) Near [distant] condition in control group

You are on the new student welcoming committee at the University of Minnesota's Minneapolis Campus [University of Minnesota's Study-abroad program in Barcelona]. You volunteered to help a student who is transferring to the University of Minnesota [a new student who is arriving] move into her apartment in Dinkytown [La-Rambla district in Barcelona]. The apartment will be available this weekend and you agree to meet her at the Coffman Union on Saturday morning to plan the move.

Here's information about Pat Greene from the University office.

Write a couple of paragraphs on what you think you will discuss at the meeting with Pat Greene to plan the move. Please provide as much as possible.

Pat Greene is a junior majoring in Physical Ed and Music [and he is looking forward to being able to use his knowledge of high school Spanish in Barcelona]. He is glad that he has an apartment in Dinkytown which is close to where classes are held in the Minneapolis campus [in the La Rambla close to where classes are held in Esade]. He plans to do his thesis on baroque music. He is having a lot of books shipped to his apartment address because he wants his key references handy. He is also planning to bring his cello to practice his music. A friend told him that the staircases in buildings are really narrow in Dinkytown [in Barcelona] and that most do not have elevators. He
wonders if it will be a problem for him to take a cello up and down to his fourth floor apartment after music classes. He is also bringing a lot of her soccer gear. He looks forward to playing each evening and to attending professional soccer matches up in Blaine [in the Sants stadium]. He is really glad to have your help as he is afraid he will not get far on Day 1 with what he knows of the town from his books [with the Spanish he learnt from his books]. He has not decided exactly when he is arriving in Minneapolis [Barcelona] as he is waiting to have his Dinkytown [Barcelona] apartment lease confirmed. He wanted to arrive at least two weeks ahead of the term but he was told the apartment will only be available the weekend before the term starts. He recently learnt that he can move into his Dinkytown [Barcelona] apartment right away. This has just accelerated his plans to come over. He has his ticket confirmed, and he will arrive in Minneapolis [Barcelona] on Saturday afternoon. It seems to be short notice but he decided to take the first available flight to Minneapolis [Barcelona]. He will call to coordinate with you as soon as he arrives.

2) Near [distant] condition in email interaction group

You are on the new student welcoming committee at the University of Minnesota's Minneapolis Campus [University of Minnesota's Study-abroad program in Barcelona]. You volunteered to help a student who is transferring to the University of Minnesota [a new student who is arriving] move into her apartment in Dinkytown [La-Rambla district in Barcelona]. The apartment will be available this weekend.

Take a look at the emails that the student has sent you. You will then be asked to write a couple of paragraphs that you can email to the student to plan the move.

From: Pat Greene
To: New Student Welcoming Committee
Title: Ask help for the move in Dinkytown [Barcelona]

Hi, I’m very excited to be coming to Minneapolis campus at the U of M [Barcelona for the study abroad program]. I’m a junior majoring in Physical Ed and Music. This is my first time living in Minnesota and I’m quite anxious about what it will be like in a totally new place [I am looking forward to being able to use my knowledge of high school Spanish in Barcelona. This is my first time traveling out of the country and I’m quite anxious about what it will be like in a totally new country]. I’m glad I have an apartment in Dinkytown [La Rambla] which is close to where classes are held in the Minneapolis [Esade] campus. I plan to do my thesis on baroque music and I’m having a lot of books shipped to my apartment address because I want my key references in handy. I’m also planning to bring my cello to practice my music. A friend told me that the staircases in buildings are really narrow in Minneapolis [Barcelona] and most don’t have elevators. Is this really true? Do you think it’ll be a problem for me to take a cello up and down to my fourth floor apartment after music classes? I’m also bring a lot of my soccer gear. I’m looking forward to playing each evening and to attending professional soccer matches up in Blaine [in the Sants stadium. Woohoo Barcelona!].

Thanks a lot for your offer of helping in moving in. I’m really glad to have your help as I’m afraid I won’t get far on Day 1 with what I know of the town from my books [with the Spanish I learnt from my books!]. I’ll let you know when I arrive so that we can coordinate.

Pat

From: Pat Greene
To: New Student Welcoming Committee
Title: Re: Ask help for the move in Dinkytown [Barcelona]

Hi, I’m afraid I still don’t know exactly when I’m arriving in Minneapolis [Barcelona] as I’m waiting to have my Dinkytown [Barcelona] apartment lease confirmed. I wanted to arrive at least two weeks ahead of the term but I’m
From: Pat Greene
To: New Student Welcoming Committee
Title: Re: Re: Ask help for the move in Dinkytown [Barcelona]

Hi, I have news! The student in my Dinkytown [Barcelona] apartment has indicated that he is OK with me moving in even before he vacates. He apparently will be living there till he defends his Master’s thesis this weekend but most important, I CAN MOVE IN!

This has just accelerated my plans to come over. I just got off the line with my agent and I have my ticket confirmed for tomorrow…. And I’ll arrive in Minneapolis [Barcelona] tomorrow in the afternoon! Sorry about the short notice but I decided to take the first available flight to Minneapolis [Barcelona]. I have the number of the UoM office and I’ll call to coordinate with you as soon as I arrive.

Pat

Instruction used in Task 2

The following essay is written by a student attending school at the Minneapolis campus of the University of Minnesota [the University of Minnesota's Study Abroad Program in Barcelona, Spain]. The essay was an assignment for an expository writing class offered every semester at the Minneapolis of the University [La-Rambla campus of the University in Barcelona]. Students taking this class while studying at Minneapolis [studying abroad in Spain] are asked to write a series of essays which support or oppose a variety of controversial topics.

This particular student was given the assignment to write an essay in support of adding a men's soccer program at the University of Minnesota.