BEYOND BEING THERE: THE SYMBOLIC ROLE OF COMMUNICATION AND IDENTIFICATION IN PERCEPTIONS OF PROXIMITY TO GEOGRAPHICALLY DISPERSED COLLEAGUES[1]

Michael Boyer O'Leary

McDonough School of Business, Georgetown University, 37th and O Streets NW,
Washington, DC 20057 U.S.A. {michael.oleary@georgetown.edu}

Jeanne M. Wilson

Mason School of Business, College of William & Mary, PO Box 8795,
Williamsburg, VA 23187 U.S.A. {jeanne.wilson@mason.wm.edu}

Anca Metiu

ESSEC Business School, Av. Bernard Hirsch, B.P. 50105,
95021 Cergy Pontoise Cedex FRANCE {metiu@essec.fr}

*Using a mixed-methods approach, we develop the concept of **perceived proximity**, which is created through communication, shared identity, and the symbolic aspects thereof. Building on previous theoretical work, we create and validate measures of perceived proximity. Then, we compare how perceived proximity and objective distance relate to relationship quality for collocated and geographically dispersed work colleagues. Our results show that perceived proximity (i.e., a cognitive and affective sense of relational closeness) and not physical proximity (i.e., geographic closeness measured in miles or kilometers) affects relationship quality in an international survey of more than 600 people and 1,300 dyadic work relationships. We also find that people's perceptions of proximity mediate the effects of communication and identification on relationship quality. Using qualitative data (2,289 comments from 1,188 respondents coded into 9 themes), we explore the symbolic meaning of perceived proximity. We show how people can form strong bonds despite being separated by large distances and continue to shift the emphasis from information systems as "pipes" or channels to information systems as vehicles for conveying shared meaning and symbolic value. Our findings have important implications for scholars, managers, systems designers, and members of virtual teams, teleworkers, and other geographically dispersed contexts.*

Keywords: Proximity, distance, relationships, symbolic action, geographically dispersed work, virtual work, telework, virtual teams, dyads, mixed methods

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Introduction ▮▮▮▮▮▮▮▮

Age-old wisdom and a solid stream of research on social relationships hold that we feel close to those who are in close physical proximity to us (Allen 1977; Festinger 1951; Kiesler and Cummings 2002). However, another school of thought has pointed out that people can develop strong bonds and feelings of proximity across spatial distance (Chayko 2002, 2007). Often, people come to feel close to those whom they rarely see (Walther 2011). As technologies and their use change rapidly, the very meaning of distance and of collaboration at a distance may be changing (Leonardi et al. 2010; Mazmanian 2012; Mazmanian et al. 2013). In order to understand the meanings people attach to their distant and proximate collaborators, we draw on ideas regarding symbolic action and symbolic interaction (Sandstrom et al. 2009). As Trevino et al. (1987, p. 117) note, "communication behavior is based on perception, the use of language and symbols, and the creation of shared meaning."

In this paper, we adopt a mixed methods approach (Mingers 2001, 2003; Venkatesh et al. 2013) to explore how communication and shared meaning affect how people perceive the geographic distances between themselves and their colleagues, and how those perceptions affect relationship quality. To understand those perceptions fully requires not only a quantitative sense of how often people communicate, what media they use, and how similar they are, but also a qualitative sense of how they convey (or undermine) a sense of proximity to their colleagues. We find that they do so by communicating frequently and having a shared identity, but also by communicating in ways that signal and symbolize their dependability, reliability, accessibility, likability, and informality, and that reinforce their shared identity. When they do so, and many in our study did, perceptions of proximity are often unrelated to actual geographic distances.

Presaging later task–technology fit ideas (Dennis et al. 2001; Maruping and Agarwal 2004), Burke (1966) believed that certain content could be delivered better with certain media, but he argued against letting a focus on media (Daft and Lengel 1986; McLuhan 1967) overshadow the importance of language as a symbolic system, or the centrality of identification. As Burke (1966, p. 3) noted, "language is a species of action, symbolic action—and its nature is such that it can be used as a tool," a tool that is especially useful because people are inherently "symbol-using animal[s]." In addition to this focus on language and communication, Burke also addressed identification. He wrote, "A is not identical with his colleague, B. But insofar as their interests are joined, A is *identified* with B" (Burke 1950, p. 20). These two themes— communication and shared identity—are central to our work

in this paper. Indeed, all relationships, especially those with geographically distant colleagues, are highly symbolic.

As we approach these themes we also draw on more recent (mostly conceptual) work that is explicitly in the context of dispersed work (e.g., Fruchter et al. 2010; Gibson et al. 2011; Mortensen 2014; Mortensen and Neeley 2012; Watson-Manheim et al. 2012; Wilson et al. 2013; Wilson et al. 2008; Zimmermann 2011) and embraces perceived proximity as a critical concept for understanding collaboration across geographic distances.[2] Using a large-sample international survey, we explore the relationships between objective distance, perceived proximity, communication, shared identity, and relationship quality in collocated and geographically dispersed coworker dyads.

We find that perceived proximity mediates the connections between communication and relationship quality, and between identification and relationship quality. We examined several potential bases for identification. Shared personal values and commitment to the work were most influential (ahead of more surface-level factors such as age and gender). Thus, even for colleagues who were an average of 825 miles apart, frequent communication and deep-level "joined interests" (Burke 1950; Rivera et al. 2010) predicted (1) how satisfied people were with their relationships, (2) whether they learned from them, and (3) whether they were interested in seeing those relationships continue. Beyond the simple frequency of communication, we analyzed qualitative responses to three open-ended questions in our survey and highlighted a series of more symbolic characteristics that colleagues convey (e.g., dependability and likability) and reinforce (i.e., various bases for shared identity).

We also find that colleagues working across an average of 825 miles communicated no less frequently on average than colleagues who were collocated in the same office. In addition, the collocated and dispersed colleagues had virtually identical average levels of shared identity and perceived proximity. These two findings contradict previous research regarding the effects of distance (for a summary, see Kiesler et al. 2002), but they lend credence to (mostly experimental) findings that relationships can become just as personal and close between geographically distant colleagues as they can between collocated ones (Chidambaram 1996; Walther 1992, 1995, 1996). It also suggests that we may need to devote

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[2]We view proximity and distance as opposite ends of the same spectrum. However, perceived proximity/distance and objective proximity/distance are empirically quite distinct (as we show in our results). For ease of exposition, rather than repeatedly writing "perceived proximity/distance" and "objective proximity/distance," we use "perceived proximity" and "objective distance" throughout.

more energy to understanding *how* the actual and expected duration of dispersed relationships, as well as expectations of future face-to-face (FTF) contact, affect people's behaviors and perceptions of their colleagues (Walther 1994). Finally, it raises anew the question of whether technology, global work, and experience with them have advanced to the point that collocated work is no longer the appropriate "control" for assessing dispersed collaboration (Hollan and Stornetta 1992; Nardi and Whittaker 2002; Olson et al. 2002; Walther 2011). "Symbol systems" may have evolved to the point where communication and shared identity can create perceptions of proximity that are as strong for dispersed colleagues as they are for collocated ones.

Overall, we believe the results of our mixed-methods approach continue to deepen the field's understanding of and appreciation for a fundamental element of geographically distributed work: distance itself. In particular, our work makes four important contributions. First, we provide empirical support for the concept of perceived proximity in dispersed work. This perceived proximity has been mentioned periodically over the last three decades, and modeled by Wilson et al. (2008), but not explored empirically. By knowing the key factors that lead to perceived proximity, we believe that managers can achieve many of the benefits of collocation without actually having employees work in one place. For the purposes of this Special Issue, we also extend and deepen the ideas in Wilson et al. (2008) by showing how perceived proximity is a function not only of communication frequency and shared identity, but also the symbolic content of that communication and identification. In particular, people use communication technologies (both putatively "lean" and "rich" ones) to convey symbols of their dependability, reliability, likability, common values, etc. Although communication frequency and demographically based identification matter, the symbolic content of communication and identification are critical. Second, we bolster the small stream of previous research that has shown how people can form strong bonds despite being separated by large distances. In this sense, our work helps combat what might be called *geographic determinism*, a belief that our behaviors and relationships are a function of geographic distance rather than a *combination* of geographic distance/proximity *and* the symbolic meaning we attach to it. Third, we shed light on the role that information systems play in supporting rich, symbolic interaction between colleagues and, in so doing, continue to shift the emphasis from information systems as "pipes" or channels to information systems as vehicles for conveying shared meaning and symbolic value. Fourth, we developed a new measure, which we hope will enable scholars to explore other aspects of perceived proximity.

Literature Review

Organizations and the people in them are systems of subjective and symbolic meaning (Fine 1993; March and Olsen 1976; Weick 1979, 1995). The view that organizations are fundamentally subjective has gained important ground partly through the reconceptualization of a number of core constructs that were previously seen as objective. The concepts of time (Ancona, Goodman et al. 2001; Hall 1983; Saunders and Kim 2007), money (Mitchell and Mickel 1999; Zelizer 1994), price (Beunza et al. 2006), identity (Burke and Stets 2005), and technology (Barley 1986) have all come to be seen as complex and profoundly social notions to which people attach various, sometimes even contradictory, meanings.

The concept of technology has been a significant beneficiary of a more subjective, symbolic view. From what was once considered an objective phenomenon assumed to affect a variety of organizational outcomes (Blau et al. 1976; Huber 1990), technologies have come to be seen as systems for social, symbolic interaction (Goldkuhl and Lyytinen 1982; Star and Ruhleder 1996; Suchman 1987). Work in the symbolic interactionist perspective has examined the meanings that emerge as people make sense of new information systems (Prasad 1993). Scholars drawing on structuration theory (Giddens 1984) have produced a particularly rich understanding of the mutually constitutive relationship between technology and structure in organizations (Markus and Robey 1988). For example, studies have shown that the design and use of technology changes the nature of work itself (Orlikowski 2000), and that the use of technology reorganizes organizational relations (Barley 1986, 1990; DeSanctis and Poole 1994; Walsham 1993). Thus, work in this realm shows that information and information systems have high symbolic value because they enable the construction of identities, coordination of relationships, and enactment of sense- and meaning-making processes (Feldman and March 1981). An important part of this sense-making is the representations that people form about their distant collaborators. Such relationships are, by definition, symbolic because people don't have access to the "real thing" (i.e., direct, face-to-face contact).

As with the concepts of technology and time, the concepts of proximity and distance, which are fundamental for understanding communication and collaboration, have recently been enriched by work that accounts for the profoundly social, symbolic meanings people attach to their collaborators. Traditionally, distance in work groups has been considered in objective and spatial terms, with spatial distances assumed to be experienced equally by all members of a team (O'Leary and Cummings 2007). Slowly, scholars have started noticing

that perceptions of proximity do not increase linearly with actual proximity (Hansen and Lovas 2004) and have raised the possibility that objective proximity might be less consequential for important work outcomes than its subjective counterpart, perceived proximity.

Wilson et al. (2008) confronted the traditional premise that collocation equals perceived proximity and developed the concept of perceived proximity in a way that is steeped in the view that all action is symbolic. Starting from the observation that some people feel closer to faraway others (as opposed to collocated collaborators), they defined perceived proximity as a dyadic and asymmetric construct that reflects one person's perception of how close or how far another person is. In that sense, it is a perceived characteristic of the relationship (not of any particular technology that might facilitate the relationship). Like many other perceptions and attitudes (Amason and Sapienza 1997; Moorman 1993), Wilson et al. noted that perceived proximity has both a cognitive component and an affective component. The cognitive component refers to a mental assessment of how close or far a teammate seems. The affective component recognizes that people's sense of perceived proximity is not a purely conscious or rational assessment; it is subject to emotions and feelings. After defining perceived proximity in these terms, Wilson et al. developed a theoretical model of perceived proximity with communication and shared identity at the core of people's representations of their coworkers' proximity.

Our sense of perceived proximity builds on Wilson et al.'s model, as well as previous research on several other distance- and proximity-related concepts—for example, presence, co-presence, and cohesiveness, which Wilson et al. (p. 995) discuss at some length and differentiate from perceived proximity. The primary distinction between perceived proximity and cohesiveness is that the latter is a group-level phenomenon capturing the collective bonds among members. The distinction between perceived proximity and presence is largely based on the focus, with perceived proximity focusing on a relationship between two people and presence focusing on an attribute of a technology, virtual object, or technologically mediated environment. For example, Chidambaram and Jones (1993, p. 492) note that "social presence reflects the capacity of the medium to convey expressiveness and emotional content." More recently, Saunders et al. (2011, p. 1095) focus on presence as a direct "attribution to the media," but they also note that "future research may measure the multidimensionality of social presence *as reflected in interactions using the media*" (emphasis added). In this sense, they acknowledge the "entangled nature of technology and behavior" and caution against "los[ing] sight of their intermingling" (p. 1096).

Yoo and Alavi (2001) did the work on presence that was most generative for our study of perceived proximity. Although they built on technology-based conceptions of presence (including interactivity and immediacy), they also measured impersonality, sociability, sensitivity, and warm/coldness, which are more about relationships. Yoo amd Alavi went beyond the purely technological view to model social presence as a function of both media and the cohesion of the group using it. Previously, Carlson and Zmud (1999) had made a similar conceptual move with their channel expansion theory. In it, they built on media richness theory, but showed that the richness of a given medium was not solely a function of the "objective" characteristics of that medium; rather, it was based heavily on people's experience with the medium. Just as they focused on understanding how richness perceptions are developed in media, we focus on how proximity or closeness perceptions are developed in dyadic relationships. Earlier still, Walther pushed for a more relational, hyperpersonal approach (Walther 1992, 1995, 1996). He argued that mediated interactions could achieve high levels of intimacy and even exceed those created in FTF interactions. We continue along this trail (blazed by Walther, Carlson and Zmud, Yoo and Alavi, Saunders and her colleagues, and other researchers) toward more mutually sociotechnical views, but our approach to perceived proximity draws more closely on notions of interpersonal closeness (Berscheid et al. 1989) adapted to a geographically dispersed work context.

In some fields, proximity is actually assumed to be perceived. As Mencl and May (2009, p. 206) noted (referring to research in the field of ethics), "proximity refers to the closeness that one feels toward others." However, most other fields have tended to treat proximity and distance as objective constructs first and only later addressed perceptions of them. As with proximity in work relationships, Mencl and May note that conflicting findings regarding proximity and ethics are also attributable to overly objective measures of proximity.

The move toward a richer, more socially informed concept of proximity is extremely valuable as it has the potential to advance scholarly views of distance. At the same time, this new, richer concept raises several important issues. The first has to do with *the relationship between objective and perceived proximity*. To what extent does objective proximity constitute a basis for the subjective feeling of proximity? For a long time, scholars have held that we feel closer to those who are physically close to us (Allport 1954; Kiesler et al. 2002; Latané et al. 1995; Newcomb 1956; Olson et al. 2002; Pinto et al. 1993; Van den Bulte and Moenaert 1998). However, some (especially in the fields of philosophy and sociology, but also in IS—for example, Fruchter et al. 2010), have also noted that people can feel close to geographically distant

others, and that communication and communication technology play a role in the development those feelings. For example, Habermas (1989) showed that the invention of the printing press and the diffusion of print media enabled the creation of a community of people throughout Europe (and beyond) who woke up in the morning to read the same journals, about the same issues. As a result, they came to share a mindset in spite of their dispersed locations and lack of a common language. Fayard and Metiu (2012) build on this, showing how letters helped distant colleagues (including Einstein and his collaborators) develop a sense of perceived proximity. Chayko (2002) also argued that people can form connections across spatial distance and that inscribing technologies such as writing have played a key role in the formation of these bonds. More recently, new media have increased the reach and the types of connections among faraway people (Chayko 2007). Thus, these scholars suggest that there is a nuanced relationship between objective distance and perceived proximity, one in which the symbolic perception of distant others has little to do with the spatial or temporal distance separating them.

Such views about the development of perceived proximity are especially pertinent in the current work environment of intense connectivity (Katz and Aakhus 2002; Kolb et al. 2008). They also raise a second major issue, which has to do with *the antecedents of perceived proximity*. As people communicate frequently and intensely with coworkers or members of their online communities, they may create a sense of closeness that contrasts with the physical or geographic distance between them. For example, free and open source software developers perceive high levels of proximity because of strong and intense communication, and strong "hacker" identities (Raymond 1999). In this sense, as modeled by Wilson et al., communication and shared identity interact in a recursive fashion, with the potential to mutually reinforce each other and perceived proximity.

Identification is a process of self-categorization in relation to others (Dutton et al. 1994). Identification or shared identity is the outcome of that process.[3] In the Wilson et al. model of

perceived proximity, identification is a core process (along with communication) in the development of perceived proximity. When people identify with each other, it increases their perception of proximity by creating a basis for common ground, lowering uncertainty about the other's actions, and prompting positive attributions about the other (Wilson et al. 2008). A sense of shared identity can be based on a wide variety of demographic and other factors (e.g., gender, age, race, ethnicity, education, functional background, tenure with a firm, values, commitments, etc.). The more people identify with the same social category (or the more Person X perceives Person Y to belong to the same social category), the greater their perceptions of proximity to each other. When they share some social category or experience, they will also project characteristics onto each other that make their behavior seem more predictable and understandable (Cramton 2001). As Wilson et al. note, this makes them feel more proximate. They also note that greater shared identity leads people to give each other the benefit of the doubt in uncertain situations (Cramton and Hinds 2014; Cramton et al. 2007). Working at a distance is often fraught with uncertainty and heightened potential for ambiguity and faulty attributions (Cramton 2002a), but "a shared identity can create a psychological tie between distant" colleagues (Hinds and Mortensen 2005, p. 293). These psychological ties (i.e., perceived proximity) are the basis for stronger, higher quality relationships, which is the third key issue raised by a richer understanding of distance and proximity.

How does a symbolic action perspective relate to existing theories and how does it advance our understanding of perceived proximity? A social constructionist view would highlight how perceived proximity develops in a social context and is not the inevitable product of some inherent, natural "given" (Berger and Luckman 1966). In that sense, our findings are consistent with a social constructivist way of thinking: perceived proximity is not the inevitable by-product of geographic distance; it is a product of people's perceptions, which derive from and may be reinforced by their social interactions. In a similar vein, the social influence perspective on technology use (Fulk and Boyd 1991) draws on social constructivist ideas and symbolic interactionism (Mead 1934). It holds that varying perceptions of media (rather than any inherent richness attributable to them) affect media choice and that those perceptions are socially constructed. Again, a symbolic action perspective is consistent with this social influence model (in terms of the emphasis on the power of perceptions and the social basis for them), but the social influence model is focused on media choice rather than relationships. The addition of a symbolic action view complements and extends these two perspectives, focusing on how the *content* of interactions with dispersed colleagues affects people's perceptions

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[3]In the literature, identification and shared identity are sometimes treated as distinct concepts, with the former being the process by which the latter is formed. If two people identify with the same entity or characteristics (e.g., "We're both older than our colleagues"), they have a shared identity (e.g., as Baby Boomers). When scholars focus on the outcome not the process per se, "shared identity" and "identification" tend to be used interchangeably (Hinds and Mortensen 2005), or identification is used to refer to both process and outcome (Wilson et al. 2008). In this paper, we use identification to refer to both the process and the outcome. In our quantitative analyses, we measure the strength of the outcome; in our qualitative analyses, we explore the factors that contribute to that strength. We do not measure or trace the actual unfolding of the identification process.

about their proximity to those colleagues. Although communication is inherently symbolic, its symbolic essence is especially important in mediated interactions, where we are constantly (consciously or unconsciously) conveying symbols of how close we are to our colleagues. Our model builds on these ideas to explore how communication and shared identity affect perceived proximity.

Hypothesis Development

Over two decades ago, Clark and Brennan (1991) pointed out that face-to-face communication affords copresence, visibility, audibility, cotemporality, simultaneity, and sequentiality, while electronic mail is lean and affords only two features: reviewability and revisability. Others have convincingly challenged the leanness of e-mail and shown that people can imbue seemingly lean media with rich, symbolic meaning (Carlson and Zmud 1999; Dennis and Valacich 1999; Rasters et al. 2002; Walther 2011). While recognizing this potential, we begin by testing a baseline hypothesis that builds on the classic view regarding physical distance and its effects on relationships (Allen 1977; Olson et al. 2002; Van den Bulte et al. 1998).

H1: Objective distance is negatively related to perceived proximity.

However, assuming that lean media can be imbued with a richer symbolic meaning, we do not expect to find support for this hypothesis.

We depict our hypotheses in Figure 1. They are based on previous research and theory, and are also grounded in the authors' studies of a wide variety of dispersed work (Cramton et al. 2007; Espinosa et al. 2003; O'Leary and Mortensen 2010; O'Leary et al. 2002; Wilson 2013; Wilson et al. 2013). For example, Metiu (2006) studied software developers working in subgroups on the West Coast of the United States and in Bangalore, India. For them, physical distances between the subgroups led to perceived distances between subgroups that were as considerable as the 14,000 km separating them. However, for other developers working on open source projects like Linux and Apache, Metiu noted high levels of perceived proximity among people who never met face-to-face. In these two cases, both groups had little or no FTF interaction, but perceived proximity was higher among the open source developers, seemingly because they had stronger communications and shared identification. Empirical examples like these helped inform our understanding of the relationships presented in the hypotheses presented below.

As Rivera et al. (2010, p. 106) note, perceived "proximity may involve but is not defined by [objective] geographic closeness." However, the relationship between communication frequency and perceived proximity has been shown to be strong (Newcomb 1956). As communication becomes more frequent, deeper in substance (i.e., more personal and more personally significant), and more interactive (i.e., characterized by more interdependent and reciprocal communicative exchanges), physically distant colleagues will seem more proximal (Burgoon et al. 2002; Walther 1992). These characteristics of communication affect perceptions of proximity through three mechanisms: increasing cognitive salience, reducing uncertainty, and envisioning the other's context (Cramton 2001; Hinds and Cramton 2014).

At the same time, a host of studies have shown that objective distance is negatively related to communication frequency (Kiesler et al. 2002; Olson and Olson 2000; Olson et al. 2002). As Rivera et al. (2010, p. 105) note, "the most elementary proximity hypothesis holds that interaction increases with geographic/physical proximity" because it encourages chance encounters and other opportunities for more frequent communication. However, frequency and interactivity of communication may relate to subjective and objective proximity in different ways. While some studies found that objective distance is associated with less communication (Cummings 2004; Sosa et al. 2002; Van den Bulte et al. 1998), others have found that, over time, interaction through collaborative technology can improve satisfaction, create cohesion, and establish effective knowledge coordination systems in culturally diverse teams (Carte et al. 2006; Kanawattanachai and Yoo 2007; Staples and Zhao 2006). Also, as people come to expect successful work outcomes while collaborating via communication technology, their attitudes towards the technology become increasingly positive, and their use of technology increases as well (Compeau et al. 1999). Overall, we expect that the frequency of communication across all media is positively related to perceived proximity, but negatively related to objective distance, with colleagues who are farther apart needing to communicate more but actually communicating less.

H2: Communication frequency is (a) negatively related to objective distance, but (b) positively related to perceived proximity.

Communication is not the only process closely tied to distance and proximity; identification is as well. Identification is a process of self-categorization with respect to others (Dutton et al. 1994) and it is also an outcome of that process. The resulting state of identification affects perceptions of proximity to another person by (1) creating a basis for common
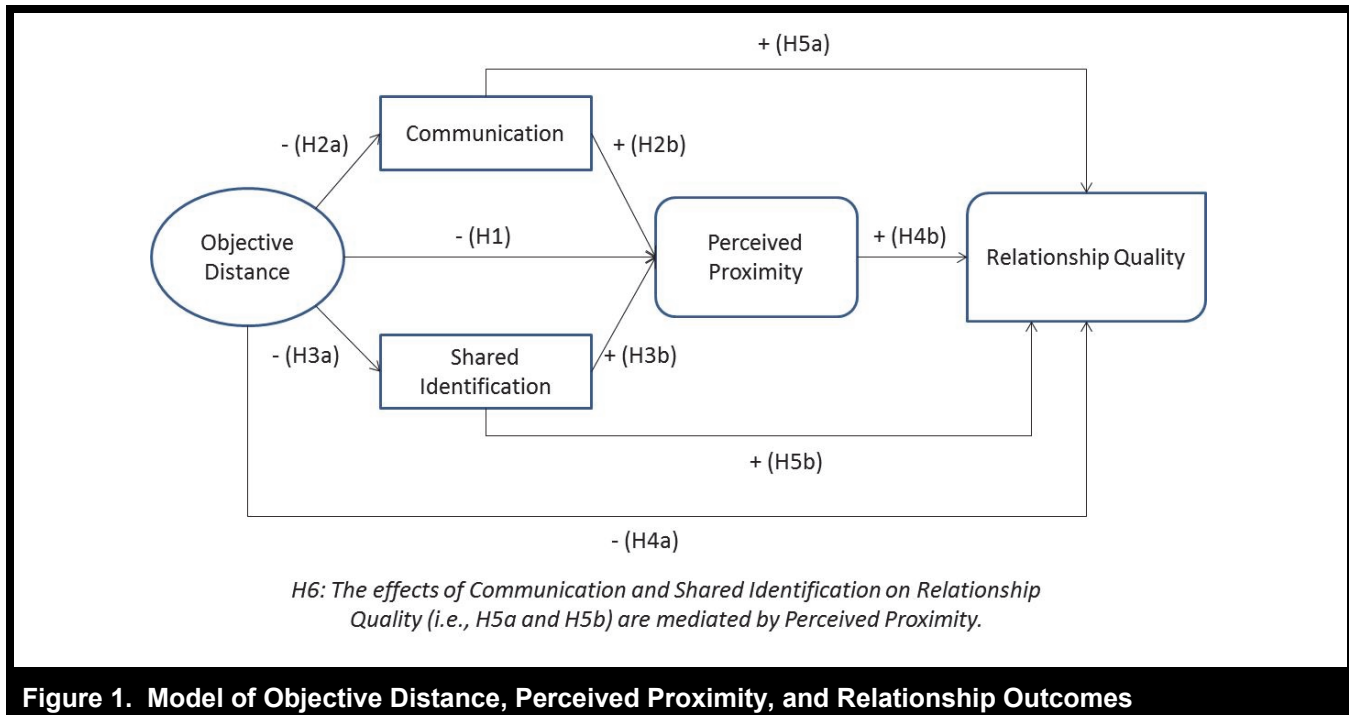
Figure 1. Model of Objective Distance, Perceived Proximity, and Relationship Outcomes

ground, (2) reducing uncertainty (just as frequent communication does), and (3) engendering positive attributions when real data are absent. Common ground is a continuous achievement rooted in communication and interaction (Vlaar et al. 2008). It refers to a mutual understanding and/or common stock of knowledge (Wilson et al. 2008). As people collaborate, they discover that they belong to similar social categories and they develop a common pool of jointly lived experiences and actions (Clark 1996; Clark and Marshall 1981). Once people view distant coworkers as belonging to similar categories (for example, they are also mothers or Linux experts) and they develop a set of common experiences (e.g., a big push to make a project deadline, or a deep exchange on a particular problem), they will perceive the objectively distant collaborators as being closer—as more proximate. In this sense, shared social categories may "supersede the confines of [objective] geographic proximity" (Rivera et al. 2010, p. 107).

Shared identity is also negatively related to objective distance. As many studies have shown, virtual teams experience difficulties forming a sense of shared identity and are prone to conflict and reduced team identification (Hinds and Mortensen 2005; O'Leary and Mortensen 2010; Polzer et al. 2006; Wiesenfeld et al. 2001).

H3: Shared identity is (a) negatively related to objective distance, but b) positively related to perceived proximity.

Another important question is, how do objective and perceived proximity affect the quality of work relationships? In spite of much research building on the idea that objective proximity is "lawfully" related to critical work processes and relationships (Lardner 1992), empirical studies regarding the effects of physical proximity have produced conflicting results. Although some researchers have found a negative relationship between physical distance and interpersonal liking in work and social settings (e.g., Allen 1977; Festinger 1951; Short et al. 1976), others have found that dispersed collaborators ultimately achieve equivalent or higher levels of quality and performance (Cummings 2004; Walther 2002). We believe that these conflicting findings may be due partly to the emphasis on objective distance and lack of consideration given to how perceived proximity enhances relationship quality. Once distant coworkers perceive each other as proximate, they will be more satisfied with their relationship, more open to learning from each other, and more willing to work together again in the future.

H4: Relationship quality is (a) negatively related to objective distance, but (b) positively related to perceived proximity.

Finally, we are concerned with the effects of communication and identification processes on relationship quality among dispersed coworkers. As we argued above in Hypotheses 2 and 3, communication frequency and identification have a

positive impact on perceived proximity. At the same time, these processes also affect relationships by facilitating coordination (Hinds and McGrath 2006) and the resolution of interpersonal conflict (Hinds and Mortensen 2005). These effects should positively impact relationship quality.

H5: Relationship quality is positively affected by both (a) communications frequency and (b) shared identity between dispersed coworkers.

At the same time, the effects of communication frequency and identification on relationship outcomes are not only direct, but operate through the mediating effect of perceived proximity. As communication and identification foster perceived proximity, relationship quality should be enhanced. Indeed, we contend that communication frequency and identification affect relationship quality insofar as they lead to perceived proximity.

H6: Perceived proximity mediates the effects of communication frequency and identification on relationship quality between dispersed coworkers.

To test these hypotheses and to better understand the symbolic aspects of perceived proximity, we designed a mixed-methods study using an international survey of people's impressions of both dispersed and collocated work relationships. In line with our mixed-methods approach, the survey included both scaled and open-ended questions. The study provides generally strong support for our hypotheses as well as further insights into the factors underlying perceived proximity.

Our study combines quantitative and qualitative analyses to more thoroughly understand the nature of perceived proximity. We used the same sample for both parts of our study. The quantitative analysis captures the levels of perceived proximity between distant and collocated colleagues and the factors that affect those perceptions. The qualitative analysis provides a more detailed view of how that sense of proximity emerges.

Quantitative Methods ■■■■■■

Sample and Procedure

Our sample included 733 respondents, reporting on their relationships with 733 distant colleagues and 733 collocated colleagues. Of the 733 respondents, we dropped 51 for incorrectly answering an attention filter question, leaving us with

a final sample of 682 responses regarding 1,364 dyadic relationships. Due to an initial problem with the reporting of objective distance, we have usable objective distance data for 676 dyads. Analyses incorporating objective distance are based on this truncated sample, but all other analyses use the full 1,364 responses. Respondents were 29 years old on average, 68 percent male, 9 percent from the United States, and 91 percent from 47 other countries. All spoke English at least somewhat fluently and they were fairly well educated, with 50 percent having bachelor's degrees, 33 percent having graduate degrees, and all but 3 percent having an associate's degree or at least some college education. We collected our data in January 2012.

We recruited survey respondents through Amazon's Mechanical Turk (MTurk) system, an online forum through which people can choose to participate in studies for payment (Buhrmester et al. 2011). In comparison to other subject pools, respondents obtained via MTurk have been found to be at least as representative of the U.S. population as traditional student subject pools (Paolacci et al. 2010) and more representative of the general work force in terms of age. MTurk samples also tend to be more ethnically diverse and have more work experience (Behrend et al. 2011). Recent studies have found that the reliability of the data obtained from MTurk and similar online survey panels (Ayyagari et al. 2011) is as good as or better than data from more traditional subject pools, and meets or exceeds the standards of published psychological research (Behrend et al. 2011; Buhrmester et al. 2011; Casler et al. 2013).

One general concern about subject pools is subjects' potential lack of attention and hurried responses. Consistent with recent research and methodological recommendations (Huang et al. 2012; Kittur et al. 2008), we used two "captcha" questions to deter and detect careless, random, or haphazard responses (Mason and Suri 2012). Based on answers to these questions, we dropped six responses. This ratio is similar to those found in previous studies of this type, allaying concerns that online respondents might simply answer randomly or haphazardly to complete the survey quickly.

Like Carlson and Zmud (1999), we limited our focus to dyads. We began by asking respondents to name three colleagues with whom they worked regularly in their own office building or office complex. To minimize bias in the respondents' choice of colleagues, we then randomly chose one of the three whom they listed and focused the remaining survey questions on that particular colleague (by inserting the colleague's name in subsequent survey questions). We also asked respondents to name three colleagues with whom they worked regularly, but who were in a different location (i.e.,

not in their office building or office complex). Again, we randomly chose one of those three distant colleagues and asked a similar series of questions about that particular colleague. To mitigate sequence effects, we randomly asked half of our respondents about their collocated colleagues first, and half about their distant colleagues first.

Measures

We used a combination of new and existing measures for objective distance, perceived proximity, communications, identification, and relationship outcomes.

Objective Distance

For the distant colleagues, we asked respondents to list the city in which the colleague was located. On that basis, we computed the "crow flies" (or point-to-point aerial) distances between them. Our respondents were an average of 825 miles from their distant colleagues. Because temporal separation has different effects than spatial separation (Espinosa et al. 2012; O'Leary and Cummings 2007), we also asked how many time zones separated our respondents from their distant colleagues. Given the number of missing responses and responses that were incorrect given the cities respondents listed, we did not conduct further tests using a temporal measure of dispersion. Respondents' apparent inability to report time zone separation correctly may be consistent with reports regarding the challenges of keeping track of which colleagues are how many hours away at any given time (Carmel et al. 2010; Rutkowski et al. 2007; Saunders et al. 2004). Research has also pointed to configuration as an important element of dispersion, but only at the team level (O'Leary and Mortensen 2010). It is not a relevant dimension for dyads like those we studied.

Perceived Proximity

We developed a measure of perceived proximity based on existing theory and related research (Wilson et al. 2008). In developing the measure, we followed recommended procedures for item construction (MacKenzie et al. 2011; Warwick and Lininger 1975). First, we wrote items to cover each of the two dimensions of perceived proximity: cognitive and affective. To generate an initial pool of items, we drew on Wilson et al. (2008), the relational aspects of social presence research (e.g., Yoo and Alavi 2001), computer-mediated communication research (e.g., Walther 1992), qualitative studies of telework (e.g., Leonardi et al. 2010), and inter-

personal closeness research. Although some items from research on social presence were relevant and served as the basis for our own, social presence has generally been studied as an inherent capacity of media rather than as a characteristic of relationships (Massey and Montoya-Weiss 2006; Walther 2011). For example, Cyr et al. (2009) build on Gefen and Straub (2003), but their items refer to the warmth, sociability, and humanity in a website.

Once we generated an initial pool of items to tap the cognitive and affective dimensions of perceived proximity, we had three researchers familiar with the domain review the items for face validity. In addition, respondents in a pilot test rated the items and we used a think-aloud procedure to identify points of confusion or misunderstanding (Ericsson and Simon 1993). Based on these preliminary tests, we deleted and modified items before arriving at an initial 19-item measure of perceived proximity. Ultimately, we used a 12 item scale (see Appendix A), which we developed based on the construct validation process described later in this section.

Communications and Shared Identity

We used standard Likert-type items to measure communications frequency by medium for FTF, e-mail, telephone, video conference, instant message, chat, text, and other forms of communications. As shown in Appendix A, choices included never, less than once a week, one to four times a week, once a day, two to five times a day, and more than five times a day. We measured shared identity by asking respondents to rate their similarity to their colleague on the basis of age, gender, personal values, and commitment to their work. These represented both surface and deep level bases for identification. Their choices ranged from "completely different from me" and "very different from me" to "very similar to me" and "the same as me."

Relationship Quality

To test the role of perceived proximity on the quality of relationships between coworkers, we adapted Hackman's (1990) widely used dimensions of team effectiveness for use at the dyadic level. This led us to gauge relationship quality in terms of respondents' (1) satisfaction with the particular dyadic relationship; (2) learning from the distant colleague; and (3) desire to work with the colleague again in the future. We changed the wording of Hackman's items only to shift the target and context of people's assessments from team to colleague. We analyzed our data separately for each of these three dimensions. There were only minor differences between them, so we report our results for an average of the three.

Controls

In all of our models, we controlled for the number of years that respondents had (1) known each other and (2) worked together, under the assumption that more established relationships are likely to be highly correlated with feelings of greater perceived proximity and relationship quality (although long-time colleagues can also become tiresome).

Measurement Validation

Following procedures suggested by Bollen (2011), Boudreau et al. (2001), and MacKenzie et al. (2011), we conducted a pilot study to evaluate our measure of perceived proximity by assessing the face validity of the indicators, examining the model's fit, and embedding the measure in a fuller model with additional causes and consequences. For the pilot, we used a sample of 375 employed people who were at least somewhat fluent in English reporting on their relationships with 375 distant colleagues and 375 collocated colleagues. Respondents were 30.2 years old on average, 58.8 percent male, 16 percent from the United States, and 84 percent from 25 other countries. They were fairly well educated, with 50.7 percent having bachelor's degrees, 30 percent having graduate degrees, and all but 12.3 percent having an associate's degree or at least some college education.

Using this pilot sample, we submitted the original 19 items in the survey to a confirmatory factor analysis to examine the dimensionality of the measure. Confirmatory factor analysis based on the unstandardized data using the covariance matrix and maximum likelihood estimation (Gefen et al. 2011) showed good fit for a two factor model [χ^2 = 30.4, df = 13, p < .004; RMSEA = .05] with a subset of 7 of the original 19 items and a relatively large sample size. The reliability coefficients for the retained items ranged from .47 to .70, which is within the acceptable range for measures of this length (Lord and Novick 1968).

Upon examination, the items that performed least well in the pilot study were either negatively worded (e.g., "I feel isolated from <distant colleague>") or were difficult to interpret (e.g., "My relationship with <distant colleague> transcends geography"). Historically, negatively worded items have been used to ensure that respondents were paying attention (Barnette 2000), but research over the past 30 years suggests that using all positively or directly worded items and not mixing them with negatively worded items improves internal consistency and factor structure (Cordery and Sevastos 1993). Thus, we dropped or reworded our negatively phrased items, and also added an attention filter question, which helped guard against haphazard responses

and also provided an "instructional manipulation check" against potential common source/common method problems (Oppenheimer et al. 2009; Richardson et al. 2009). In addition, we included a more specific prompt to measure communication frequency via social media (Twitter, Facebook, etc.) and also added control variables for respondents' prior familiarity and previous collocation with their distant colleagues.

Based on the confirmatory factor analysis in our pilot study, we retained seven items and created five new ones. They included statements such as "when I think of <distant colleague>, the distance between us seems small" for the cognitive dimension and "even when we are not working in the same place, I still feel close to <distant colleague>" for the affective dimension. Based on our initial analyses, and contrary to previous theoretical work (Wilson et al. 2008), the cognitive and affective dimensions did not differ. Thus, we collapsed these two dimensions into a single, seven-item measure of perceived proximity in all of our subsequent analyses. We drew on existing measures in spirit (Berscheid et al. 1989), but adapted them to the dispersed work context. For example, Berscheid et al. used a seven-point scale from "not at all close" to "extremely close" and asked, "Relative to all your other relationships (both same and opposite-sex), how would you characterize your relationship with this person?" McGregor and Elliot (2005) asked a similar question: "Right now, how close do you feel to your ____?" Questions like this get at similar constructs, but do so in the context of very different types of relationships (e.g., romantic, parental) and never in relation to geographically dispersed work. Nonetheless, they provided a solid basis on which to build our initial item pool. We present the final 12 items in Appendix A (for both the distant and collocated colleagues, which differ only in their references to the colleague's location).

To get a more qualitative sense of respondents' perceptions of proximity, we also expanded the pilot survey from one very general open-ended question, to the following three open-ended questions:

1. Describe how you think about <distant colleague> differently than you think about your collocated colleague, <proximate name>. We are very interested in your opinions and experiences; be as detailed as you can in describing them.

2. Does <distant colleague> feel as close to you as <proximate colleague> feels to you or not? Why do you think this is the case?

3. What role do you think technology plays in your feelings about <distant colleague> and <proximate colleague>. Again, we are very interested in your opinions and experiences; be as detailed as you can in describing them.

Quantitative Results ▮▮▮▮▮▮▮▮

Confirmatory Factor Analysis

Confirmatory factor analysis based on the unstandardized data using the covariance matrix and maximum likelihood estimation (Gefen et al. 2011) showed good fit for a two factor model [χ^2 = 207.8, df = 53, p < .001; TLI = .96; CFI = .963; RMSEA = .06] with 12 items and a large sample size. Hoelter's Index was 241, showing good fit and indicating that the sample size would have needed to be much smaller for the chi square statistic to be no longer significant. Although the dimensionality proposed by Wilson et al. (2008) held up in our data, the cognitive and affective dimensions of perceived proximity (i.e., the two latent variables) were highly correlated (r = .97), so we combined them in the remaining analyses. The reliability coefficients (α) for the retained items were .91 and .92, which were considerably better than in the pilot study, indicating that the revised items are more reliable, and exceed current measurement standards (Aiken 2000). Table 1 shows the descriptive statistics and bivariate correlations for all variables.

Since our study used same-source data, we tested for the extent of common method variance. As Cyr et al. (2009) noted in their survey of the IS literature, such checks are rare but important. We added a common latent factor to the confirmatory factor model (including communication, identification, and objective distance), connecting it to all of the observed items in the model and constraining the paths from the common latent factor to be equal. In this way, each item serves as an indicator not only of its substantive factor, but also of an unmeasured latent method factor (Podsakoff and MacKenzie 1994). By squaring the unstandardized regression coefficients from the common factor we determined that the common shared variance was less than .01. This suggests that common method variance was not an important factor in our results.

Objective Distance and Perceived Proximity

We compared perceived proximity for both 682 dispersed work relationships and 682 collocated work relationships. Our data indicate that the levels of perceived proximity are almost identical for distant colleagues (M = 3.35) and for collocated colleagues (M = 3.39). Thus, on average, paired comparisons showed that respondents did not perceive themselves to be closer to their collocated colleagues than they did to their geographically distant colleagues (t = .937, df = 681, p = .35). Furthermore, the amount of objective geographic distance (in "as the crow flies" miles) between distant colleagues was not correlated with respondents' perceptions

of proximity to those colleagues (r = -.01, p = n.s.). In short, we find no evidence that perceived proximity is related to objective geographic distance. Thus, Hypothesis 1 was not supported, but the paradox of being far but feeling close, which Wilson et al. (2008) described, was.

We also expected that objective distance would be associated with less frequent communications (H2a), but that frequent communications would be associated with higher perceived proximity (H2b). Our results show that objective distance was only significantly correlated with frequency of video and e-mail communications (i.e., H2a was partially supported). Using a combined index of communication frequency across multiple media, objective distance was not significantly related to the communication frequency. However, as the path coefficients in Figure 2 indicate, more frequent communications was related to perceived proximity (supporting H2b).

Hypothesis 3 contended that shared identity would be (a) negatively related to objective distance, but (b) positively related to perceived proximity. As shown in the path model in Figure 2, objective distance was negatively related to shared identity as expected, but the relationship was small (β = -0.06) and not statistically significant, contrary to H3a. However, perceived proximity and shared identity were significantly related (β = 0.47, p < 0.01), supporting H3b.

Based on Hypothesis 4, we expected that relationship outcomes would be (a) negatively related to objective distance, but (b) positively related to perceived proximity. The results in Figure 2 support H4b (β = 0.56, p < .01) but not H4a (β = 0.03, p = n.s.). Perceived proximity was significantly positively related to relationship outcomes, but objective distance was insignificantly related to relationship outcomes, supporting H4a, but not H4b.

In Hypothesis 5, we expected that both communications frequency and shared identity would be positively related to relationship outcomes. The combined index of all forms of shared identity was significantly related to relationship outcomes (β = 0.21, p < .01) supporting H5b. However the combined index of all forms of communication was not significantly related to relationship outcomes when shared identity and perceived proximity were included in the equation.

The regression results in Table 2 provide further support for most of our hypotheses, controlling for other factors. Model 1 includes only the controls for how long colleagues have known each other and how long they had worked together. Model 2 adds the objective distance (in crow-flies miles) between the respondents and their distant colleagues. Objective distance has no significant relationship with relationship outcomes (thus failing to support Hypothesis 4a).

Table 1. Means, Standard Deviations, and Correlations

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Years Known	4.72	4.55	--											
2. Years Worked with	3.43	3.21	.72**	--										
3. Miles to Distant Colleague	788	2,032	-.65	-.01	--									
4. Perceived Proximity	3.37	.79	.18**	.12**	-.01	--								
5. Phone Frequency	3.33	1.42	.11**	.10*	-.02	.37**	--							
6. Video Frequency	1.94	1.36	-.00	.05	.11*	.11**	.29**	--						
7. E-mail Frequency	3.05	1.50	.02	.06*	.13*	.17**	.39**	.47**	--					
8. IM, text, or Chat Frequency	3.40	1.76	.05	.03	-.01	.35**	.46**	.39**	.44**	--				
9. Similar Age	3.41	1.25	.10*	.01	-.13*	.28**	.06	-.01	-.00	.15**	--			
10. Similar Gender	3.82	1.57	.07*	.02	-.05	.07*	-.01	-.09	-.02	-.02	.23**	--		
11. Similar Personal Values	3.35	1.14	.11**	.06	-.05	.40**	.16**	.02	.08	.18**	.25**	.05	--	
12. Similar Commitment to Work	3.63	1.10	.10*	.09*	.11*	.35**	.21**	-.01	.14**	.15**	.12**	.06*	.30**	--
13. Mean Relationship Outcomes	3.75	.86	.10**	.05	.01	.69**	.30**	.00	.14**	.27**	.21**	.07*	.41**	.43**

**Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed). N = 1,354 except for miles to distant colleague, which includes 676 responses.
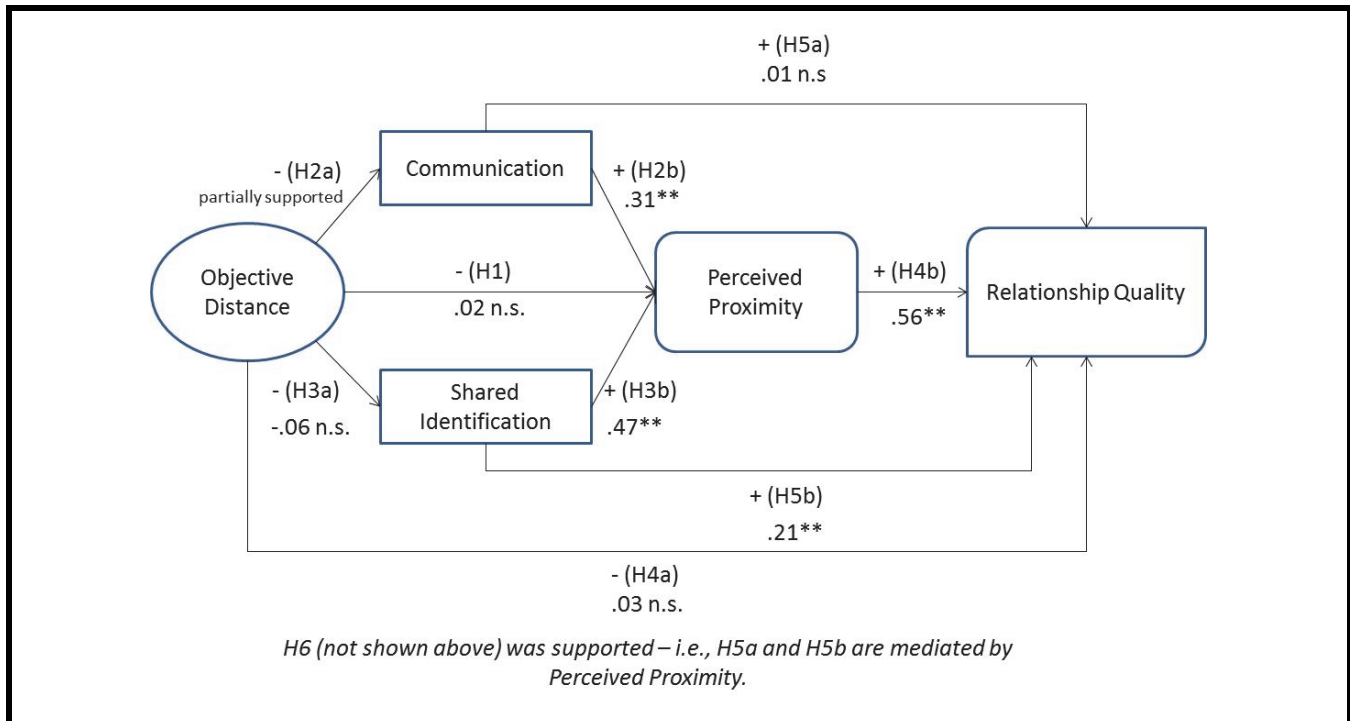
Figure 2. Summary of Results Objective Distance, Perceived Proximity, and Relationship Quality

Table 2. Results of Regression Predicting Influences on Relationship Quality										
	Model 1		Model 2		Model 3		Model 4		Model 5	
Variables	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
Years Worked with Distant Colleague	.02	.01	.05	.02	.10	.02	-.10	.02	.05	.02
Years Known Distant Colleague	.11*	.01	.04	.01	-.03*	.01	-.10	.01	-.09	.01
Miles to Distant Colleague			.01	.00	.02	.00	.00	.00	.00	.00
Phone Communications Frequency					.20***	.04	.11*	.04	-.00	.03
E-mail Communications Frequency					-.03	.04	.02	.03	.01	.03
IM, Text, or Chat Communications Frequency					.28***	.04	.18**	.03	.10**	.03
Social Media Communications Frequency					-.04	.03	.00	.03	-.07	.03
Similar Age							.09†	.03	.04	.03
Similar Gender							.04	.04	.02	.02
Similar Personal Values							.24***	.03	.10**	.03
Similar Commitment to the Work							.31***	.04	.20***	.04
Perceived Proximity to Distant Colleague									.53***	.06
R-Squared	.011		.008		.168		.332		.530	
Sig. F Change	.027*		.466		.000***		.000***		.000***	

†$p < .10$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

The addition of four types of communication frequencies in Model 3 improves the overall model ($p < .001$), with the most synchronous of the four communication media (phone, IM, text, and chat) being most statistically significant (partially supporting H5a). This is consistent with research showing how dispersed colleagues employ a repertoire of communication media rather any one particular medium (Watson-Manheim and Bélanger 2007) and how using a variety of media improves communication performance (Dennis et al. 2008). Model 4 adds four bases for shared identity (i.e., similar age, gender, personal values, and commitment to their mutual work), with shared personal values and shared commitment to work being statistically significant (supporting H5b), and the overall model improving significantly again.

As shown in Model 5, perceived proximity is powerfully related to relationship outcomes ($p < .001$), after controlling for relationship duration, objective distance, communication frequency, and shared identity. Its addition dramatically increases the overall quality of the model. This supports Hypothesis 4b. One type of communications (IM, text, or chat) and two forms of identification (based on similar values and shared work commitment) remain significant as well. Additional regression results (not presented here) with perceived proximity as the dependent variable provide further

support for the role of communications and identification in making distant colleagues seem more proximate, while objective distance continues to have no significant influence on perceived proximity.

Given our relatively large sample size, we were able to use Baron and Kenny's (1986) procedures to test whether perceived proximity operated as a mediator for relationship outcomes. We regressed perceived proximity on an index of all forms of communication and the relationship was significant as expected ($\beta = .38$, $p < .001$). Communication was also significantly related to relationship outcomes ($\beta = .24$, $p < .001$). When we used both communication and perceived proximity to predict relational outcomes, the effect of communication was not significant ($\beta = .01$, $p = .732$), but perceived proximity was significant ($\beta = .67$, $p < .001$), indicating full mediation. We found similar effects for perceived proximity as a mediator of the relationship between shared identity and relationship outcomes. Shared identity was significantly related to perceived proximity ($\beta = .50$, $p < .001$) and to relational outcomes ($\beta = .51$, $p < .001$). When both shared identity and perceived proximity were used to predict relational outcomes, shared identity was lower ($\beta = .23$, $p < .001$), while the effect for perceived proximity was stronger ($\beta = .56$, $p < .001$) indicating partial mediation. A Sobel test indicated

that the indirect effect of shared identity on relationship outcomes via perceived proximity was significantly different from zero ($z = 9.51$, $p < .001$). Thus, perceived proximity mediated the effect of communications and shared identity on relationship quality (supporting Hypothesis 6). However, when both shared shared identity and communication are used to predict relationship quality, the effects of communication are washed out (as noted earlier), suggesting that shared identification is the more proximal predictor of relationship quality.

Qualitative Methods ▰

Following Venkatesh et al. (2013), we analyzed quantitative and qualitative data to develop deeper insights into perceived proximity. Whereas the quantitative data helped us confirm the existence and strength of relationships between objective and perceived proximity, identification, and communication frequency, the qualitative data helped us understand these variables in more depth. Combining both types of data was a particularly valuable way for us to explore the role of communication and identification. It allowed us to understand what was behind the frequency of communication and strength of communication, and how it came to symbolize perceived proximity.

We obtained our qualitative data from the same sample as our quantitative data. We asked every respondent open-ended questions about whether and how they thought differently about their collocated and distant colleagues, whether and why they felt close to distant and collocated colleagues, and what role technology played in their feelings about their distant and collocated colleagues. The survey automatically populated the open-ended questions with the names of distant and collocated colleagues used in the scaled questions. Respondents' qualitative comments on the survey support the relationships in our model and enrich our understanding of them.

For our analysis of the open-ended comments, we combined the results from our pilot surveys and the final sample, yielding 2,289 comments from 1,188 respondents. Independently, we each read the same randomly chosen set of 186 comments from 62 respondents and generated lists of recurring themes in those comments, with sample comments for each theme. We then shared our lists of themes and sample comments. We discussed the themes, refined our shared understanding of them (e.g., the "Informality" theme had to mention interaction outside of or otherwise unrelated to work), discussed what differentiated some themes from each

other (e.g., we added a separate code to distinguish between comments that referred to a colleague being generally likable or personable and comments that more explicitly referred to the colleague as a friend, although many comments were ultimately coded in both of those categories), and combined themes that were the same or nearly the same. The result was 9 themes (see Table 3), by which we each then coded all 2,289 comments. Some had comments that touched on as many as 7 of the 9 themes, but, on average, each respondent's comments related to 1.9 of the themes.

Qualitative Results ▰

The most frequently mentioned themes (related to their perceptions of proximity with their colleagues) were communication technology (noted in 17% of comments), personality/likability (16%), shared identity (14%), reliability/dependability (14%), friend/ly/ship (13%), and informality (9%). Appendix B provides four illustrative quotes for each of the nine themes. The 17 percent who mentioned that technology fosters perceptions of proximity included comments such as

> Though we are separated by miles, the social media networks, email, etc. [have] really helped in making [me] feel that the distance does not really matter. We can connect in a jiffy.

Others said quite specifically how they used technology in counterintuitive ways to *create* distance. For example, one wrote

> Technology helps me in getting more close to Raj [my geographically distant coworker). For Ron [my collocated coworker], it helps me to keep distance from him.

A small minority (4%) of comments said that technology did not matter in the development of perceived proximity. Such comments included statements like

> In my opinion, technology plays no role whatsoever. The chemistry between 2 people rarely depends on proximity.

In Table 3, we show the number and percent of coded comments by theme for respondents at each level of perceived proximity. Of those who felt close to or far from their distant and collocated colleagues, each coded theme was mentioned with almost equal frequency. For example, one-quarter (25%) of those who had low levels of perceived proximity to their

Table 3. Frequency of Comments by Theme and Perceived Proximity						
			Number of Comments by Theme by Level of Perceived Proximity to Distant and Collocated Colleagues			
	Number of Comments Regarding Each Theme	Percent of Total Themes Coded	Level of Perceived Proximity to *Distant* Colleague		Level of Perceived Proximity to *Collocated* Colleague	
Themes			Low (1-2) n = 236	High (4-5) n = 696	Low (1-2) n = 223	High (4-5) n = 721
Technology matters	389	17%	71 (30%)*	236 (34%)	72 (32%)	237 (33%)
Personality/Likability	372	16%	80 (34%	211 (30%)	92 (41%)	198 (27%)
Reliability/Dependability	319	14%	55 (23%)	198 (28%)	64 (29%)	190 (26%)
Shared identity	315	14%	58 (25%)	179 (26%)	56 (25%)	193 (27%)
Friend/ly/ship	287	13%	52 (22%)	177 (25%)	54 (24%)	181 (25%)
Informality	208	9%	45 (19%)	118 (17%)	35 (16%)	135 (19%)
Frequency of Communication	140	6%	35 (15%)	64 (9%)	24 (11%)	82 (11%)
Duration of Relationship	82	4%	11 (5%)	57 (8%)	12 (5%)	51 (7%)
Responsiveness+Accessibility	76	3%	16 (7%)	39 (6%)	22 (10%)	43 (6%)
Technology does *not* matter	101	4%	29 (12%)	47 (7%)	22 (10%)	51 (7%)
Total Comments Coded	**2,289**	**100%**				

*Percent of respondents at that level of perceived proximity (e.g., 71/236 = 30%).

distant colleague commented about shared identity and about one-quarter (26%) of those with high levels of perceived proximity to their distant colleague also commented about shared identity. In other words, people were just as likely to comment about shared identity if they had low perceived proximity as they were if they had high proximity.

The exception was personality/likability, where 41 percent of those with low perceived proximity to their collocated colleague commented on personality/likability, but only 27 percent of those with high perceived proximity to their collocated colleague commented on personality/likability. This group of 41 percent included those who felt "oppressively close" to their collocated colleagues. Such respondents provide comments like

> Due to the fact that in an office you spend a lot of time with a person such as Mike, I find that he is harder to get on with because his personal habits affect the work relationship, therefore making me closer to Will [my distant colleague] as he is someone I see less frequently.

Taken together, these comments provide a richer understanding of the ways in which people's perceptions of proximity are intertwined with communication, the technology that supports it, and various bases of shared identification. The presence and embeddedness of new technology

and the frequency of communications clearly change the way respondents think about relationships, but the qualitative comments illustrate that those relationships are a function of the content and timing of that communication, as well as the demographic and practice-based sources of shared identity, not just the technical properties of ICTs. As the relatively equal percentages of comments at both high and low levels of objective and perceived proximity indicate, distance and closeness are less and less important as objective/geographic constructs and more and more important as subjective, symbolic ones.

Beyond just communicating more frequently and being accessible when their colleagues needed them, respondents appear to imbue their communications with clear expressions of shared identity (based on age, attitudes, goals, skills, values, training, etc.). As one respondent commented, "I think physical distance sometimes doesn't matter when your mental frequency matches with someone." Another noted

> He has the same temperament and attitudes toward life as mine. Though we are thousands of kilometers apart, we feel connected and physical distances matter very little for our friendship.

These bases for strong shared identity often appeared to operate recursively with non-work-related interaction. Shared identity begat informal interaction and such interaction, in

turn, provided the opportunity for meaning making and finding additional bases for shared identity. For those with high levels of perceived proximity, they wrote comments like

> More than anything, understanding the other person effectively is the core factor for feeling a person is close to you.

Conversely, those with low levels of perceived proximity made comments like

> In the case of [my collocated colleague], I find her to be a different person with difference in thinking processes; I have to think many times before telling her anything because I am not sure how she will take it. [So] yes, [my geographically distant colleague] feels closer to me than [my collocated colleague].

Strengthened by the analyses of these comments, our results are consistent with Wertsch's (1991) approach that "in trying to understand mental functioning [perceived proximity in our case], one cannot begin with the environment or the individual human agent in isolation" (p. 9). Wertsch states that what one needs to do is "take action and interaction as basic analytic categories and view accounts of the environment or human mental functioning as emerging from them" (p. 9). What we uncover, especially in the qualitative comments, is this iceberg of communicative acts that create perceptions of proximity, which recursively deepen shared identity and perceived proximity. Frequency (as captured in our quantitative model) is just the tip of the iceberg; the comments show the depth below, with communication's role being partly a function of basic frequency, but also a function of symbolic meaning conveyed in those communications. Those comments also suggest that the Wilson et al. (2008) model should be expanded to include a more dynamic conceptualization, whereby perceived proximity feeds to communication and (through communication) to shared identity. In this sense, our findings reinforce and extend Te'eni's (2001) theoretical model, which proposes that mutual understanding and relationships feed back into people's sense of cognitive and affective distance.

As the categories of codes show, those meanings include personal/individual factors (e.g., the extent to which someone is generally likable, friendly, reliable, or dependable), relationship factors (e.g., the extent to which someone is accessible, and responsive; the extent to which the coworkers share a common history, outlook, values, etc.; the extent to which the relationship is informal and long-standing), and the extent to which the technology facilitates these other factors (especially accessibility, responsiveness, and frequency).

In summary, in contrast to much previous research, on the basis of both our quantitative and qualitative data and analyses, we found little support for connections between objective geographic proximity and (1) communication, (2) shared identity, and (3) relationship outcomes. Also, contrary to the long-held assumptions of many previous studies, we found no relationship between objective proximity and perceived proximity. Among the distant colleagues in our sample, objective proximity's effects seem to pale in comparison to those of the more symbolically laden and malleable perceived proximity. The qualitative data reinforce the finding that perceived proximity is tightly linked to communications frequency and shared identity—and also show how the nature of that communication comes to symbolize reliability, dependability, likability, and technologically mediated accessibility. It is not enough just to be geographically close to engender perceived proximity. Nor is it enough to rely simply on frequent communication and shared characteristics when people are geographically far apart. In both cases, a sense of perceived proximity is engendered and maintained through communications that are symbolically significant. We see that "computer mediation is [not] simply a detail, or something that provides a quantitative increment in efficacy"; it is something that has the *potential* to facilitate a "qualitative transformation [and] alter the entire flow and structure" of individual interpretations and collaborative processes (Wertsch 2002, p.106 citing Vygotsky 1930).

Discussion

Our mixed-methods study shows that perceived proximity, the symbolic representation of one's faraway coworkers, is a powerful force shaping important outcomes in today's workplace. As our results show, the impact of perceived proximity on work relationships outweighs objective proximity. At the same time, as a symbolic construct, perceived proximity is related to two other symbolic processes: communication and shared identity. Our results have implications for the symbolic action perspective, research on distributed work, information systems, and research methods.

First, we find support for a symbolic, subjective understanding of distance in distributed collaborations (and in collaborations in general), a concept that has been mentioned as potentially important for decades, and modeled by Wilson et al. (2008), but rarely directly explored. The notion of perceived proximity broadens the theoretical understanding of proximity in organizational studies, and the results of our study contribute to a deeper understanding of how human action is driven by the meanings people give to their context (Blumer 1969). Just as organizational scholars recognized the

importance of subjective perceptions of time (Ancona, Okhuysen, and Perlow 2001), we have shown how perceptions of proximity influence relationship outcomes. Thus, we see our results as bringing in line our theoretical understanding of the concept of distance with the current ubiquity and even banality of distributed collaboration.

Probably our most striking finding is that objective proximity has generally weak or mixed relationships with perceived proximity, communication, and shared identification, and no effect on relationship quality. The explanation lies with the intricacies we uncovered among the highly symbolic aspects of communication and identification. Because perceived proximity is highly symbolic, it is not only a basis for action (Feldman and March 1981), but also an affirmation of one's identity as a connected, active, "always on" participant in fluid processes in a world without borders (Katz and Aakhus 2002). It is in this sense that feelings of proximity to distant colleagues are highly symbolic.

At the same time, the communication and identification processes generate perceived proximity in multiple ways. The act of communicating with someone is laden with meaning that is often rich and multilayered (Burke 1950). It can often carry multiple symbols of closeness. In the work context, as our qualitative data suggest, such symbols range from sharing informal and/or personal information, conveying one's commitment to shared work goals, demonstrating one's dependability, etc. Through communication, people discover and develop new bases for shared identification. At the same time, the act of communication itself is a symbol of closeness, even more so when the communication is frequent and on topics of common interest, in effect creating a shared context and sense of interpersonal proximity that does not require a shared physical context (Cramton 2002b).

Although we did not predict it, we found strong similarities between dispersed and collocated colleagues' perceptions of proximity, communication frequency, and identification. These similarities will be surprising to many, but we think the lack of a statistical difference in perceived proximity, communication frequency, and similarity for collocated and distant colleagues may be a figure-ground issue. In contexts where colleagues have little influence over the distance between them (e.g., where the cost of travel makes the distance between colleagues something that rarely, if ever, changes), it recedes into the background, becomes taken for granted, and people focus on the things over which they do have control (i.e., how and how often they communicate). For example, one recent study reported that after 2 years of working together, more than 90 percent of respondents were not concerned about the effect of objective distance on the development of their work relationships and reported that

distance was not a problem (Leonardi et al. 2010). If anything, they occasionally felt like they did not have enough distance; their colleagues were objectively far, but subjectively too close. Through communication frequency and increased identity, they have created a new context, one that does not expect/require physical proximity.

In contrast, in situations where people have more control over distance (because they are close enough for low cost travel—for example, by foot through a building or corporate campus, or by cab within a city), we would expect objective distance to play a stronger role. We also think that colleagues working across objectively large distances (with little anticipation that occasional travel will narrow those distances) may work harder to communicate and develop relationships (i.e., as Leonardi et al. found, they may compensate or overcompensate for the objective distance between them). This too may help explain the lack of differences between distant and proximate colleagues in our findings.

Second, the symbolic understanding of perceived proximity also sheds light on seemingly contradictory findings in terms of the effects of objective distance on collaboration outcomes. The traditional position on the matter has been that objective distance almost always exerts a negative impact on collaboration (Allen 1977; for a review, see Kiesler et al. 2002). Other studies have shown that distant collaborations can be very effective (Chidambaram 1996; Walther 1992, 1995). Over time, with the right approach, and occasionally some added time, some are finding that dispersed work can be just as effective as collocated work (Majchrzak et al. 2004). Our study shows that to understand such wide fluctuations in the outcomes of distributed collaborations requires less of a focus on objective distance than a focus on perceived proximity as a construct that develops through both the frequency of communication and the symbolic content thereof, as well as the shared identity that is developed through (and, in turn, affects) such content.

As we describe in our introduction, prior work has attended to the social (and sometimes symbolic) construction of certain aspects of dispersed work, for example, tools and objects (Carlile 2004; Carlson et al. 1999; Leonardi et al. 2010), time (Orlikowski and Yates 2002), images (Walther et al. 2001), and relationships (Walther 1992). There is also a stream of literature showing that people can form strong bonds with distant others through communication (Chayko 2002; Fayard and Metiu 2012, 2014), as well as a theoretical model of that describes how it happens (Wilson et al. 2008). Our work extends and enriches this work by focusing on the relationship between objective and perceived proximity/distance. It also sheds light on the contradictory findings mentioned earlier and the public debate about the role of distance more broadly

(e.g., Cairncross 1997; Florida 2005; Friedman 2006). Despite this lively debate, we still know relatively little about whether and how distance plays a role in relationships between dispersed colleagues. We believe our study, combining quantitative and qualitative results, contributes to this debate in several important ways.

First, building on prior work suggesting that the relationship between objective and perceived proximity is quite complex, mediated by factors such as communication technology features and group cohesion (Yoo and Alavi 2001) and the history of the relationship (Chidambaram 1996; Walther 1995, 1996), our finding about the importance of *perceived* proximity reinforces the notion that critical aspects of distributed work are socially constructed and symbolically laden. Second, our findings are relevant at the broader level of intra- and interorganizational collaborations. As researchers have found, virtual teams often devise different practices than traditional collocated teams (Piccoli and Ives 2003). These new practices may be supported and even fostered by the emergence of perceived proximity. Dyads that feel close even when separated by large geographic distances may provide much-needed boundary spanning roles across distant sites (Levina and Vaast 2005). Studying the role played by such dyads in organizational groups is an important avenue for future research, especially as individuals continually adapt the way they use communication technologies (Nan 2011; Orlikowski 2000) and as dyads are such a fundamental building block of social systems (Rivera et al. 2010).

Third, our findings have broad relevance for information systems (including Facebook and other new social media) in organizational and non-organizational settings where forging strong relationships with faraway others is important. As we noted, more subjective and symbolically rich conceptions of information systems can help explain previously contradictory findings (i.e., why people can be very far apart, yet feel very close or vice versa). Our work continues to shift the emphasis from information systems as a pipes or channels to information systems as vehicles for conveying meaning and symbolic value (Carlson and Zmud 1999). It also suggests the need for more research on the particular technological affordances that are most symbolically rich. Reinforcing Werstsch's (2002) findings, our results show that "the introduction of a new cultural tool into the flow of human action [should put us] on the lookout for qualitative transformation of that action rather than [just] a mere increment in efficiency or some other quantitative change" (p. 105).

In fact, the symbolic features in new technologies are beginning to instantiate our sense of perceived proximity. For example, Google+ allows users to arrange their contacts in circles that represent varying degrees of perceived proximity.

Users can share different information with only certain circles of people. Conceptually, Google+ draws on metaphors like one's "inner circle" to characterize the people whom we perceive to be most proximate. Although Google+ is still a new product, it is not hard to envision its structurational qualities (Giddens 1984; Jones and Karsten 2008; Lamb and Kling 2003) whereby the mere assignment of people to circles represents our thoughts and feelings about them, but also reinforces those perceptions. Putting someone in your inner circle on Google+ is likely to create or reinforce an expectation about how closely you identify and communicate with them. Similarly, the social network diagrams that sites like LinkedIn create are likely to instantiate our own perceptions about proximity.

Fourth, our results suggest the need to revisit some notions regarding face-to-face communication. For example, some respondents debunked the assumption that collocation implies frequent, in-depth communication. As one noted,

> I meet John [my collocated colleague] every day, but we don't have time to talk daily, but I talk with Ben almost every day. [In contrast,] Ben [my geographically distant colleague] feels closer [even] though he's miles away from me. We talk on the phone every day.

As this statement suggests, frequency matters for the development of perceived proximity, but it isn't necessarily a product of collocation. Technology-mediated communication is also prevalent between *collocated* colleagues. Respondents often noted how they used Facebook, text messages, and other media to communicate with colleagues in the same office. This appears to satisfy the need to create subjective distance from some colleagues, but it also shows that the affordances of mediated communication can actually trump those of FTF communication (Hollan and Stornetta 1992).

For example, pointing to the affordance of rehearsability, one respondent said,

> It makes it easier to discuss things about work if we aren't in the same room as we can talk online or through the telephone. Being able to communicate through the computer makes it easier to plan what to say and how to say and explain things.

Another noted that

> Technology is key to the relationship between myself and Will. As we do not work in the same office, the only form of communication on a regular basis has to go through e-mail or phone calls. This allows

preparation of what needs to be said whereas with Mike [collocated] things are sometimes said hastily as they pop into mind, without considering the full implications of what is being said.

Such comments harken back to Wertsch's notion that the technologies that bind distant colleagues enable sequences of turns, which can involve extended, explicit, uninterrupted utterances. Our respondents pointed out that their use of communication technology enabled both rapid-fire exchanges as well as long, fully developed ones.

Finally, the measure that we created and validated should be useful to scholars studying remote collaborations, telecommuting, dispersed or virtual teams, and other forms of interaction where distance and proximity are relevant. In addition, because collocation is no guarantee of perceived proximity, these measures should also be useful for studying any workplace interactions where relationship outcomes are important. In this sense, the measures that we developed are a useful complement to those developed to gauge different forms of geographic dispersion (O'Leary and Cummings 2007). Future research using the measure could help with the development of norms for the scale (MacKenzie et al. 2011).

Limitations and Opportunities for Future Research

Despite the theoretical, methodological, and managerial implications of this study, it is not without its limitations. First, although our study was explicitly about dispersed dyadic relationships and we had a very international sample (with a minority of U.S. residents), we limited our sample to people who were at least somewhat fluent in English. Future studies could develop alternative language versions of our perceived proximity items and validate these results with respondents who are not fluent in English. Furthermore, given the primacy of communications in our model, future research could assess the effects of the language fluency of the distant coworkers. We only gathered data on the fluency of the respondents themselves. Future research could also gather data from the coworkers, in order to explore the reciprocality of perceptions (Krasikova and LeBreton 2012). Harkening back to Goffman (1959), Leonardi et al. (2010) emphasize that it is not just our perceptions of others, but others' perceptions of our distance that matter (and that people spend considerable energy to manage).

Second, the addition of longitudinal data would allow us to develop a more refined sense of how proximity emerges and evolves. We showed how it relates to a variety of key factors,

but we were not able to explore the dynamics of perceived proximity. We believe it will be important for future research to explore how communications media affect perceived proximity, as well as how perceived proximity affects the use of communications technology. More longitudinal research might also test quantitative models based on the themes that emerged from our coding of respondents' qualitative comments (e.g., informality, accessibility, dependability). Their answers to our open-ended questions enriched our analyses, but we could not test the relative strength or interaction of such variables. As various technology features help instantiate our perceptions of proximity (e.g., the circles in Google+ and aspects of LinkedIn, which we mentioned earlier), it is important to keep in mind that people are becoming more and more familiar with dispersed work and the technologies to support it (whether in virtual teams, telecommuting, or other forms). As the work and tools evolve, people's choices and use will inevitably evolve too. Careful, fine-grained longitudinal work holds the potential to track how communication, identification, and their symbolic aspects coevolve with perceived proximity and new technologies in the workplace.

Third, although we gauged the frequency of FTF communications and distant colleagues did have some (albeit infrequent) in-person interactions, we did not assess the timing or content of those in-person interactions. For example, some have claimed that FTF interactions are especially important at the beginning of otherwise dispersed collaborations; others have noted that the rhythm of distant and FTF interactions is also important (Maznevski and Chudoba 2000). This is an area for future papers to extend the Wilson et al. (2008) model. Our qualitative results also suggest that responsiveness is an element of communications timing that warrants further study. When texts, e-mails and other asynchronous media are exchanged in rapid succession, they can quickly take on the interactive, proximity-enhancing characteristics of more fully synchronous interactions. Time stamps in email system logs (as well as self-reported measures) could be used to gauge the speed with which colleagues respond to each other—and link that speed to relational and other outcomes. We also did not have access to the content of the communications themselves, relying on subjects' comments about those communications instead. Future research might include more direct assessment of the written and spoken communication itself.

Fourth, as with many symbol-laden processes, we believe there are important feedback loops, whereby perceived proximity affects people's sense of shared identity at the same time that shared identity is building and reinforcing perceptions of proximity. The same is likely to be true with communications: the closer people feel, the more frequently they may communicate, and the closer they will feel. In this

sense, the causal arrows implied in our model might best be depicted as recursive relationships with arrows at both ends and perceived proximity as both the symbolic result of communications and identification as well as a force that boosts them both.

Conclusion

In previous work, scholars have noted that

> Research should explore the relationship between the objective aspects of dispersion and people's perceptions thereof, with an eye toward how technology use can minimize perceived dispersion (O'Leary and Cummings 2007, p. 448).

In this paper, we have done so, showing how perceived proximity is a function of communications and identification, with information technology providing the means by which both dispersed and proximate colleagues convey symbols of their closeness, enact a sense of shared context, and enhance the quality of their work relationships.

Acknowledgments

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About the Authors

Michael Boyer O'Leary is a Teaching Professor of Leadership and Management at Georgetown University's McDonough School of Business. He graduated from MIT's Sloan School of Management (Ph.D., Organization Studies) and Duke University (BA, Public Policy). Previously, he was on the faculty at Boston College's Carroll School of Management and worked as a management consultant (Coopers & Lybrand, LLC) and policy analyst (Pelavin Associates/American Institutes of Research). His research deals with high-performing teams (especially geographically dispersed or virtual teams), information technology use, multiteaming, and multitasking. His work has been published by MIT Press and in the *Academy of Management Review*, *Journal of Organizational Behavior*, *MIS Quarterly*, *Organization Science*, and *Organization Studies*. He has been a member of the executive committee of the Academy of Management's OCIS Division and has served as a member of three National Science Foundation grant review panels.

Jeanne M. Wilson is the Dorman Family Term Associate Professor at the Mason School of Business at The College of William & Mary. She received her Ph.D. from Carnegie Mellon University. Her research focuses on new organizational forms, particularly distributed work groups and the role of distance in work relationships. She has studied the development of trust over time in distributed groups, knowledge transfer in teams that cross organizational boundaries, and attributions about performance in international project teams. Her work has appeared in *Academy of Management Review*, *Organizational Behavior and Human Decision Processes*, *Organization Science*, and *Journal of Organizational Behavior*.

Anca Metiu is Professor of Management at ESSEC Business School in France. She earned her Ph.D. from the Wharton School of the University of Pennsylvania and her MBA from the University of Illinois at Urbana-Champaign. Previously, she was on the faculty at INSEAD. Her research examines intra- and intergroup cooperation, the creation of group engagement in teams, and the processes of professional identity formation for women in the free/open source software communities. Her book, *The Power of Writing in Organizations* (Routledge, 2013), examines the role of written communication in distant collaboration. Her work has been published in several edited volumes, as well as in the journals *Administrative Science Quarterly*, *Organization Science*, *Organization Studies,* and *Oxford Review of Economic Policy*. She is a senior editor at *Organization Studies* and a member of the Editorial Board of *Organization Science*.

BEYOND BEING THERE: THE SYMBOLIC ROLE OF COMMUNICATION AND IDENTIFICATION IN PERCEPTIONS OF PROXIMITY TO GEOGRAPHICALLY DISPERSED COLLEAGUES

Michael Boyer O'Leary

McDonough School of Business, Georgetown University, 37th and O Streets NW,
Washington, DC 20057 U.S.A. {mbo9@georgetown.edu}

Jeanne M. Wilson

Mason School of Business, College of William & Mary, PO Box 8795,
Williamsburg, VA 23187 U.S.A. {jeanne.wilson@mason.wm.edu}

Anca Metiu

ESSEC Business School, Av. Bernard Hirsch, B.P. 50105,
95021 Cergy Pontoise Cedex FRANCE {metiu@essec.fr}

Appendix A

Perceived Proximity, Communication, and Attentional Filter Items from the Online Survey

Final Perceived Proximity Items for Distant Colleagues

Describe how you think and feel about this colleague using the pull-down menus for each of the following statements.

I feel close to Distant Colleague.	▼
Even when we are not working in the same place, I still feel close to Distant Colleague.	▼
I feel closer to Distant Colleague than the actual physical distance would suggest.	▼
I have a warm feeling about Distant Colleague.	▼
Physical distance doesn't matter in my relationship with Distant Colleague.	▼
When I think of Distant Colleague, the distance between the two of us generally seems small.	▼
With regard to work, I often think about Distant Colleague.	▼
Even when we're not actively working on something, I feel close to Distant Colleague.	▼
Psychologically, Distant Colleague feels close.	▼
I feel connected to Distant Colleague.	▼
Even when we haven't been in the same place, it hasn't seemed like I was far from Distant Colleague.	▼
When I think of Distant Colleague, she/he seems close.	▼

The pull-down menus included five choices from strongly disagree to strongly agree.

Final Perceived Proximity Items for Proximate Colleagues

Describe how you think and feel about Proximate Colleague using the pull-down menus for each of the following statements.

Even when we haven't been in the same place, it hasn't seemed like I was far from Proximate Colleague.	▼
I feel closer to Proximate Colleague than the actual physical distance would suggest.	▼
Physical distance doesn't matter in my relationship with Proximate Colleague.	▼
When I think of Proximate Colleague, the distance between the two of us generally seems small.	▼
Even when we are not working in the same place, I still feel close to Proximate Colleague.	▼
When I think of Proximate Colleague, she/he seems close.	▼
Even when we're not actively working on something, I feel close to Proximate Colleague.	▼
I feel connected to Proximate Colleague.	▼
I feel close to Proximate Colleague.	▼
With regard to work, I often think about Proximate Colleague.	▼
I have a warm feeling about Proximate Colleague.	▼
Psychologically, Proximate Colleague feels close.	▼

The pull-down menus included five choices from strongly disagree to strongly agree.

Communication Items (for Proximate and Distant Colleagues)

When you interact with Proximate Colleague, how often do you communicate using each of the following media?

	Never	Less than Once a Week	1-4 Times a Week	Once a Day	2-5 Times a day	More than 5 Times a day
By phone	○	○	○	○	○	○
Face-to-face	○	○	○	○	○	○
By email	○	○	○	○	○	○
By video conference	○	○	○	○	○	○
By instant message, chat, or text	○	○	○	○	○	○
Social Media (Twitter, Facebook, etc.)	○	○	○	○	○	○
Other communication media (please specify)	○	○	○	○	○	○

First Attention Filter Question

Complete the following analogy incorrectly. Do not enter the correct answer.

"Up" is to "Down" as "In" is to _____.

[   ]

Second Attention Filter Question

What relationships have been most consequential in your career? Relationships shape the way we experience our professional lives in substantial ways: they determine whether we find the right job, whether we advance in our careers, and how much we develop our professional and personal skills.

Although relationships are an interesting topic, the purpose of this question is solely to check if you read instructions carefully. So please do not choose one of the multiple choice answers below. Instead, ignore the first six potential answers below and -- regardless of your what your real answer would be -- write the word "None" in the box marked "Other, please specify."

In terms of your career choices, who has been the most influential person?

- ○ My father
- ○ My mother
- ○ Another family member
- ○ A friend
- ○ A mentor
- ○ A boss
- ○ Other, please specify:

Appendix B

Quotes Illustrating Each Theme in the Coded Comments ▆▆▆▆▆

Themes and Frequency	Illustrative Quotes
Communication Technology 17% of coded comments	• The fact that we can remain connected and maintain very effective communication over a long distance, certainly has a positive impact on my relationship with Annie because important things are not lost in translation and the physical distance tends to compress when problems can be solved seamlessly. • Technology has really helped in keeping the relationship afloat. Though we are separated by miles, the social media networks, email etc. has really helped in making it feel that the distance does not really matter. We can connect in a jiffy because of constant innovative technology. • Technology is very important as it helps with the communication and feeling of "togetherness" even while we are not at work – this is mainly through text messaging, email, and Facebook.
Personality and Likability 16% of coded comments	• Pad is over-bearing and a bit uncooperative. • Ali is a quite modest person, very friendly and co-operative. While John is a bit arrogant and aggressive in nature. • I feel Aaron is more self-oriented and less talkative, while Andi is outgoing, sociable, and friendly. • Yes because he is much nicer to work with I feel at ease working with him so it feels like he is close, and mike is so bad to work with I feel like even when he is at my desk he is a million miles away.
Shared Identity 14% of coded comments	• Well it is not the distance that matters, but the similarities in the attitudes towards work. Such as commitment level, time management skills, effective results etc. I feel more compatible with Jennifer on the above. • Harshini [physically faraway] is like my mirror. I know what she is like and also am very sure about her thoughts and views. We usually affirm the same things. There is very little that we differ in. So I do not have to always explain to her about certain things as she automatically understands and vice versa. In the case of Pushpa [collocated], I find her to be a different person with difference in thinking process, I have to think many times before telling her anything because I am not sure how she will take it. Yes Harshini feels closer to me than Pushpa. • Sathish has similar taste and values as me. It makes me much closer to him. I can share my personal values and dilemmas with him. Similarly he shares his problems with me. Yes Sathish feels very close to me even we work in different places. • No. My life and Jennifer's life seem to be going in different directions. We have very different views and it's hard to talk to her sometimes when she's being arrogant and self-absorbed. I can tell Jeff anything and know he won't tell anyone. We are VERY similar which is kind of ironic since we were both raised very differently from each other.
Reliability and Dependability 14% of coded comments	• Annie [physically faraway] is very committed to her job and will go the extra mile to achieve goals. Mannie [collocated] is more laid back and would generally have the tendency to do the bare essentials to survive. Annie feels closer in terms of work related situations principally because of her work ethic and achievement orientation. So in work situations I feel closer to Annie. • Anita is somewhat careless and very irresponsible but Arwa is very much dedicated to her work. • Annu is fun to work with and her dedication and passion towards work match mine completely. Also, she understands me and my work completely whereas with Anup I need to push as the levels of dedication towards work are different. This makes his and mine priorities towards work different and hence there is a gap. Whereas with Annu, even if I am not communicating, there is no gap in understanding, • Gregory is much [more] responsible than Nithin. He is focused in his goals.

Themes and Frequency	Illustrative Quotes
Friendly/Friendship 13% of coded comments	• Mack is very friendly to me even he is located far from me. • Arul is very friendly and cares for me a lot. Arul is very frank and lovable to me than Gayathri. Arul is much closer to me in all aspects than Gayathri. Also I care for Arul more than Gayathri. • Priscilla definitely feels closer to me than John does because we are good friends. • Even though we are not working in the same place I have positive opinion about Aruna. She is my best friend. I can share everything with her. She supports me and encourages in every aspect of life and helps when I am in need.
Informality 9% of coded comments	• George and I shared a cordial work relationship and we also hang out together during weekends. We have other common friends also and it reduces the stress in our professional relationship. The same is not true with Pedro. • I think Bhabes is closer. Well, my communication with Bhabes does not include work alone but with other friendly quotes and thoughts while that of Mark's is about work, work and work. • While I know about May's skills and abilities in relation to our shared work, I don't feel like I know much about her life outside of work, or even much about anything non-work related. Communication is always direct and related to the issue at hand. So we don't have the chance to run into each other in the hallway or talk about what each other is having for lunch or what we did on the weekend and so on. With John we can and do talk about a wide number of things and know more about each other's personal lives and circumstances. I feel I could go to him with a work problem and get a better solution because he knows more about me and how I operate than May does. • I don't think she feels as close to me as TG would feel. We are strictly professional. We have no friendly relationship outside of work.
Frequency of Communications 6% of coded comments	• Technology plays a very important role in my feelings about Richard. It's technology that has provided us the opportunity to interact so frequently whenever and wherever we want, we share our feelings and understand each other's problems and try to find solution despite of our physical differences. Without technology it was not possible. • Ben is closer though he's miles away from me. We talk on the phone every day and we work together. • [I] talk to him regularly so he is far better than my collocated colleagues. • [Technology matters] quite a bit – the constant cell phone contact and frequent email is a major form of communication in both relationships. In person interaction is important, but is one piece of our connections and working together.
Duration of Relationship 4% of coded comments	• Salim feels closer to me. We worked together for a long time… • Yes he does [feel close] because of our relationship which has spanned for over 5 years where we have got to know and understand each other and even though we may be far off we still share the same relationship no matter what. • I am more close to Jaat and reason for this is that I had been working with him from last 4-5 years and he understands me well... • I don't think that Janet feels as close as I feel towards Nicole. Nicole and I have known each other for a number of years while Janet and I have known each other for only a short number of years.
Responsiveness and Accessibility 3% of coded comments	• Bob works from home, but he is always on e-mail, even on the weekends. I believe he goes out of his way to be accessible because he is a remote worker. • Kumar reacts to the situation immediately whereas Gyanendra needs to be reminded for completing the task. Distance does not matter with Kumar. He is more trustworthy. • Michael is actually better that Peter, because if we need to discuss about our project we just make a call to Michael and he will arrive to the office within 2 hour and then we will have all type of discussions and queries are solved, but this is not possible for the Peter as we could meet only after a month. • Paul is also easier to contact and talk to, even if he is in a different office. He will always reply to emails quickly and answer the phone, where Nicky doesn't.