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Understanding Conflict in Geographically Distributed Teams: The Moderating Effects of Shared Identity, Shared Context, and Spontaneous Communication

Pamela J. Hinds
Center for Work, Technology and Organization, Department of Management Science and Engineering, Stanford University, Stanford, California 94305-4026, phinds@stanford.edu

Mark Mortensen
Sloan School of Management, Massachusetts Institute of Technology, 50 Memorial Drive, Cambridge, Massachusetts 02142-1347, markm@mit.edu

Geographically distributed teams are increasingly prevalent in the workplace, and research on distributed teams is ever more available. Despite this increased attention, we still know surprisingly little about how the dynamics of distributed teams differ from those of their collocated counterparts and how existing models of teams apply to this new form of work. For example, although it has been argued that distributed as compared with collocated teams have more severe conflicts that fester longer and resist resolution, few comparative studies investigate dynamics such as conflict in both distributed and collocated teams. In this study, we examine conflict, its antecedents, and its effects on performance in distributed as compared with collocated teams. Our goal is to understand how conflict plays out in distributed and collocated teams, thus providing insight into how existing models of conflict must be augmented to reflect the trend toward distributed work.

We report the results of a field study of 43 teams, 22 collocated and 21 distributed, from a large multinational company. As expected, the distributed teams reported more task and interpersonal conflict than did the collocated teams. We found evidence that shared identity moderated the effect of distribution on *interpersonal* conflict and that shared context moderated the effect of distribution on *task* conflict. Finally, we found that spontaneous communication played a pivotal role in the relationship between distribution and conflict. First, spontaneous communication was associated with a stronger shared identity and more shared context, our moderating variables. Second, spontaneous communication had a direct moderating effect on the distribution-conflict relationship, mitigating the effect of distribution on both types of conflict. We argue that this effect reflects the role of spontaneous communication in facilitating conflict identification and conflict handling.

Key words: distributed teams; conflict; shared identity; shared context; team communication; distributed work

Recent advances in telecommunication and information technologies offer new opportunities for engaging in geographically distributed work. Research and development laboratories rely on facilities around the globe (Brockhoff 1998), and software development teams are increasingly spread across multiple countries (Carmel 1999) to take advantage of resources at local sites. Although an increasing number of organizations are relying on technology-enabled geographically distributed teams (McDonough et al. 2001), these teams are often difficult to manage and fall short of performance expectations. Distributed teams frequently suffer coordination problems (see Cramton 2001), crises of trust (Jarvenpaa and Leidner 1999), and unhealthy subgroup dynamics (Armstrong and Cole 2002, Cramton and Hinds 2005). Despite an increasing amount of research examining the dynamics of distributed work (e.g., Gibson and Cohen 2003), it is not yet clear whether or not, and how, the dynamics of distributed teams can be predicted by existing models of teams that are based on decades of research on collocated teams. Some scholars have, in fact, questioned whether distributed teams are fundamentally different than collocated teams and thus deserving of separate study. With our study, we strive to address this question by comparing the dynamics of distributed and collocated teams, in particular their experiences with conflict, as a means of understanding the extent to which geographic distribution affects this important dimension of teamwork.

We focus on conflict because previous work suggests that distributed teams find conflict not only prevalent, but particularly difficult to isolate and manage (see Hinds and Bailey 2003, Mannix et al. 2002). Studies of geographically distributed teams report significant conflict between distant members as team members struggle to come to terms with different perspectives, unshared information, and tensions between distant subgroups (see Armstrong and Cole 2002, Cramton 2001). Existing empirical research, however, has typically included no collocated comparison teams and, for the most part, has not set out to study conflict. Another reason we study conflict is because of the well-established relationship between conflict and performance. Although some studies have reported a positive relationship between task

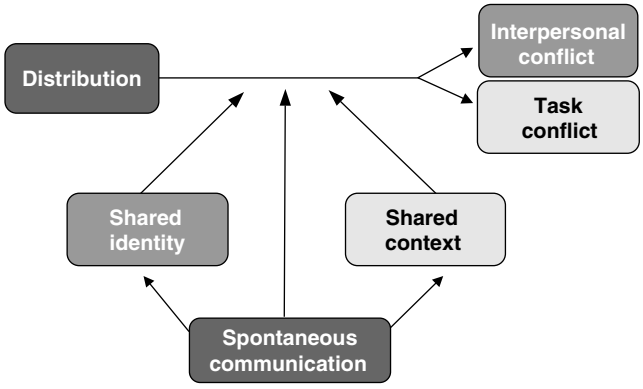
conflict and performance (e.g., Pelled et al. 1999), a recent meta-analysis suggests that both task and interpersonal conflict are consistently linked with worse performance, particularly when teams are engaged in highly complex tasks (De Dreu and Weingart 2003). Conflict can interfere with performance, decrease satisfaction, and reduce commitment to the organization. If, as suggested, conflict is more prevalent in distributed teams, the ability of distributed teams to perform effectively may be endangered.

In this study, we aim to better understand the factors that mitigate conflict on distributed teams. Not all distributed teams experience crippling or even serious conflicts. We strive to understand why some do and others do not. With few exceptions (i.e., Lovelace et al. 2001), there has been surprisingly little empirical research that examines the factors that moderate the relationship between conflict and its antecedents. Recent research instead has tended to focus on the direct effect of diversity on conflict or on moderators of the conflict-performance relationship. Because of this, in their review of 40 years of research on diversity, Williams and O'Reilly (1998) call for more research into the moderators of diversity on group process. They, and others, suggest that the mechanisms through which diversity affects conflict fall into two categories: those related to social categorization or affective ties and those acting on informational factors. This is consistent with McGrath's (1984, Chapter 1) argument that group dynamics are affected by both interpersonal relations and task-related patterns. Regarding conflict, Jehn et al. (1999) argue that social categorization and differences in information *mediate* the relationship between diversity and conflict, although they do not actually measure either social categorization or differences in information. In theorizing about conflict in distributed teams, Hinds and Bailey (2003) argue that shared identity and creating similar contexts *moderate* the relationship between distribution and conflict. Thus, although numerous scholars have suggested that social categorization and informational factors are key to understanding conflict in teams, the exact nature of the relationships between social categorization, informational factors, and conflict remain vague.

Our goal in this paper is to shed light on these relationships through an empirical investigation. We propose that geographic distribution contributes to conflict and that this effect is moderated by shared identity and shared context (an informational factor). Using the taxonomy of Marks et al. (2001), we argue that shared identity and shared context are emergent states within teams. Emergent states are "properties of the team that are typically dynamic in nature and vary as a function of team context, inputs, processes, and outcomes" (Marks et al. 2001, p. 357). We also argue that spontaneous communication plays a pivotal role in reducing conflict on distributed teams. According to Marks et al. (2001, p. 357), team processes are "members' interdependent acts that convert inputs to outcomes through cognitive, verbal, and behavioral activities directed towards organizing task work to achieve collective goals." We suggest that spontaneous communication is a team process that aids in the development of a shared identity and contributes to a shared context. In addition to its indirect effects, we also posit that spontaneous communication independently moderates the relationship between distribution and conflict by facilitating conflict identification and handling. A number of scholars have argued that informal communication plays an important role among workers who are not copresent (e.g., Kraut et al. 2002, Sarbaugh-Thompson and Feldman 1998, Sproull and Kiesler 1991). Sarbaugh-Thompson and Feldman (1998), for example, stress the importance of casual conversations as a mechanism for appropriately signaling availability and avoiding potentially embarrassing social interactions. With the exception of the work of Sarbaugh-Thompson and Feldman (1998), little research has empirically examined how informal, spontaneous communication contributes to the healthy functioning of distributed teams.

We propose that geographic distribution leads to conflict and that this effect is moderated by shared identity and shared context, and by spontaneous communication that acts on shared identity and shared context as well as independently (see Figure 1). Finally, we consider the effect of conflict on performance in distributed and collocated teams. By geographically distributed teams, we mean those in which team members are located at significant distances from one another, e.g., residing in different cities or countries.

Figure 1 Theoretical Model Predicting the Relationships Between Geographic Distribution, Shared Identity, Shared Context, Spontaneous Communication, and Conflict



Notes. As indicated by the shading, shared identity is expected to primarily moderate the relationship between distribution and *interpersonal* conflict, and shared context is expected to primarily moderate the relationship between distribution and *task* conflict.

Along with others, we differentiate interpersonal conflict and task conflict (e.g., Jehn 1994, 1995; Pelled 1996; Pelled and Adler 1994). Interpersonal (also known as affective or emotional) conflict refers to conflicts that arise from perceived interpersonal incompatibilities and clashing personalities. Such conflict is typically characterized by feelings of anger, frustration, and distrust. In contrast, task conflict refers to discord over different opinions and viewpoints about the work being performed, often including differences of opinion about what should be done. While task conflict may involve heated debates regarding the task being performed, it is typically devoid of the intense negative feelings characteristic of interpersonal conflict. Although interpersonal and task conflict often are correlated, the mechanisms through which they operate on group process are different, as are their effects on group performance. We therefore treat interpersonal and task conflict as separate constructs throughout this study. A third type of conflict, process conflict, has also been identified (see Jehn 1997). Process conflict refers to conflicts not about the task itself, but about *how* the work should be done. We do not examine process conflict because it was not well established nor were the measures well developed at the time of this study.

Geographic Distribution and Conflict

Scholars have consistently argued that conflict will be more extreme on geographically distributed as compared with collocated teams (Hinds and Bailey 2003, Mannix et al. 2002), and empirical work has confirmed that distributed teams often experience high levels of conflict (Armstrong and Cole 2002, Cramton 2001). Olson and Olson (2000), for example, observed misunderstandings between distant team members when members in the United States curtailed a video conference without giving a proper farewell to one of their European colleagues. This was due, in part, to unshared contextual information as the team members in the United States were unaware of the importance of appropriately acknowledging their European colleague's departure, while those in Europe were unaware of the pressure on the American team members to save costs by shortening video conferences. Similarly, in her study of distributed student teams, Cramton (2001) observed that conflict erupted as team members made harsh attributions about their distant colleagues when information was missing or miscommunications occurred. Theory suggests that conflict in these teams is a result of weak interpersonal bonds between sites, unshared context, and poor information sharing (see Hinds and Bailey 2003), although the mechanisms have seldom been closely examined, particularly in teams within organizations.

Although theory and evidence suggest that conflict will be greater in distributed teams, few empirical studies systematically compare distributed with collocated teams to determine whether conflict is more severe, and even fewer have compared the conditions under which conflict occurs in these teams. One exception is a study comparing 12 distributed and 12 collocated product development teams (Mortensen and Hinds 2001). Surprisingly, Mortensen and Hinds (2001) found no significant difference between distributed and collocated teams in the amount of interpersonal or task conflict. They conclude that relationships between distant team members become more harmonious over time as teams develop familiarity and shared processes (see Zack and McKenney 1995, Walther 1995). In this study, we explicitly examine the moderating factors that determine whether or not distribution will fuel conflict in distributed teams.

Shared Identity

As noted earlier, a shared team identity is an emergent state—a dynamic property of a team. A strong shared identity among team members has been linked to reduced conflict, particularly interpersonal conflict (see Jehn et al. 1999). We argue that when a team has a strong shared identity, the effect of geographic distribution on conflict will be mitigated. Social identity and social categorization theories suggest that individuals reduce ambiguity and promote self-enhancement by partitioning their colleagues on the basis of relative similarity to themselves. They create "in-groups" composed of similar others and "out-groups" of those perceived as different (Tajfel 1974, 1981). Members of in-groups are subsequently evaluated more favorably than those considered part of the out-group (Hogg and Abrams 1988, Levine and Moreland 1987). Although in-group and out-group designations are most frequently viewed as intrateam phenomena, the distinction also occurs among subgroups within a single team (see Hogg and Terry 2000, Gibson and Vermeulen 2003). In the absence of a strong shared identity, team members are likely to evaluate other team members' behaviors negatively, assuming a competitive rather than cooperative stance when problems or miscommunications arise: "This intergroup hostility can surface as relationship conflict—conflict over workgroup members' personal preferences or disagreements about interpersonal interactions, typically about non-work issues such as gossip, social events, or religious preferences" (Jehn et al. 1999, p. 745).

Because of the potential for conflict resulting from rifts between distant sites, we expect a shared identity to be an important mechanism for ameliorating interpersonal conflict in geographically distributed teams. Distributed teams, especially those that rely heavily on mediating technologies, are often less cohesive, and their members are less satisfied with their interaction and like each other less than members of face-to-face teams (e.g., McLeod and Liker 1992, Straus and McGrath 1994,

McGrath 1984). Members of distributed teams also are inclined toward harsh, dispositional attributions about distant team members because they lack situational information to help them interpret the behaviors and activities of their distant colleagues (Cramton 2002). When a shared group identity is salient, team members are inclined to be more loyal, more trusting, and more concerned about promoting the welfare of the group (Brewer and Miller 1996). Thus, we reason that a shared identity can create a psychological tie between distant team members that helps them to bridge the physical and contextual distance that otherwise separates them. In the presence of a shared team identity, distant team members may have more faith in other members and be more likely to talk through issues that arise (Hinds and Bailey 2003). Such arguments led Mannix et al. (2002) to identify a lack of common social identity as a key hurdle distributed teams must overcome to effectively deal with conflict. Based on these arguments, we predict that interpersonal conflict in distributed teams will be lessened when teams have a strong shared identity.

Although our theoretical arguments suggest that a shared identity will more strongly moderate the relationship between distribution and *interpersonal* conflict, shared identity might also moderate the relationship between distribution and *task* conflict. In distributed environments, mistrust might disrupt working relationships and inhibit information sharing, thus spurring task conflict (see Simons and Peterson 2000). A strong shared team identity across distributed sites, however, can reduce mistrust and, potentially, ease the flow of information because team members are concerned about maintaining strong group ties and promoting the group welfare. We therefore argue that shared identity will moderate the relationship between distribution and *interpersonal* conflict, but also more weakly moderate the relationship between distribution and *task* conflict.

HYPOTHESIS 1. *Shared identity will moderate the relationship between geographic distribution and conflict, particularly interpersonal conflict.*

Shared Context

A shared context exists when team members have access to the same information and share the same tools, work processes, and work cultures. Occupying different contexts can make it more difficult to co-orient to a particular object or approach (Schober 1998), develop mutual understanding (Fussell and Kreuz 1992), and establish common behavioral norms (Hinds and Bailey 2003). We anticipate that a shared context—an emergent state that develops in a team—will moderate the relationship between geographic distribution and task conflict. Although it is nearly impossible to provide distributed teams with identical contexts, standardization of work processes, tools, and systems might reduce the extent to which distance becomes a burden. A shared context can reduce the likelihood that misunderstandings and divergent approaches emerge. When collocated, team members are able to easily see what their colleagues are doing, identify dissimilar work processes, and understand the source of coordination problems (see Kraut et al. 2002). In distributed teams, however, missing contextual information is likely to make it more difficult to identify and resolve coordination problems before they degenerate into conflict. Grinter et al. (1999), for example, recall one of the members of a software development team they studied as saying he was "fighting upstream" when trying to stay informed about decisions being made at the other site. We therefore reason that distributed teams will have less severe task conflict when their context is more shared.

We predict that a shared context will more strongly moderate the relationship between distribution and task conflict, but that it may also moderate the relationship between distribution and interpersonal conflict. In distributed environments, interpersonal conflict arises, in part, because of confusion and misattributions about distant members' behaviors (Cramton 2002). A shared context across sites provides the grounding necessary to better understand and make sense of these behaviors, potentially mitigating harsh attributions and, in turn, reducing interpersonal conflict. In sum, we predict that conflict of both types will be reduced when distributed teams have a shared context, although task conflict will be more strongly affected.

HYPOTHESIS 2. *Shared context will moderate the relationship between geographic distribution and conflict, particularly task conflict.*

Spontaneous Communication

Spontaneous communication refers to informal, unplanned interactions that occur among team members (see Kiesler and Cummings 2002, Kraut et al. 2002, Monge and Kriste 1980). In contrast to shared identity and shared context, which are emergent states, spontaneous communication is a team process—a set of behavioral activities. Numerous scholars have argued for the importance of informal, spontaneous communication among distributed workers, suggesting that these interactions build bonds between distant colleagues (Nardi and Whittaker 2002, Sarbaugh-Thompson and Feldman 1998) and enable information to flow more fluidly between sites (e.g., Kiesler and Cummings 2002, Kraut et al. 2002). As Zack (1993) discovered, informal interaction can compensate for a loss of meaning introduced by the use of mediating technologies. Few scholars, however, have directly examined how spontaneous communication affects the dynamics of distributed teams. Although communication can lead to increased conflict as team members bring more of their differences to the

surface (Jehn and Mannix 2001), we speculate that spontaneous communication will play a central role in mitigating conflict on distributed teams because it allows team members to learn informally about what others are doing, enabling them to identify and resolve issues before they escalate (see Kiesler and Cummings 2002). It will, we argue, do this in three ways. First, it will increase shared identity. Second, it will increase shared context. Finally, it will have an independent moderating effect on the relationship between distribution and conflict that can be explained by its role in facilitating conflict identification and handling.

We posit that spontaneous communication will have a direct effect on a team's ability to establish and maintain a shared identity. Spontaneous communication builds social ties (Festinger et al. 1950), increases awareness of others' moods and states (Olson et al. 2002), and strengthens interpersonal bonds between distant workers (Nardi and Whittaker 2002). Consistent with this, Morris et al. (2002) reported that "schmoozing" before an e-mail negotiation increased rapport between dyads and decreased the number of impasses. Often, even task-related casual conversation turns to personal topics and provides a means through which to get to know one another better (see McGrath 1984, Sarbaugh-Thompson and Feldman 1998). The absence of spontaneous communication, however, can disrupt the development and maintenance of a shared identity. In their study of the introduction of e-mail into a research institute, Sarbaugh-Thomspon and Feldman (1998, p. 692), for example, suggest that the absence of informal, spontaneous communication may have resulted in "decreased perceptions of connectedness and community."

HYPOTHESIS 3A. *Spontaneous communication will be positively related to shared identity.*

We also argue that spontaneous communication will contribute to a shared context in distributed teams. We reason that, in collocated teams, a large amount of information is shared without the need for explicit communication. People can see what others are working on, watch their colleagues struggle on a task, notice when team members come and go, overhear activities in the background, and monitor progress unobtrusively (see Olson et al. 2002, Weisband 2002). Without access to this rich visual and sensory data, the members of distributed teams lack awareness of what is occurring and what their teammates are doing at distant sites (Weisband 2002). Spontaneous communication can help overcome this limitation of distributed work. With planned, formal communication, people often feel constrained to prespecified topics and timeframes (see Olson and Olson 2000). In contrast, spontaneous communication is more flexible and allows more open, uninhibited conversations about topics that are salient at a particular point in time. Casual encounters increase the convenience and enjoyment of communication, and therefore the likelihood that it will occur (Kiesler and Cummings 2002, Kraut et al. 2002). As people interact informally and spontaneously, more information, particularly contextual information, is shared (see Nardi and Whittaker 2002).

HYPOTHESIS 3B. *Spontaneous communication will be positively related to shared context.*

In addition to its positive effects on shared identity and shared context, we hypothesize that spontaneous communication will independently moderate the relationship between distribution and conflict. Spontaneous communication provides opportunities for team members to expand contact with their teammates (Festinger et al. 1950). These opportunities to interact, we argue, enable more effective conflict identification and handling on distributed teams. Conflicts on distributed teams are said to fester longer than conflicts on collocated teams (see Armstrong and Cole 2002). With spontaneous communication, however, conflicts may be identified more rapidly, and thus dealt with before they escalate (see Hinds and Bailey 2003). Spontaneous communication also increases opportunities to share information, including information about one's own interests, a crucial element for fostering collaborative conflict resolution (see Thomas 1992). As parties share information about their own concerns, they have a greater opportunity for creating a win-win solution (Lovelace et al. 2001, Tinsley 1998). Potential or low-level conflicts can be discussed and worked through before they have a chance to worsen and grow into larger, more substantive conflicts. We therefore argue that spontaneous communication will serve to ameliorate conflicts that arise in distributed teams.

HYPOTHESIS 3C. *Spontaneous communication will moderate the relationship between geographic distribution and conflict.*

Performance

Extensive research has examined the conflict-performance relationship. Although research generally reports a negative relationship between interpersonal conflict and performance (e.g., Jehn et al. 1997, Jehn 1997), the relationship between task conflict and performance is less clear. Some studies have reported a positive relationship between task conflict and performance (e.g., Jehn 1995, Pelled et al. 1999), whereas others have reported that groups often do not achieve the benefits of having diverse perspectives on a task (Hackman 1990, Jehn et al. 1997, Stasser and Titus 1985, Wittenbaum and Stasser 1996). A recent meta-analysis suggests that these inconsistent findings can be explained by task type: teams with highly complex tasks appear to be most hindered by task conflict (De Dreu and Weingart 2003).

We anticipate a negative conflict-performance relationship in distributed as well as collocated teams, but we posit that the relationship will be stronger in distributed teams for two reasons. First, to the extent that conflict is beneficial, its benefits are realized because team members are sharing information and thinking through options more thoroughly (Pelled et al. 1999). Sharing complex information, however, is particularly difficult for distributed teams because of the limitations of mediating technologies, differences in time zones, and dissimilar experiences and perspectives at distant sites (Kraut et al. 2002). Thus, the benefits of considering more information and perspectives may be elusive in distributed teams. Second, we argue that it might be more difficult to harness the potential benefits of task conflict in distributed as compared with collocated teams because task conflicts will be resolved less readily and will, consequently, be more likely to degenerate into interpersonal conflict. Thus, we anticipate that task and interpersonal conflict will diminish performance in all types of teams and that these effects will be stronger in distributed as compared with collocated teams.

HYPOTHESIS 4A. *Task conflict will be associated with lower performance in collocated and distributed teams.*

HYPOTHESIS 4B. *Interpersonal conflict will be associated with lower performance in collocated and distributed teams.*

HYPOTHESIS 4C. *Task conflict will be more strongly associated with reduced performance in distributed as compared with collocated teams.*

HYPOTHESIS 4D. *Interpersonal conflict will be more strongly associated with reduced performance in distributed as compared with collocated teams.*

Method

To test our hypotheses, we conducted a web-based survey of geographically distributed and collocated research and development (R&D) teams located within a single multinational corporation. The surveys were followed by interviews intended to provide a richer understanding of the teams, their work processes, and the challenges they faced.

Research Setting

The organization we studied was the R&D arm of a firm in the natural resources extraction and processing industry. Though the organization had a history of locating facilities around the globe, three years prior to our study, management decided to increase the firm's global reach by restructuring many of its R&D teams so the teams spanned multiple sites. The management's expressed objective in doing this was to increase access to expertise and to customers at distant locations. At the time of our study, the firm was evaluating this decision. Although most managers and team members were articulate about the benefits of this global work arrangement, they also expressed frustration and doubt. Through this research, they hoped to gain insights into the challenges faced by these geographically distributed teams and to better understand the basis on which to make decisions about distributing R&D work across distant sites.

Procedure

Initial contact with teams was arranged through a representative in the organization who provided rosters and team member contact information for as many teams as were willing to participate. Individual team members were then contacted via e-mail and provided with the necessary information to access and complete our web-based survey. In those cases where individuals were simultaneously members of multiple teams in the sample, they were asked to complete the survey multiple times, once for each team of which they were a member. This affected only six respondents (2% of the data set), each of whom was a member of two different teams. Given the global nature of these teams, the web-based medium was particularly well suited to this sample, allowing for quick and consistent distribution to all sites as well as easy access and minimal effort by participants. Data indicate that the survey took approximately 30 minutes to complete. We augmented the survey data with face-to-face semistructured interviews conducted with 1 to 2 randomly selected members of each team (at least 1 at each site for distributed teams), as many team managers as possible (7 managers, comprising 47% of the teams in the sample), and 11 upper level managers, including the vice president responsible for the organization we studied. The intent of the interviews was to learn more about the type of work being done within the teams and to better understand the issues faced by members and leaders of these teams. Interviews were audiotaped and transcribed.

Sample

A total of 455 individuals, situated within 49 teams were initially contacted, with a response rate of 68% (310 respondents). To ensure that the respondents in our sample accurately reflected their teams, we restricted the sample to include only those teams in which at least three team members responded and in which the respondent's answers were internally consistent (interrater reliability on the dependent variables of interpersonal and task conflict above 0.70). Thus, our final sample consists of 43 teams (42 teams for the analyses of interpersonal conflict) with a total of 288 responses. The teams ranged in size from 3 to 21 members. Of the 43 teams in our sample, 21 consisted of members who were all situated at one location and the remaining 22 teams were composed of members situated at two or more locations. The

sites represented in the sample included a single country in Europe and two states in the United States.

Dependent Variables

Task and interpersonal conflict were measured using a scale based on Jehn's (1994, 1995) relationship conflict scale. Respondents rated four statements for task conflict and six for interpersonal conflict, using a five-point Likert scale anchored by 1 = not at all and 5 = very much (see Figure 2). We averaged the items based on Jehn's (1994) model to form reliable indices of task and interpersonal conflict ($\alpha = 0.82$, $\alpha = 0.89$, respectively). To determine if aggregation to the team level was justified for our team-level variables, we estimated within-group interrater reliability scores based on the formula derived by James et al. (1984). In the case of task and interpersonal conflict, this yielded interrater reliability scores of 0.90 and 0.89, respectively. Based on the guidelines put forth in James et al. (1984), aggregation to the team level was therefore justified.

To measure performance, we distributed a web-based survey to team managers. In most cases, team managers were responsible for two or more teams included in the survey, so we asked them to respond to a set of performance questions for each of the teams they managed that were included in the sample. There were responses from 10 team managers, providing performance ratings for 35 of the 43 teams we studied. We adapted a performance measure from Ancona and Caldwell (1992), asking team managers to rate each team along five dimensions: efficiency, quality, technical innovation, adherence to schedule and budget, and work excellence. Managers rated each question on a five-point Likert scale in which 1 = poor and 5 = excellent. The five-item scale showed high ($\alpha = 0.84$) reliability.

Figure 2 Survey Items Measuring Conflict, Shared Context, and Performance

Task Conflict[a]
Please answer the following questions about the extent to which differences in opinion and disagreements occur within the TEAM.
- How frequently are there conflicts about ideas in the TEAM?
- How much conflict about the work you do is there in the TEAM?
- How often do people in the TEAM disagree about opinions regarding the work being done?
- To what extent are there differences of opinion in the TEAM?

Interpersonal Conflict[a]
Please answer the following questions about the extent to which differences in opinion and disagreements occur within the TEAM.
- How much friction is there among members in the TEAM?
- How much are personality conflicts evident in the TEAM?
- How much tension is there among members in the TEAM?
- How much emotional conflict is there among members in the TEAM?
- To what extent do people take the arguments in the TEAM personally?
- How much jealousy or rivalry is there among the members in the TEAM?

Shared Context[b]
How frequently do you experience the following issues in attempting to coordinate work on the TEAM?
- Incompatibility between different team members' tools and/or work processes
- Team members having different priorities
- Differences in the information held by team members
- Incomplete or inaccurate information about what other team members are doing

Performance[c]
Compared with the very best team you are working with or have worked with in the past, please rate the performance of the TEAM on the following dimensions:
- Efficiency
- Quality
- Technical innovation
- Adherence to schedule/budget
- Work excellence

Notes. "TEAM" indicates a value that was tailored to reflect the name of the respondents' project team. Items with an "*" were reverse coded.

[a]Rated on a five-point Likert scale anchored by 1 = not at all and 5 = very much.

[b]Rated on a five-point Likert scale anchored by 1 = not at all and 5 = very. The entire scale was then reverse scored to reflect *shared* context.

[c]Rated on a five-point Likert scale anchored by 1 = poor and 5 = excellent.

Independent Variables

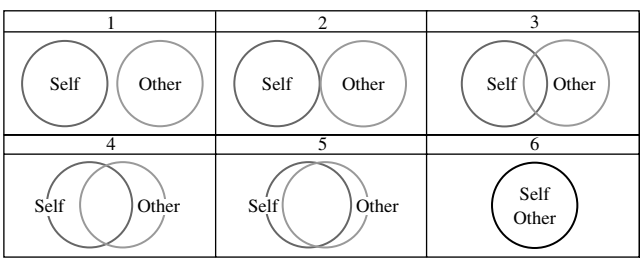
To measure geographic distribution, we used self-report data (verified against the company database) to identify each respondent's office location. Based on Cummings and O'Leary (2002), we used this information to calculate five indices of distribution: (1) number of sites, (2) percentage of isolates, (3) imbalance (unevenness of membership across sites), (4) separation (physical distance), and (5) lack of time zone overlap. In an effort to consolidate the multiple indicators of geographic distribution, we used an exploratory factor analysis to empirically identify groups of indices that could justifiably be reduced to a smaller set of factors. This analysis grouped the indices into two factors, which further displayed a strong theoretical justification by differentiating between primarily structural and psychological aspects of distribution. The first factor, which we identified as structural distribution, consisted of the indices for the number of sites, geographic distance (separation), and lack of time zone overlap. The second factor, which we refer to as psychological distribution, consisted of the indices for the percentage of isolates and imbalance. We calculated z-scores and averaged within each of the two factors, yielding two measures: structural distribution and psychological distribution, which were found to be reliable ($\alpha = 0.92$ and $\alpha = 0.71$, respectively). The pattern of results for the measures of structural and psychological distribution were identical in all analyses we conducted and were furthermore identical to the simple measure of the number of sites. For simplicity of presentation, we present the models based on the number of sites,

hereafter referred to as *distribution*. We also calculated a simple dichotomous measure of distribution in which teams were considered distributed (=1) if team members were spread across at least two locations and collocated (=0) if all team members were based at the same location (building or campus). This dichotomous measure yielded results that were similar, though weaker, than the measures described above. It is important to note that in selecting the sample for our study, we intentionally selected an organization with teams *primarily* distributed between two sites—one in the United States and one in Europe. This was done to reduce variation in the different possible patterns of distribution (e.g., number of sites, actual distance in miles, within versus across national boundaries, and so forth). We would therefore have expected little difference between the more complex measures of distribution and a simple dichotomous indicator.

To measure shared team identity, we used a pictorial measure of interpersonal closeness shown to correlate with feelings and behaviors reflecting interconnectedness (Aron et al. 1992). We adapted this measure to the team level by providing team members with a set of six graphical representations of relationships between "self" and "other" (see Figure 3), and asking them to select the number that corresponded to the picture that most closely matched their relationship with their team (1 = very distant, 6 = very close). Individual ratings were then averaged across the team. To validate the use of this measure, we collected data using 12 items suggested by Tyler (1999) for measuring shared identity and found the 2 measures to be positively correlated ($r = 0.75$, $p < 0.001$).

We created a measure of shared context by using respondents' ratings of four issues that reflected unshared context (see Figure 2). We asked respondents to rate each of these items by using a five-point Likert scale anchored by 1 = not at all and 5 = very much. We calculated a mean of the four items to create an individual-level measure of unshared context with high reliability ($\alpha = 0.83$). For a team-level measure, we then averaged across individuals in the team, yielding an interrater reliability score of $r_{wg} = 0.73$. To create a measure of shared context, we reverse scored this measure.

Figure 3 Figure Used to Measure Perceptions of Shared Identity



To measure spontaneous communication, we asked each respondent to indicate how often he or she had unplanned, spontaneous interactions with each person in the team. Respondents selected a unit of measurement (per year, per month, per week, per day, or per hour) and identified the number of spontaneous interactions by that unit. We did not specify the content of these communications because we reasoned that a single spontaneous communication was likely to contain both personal- and task-related topics, thus resisting classification. Responses were standardized into the number of spontaneous interactions per month and averaged across all team members to create a team-level measure of spontaneous communication.

Control Variables

Extensive research on conflict suggests that demographic heterogeneity promotes conflict, particularly interpersonal conflict (e.g., O'Reilly et al. 1997, Pelled 1996). Cultural heterogeneity is expected to derive directly from geographic distance, especially on globally distributed teams. Consequently, although cultural heterogeneity was not the focus of our study, we thought it important to include as a control variable. To collect data on cultural heterogeneity, we asked respondents to report their ethnicity, the countries in which they were raised, and the languages in which they were fluent before the age of 10. Each respondent's answer was then compared with those of each of his or her teammates to create a dichotomous difference score of one if the two respondents differed in their response to the question and zero if they provided the same answer. A combined measure was then created by summing the three dichotomous measures for each pair of respondents in a team. To create a team-level measure of cultural heterogeneity, we used a derivation of the relational demography scores suggested by O'Reilly and colleagues (O'Reilly et al. 1989, Tsui et al. 1992, Tsui and O'Reilly, 1989). To capture cultural heterogeneity, we calculated the square root of the summed squared difference scores divided by the total number of team members. We included cultural heterogeneity in all regressions predicting conflict.

We also examined the effects of heterogeneity of age, gender, and tenure. The only demographic variable that was significantly related to distribution was age—older employees were more likely to be in distributed teams—but none of these variables were significantly related to conflict, nor did they affect the pattern of results, so we removed them from further analyses. In addition, to account for conflict that might arise from the coordination requirements faced by larger teams, we evaluated team size as a control variable. As with the demographic variables, this measure was not significantly related to either type of conflict, nor did it change the pattern of results. We therefore removed it from further analyses.

Previous research suggests that some types of work are better suited to geographic distribution than others. Ambiguous tasks, for example, are said to be less well suited for distributed work (Grinter et al. 1999, Olson and Teasley 1996). We therefore included a four-item measure of task ambiguity based on the Kraut et al. (1998) task analyzability scale. Distributed teams, however, did not report significantly less ambiguous (or more ambiguous) work ($F[2, 37] = 0.98$, n.s.). Others have suggested that reciprocal interdependence between distant team members may be a source of problems on distributed teams (Kiesler and Cummings 2002, Olson and Olson 2000). Consequently, we asked respondents about the nature of interdependence on the team (based on measures by Van de Ven et al. 1976). The results suggest that distributed teams experienced no less reciprocal interdependence than their collocated counterparts ($F[2, 37] = 1.96$, n.s.). Neither reciprocal interdependence nor task ambiguity was linked to conflict, nor did either of these variables effect the pattern of results. To protect degrees of freedom, we excluded these variables from the reported models.

Finally, although we predicted effects for spontaneous communication, underlying that prediction was a suggestion that distributed teams as compared with collocated teams may communicate less and rely more on mediating technology. As expected, the distributed teams in our study relied more heavily on mediating technologies ($F[2, 37] = 3.52$, $p < 0.05$) than did the collocated teams we studied, although those on distributed teams did not talk face to face significantly less often ($F[2, 37] = 1.66$, n.s.). Neither technology mediation, nor frequency of face-to-face interaction was significantly associated with conflict. Because of multicollinearity problems associated with the communication variables, we excluded these variables from further analysis.

Results

In Table 1, we provide descriptive statistics on the respondents in our sample. Most of the employees in the organization we studied were male, resulting in a sample that was only about 20% female. On average, respondents had spent nearly 9 years ($M = 8.94$) employed by the company and were about 40 years old. Teams ranged in size from 3 to 21 members, with an average size of 6.70 members. Most of the teams provided technical development and technical services to clients internal to the larger organization. Although it was not possible to get data on the demographic characteristics of the population from which our sample was drawn, company representatives assured us that the demographics of our sample mirrored those of the organization we studied.

Table 1 Sample Characteristics of Respondents

	% Female	Mean age	Mean tenure in organization (in years)
Distributed teams ($n = 172$)	19.77	42.91	9.18
Collocated teams ($n = 109$)	19.27	39.77	8.57
Total sample ($n = 281$)	19.57	41.70	8.94

In Table 2, we provide the descriptive statistics for and correlations between our primary variables of interest. As reported in other studies (Simons and Peterson 2000), task and interpersonal conflict were highly correlated ($r = 0.75$, $p < 0.01$), suggesting low differential validity between the constructs. The results of our analysis, however, suggest that there may be some benefit in reviewing their impact separately, so we treat them as separate constructs throughout the analysis.

Distribution and Conflict

Looking first at the relationship between distribution and conflict, we found that task and interpersonal conflict were greater in distributed than in collocated teams ($M = 2.64$ versus $M = 2.10$ and $M = 2.10$ versus $M = 1.95$, respectively). The results of regression analyses (see Table 3, Model 1a and Table 4, Model 2a) confirm a significant positive relationship between distribution and task conflict ($\beta = 0.41$, $p < 0.01$) and a marginally significant positive relationship between distribution and interpersonal conflict ($\beta = 0.29$, $p < 0.10$).

We now set out to understand the factors associated with conflict in distributed as compared with collocated teams. In our first hypothesis, we argued that shared identity would moderate the relationship between geographic distribution and conflict, particularly interpersonal conflict. To test Hypothesis 1, we included interaction terms in the models predicting task and interpersonal conflict (see Table 3, Model 1c and Table 4, Model 2c). Although the distribution-shared identity interaction terms were negative in both models predicting conflict (interpersonal and task), only the interaction term predicting interpersonal conflict ($\beta = -2.59$, $p < 0.05$) was significant, thus providing some support for Hypothesis 1. A graph of the interaction between interpersonal conflict and shared identity (see Figure 4b) indicates a weaker relationship between distribution and interpersonal conflict when teams have a strong shared identity.

The results from our interviews reinforce that shared team identity may have ameliorated interpersonal conflict on the distributed teams we studied. One member of the leadership team described how a successful distributed team overcame polarization between two sites by establishing a strong shared identity with boundaries that were difficult to penetrate. He referred to these

Table 2 Descriptive Statistics and Correlations Between Variables

Variable	Mean	Std. dev.	1	2	3	4	5	6	7
1. Cultural heterogeneity	0.52	0.13							
2. Geographic distribution[a]	1.56	0.55	0.07						
3. Task conflict[b]	2.51	0.50	0.04	0.43**					
4. Interpersonal conflict[b]	2.03	0.58	0.17	0.27†	0.75**				
5. Shared identity[b]	3.10	0.47	−0.26	−0.40**	−0.27	−0.36*			
6. Shared context[b]	3.15	0.47	0.02	−0.36*	−0.46**	−0.57**	0.39*		
7. Spontaneous communication[c]	5.73	8.56	0.12	−0.32*	−0.40**	−0.24	0.43**	0.62**	
8. Performance[b]	3.61	0.87	−0.04	−0.08	−0.23	−0.12	0.08	0.29†	0.13

Notes. Correlation matrix is at the team level ($n = 43$ for all except interpersonal conflict, where $n = 42$ and performance, where $n = 35$).

[a]Distribution ranges from 1 to 3 sites.

[b]Measured on a five-point Likert scale with five equal to higher levels of that variable.

[c]Average number of spontaneous communications per week ranged from 0.39 to 43.33.

$^{**}p < 0.01$, $^{*}p < 0.05$, $^{\dagger}p < 0.10$.

boundaries as a "ring fence." He said, "So for the first seven or eight months, close to a year, there was an enormous amount of tension . . . ." He went on to explain that one of the key factors that contributed to the success of the team was its ability to distance itself from external pressures by creating a shared identity and described the role of the team manager (Jack) in maintaining a shared identity. As he noted:

> . . . there is a concept of a ring fence for them, and what I mean by a ring fence is they have managed to insulate themselves from some of the things that go on in [the division] . . . . Jack, who is the general manager, it's his role and we all kind of refer to it metaphorically as: he's the one that rides around the corral protecting the ring fence from intrusion by [the division] or from outsiders or whatever. One of his roles is to try to do it—and he does it pretty successfully. He gets bloodied a lot because people keep saying: "Well, why does [the area] think they're different?" and "Why do they have to do that?" or "Why can they do that?"

We also predicted that shared context would moderate the relationship between geographic distribution and conflict (Hypothesis 2). To test Hypothesis 2, we introduced interaction terms into our regression models (Table 3, Model 1d and Table 4, Model 2d). As expected, when predicting task conflict, the interaction between distribution and shared context was significant ($\beta = -2.10$, $p < 0.05$, Model 1d). Although only marginally significant, the same pattern was obtained when predicting interpersonal conflict ($\beta = -1.91$, $p < 0.10$, Model 2d). A graph of the interaction between conflict (task and interpersonal) and shared identity (see Figure 5) indicates that although there is a positive

Table 3 OLS Estimates for Regression Analyses Predicting Task Conflict

	Models				
Independent variable	1a	1b	1c	1d	1e
Cultural heterogeneity	0.01	0.10	0.14	0.09	0.16
Geographic distribution	0.41**	0.20	2.25†	2.52*	0.51*
Shared identity		0.30*	0.94*	0.27†	0.33*
Shared context		−0.41*	−0.46*	0.69	−0.40*
Spontaneous communication		−0.23	−0.27	−0.48*	1.24†
Interaction terms:					
Distribution × shared identity			−2.09		
Distribution × shared context				−2.10*	
Distribution × spontaneous communication					−1.45*
Adj. R^2	0.13	0.35	0.38	0.41	0.41
F	3.78*	5.18**	5.02**	5.42**	5.50**
df	2, 37	5, 34	6, 33	6, 33	6, 33

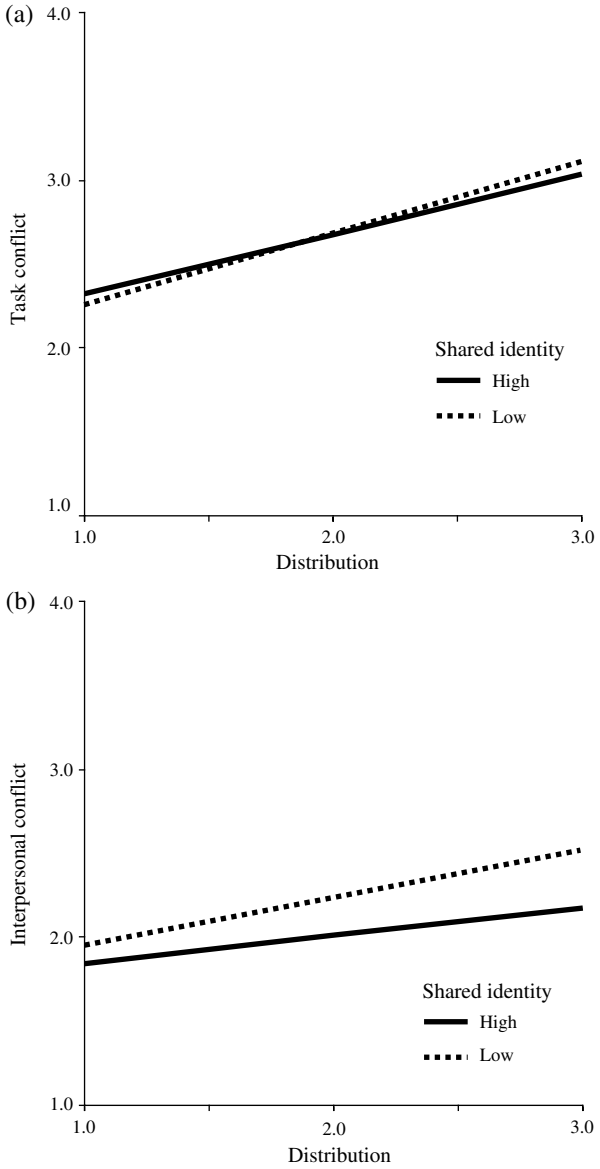
$^{\dagger}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$.

Table 4 OLS Estimates for Regression Analyses Predicting Interpersonal Conflict

	Models				
Independent variable	2a	2b	2c	2d	2e
Cultural heterogeneity	0.16	0.19	0.24†	0.18	0.26†
Geographic distribution	0.29†	0.04	2.62*	2.18†	0.42†
Shared identity		0.16	0.96*	0.14	0.20
Shared context		−0.68**	−0.73**	0.35	−0.66**
Spontaneous communication		0.13	0.07	−0.11	1.90*
Interaction terms:					
Distribution × shared identity			−2.59*		
Distribution × shared context				−1.91†	
Distribution × spontaneous communication					−1.75*
Adj. R^2	0.07	0.31	0.37	0.35	0.41
F	2.32	4.42**	4.78**	4.46**	5.32**
df	2, 36	5, 33	6, 32	6, 32	6, 32

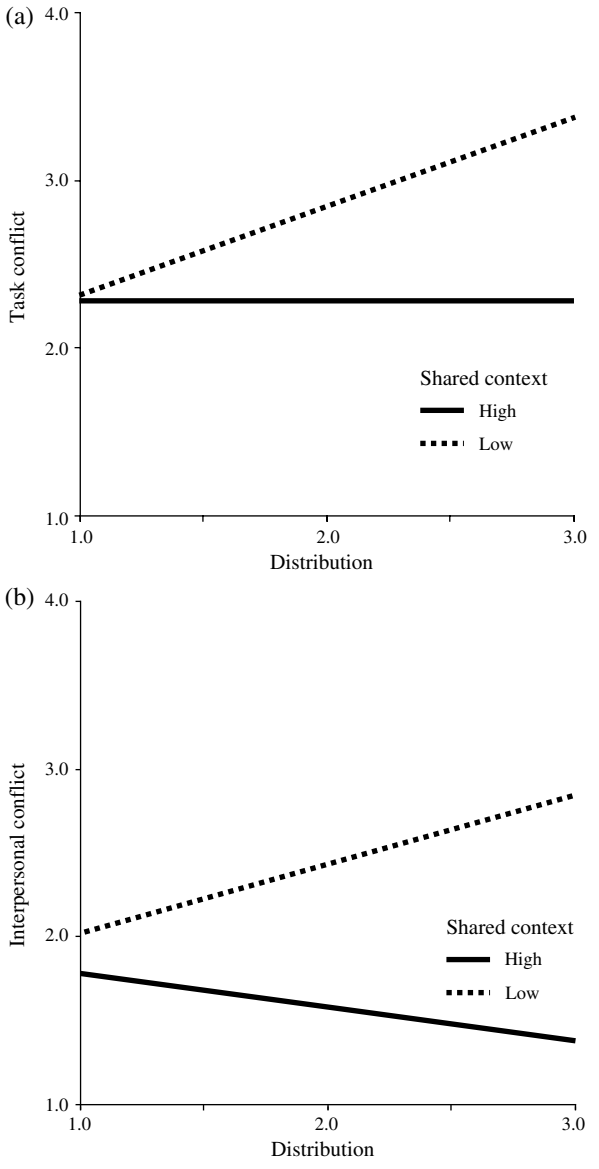
$^{\dagger}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$.

Figure 4 Graphs of the Moderating Effect of Shared Identity* on the Relationship Between Geographic Distribution and Task Conflict (a) and Interpersonal Conflict (b)



*To graph these relationships, shared identity was dichotomized such that *high* shared identity reflects responses that were above the mean, and *low* shared identity reflects responses that were below the mean.

Figure 5 Graphs of the Moderating Effect of Shared Context* on the Relationship Between Geographic Distribution and Task Conflict (a) and Interpersonal Conflict (b)



*To graph these relationships, shared context was dichotomized such that *high* shared context reflects responses that were above the mean, and *low* shared context reflects responses that were below the mean.

relationship between distribution and conflict, this effect is eliminated when teams share similar contexts.

The topic of shared context frequently came up in our interviews, particularly among members and managers of distributed teams. As with our quantitative data, our interview data suggest that having an unshared context exacerbated the problems faced by geographically distributed teams. Consistent with this, one manager described how intersite tensions were heightened as a result of incomplete and unshared information that arose initially from poor coordination or technological breakdowns. He said:

> Very frequently we had situations where a piece of data wasn't sent out at the right time or something went wrong and immediately I could hear "[expletive deleted]... those guys over there, they're messing us around, they're deliberately not telling us something. They've got some deal on the side... ."

Another team member explained how an unshared context initially increased conflicts in his team's

cross-site meetings as a result of incompatible terminology and processes. He noted:

> [Now] when we have our meetings, people can talk and use acronyms and people know what the heck they're talking about. Whereas at first, we started to slam them together as, "Well, are we going to use our process or are we going to use their process?" Then there was a lot of animosity on that kind of stuff.

In Hypotheses 3a and 3b, we predicted that spontaneous communication would contribute to shared identity and shared context, respectively. To test this, we ran regressions predicting shared team identity and shared context with spontaneous communication (as well as our controls for distribution and cultural heterogeneity) as an independent variable. We found spontaneous communication to be positively related to shared team identity ($\beta = 0.40$, $p < 0.05$) and shared context ($\beta = 0.56$, $p < 0.01$), thus supporting our hypotheses. These relationships were further highlighted in our interviews. Spontaneous communication, for example, was identified as contributing to a sense of team identity. One team member focused on frequent and open communication as a means of working through conflict as well as a means of increasing team members' sense of ownership and connection to the team. As he noted:

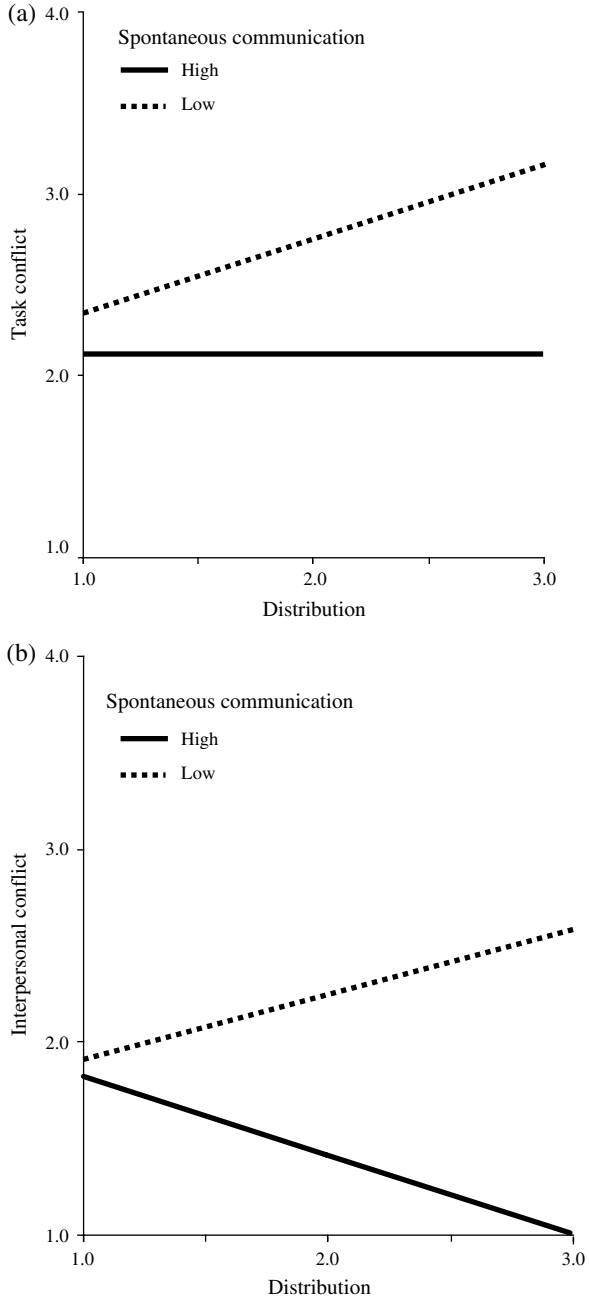
> We have very open communication, and I've had this feedback from all of the different people. We all give each other open feedback, and we can say anything to each other. We can say, "Go on, at the moment I really feel you're being aggressive," or such and such, such and such. Behavioral things, and when you discuss behaviors in an open environment, that builds the team ownership as well.

A member of a different distributed team, when speaking of the issues his team faced, noted the importance of spontaneous communication in sharing contextual information across sites. He said:

> . . . you have also different styles of work. How is it being addressed, usually if these things are minor and obviously they occur on a normal day-to-day basis, that's either addressed through a face-to-face contact or through a telephone call if it happens to be the other side of the ocean. And then you discuss those things and resolve it and come to some form of an agreement . . . .

In Hypothesis 3c, we predicted that spontaneous communication would directly moderate the relationship between geographic distribution and conflict. As expected, we found significant negative effects for the distribution-spontaneous communication interaction term in models predicting task ($\beta = -1.45$, $p < 0.05$, Model 1e) and interpersonal conflict ($\beta = -1.75$, $p < 0.05$, Model 2e). Figure 6 graphs the relationships between spontaneous communication and task (6a) and interpersonal conflict (6b). In both cases, spontaneous communication appears to mitigate the effect of distribution on conflict.

Figure 6 Graphs of the Moderating Effect of Spontaneous Communication* on the Relationship Between Geographic Distribution and Task Conflict (a) and Interpersonal Conflict (b)



*To graph these relationships, spontaneous communication was dichotomized such that *high* reflects responses that were above the mean, and *low* reflects responses that were below the mean.

Consistent with our quantitative findings, the importance of spontaneous communication as a means of resolving issues in distributed teams was a recurring theme in our interviews. One team member told us that he believed the success of his distributed team was the

Table 5 OLS Estimates for Regression Analyses Predicting Performance

	Models			
Independent variables	3a	3b	3c	3d
Geographic distribution	0.05	−0.04	−0.45	−0.54
Task conflict	−0.36†		−0.62	
Interpersonal conflict		−0.01		−0.49
Shared identity	0.48*	0.30	0.49*	0.33
Shared context	0.28	0.34	0.30	0.36
Spontaneous communication	−0.36	−0.21	−0.40	−0.26
Interaction terms:				
Distribution × task conflict			0.62	
Distribution × interpersonal conflict				0.74
Adj. R^2	0.14	0.01	0.12	−0.01
F	2.13†	1.06	1.76	0.93
df	5, 29	5, 28	6, 28	6, 27

†$p < 0.10$, *$p < 0.05$, **$p < 0.01$.

result of constant unscheduled communication, saying that "... we here communicate with everybody and we make sure we do that, regularly, three, four times per week on the phone." Another discussed how his team dealt with team members' frequent travel. He said:

> It is so often that people from our team are not here, that there's much more of informal ad hoc meetings, short meetings in the office space itself, where we bring up issues. We are very direct .... if there are issues, we can talk them out and usually we can solve things together.

Performance

In our last set of hypotheses (Hypotheses 4a–4d), we argued that conflict would hinder performance in teams, particularly those that are geographically distributed. In Table 5, we report the results of our regression analyses predicting performance. The relationship between task conflict and performance was only marginally significant ($\beta = -0.36$, $p < 0.10$, see Model 3a) and interpersonal conflict was not significantly associated with performance in any of the models, suggesting only marginal support for Hypothesis 4a and no support for Hypothesis 4b. We also found no support for Hypotheses 4c or 4d. Neither the interaction between distribution and task conflict ($\beta = 0.62$, n.s., Model 3c) nor the interaction between distribution and interpersonal conflict ($\beta = 0.74$, n.s., Model 3d) was significant.

Discussion

Research on distributed teams is burgeoning, yet our understanding of the dynamics in distributed teams remains vague, and it is not yet clear how distributed team dynamics compare to those of collocated teams. We set out to investigate the dynamics of distributed and collocated teams, particularly the dynamics of conflict on these teams. As expected, distributed teams in this study experienced more conflict, particularly task conflict, than did their collocated counterparts. More importantly, we found that shared identity, shared context, and spontaneous communication all moderated the relationship between distribution and conflict. As hypothesized, shared identity was more important in the models predicting interpersonal conflict, whereas shared context was more important in the models predicting task conflict. We also found that spontaneous communication played an important role in moderating the distribution-conflict relationship. It directly moderated the relationship between distribution and both task and interpersonal conflict. Spontaneous communication also was associated with a stronger shared identity and more shared context. We conclude that spontaneous communication contributes to a shared identity, facilitates the creation of shared context, and aids distributed teams in identifying and resolving conflicts before they escalate, benefits that do not necessarily accrue for collocated teams.

Our findings are that shared identity and shared context moderate the distribution-conflict relationship. In establishing that shared identity and shared context have different effects, our findings suggest more generally that any variables that reflect dimensions of the broader constructs of social categorization and information congruence may behave similarly to the emergent states of shared identity and shared context. That is, emergent states that reflect dimensions of social categorization should moderate the distribution-interpersonal conflict relationship, and emergent states that reflect dimensions of information congruence or differences in the information held by team members should moderate the distribution-task conflict relationship. Transactive memory, for example, which addresses not only content knowledge, but awareness of the location of knowledge within the team (see Hollingshead 1998), may reflect a dimension of information congruence and thus moderate the distribution-task conflict relationship. As team members are more aware of where knowledge in the team resides, they may be willing to relinquish some sense of responsibility for and control over that knowledge, thus reducing the potential for conflict. Of course, future research is needed to evaluate our broader theoretical framework and identify additional factors that moderate the distribution-conflict relationship.

Our findings contribute to the scant empirical literature on the dynamics of distributed teams, particularly those embedded in organizational settings. We also provide a comparison between distributed and collocated teams as a means of shedding light on their similarities and differences. Our results suggest that distributed teams do not require different models than their collocated counterparts. In most cases, collocated teams were either unaffected by the moderators in our study or the effects were weaker than those found in distributed teams. Both types of teams, for example, benefited from

spontaneous communication, but distributed teams benefited more. This suggests that separate models are not required to explain the dynamics of distributed teams, but that, to reflect this new type of team, models of teams may need to be augmented with those factors that remain undetected in collocated teams because of their weak effects. This insight also suggests that distributed teams may be more fragile and require more active and early detection and management of conflict.

Stepping beyond distributed teams, research on intrateam conflict has been an active area of research over the last decade. Most of this research, however, has focused either on the direct relationship between different types of diversity (e.g., gender diversity, tenure diversity, functional diversity, etc.) and conflict or on the factors that moderate the conflict-performance relationship. Our research delves more deeply into the causes of conflict and the conditions under which conflict may occur. Cummings (2004) recently argued that geographic distribution qualifies as a type of diversity within teams. He suggested that being located across vast physical distances constitutes one form of "structural diversity" (other forms of structural diversity include functional diversity and diversity in reporting structures). If we consider geographic distribution as a type of structural diversity, our results suggest that shared identity and shared context could moderate the relationship between structural diversity and conflict. More specifically, shared identity and shared context may moderate the relationship between diversity and interpersonal and task conflict, respectively. To evaluate this possibility, we examined shared identity, shared context, and spontaneous communication as moderators of the diversity-conflict relationship using cultural heterogeneity, ethnic diversity, diversity of age, and diversity of gender as measures of diversity in the teams we studied. Our results are inconclusive. Although shared identity moderated the relationship between ethnic diversity and task conflict ($\beta = -2.70,\ p < 0.05$) and spontaneous communication weakly moderated the relationship between age diversity and interpersonal conflict ($\beta = -0.88,\ p < 0.10$), few other effects were detected. Unfortunately, we did not have the data to examine other forms of structural diversity such as functional diversity or diversity in reporting structure. Thus, our results suggest that shared identity and shared context could moderate the diversity-conflict relationship, especially for structural forms of diversity, but more research is needed to evaluate this proposition.

The focus of our study was on the moderating effects of shared identity, shared context, and spontaneous communication and we found that the relationship between geographic distribution and conflict was *moderated* by the variables we investigated, but others have argued convincingly that the distribution-conflict relationship may, in fact, be *mediated* by shared identity, shared context, and spontaneous communication. To evaluate this alternative, we tested the mediating roles of shared identity and shared context. Because distribution was significantly associated with task conflict ($\beta = 0.41$, $p < 0.01$), but not interpersonal conflict, we were only able to test mediators predicting task conflict. Spontaneous communication did not significantly predict task conflict, so a mediation test was not warranted. That left only shared context as a possible mediator of the distribution-task conflict relationship. To test whether shared context acted as a mediator between distribution and task conflict, we ran a regression with distribution predicting shared context and found that distribution was associated with shared context ($\beta = -0.36,\ p < 0.05$). A model with distribution predicting task conflict was also significant ($\beta = 0.43,\ p < 0.01$). In a model with distribution and shared context predicting task conflict, shared context remained equally predictive ($\beta = -0.35$, $p < 0.05$), but the predictive power of distribution diminished slightly ($\beta = 0.30,\ p < 0.05$), suggesting the possibility of partial mediation. To evaluate mediation, we ran a Sobel test. The Sobel test, as described by Baron and Kenny (1986), provides a significance test for the effect of the independent variable on the dependent variable via the mediator. Thus, if significant, the Sobel test suggests that mediation is a viable interpretation of the data. Sobel tests of partial mediation, however, provide only weak support for the conclusion that shared context is a mediator of the distribution-task conflict relationship ($z = 1.74,\ p = 0.08$), suggesting that moderation is a more compelling explanation. Our study, therefore, provides more evidence for the moderating effects of shared identity, shared context, and spontaneous communication than it does for the mediating role of these variables. Clearly, these are complex relationships. Future research would benefit from further examination of the mediating and moderating roles of these variables on the distribution-conflict relationship.

Our final analyses examined performance. Our results indicate that task, but not interpersonal, conflict was associated with lower performance, providing partial support for Hypothesis 4a. In our regression models, however, we found no support for the idea that conflict of either type is more detrimental to the performance of distributed teams. In sum, our results suggest that task conflict is associated with lower performance and that distributed teams report more task conflict. Thus, even though conflict is not more detrimental to the performance of distributed as opposed to collocated teams, because task conflict impedes performance and is more prevalent in distributed teams, we anticipate that task conflict may be more problematic for distributed teams. Eliminating task conflict, therefore, may be a higher priority for distributed as compared with collocated teams. As well, distributed teams and their management may

benefit greatly from more active management of the conflicts that arise.

There are, of course, limitations to our study. First, this was a study within one R&D organization split between two states in the United States and a single country in Europe. The team members in our sample were highly educated and able to work autonomously on complex tasks. It is, therefore, not clear that the results from this study will generalize to teams of all types, particularly to those with less professional training and those employed on more routine tasks. We also intentionally selected our sample to hold constant the nature of the geographic distribution faced by these teams. Most of our teams were split between two (and no more than three) sites and those sites were approximately 3,000 miles apart. Thus, we more or less held constant the number of sites, number of time zones, number of countries, and actual geographic distance. Because of this, we have no assurance that our results will generalize to teams split between more sites, more time zones, or countries with deeper cultural divides. Although little work has yet examined different dimensions of distributed work and how these dimensions shape team dynamics, we believe that this is an important avenue for future research.

Another limitation of our study is that we measured shared identity, shared context, spontaneous communication, and conflict at the team level. Although this is consistent with our conceptualization of these as team-level constructs, the logic underlying our hypotheses suggests that the dynamics may occur across subgroups based on location (see also Cramton and Hinds 2005). Our measurement approach also may have obscured some of the effects we were investigating and weakened our results. That is, when we asked questions about shared identity, shared context, and conflict, respondents may have been thinking more about their local team than about the entire team (although we attempted to focus them on the entire team by providing team member names). In this case, teams may have appeared to have had stronger team identities, more shared context, and less conflict because their feelings about their local subteam were driving their responses. In future studies, data need to be collected at the subgroup level to more directly investigate subgroup dynamics on geographically distributed teams.

In assessing performance, we asked managers to rate the performance of each of their teams. Having separate evaluations by managers helps to eliminate a potential common method bias, but it may not reflect the actual performance of these teams. Managers may have evaluated the performance of the collocated and distributed teams based on their beliefs about what level of performance these teams should be capable of achieving. Although we argue that, in this context, manager evaluations are preferred to self-reported team member evaluations, future work on performance should strive to identify more objective measures of performance that can be compared across teams, thus improving our ability to detect the effect of group dynamics on performance.

Our study also may suffer from omitted variable bias. Although we examined some task and structural variables, we did not measure all of the possible factors that may have influenced conflict. With a correlational field study, we were limited in the number of questions that we could investigate and the number of questions we could ask our informants. Thus, there may be other factors that play an explanatory role that we cannot evaluate. Further, the correlations we uncovered cannot be assumed to be causal. Longitudinal research is needed to assess the causal nature of these relationships. More ethnographic field work is also needed to better understand what prompts conflict on these teams, how it escalates or gets resolved, and the effects it has on team members' behaviors and performance. Rich process data of this type would make a significant contribution to our understanding of interpersonal dynamics in distributed teams.

Although there are limitations to this study, we cautiously offer several recommendations for future research and for practice. Regarding research, we believe that more research is needed to understand the role of shared identity, shared context, and spontaneous communication in the dynamics of teams, particularly distributed teams. In our study, we focused somewhat narrowly on conflict, but we believe that shared identity, shared context, and spontaneous communication may moderate other aspects of team dynamics such as cohesion, participation, and trust. Our study also suggests a place for more comparative studies of collocated and distributed teams as a means of understanding how distributed teams differ and whether existing models, built primarily on studies of collocated teams, are adequate or need to be augmented to account for this new form of work.

Our findings also offer some guidance for managers of distributed teams. For example, we found that spontaneous communication may be particularly important for distributed teams as a means of preventing and ameliorating conflict. We therefore recommend that managers and team members work to encourage spontaneous communication, particularly across locations. In our interviews, we discovered the value of informal "liaisons" who took responsibility for ensuring that all team members knew what had occurred in face-to-face discussions at distant sites. Some distributed teams also found success with regular communication between sites at the end of each day or week with the purpose of sharing the status of work activities. Although not spontaneous, such activities, designed to facilitate the sharing

of information across sites, may help to reduce conflict and boost the performance of distributed teams. We also found that an unshared context was particularly detrimental to distributed teams. We therefore encourage distributed teams to be attentive to differences in work practices and information across sites. One role for managers of distributed teams is to work toward compatibility of processes, tools, and systems across sites. We do not anticipate that this will be an easy task or a task that need only be accomplished once. Standardizing work processes and tools can raise political and practical concerns. Grinter et al. (1999), for example, noted that the processes being used by the software development teams they studied were a result of many years of experience and reflected the personal preferences and effort of their local architects. Still, movement in this direction may aid distributed teams in working across distance.

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