

Comparing traditional and virtual group forms: identity, communication and trust in naturally occurring project teams

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This study compares three types of project teams in a global high-tech organization: traditional (co-located), virtual (completely distributed), and 'semi-virtual' or hybrid (containing both local and remote members). We use in-group/out-group theories of subgroups to help explain the findings. Specifically, local members of semi-virtual teams report much more positive perceptions of their local than their remote members, while traditional and virtual team members appear similar. We conclude by drawing implications for practice, such as the avoidance of semi-virtual teams whenever possible and the development of strong team identities.

Keywords: distributed team; in-group; subgroup; virtual; group identity

Introduction

Virtual teams, or geographically distributed groups who rely primarily on computer-mediated technologies to communicate, are becoming more prevalent in organizations (Beranek 2000). This increase arises from forces such as interorganizational alliances, globalization, outsourcing and alternative work arrangements, such as job sharing and telecommuting (Saunders 2000). Further, virtual work is expected to grow significantly due to travel restrictions resulting from recessionary forces and September 11th (Staples 1999; Kirkman, Rosen, Gibson, Tesluk and McPherson 2002). Thus, selecting, training and socializing employees in virtual-team work has become an important human resource function (Shin 2004).

Although virtual teams are becoming more common, much of the literature has been prescriptive in nature and has not drawn from a theoretical base (Saunders 2000; Kirkman et al. 2002; Cohen and Gibson 2003). Not enough empirical research on virtual-teams exists (Stanton and Steinbrenner 2002) and most is limited in scope (Martins, Gilson and Maynard 2004), examining short-term, temporary student-groups rather than ongoing employee groups. Further, little of the research on employees has compared virtual-teams with co-located teams and only a few studies have compared different forms of virtual teams (Axtell, Fleck and Turner 2004). However, virtual teams can take on a variety of forms, such as groups containing some co-located members and some distributed members (Saunders 2000). This variety of forms helps to explain some of the problems with conducting research in this area – 'apples' are often combined with 'oranges' within the same study. For instance, Kirkman et al. (2002) report in their study of virtual-teams on

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some face-to-face teams, some geographically distributed teams and some individuals telecommuting, but do not compare them. Thus, researchers have called for more research investigating how different forms of virtual-teams affect team functioning (e.g. Martins et al. 2004; Fiol and O'Connor 2005).

In the present research, we had the opportunity to conduct a field study of naturally occurring project teams in a global firm. In this study, some groups were traditional (that is, co-located or face-to face), some were purely virtual (completely distributed), and some were what we call 'semi-virtual' or hybrid (composed of a local subgroup as well as remote team members). More research is needed on semi-virtual teams (Pauleen 2003) because these types of groups may interact differently from completely distributed groups (Burke, Aytes, Chidambaram and Johnson 1999; Webster and Staples 2006).

In this study, we compare employee attitudes such as trust across these three types of teams. Employee attitudes are important to understanding team functioning since they relate to critical outcomes such as performance, organizational commitment and withdrawal behaviours (Cohen 1994). Nevertheless little empirical research has examined employee attitudes towards teams (Kiffin-Petersen and Cordery 2003) or trust in particular, although trust is critical for dispersed teams (Zeffane and Connell 2003). For example, group trust relates to employee preferences for teamwork (Kiffin-Petersen and Cordery 2003) and to knowledge creation and sharing (Zárraga and Bonache 2003).

The next section of the article presents several hypotheses concerning how the three types of teams might differ in terms of group identity, communication, trust, perceptions of team members' skills and project satisfaction. Further, it presents a research question exploring employees' suggestions for improving distributed teamwork. The subsequent section reports on the results of a survey conducted in a large, high-tech global organization. The article concludes with implications for research and practice.

Comparing types of teams

Virtual teams are often constructed because organizations require skills, local knowledge, experience, resources, or expertise from employees who are distributed. For example, an existing local team may bring several remote employees on board because of their unique expertise, thereby creating a semi-virtual team. How do employees perceive fellow team members when they are part of a semi-virtual team as compared to a co-located or completely virtual team? Although the teams we studied were in one organization and thus should have a shared understanding of organizational norms and practices, we still expected to see differences in employee perceptions across these types of teams. Specifically, we use in-group/out-group favouritism as our theoretical lens to propose such differences.

Theoretical lens for explaining group differences

We propose that in-group/out-group favouritism provides a powerful explanation for differences between co-located, virtual and semi-virtual teams. In-group favouritism represents a robust finding across a variety of situations, ranging from artificial groups to existing organizational groups (Lewis and Sherman 2003a). As Ashforth and Mael (1989, p. 24) noted:

in-group favoritism tends to occur even in the absence of strong leadership or member interdependence, interaction, or cohesion. Laboratory studies ... have demonstrated that simply assigning an individual to a group is sufficient to generate in-group favoritism Favoritism is not dependent on prior perceptions of interpersonal similarity or liking, and it

occurs even when there is no interaction within or between groups, when group membership is anonymous, and when there is no link between self-interest and group responses.

We propose that local members of a semi-virtual team represent an in-group, and thus may interact with and evaluate their in-group members differently than their remote group members. Previous research on traditional groups suggests that organizations should avoid the deliberate creation of subgroups (Ashforth and Mael 1989) because subgroups may appraise others stereotypically and prejudicially (Swann, Polzer, Seyle and Ko 2004). For example, team members of in-groups are more likely to make 'mindless' conclusions about out-group members by 'relying on past categories, acting on automatic pilot, precluding attention to new information, and fixating on a single perspective' (Fiol and O'Connor 2003, p. 58). Similarly, if local members of semi-virtual teams view remote members as belonging to different social categories due to their locations, this categorization can provide the basis for in-group/out-group dynamics in semi-virtual teams (Cramton 2001), creating a 'group within a group' (Burke and Aytz 2002, p. 39). As local members are less likely to interact with remote members, this exacerbates the strength of the in-group, resulting in higher conflict and lower cohesion, satisfaction, communication and cooperation with the out-group (Axtell et al. 2004).

Some empirical research supports the in-group/out-group distinction in semi-virtual teams. Armstrong and Cole (2002, p. 169) reported that: 'Members of the same group treated each other as if they were members of different groups, with colleagues at one office site described as *us* and group members at distant sites labelled *them*.' Malhotra Majchrzak, Carman and Lott (2001) found that the local team members of a semi-virtual team would discuss team issues face-to-face, which resulted in resentment by the remote team members who were initially unaware of these discussions. Cramton (2002) demonstrated that team members are more likely to attribute local members' failures to the situation but distributed members' failures to their dispositions. Staples and Webster (2008) showed that the relationship between knowledge sharing and team performance was much weaker for semi-virtual teams than for traditional or purely virtual teams. Other studies demonstrate that dispersed team members often call on local colleagues (rather than their dispersed members) when faced with problems (Sole and Edmondson 2002) and perceive dispersed colleagues as less helpful than local colleagues (Herbsleb, Mockus, Finholt and Grinter 2000). A final study shows that restructuring teams by distributing members of subgroups among the rest of the team increases overall team identity in teams that had strong subgroup identities (Rock, Pratt and Northcraft 2002).

In light of the potential for in-group/out-group favouritism, we propose that employee perceptions will differ across the three types of teams. Specifically, we suggest that group identity, communication, trust, perceptions of group member skills, and satisfaction will inter-relate and will differ across the three types of teams.

Group identity

Group identity represents team members' sense of oneness with the group, and is made up of a cognitive component of belonging, an affective component of emotional attraction, and a behavioural component of joint effort toward a common goal (Ashforth and Mael 1989; Ashforth 2001). Those who identify more with their workgroups tend to perform better (Vogel, Davison and Shroff 2001) and to perceive higher trust, cooperation, confidence and personal satisfaction (Fiol and O'Connor 2002).

Group identity helps to satisfy individuals' needs for belonging, inclusion, order, structure and predictability (Fiol 2002). According to social identity theory (Tajfel and Turner 1986), people are motivated by uncertainty reduction. People seek out certainty

and validate their perceptions, attitudes, feelings and behaviours by identifying with in-group members. Because employees' self-esteem arises, in part, from group membership, employees are motivated to see their in-group members in the most positive light in order to maintain their self-identity (Lewis and Sherman 2003a). Consequently, members of co-located groups identify more with their groups than do members of virtual groups (Bouas and Arrow 1996).

Employees in the same location can more easily exchange information about others simultaneously and this helps to reduce uncertainty. For instance, local employees can observe static cues such as one's type of dress and dynamic cues, such as nodding, when they meet face-to-face (Fiol and O'Connor 2002). However, because dispersed team members generally meet through computer-mediated technologies, they have fewer cues about their partners and thus assign them to social categories based on this reduced perspective (Lea and Spears 1991). In contrast, local team members are often more salient than distributed team members. Thus, we suggest that local members of semi-virtual teams should identify more with their local team members than with their remote colleagues.

We also propose that semi-virtual team members will identify more with their local team members than with their remote colleagues because in-group (local) members may develop negative stereotypes of out-group (remote) members (Ashforth and Mael 1989). For example, in a study of 13 virtual student groups, Cramton (2001) reports that local coalitions formed in seven of the groups. She found that local partners relied more on each other, criticized their remote partners, and sometimes disengaged from the group's work. Partners described 'remote subgroups as "lackadaisical," "aggressive" and having an "inferiority complex"' (p. 366). Thus, 'identity boundaries' are created in semi-virtual teams (Espinosa, Cummings, Wilson and Pearce 2003).

In contrast to semi-virtual teams, virtual teams have no local partners with whom they can easily meet face-to-face to criticize and disparage their distributed team members. In other words, virtual team members are on a more equal footing than are members of semi-virtual teams. Further, virtual teams members transmit fewer cues (because of leaner communication media) and thus less negative stereotypic information (Rock, Pratt and Northcraft 2002) although they may take longer to identify with their group members (Burke et al. 1999). Therefore, because of the lack of in-group/out-group problems, virtual team members may exhibit greater group identity than semi-virtual team members do with their remote partners.

Communication

Some argue that technologies transform the ways that teams work (Beranek 2000). However, this transformation may be equally true for all types of teams because many of the technologies distributed employees use today (e.g. email, shared workspaces, shared databases) are used equally by face-to-face employees. For instance, Burke and Chidambaram (1995) found no differences in social presence between groups working face-to-face, synchronously, or asynchronously with an electronic meeting system. Similarly, Ocker and Fjermestad (2000) found that communication patterns of virtual teams that perform well appear more similar to face-to-face teams than to virtual teams that perform poorly. Finally, Mortensen and Hinds (2001) found that co-located groups use electronic communication technologies as much as distributed groups.

Even though patterns of electronic communication may be similar across types of groups, patterns of face-to-face communication differ – and, thus, local team members will still communicate more frequently in total than distributed team members. Moreover,

not only do local members have increased opportunities for face-to-face communication, they have many occasions to observe team members' behaviours, meet informally, and pick up on non-verbal cues. The socializing that is easily available to local members, such as eating together, helps to develop social relationships (Nardi and Whittaker 2002). In contrast, semi-virtual team members will interact more frequently face-to-face with their local members, but more frequently electronically with their remote members. Because of the limitations of electronic communication, this will negatively affect their perceptions of their remote members (Burke et al. 1999). Empirical research supports this contention: studies demonstrate negative associations between the degree of virtuality and communication, integration, coordination, trust, experienced meaningfulness, experienced responsibility and team performance (Cramton and Webber 1999; Gibson and Cohen 2002). Consistent with these findings, O'Leary and Cummings (2002) found that frequency of communication is negatively related to degree of dispersion. Consequently, remote team members face greater challenges to communicating effectively (McDonough, Kahn and Barczak 2001). Thus we propose that co-located teams and local members of semi-virtual teams communicate more, in total, than do remote members of semi-virtual teams or virtual team members. This increased communication can result in higher trust (Jarvenpaa, Knoll and Leidner 1998; Ishaya and Macaulay 1999; Staples 2001).

Group trust

Trust is the belief or confidence in a person or organization's integrity, fairness and reliability (Lipnack and Stamps 1997). It represents risk-taking behaviour towards the trustee (Mayer, Davis and Schoorman 1995); thus, with trust comes the feeling that the trusted party will not take advantage of the other (Porter, Lawler and Hackman 1975). McKnight, Cummings and Chervany (1998) suggest that trust has three dimensions: disposition to trust (faith in humanity), interpersonal-intergroup trust (trusting beliefs, trusting intention) and institution-based trust (trust in structure instead of in person). In this study, we focus on the interpersonal trust between team members, which has been described as a psychological state comprising the intention to accept vulnerability based on positive expectations of the intentions or behaviours of another (Rousseau, Sitkin, Burt and Camerer 1998).

Trust has a variety of constructive effects, including employees contributing time and attention to collective goals, sharing useful information, helping others and performing extra-role behaviours (Kramer 1999). For instance, virtual team members who believe in the trustworthiness of their fellow team members cooperate more than those who are less sure of their colleagues (Galvin, Ahuja and Agarwal 2000; Galvin, McKnight and Ahuja 2001). In virtual teams, both the lack of face-to-face interaction and nonverbal cues and the reliance on computer-mediated communication can pose big challenges to both managers and team members. These challenges result not only from searching for new ways to facilitate communication with remote team members, but also from building relationships to shorten the psychological distance between team members. Trust is pivotal to preventing geographical distance from leading to psychological distance in global teams (Snow, Snell and Davison 1996).

There are two forms of interpersonal trust, cognition-based trust and affect-based trust (Lewis and Wiegert 1985). Cognition-based trust is based on reasoning about others' reliability and dependability. The competence, integrity, ability and past record of the person being trusted form the rational basis for withholding trust (Luhmann, 1979). Affect-based trust consists of emotional bonds between two parties who express genuine care and concern for the welfare of each other (McAllister 1995). McAllister (1995) found

that some level of cognition-based trust is necessary for affect-based trust to develop and empirical research has demonstrated strong relationships between these two dimensions of trust (McAllister 1995; Staples 1999).

Trust can result from shared membership in a category (such as an in-group). Team members identify more strongly with their in-group than their out-group members, resulting in greater trust of in-group members (McKnight et al. 1998; Fiol and O'Connor 2002). This is because categorization and in-group biases lead to individuals tending 'to attribute positive characteristics such as honesty, cooperativeness, and trustworthiness to other in-group members' (Kramer 1999, p. 577). In contrast, the mere categorization into subgroups can create a climate of distrust between the subgroups (Kramer 1999).

Team members who trust their colleagues have social exchanges early in their acquaintance, are enthusiastic and optimistic in their messages, take initiative and cope with task and technical uncertainty to establish reliable communication (Jarvenpaa and Leidner 1999). Early trusting intentions are upheld through social interactions (McKnight et al. 1998). This results in a reinforcing cycle, given that local members have easier access to face-to-face communication, considered the most effective means to generate trust (Handy 1995). Thus, the increased set of communication opportunities, coupled with in-group favouritism, result in greater affective trust among local team members. In support of this, Bos et al. (2002) examined the effects of four communication modes on trust within teams and found that face-to-face teams develop trust fastest. In contrast, remote employees have fewer opportunities for informal communication and information gathering and developing trust is even more difficult for them (Saunders 2000; Staples 1999), while local team members confer greater trust on in-group members because of their shared category membership (Kramer 1999). Therefore, we expect that co-located teams and local members of semi-virtual teams demonstrate greater interpersonal trust than do virtual teams or remote team members of semi-virtual teams.

Perceived task skills of group members

In-group biases suggest that employees perceive their local group members more positively than their remote colleagues. As such, we propose that employees perceive local team members as possessing higher task skills than do their remote team members. Again, this may be because of a self-reinforcing cycle, in which greater trust relates to more positive perceptions of local team members' responsibility and competence (Lewis and Wiegert 1985; McAllister 1995).

In sum, based on these proposed differences between the three types of teams, we suggest that employees' communication and perceptions of group identity, trust and member task skills will differ across co-located, semi-virtual and virtual teams. Specifically, we hypothesize that:

- Hypothesis 1: Members of semi-virtual teams will communicate more with and exhibit more positive perceptions (group identity, trust and member task skills) of their local group members than of their remote members.
- Hypothesis 2: Members of co-located teams will communicate more and exhibit more positive team member perceptions (group identity, trust and member task skills) than will members of semi-virtual or virtual teams

Project satisfaction

Project satisfaction represents an attitude reflecting the employees' overall positive and negative reactions to their group project. Some research has demonstrated that satisfaction

is higher for face-to-face than for virtual teams (e.g. Gallupe and McKeen 1990; Hollingshead, McGrath and O'Connor 1993; Thompson and Coover 2002). However, research on satisfaction in virtual teams has been mixed, and much of it has examined ad hoc groups for short periods of time (Saunders 2000). Hollingshead et al.'s (1993) and Walther's (1995) research suggest that although initial differences exist, satisfaction for computer-mediated groups becomes similar to face-to-face groups over time. This may be because groups develop norms and ways of working over time, resulting in fewer process losses. In fact, Kirkman et al. (2002) found that some team members felt that they had better relationships with their distributed team mates because they worked virtually. In contrast, those in semi-virtual teams may experience lower overall satisfaction due to the requirement to deal with both local and remote members. Thus, we take an exploratory stance to suggest that:

Hypothesis 3: Project satisfaction will differ between co-located, semi-virtual and virtual teams

Finally, we explore what employees say about team functioning and how it can be improved for distributed employees. The 'best practices' literature for virtual teams includes a variety of recommendations. For example, Staples, Wong and Cameron (2004) reviewed the academic and practice literatures, as well as their own case studies, to categorize these practices according to organizational, leader and individual factors. The most important factors in their case studies related to effective communication, team members' self-motivation, and establishment by the team leader of a team vision and purpose. Thus, we investigate the following research question:

What 'best practices' do team members propose for distributed teams?

Method

Employees in the Information Technology business function of a large, global, high-tech organization completed a web-based survey. Survey items were based on valid measures from the literature and the survey was pilot tested with a group of employees. The survey included an area for open-ended comments on team functioning at their organization. At the time of this survey, the organization had instituted travel restrictions; that is, employees needed to obtain permission to travel to remote locations. We received completed surveys from 453 employees.

We asked employees to 'think about a team project (that includes at least three team members) in which you *currently* spend the majority of your time'. Of 453 surveys, 79 indicated that all team members were 'located in the same building as you (local)' (*co-located* teams), 118 that all members were 'located remotely (that is, in a different office building from you)' (*virtual* teams), and 256 that members were both local and remote (*semi-virtual* teams).

Participants

For the participants, 94.4% were full-time and permanent, 63.7% were located in North America, 27.7% in Europe and 6.5% in Asia Pacific (with the remaining distributed around the globe), 58.4% were males, and 18.6% were managers. The average participant was 30–39 years of age, had a university degree, had worked for the organization for 5–10 years, was located in a different office building (but the same local area) than his/her manager, and had between 3 and 5 years of experience with teams in which some members

were located remotely. The average team project was comprised of eight members, was structured with programme and project managers (but did not have a formal project charter), and was expected to exist between 3 months and 1 year.

Measures

Each of the following variables was measured once for participants in co-located or virtual teams. However, for participants in semi-virtual teams, each of these variables was measured twice; once for their perceptions of their local team members and once for their perceptions of their remote team members.

Group identity

Two items to assess group identification were adapted from Jetten, Hogg and Mullin (2000), such as 'I feel strong ties with these team members', ranging from 'Strongly disagree' (1) to 'Strongly agree' (7). Cronbach's alpha for this study was .84 for remote members and .83 for local members.

Communication frequency

Based on the communication media utilized in this organization, the frequencies of communication with eight media were assessed: 'Face-to-face', 'Phone (1:1) or Voice mail', 'Teleconference', 'Email', 'E:Room/Network file share', 'NetMeeting', 'Video-conferencing', and a free-format item called 'Other' (for participants to indicate any communication medium not listed; the most frequently listed one was instant messaging). The response scales ranged from 'Never' (1), 'About once a month' (2), 'About once a week' (3), 'About once a day' (4), 'About 2–3 times per day' (5), 'About 4–5 times per day' (6), to 'Almost continuously' (7). The sum of these eight communication media items was calculated to represent the total frequency of communication.

Cognitive-based and affect-based trust

Eleven items for interpersonal trust were adapted from McAllister (1995). For example, the item 'To what extent do you feel that the team members approach their jobs with professionalism and dedication?', ranging from 'Strongly disagree' (1) to 'Strongly agree' (7), captured the dimension of 'Cognitive-based trust', and the item 'We have a sharing relationship. We all can freely share our ideas, feelings, and hopes', ranging from 'Strongly disagree' (1) to 'Strongly agree' (7), assessed the 'Affect-based trust' dimension. As with previous studies, cognitive and affective trust related very highly ($r = .73$ for local members, and $.65$ for remote members) and an overall trust measure was created. Cronbach's alpha for the overall measure was $.92$ for both remote and local members in this study.

Perceived task skills

Three items from Gomez, Kirkman and Shapiro (2000) perceived task skills scale, such as 'These team members are efficient', ranging from 'Strongly disagree' (1) to 'Strongly agree' (7), were used. Cronbach's alpha for this study was $.85$ for both remote and local members.

The following measures were captured once for participants from each of the three types of teams.

Project satisfaction

Six items were adapted from Warr, Cook and Wall (1979), such as 'The recognition you get for good work' and 'The amount of variety in this project', ranging from 'Strongly dissatisfied' (1) to 'Strongly satisfied' (7). Cronbach's alpha for this study was .88.

Control variables

Control variables that might potentially relate to the outcomes were included in the questionnaire, specifically the number of employees in the team, the expected time span for the team, the project team structure, the team members' age, gender, education, management level, years of service in the organization, past experience with distributed teams and regional location (e.g. Lind 1999; Massey, Hung, Montoya-Weiss and Ramesh 2001; Mortensen and Hinds 2001). For instance, project time span was assessed with the question, 'What is the expected time span for this project team?', ranging from 'less than 1 month' (1), '1 month to less than 3 months' (2), '3 months to less than 1 year' (3), '1 year to less than 2 years' (4), to '2 years or more' (5). Project team structure was assessed with the following question, 'Which one of the following best describes your project team structure?', on a scale from 'with program manager(s), project manager(s), and a formal project charter' (1), 'with program manager(s) and project managers(s), but no formal project charters' (2), 'without program manager(s), but with project manager(s) and a formal project charter' (3), 'without program manager(s) or a formal project charter, but with project manager(s)' (4), to 'without program manager(s), project manager(s), or a formal project charter (that is, a self-managed project)' (5).

Open-ended comments

At the end of the survey, participants were asked for general open-ended comments, specifically for 'any other comments about team functioning at < name of organization > '.

Analyses

We analysed whether any of the control variables differed across the types of teams by comparing their group means using one-way analysis of variance (ANOVA). Differences between groups were found for team structure, years of service in the organization, past experience with distributed teams and regional location. Therefore, we included these four variables as controls in all subsequent analyses.

As the dependent variables for the hypotheses were expected to be correlated (e.g. we would expect that teams that trust each other more would communicate more), we conducted overall (omnibus) tests for type of team (with the four control variables as covariates). For these overall tests, we used multivariate analysis of covariance (MANCOVA). In addition, because these teams were naturally-occurring, we did not have the same number of teams for each type (traditional, virtual and semi-virtual); therefore, for comparisons of the three types of teams, we used Type III sums of squares in our analyses to take into account these unequal group sizes (Tabachnick and Fidell 2001).

For hypothesis 1, comparing semi-virtual team members' perceptions of their local and remote group members, we needed to use 'repeated-measures' analyses because the dependent variables were measured more than once (that is, each of the variables, such as group identity, was measured twice for semi-virtual team members – once for their perceptions of their local team members and once for their perceptions of their remote team members). To do so, we utilized repeated-measures MANCOVA (a doubly-multivariate

design or 'profile analysis' (Tabachnick and Fidell 2001). We then conducted individual repeated-measures ANCOVAs for each of the dependent variables.

For hypothesis 2, comparing the three types of teams, we conducted two overall MANCOVAs because semi-virtual team members responded twice to questions about their team members (once for local and once for remote team members), while co-located and virtual team members responded once. That is, in one MANCOVA, we compared perceptions of co-located teams, local members of semi-virtual teams, and virtual teams, and in the second MANCOVA, we compared perceptions of co-located teams, remote members of semi-virtual teams, and virtual teams.¹ We then conducted individual ANCOVAs for each dependent variable.

For hypothesis 3, comparing overall project satisfaction across the three types of teams, we conducted an ANCOVA comparing co-located, semi-virtual, and virtual teams.

Participants' responses to the open-ended comments were coded by an independent rater. This rater had considerable previous experience coding qualitative research: specifically interview transcripts. She was instructed to create her own categories of responses and was blind to the hypotheses and quantitative results of this study. She placed participants' comments into 35 categories that she created (such as 'leadership issues', 'face-to-face communication', and 'social connections'). The first author checked the coding on the most frequently occurring category and agreed over 90% with the rater.

Results

Surveys were completed by 455 employees and reduced to 453 for analysis, as described next. Prior to analyses, the variables were examined for fit between their distributions and the assumptions of multivariate analysis (Tabachnick and Fidell 2001). An examination of normality of the variables' distributions demonstrated that they were moderately skewed to the left. Because the variables were skewed to the same moderate extent, improvements using transformations of the variables would be marginal (Tabachnick and Fidell 2001). Three cases were found to be univariate outliers on multiple variables (each of these respondents was a European, highly educated employee between 40–49 years of age). Based on Mahalanobis distance ($p < .001$) within the three groups (of co-located, semi-virtual, and virtual teams), two of these three cases were also multivariate outliers. Thus, these two cases (which were both in semi-virtual teams) were removed from further analyses, leaving a sample size of 453.

Findings related to the hypotheses

For hypothesis 1, comparing semi-virtual team members' perceptions of their local and remote team members, the overall repeated-measures MANCOVA was significant (Wilks' lambda = .88, $F = 8.00$, $p < .001$, observed power $> .99$). In addition, all follow-up ANCOVAs were significant ($p < .001$): semi-virtual team members perceived their local team members more positively than they did their remote team members. Specifically, semi-virtual team members experienced a higher identity with their local team members, communicated with them more frequently, trusted them more and perceived their task skills to be higher (see Table 1, column H1). Further, as expected, although they reported higher overall communication, this was due to more face-to-face communication with their local (as compared with their remote) members, not due to differences in other types of technology-mediated communication (see Figure 1).

Open-ended comments support these findings. For example, one participant remarked: 'I find myself with mixed feelings about working remotely. It is particularly difficult

Table 1. Comparison of team types.

Dependent variables	Means			ANCOVA F-tests			
	Co-located teams	Semi-virtual Teams		Virtual teams	H2: Comparing co-located and virtual teams with:		
		Local members	Remote members		H1: Comparing local and remote members of semi-virtual teams	Local members of semi-virtual teams	Remote members of semi-virtual teams
Group identity	4.86	5.22	4.48	4.87	17.15***	3.31*	3.59*
Communication Frequency	18.07	21.68	18.43	18.51	10.37***	17.41***	0.09
Trust	5.20	5.54	4.98	5.30	23.48***	3.59*	2.89+
Perceived task skills	5.52	5.81	5.49	5.77	9.05***	1.65	1.47
Project satisfaction	4.91	Overall: 5.25		5.47			3.66*

Notes: + $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .001$.

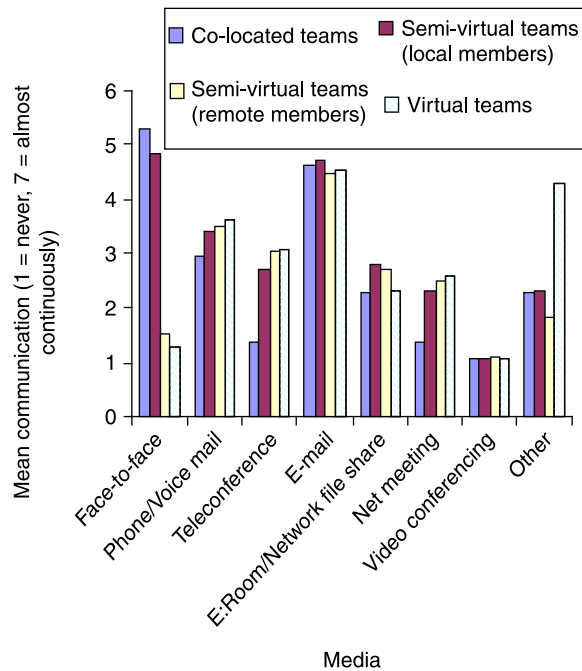


Figure 1. Patterns of communication across types of teams.

to work in a team that is mostly concentrated at one site, and you are the remote one.’ Another participant stated: ‘My experience with remote management is totally negative. The people who were not remote without fail had more opportunity.’ A third participant said: ‘Synergy is lacking for the team when there are remote components. There are limits to the virtual team and the members that come to the office within [company name], do most of the real work.’ Finally, a fourth participant remarked: ‘In this project the six of us are a small sub-team of a large project. . . . We work in a conference room. . . . I find that the other members of the [sub-]team are extremely critical and judgemental about just about everyone outside the immediate team . . . and especially about the members of the other sub-teams who can impact our part of the project by making certain decisions.’

Examining hypothesis 2, concerning differences between co-located, semi-virtual and virtual teams, two overall MANCOVAs were conducted before performing the individual ANCOVAs. The MANCOVA comparing perceptions of co-located teams, local members of semi-virtual teams, and virtual teams was significant (Wilks’ lambda = .87, $F = 5.05$, $p < .001$, observed power $> .99$) while the second MANCOVA comparing co-located teams, remote members of semi-virtual teams, and virtual teams was not (Wilks’ lambda = .98, $F = 1.27$, $p > .10$, observed power = .59). Table 1 presents the means by type of team and the results for the individual ANCOVAs. All of the means generally follow the pattern shown in Figure 2 for group identity. What this figure demonstrates is that employees perceive similar levels of group identity in both co-located and virtual teams. Thus, contrary to the hypothesis of higher perceptions by co-located team members as compared to both semi-virtual and virtual team members, we found no differences between co-located and virtual teams. Some open-ended comments support this finding. For instance, one participant stated: ‘We don’t realize how well we do it. We can function as

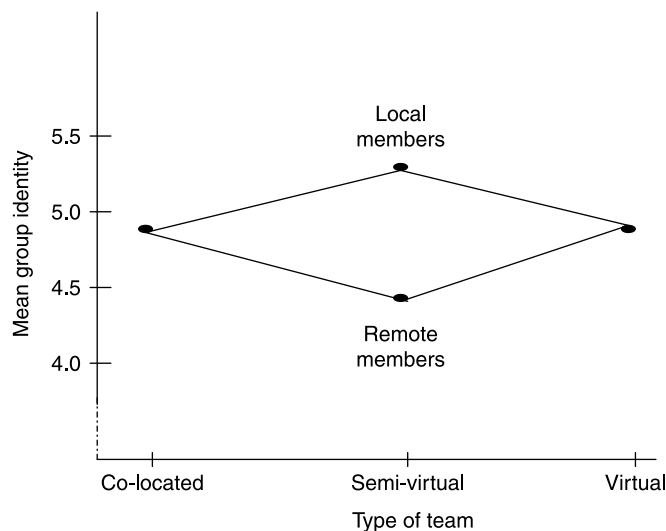


Figure 2. A Comparison of group identity across types of teams.

a dispersed team rapidly, even though we have never met one another. That's impressive!' Another remarked: 'Working remotely is nothing exceptional for me.'

Of the three types of teams (co-located, semi-virtual and virtual), semi-virtual team members' perceptions of their local members were highest. Specifically, significant differences existed in group identity, communication frequency and trust for perceptions of local members of semi-virtual teams as compared to co-located and virtual teams (see Table 1, column H2, local members). Further, significant differences in group identity and marginally significant differences in trust existed for perceptions of remote members of semi-virtual teams as compared to those of co-located and virtual teams (see Table 1, column H2, remote members). These results support the notion of in-group/out-group dynamics in semi-virtual teams.

Hypothesis 3, examining differences in overall project satisfaction across the three types of teams, was significant ($F = 3.66$, $p < .05$, observed power = .67). Unexpectedly, however, virtual team members reported greater satisfaction than did co-located team members (see Table 1, column H3). Some open-ended comments support this finding. For example, one participant argued that 'Remote teams can be very beneficial to both [company name] and the team members.' Another stated: 'As global teams continue to increase, physical location no longer represents a value. Productivity time is lost in commutes. Telecommuting allows flexible work time and actually institutes longer work days as during evening hours, there is typically an opportunity to prepare for the next day or take care of emails from other parties located in other geographical areas. ... Global teams should become the norm, not the exception.'

Research question

Many of the open-ended comments related to the (mis)management of virtual teams and to the challenges of working remotely. These comments, although not relating to the particular type of team in which participants spent most of their time, do help to shed light on team functioning and suggest ways to minimize in-group/out-group problems.

The most frequent groupings of comment categories related to management issues around teams (65 comments), team communication (61 comments) and social issues in teams (29 comments) (there also were 28 comments about the company generally complaining that it wasn't like the 'old days'); see Table 2. Specifically, consistent with the best practices literature (Staples et al. 2004), employees felt that leadership is still critical for distributed teams, face-to-face communication needs to occur periodically, and team spirit distinguishes better functioning from poorer functioning teams.

Discussion and conclusions

Study findings imply that the type of team, or the 'degree of virtuality', can be important to team functioning. In particular, semi-virtual teams appear to differ from both co-located and virtual teams. In fact, semi-virtual team members experience even higher local group perceptions than do members of co-located teams. Thus, it appears that creating subgroups of local and remote members can result in in-group/out-group issues in semi-virtual teams.

Although semi-virtual team members reported more positive perceptions of their local than their remote members, there were no differences between co-located and virtual teams. This may be due to our particular sample: all of our participants worked in the information technology (IT) area of the same organization. That is, our participants shared 'categories' (here, IT roles within the same organization), and sharing categories tends to reduce uncertainty regarding others' intentions and capabilities (Kramer 1999). Consequently, virtual team members may have had high 'presumptive trust', or trust arising from membership in like categories. Presumptive trust is based on substitutes or proxies for direct knowledge of others, and results in individuals who are 'generous with respect to giving others the "benefit of the doubt" when "noise" or uncertainty regarding their trustworthiness is present' (Kramer 1999, p. 583). Further, when roles are clear, virtual teams may develop 'swift trust', or the rapid formation of trust (Meyerson, Weick and Kramer 1996; Jarvenpaa, Knoll and Leidner 1998). Therefore, we may have found similar levels of trust for virtual as for co-located teams because of the presumptive and swift trust experienced by virtual team members.

Although members of semi-virtual teams also experience similar role and organization membership, our results support that notion that the design of semi-virtual teams sets up in-group/out-group biases that are stronger than the effects of existing role and organization categories. Consequently, organizations need to be sensitive to any subgroups they inadvertently create in distributed teams.

Virtual team members were even more satisfied with their projects than were members of co-located teams. This may be because virtual employees feel that they have better access to distributed experts, more freedom to manage their work tasks, and a better balance of work/family duties.

Strengths, limitations and directions for future research

This study has responded to calls for more research on virtual teams, and on partially distributed teams in particular (e.g. Burke, Aytes, Chidambaram and Johnson 1999; Martins et al. 2004; Fiol and O'Connor 2005). We were able to hold department, organization, and industry constant, and to tease apart the effects of different types of teams on key constructs such as interpersonal trust. However, little previous research has focused on the antecedents of interpersonal trust in teams (Kiffin-Petersen and Cordery 2003). In contrast, much of the past research has mixed together different types of virtual

Table 2. Major groupings of open-ended comments.

<i>Major groupings (total number of comments)</i>	<i>Specific categories (number of comments)</i>	<i>Sample quotes</i>
Team management (65)	Leadership (12)	<ul style="list-style-type: none"> • The help of managers is important. There are managers that let you feel abandoned and managers that show that they care what you're doing even if they don't see you every day. • My manager was nice but he didn't 'lead' the group. We spend lots of time on teleconferences disagreeing on matters that didn't need all of our input. • The emphasis that a team's manager places on the cohesiveness of the team determines the effectiveness of the team as a whole. If a remote team member is 'out-of-sight, out-of-mind' and the manager does not take pains to understand what that person is doing, it can result in a difficult situation. • Project teams want to work hard, but lack of management skills, communication skills and teamwork skills by functional management can help or hinder remote teams.
	Performance evaluation (16)	<ul style="list-style-type: none"> • Your work is not clearly visible to your manager or the project manager. In these remote situations only the final result is seen by the project manager and they have no visibility in what you had to do to get those results. • Results are the key indicators of a remote employee's work habits and efforts – let go of the concept that merely seeing somebody in the office indicates they are working!!!
	Team design (13)	<ul style="list-style-type: none"> • The success of a remote team is mainly due to the fact that what the program manager expects from each member is clearly defined and shared.
	Resources (10)	<ul style="list-style-type: none"> • Nearly everyone has commented on the challenges we are facing – especially with current restrictions on travel (though we have somewhat of an exemption on this restriction). Several members of our new organization feel that there is inadequate infrastructure to support cross-team collaboration – they want easily accessible (and inexpensive) multi-port video conferencing capability, for instance.
	Other (14)	<ul style="list-style-type: none"> • A common challenge is sustained executive sponsorship/commitment. • There needs to be more formal information of the best practices for successful remote working available to people.

Table 2 (Continued)

<i>Major groupings (total number of comments)</i>	<i>Specific categories (number of comments)</i>	<i>Sample quotes</i>
Team communication (61)	Face-to-face (32)	<ul style="list-style-type: none"> • Team functioning depends on initial/occasional face-to-face meetings. • This team was never brought face-to-face and was extremely competitive rather than cooperative. • I've been on some teams where I never met any of the other members face-to-face. This has made it harder to work together. I think an initial face-to-face meeting can significantly enhance the overall team success, and certainly get things started faster – even if most of the team contact is virtual. In some cases, I've later met a team member at an industry conference and this has made it easier to feel more like fellow employees. • Working remotely is tough. Teleconferences help. It is very important though to have face-to-face meetings to develop complex plans and solve difficult problems. The project I am working on now is very complex with lots of people and lots of teleconferences. Since a person can't see a person when they talk, there are many times misunderstandings that could be avoided with face-to-face meetings. Also constant teleconferences for 5–6 hours a day is extremely draining and tiring. • If a team is wholly local it is easy to show a slide, brainstorm, etc. because everybody can meet in the same physical room – remotely, everything must be prearranged, zipped up, emailed, etc. and can be less 'organic' in evolution.
	Technology-mediated (20)	<ul style="list-style-type: none"> • Teleconferences are feasible for a stable working-group working regularly according to regular agenda. But if you are dealing with people from eight different countries you have never met and with topics you do not really know in advance, then it is a nightmare! • The hardest is reading the audience. Teleconferencing does not allow you to read expressions and you have to assume a lot. • Trust is the biggest factor in the success of teams – without it your team is destined to fail. And, how can you be expected to trust your fellow team members if your only communication for months or even years is on a conference call? How do you know they're not just putting themselves on mute while you're talking, to rip apart your idea and roll their eyes to communicate their dissatisfaction? I know it sounds childish. You may say that we are adults and that only happens in elementary school but it happens – I see it happen here everyday. I think you'd be hard pressed to find one person who can honestly say they haven't done that.
	Other (9)	<ul style="list-style-type: none"> • The highest difficulty is to get timely decisions, as you can't follow up immediately on people not at your site and/or in a different time zone.

Social issues (29)	Social relationships (18)	<ul style="list-style-type: none"> • I just left a totally remote team. It was very difficult to bond with the team. • One of the biggest obstacles I see in a remote team is the informal communication aspect. In a local team all members have an opportunity to discuss issues/roles, etc. at non-regularly scheduled times (breaks, lunch or after work). This allows the team members to develop better working/social relationships outside the project scope and this directly effects their relationship within the project.
	Team spirit (6)	<ul style="list-style-type: none"> • With the remote teams, even with the wonders of the technology that make it so easy to work remotely, it seems that when working with remote teams it is like working with different companies. I think that the main problem is that people are so busy that there is never time to know other team members of the project before starting with the project. There is no sense anymore of belonging. • I've recently worked with one of the best functioning remote teams in all of < organization name >. One of the great things about that team was the sense of family in a very diverse group and the investment in constant learning what we didn't know to help make us better. We focused on listening a lot. It was a very proactive, very successful, confident team that took pride in being humble and listening to their people. There was no 'us vs. them'.
	Other (5)	<ul style="list-style-type: none"> • Managing remote teams requires the building of relationships and trust between members.

work, making it difficult to tease apart any effects. Further, little past research has reported whether different types of virtual teams have been included, making it difficult to draw generalizable conclusions.

This research has several limitations that should be addressed in future studies: it was cross-sectional, it only examined the perceptions of employees in the information technology area, and it studied perceptions of individuals in teams, not teams as a whole. The research was survey-based, but future studies could also explore the use of more fine-grained methods, such as network analysis, in the study of distributed team member relations. Further, the research examined team members' perceptions of projects on which they focused the majority of their time. However, team members could be distracted by other projects, especially individual remote members who would more likely be sidetracked by priorities at their local sites. Future research should look at how employees trade off and manage their time in competing, distributed team projects.

This study was not able to investigate differences between in-groups – that is, whether some subgroups are perceived as stronger or weaker entities than others. That is, in-groups may differ in their degrees of perceived entitativity, or 'the degree to which they are perceived as unified, coherent entities' (Lewis and Sherman 2003b). The degree of perceived entitativity represents a potentially important construct when attempting to manage in-group/out-group biases because it relates to important team processes such as group impressions and stereotyping (Lewis and Sherman 2003b).

Implications for practice

Study results imply that it is best to avoid creating semi-virtual teams – in other words, all team members should be 'in the same boat', that is, all local or all remote. However, if creating semi-virtual teams cannot be avoided, there are methods for minimizing problems. For example, effective leaders can emphasize the project team's (rather than the subgroup's) identity by reinforcing individuals' sense of working on their specific project. That is, these leaders can provide team members with something new with which to identify (Fiol 2002) and shared team identity can help to bridge the distance between group members (Hinds and Bailey 2003). Our open-ended comments reinforce the importance of team identity (e.g. 'the emphasis that a team's manager places on the cohesiveness of the team', a 'sense of family', and 'belonging'). Further, the best practices literature supports this recommendation by highlighting the importance of team leaders defining a vision for the team, generating a passion around a cause, finding common ground and visualizing the 'big picture' for the project (Staples et al. 2004).

Another way of reducing in-group/out-group team categorizations relates to increasing team member 'mindfulness' or their 'ability to make fine-grained and current distinctions in the face of historical stereotypes' (Fiol and O'Connor 2002). For instance, team members can be trained to embrace differences (Swann, Polzer, Seyle and Ko 2004). However, interventions such as training need to occur very early, before the mindless categorizations set in and people become resistant to appeals (Fiol and O'Connor 2002). As suggested by our open-ended comments, ways of increasing mindfulness include periodic face-to-face meetings, team training on virtual team challenges and a commitment to continual learning. Similarly, research on virtual team training has demonstrated its benefits for virtual team functioning (e.g. Warkentin and Beranek 1999, Tullar and Kaiser 2000; Okhuysen and Eisenhard 2002). We suggest that such early training should include sensitivity to in-group/out-group problems that can arise in semi-virtual teams.

As the world becomes increasingly more global, firms will continue to draw on distributed expertise from both inside and outside their organizations. The implications of bringing together remote team members will persist as a fruitful topic for human resource practitioners and researchers alike.

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Note

1. Due to the design of this study (with repeated measures on only one type of team, semi-virtual teams, as only these teams have subgroups), a causal model across the three types of teams could not be created or tested. However, we proposed that the dependent variables would interrelate, and MANOVA handles correlated dependent variables.

References

- Armstrong, D.J., and Cole, P. (2002), "Managing Distances and Differences in Geographically Distributed Work Groups," in *Distributed Work*, eds. P. Hinds and S. Kiesler, Cambridge, MA: MIT Press, pp. 167–186.
- Ashforth, B.E. (2001), *Role Transitions in Organizational Life: An Identity-based Perspective*, London: Lawrence Erlbaum Associates.
- Ashforth, B.E., and Mael, F. (1989), "Social Identity Theory and the Organization," *Academy of Management Review*, 14, 20–39.
- Axtell, C.M., Fleck, S.J., and Turner, N. (2004), "Virtual Teams: Collaborating across Distance," in *International Review of Industrial and Organizational Psychology* (Vol. 9), eds. C.L. Cooper and I.T. Robertson, Chichester: Wiley, pp. 205–248.
- Beranek, P. (2000), "The Impacts of Relational and Trust Development Training on Virtual Teams: An Exploratory Investigation," in *Proceedings of the 33rd Hawaii International Conference on Systems Sciences*, Hawaii.
- Bos, N., Olson, J., Gergle, D., Olson, G., and Wright, Z. (2002), "Effects of Four Computer-mediated Communications Channels on Trust Development," in *Proceedings of CHI 2002* (Vol. 4), Minneapolis, MN, pp. 135–140.
- Bouas, K.S., and Arrow, H. (1996), "The Development of Group Identity in Computer and Face-to-Face Groups with Membership Change," *Computer Supported Cooperative Work (CSCW)*, 4, 153–178.
- Burke, K., and Aytes, K. (2002), "Do Media Really Affect Perceptions and Procedural Structuring Among Partially-distributed Groups?," *Journal of Systems & Information Technology*, 5, 1, Special edn, 33–58.
- Burke, K., Aytes, K., Chidambaram, L., and Johnson, J. (1999), "A Study of Partially Distributed Work Groups: The Impact of Media, Location, and Time on Perceptions and Performance," *Small Group Research*, 30, 4, 453–490.
- Burke, K., and Chidambaram, L. (1995), "Developmental Differences Between Distributed and Face-to-Face Groups in Electronically Supported Meeting Environments: An Exploratory Investigation," *Group Decision and Negotiation*, 4, 213–233.
- Cohen, S.G. (1994), "Designing Effective Self-managing Work Teams," in *Advances in Interdisciplinary Studies of Work Teams, Volume 1, Series of Self-Managed Work Teams*, eds. M.M. Beyerlein, D.A. Johnson and S.T. Beyerlein, Greenwich, CT: JAI Press, pp. 67–102.
- Cohen, S.G., and Gibson, C.B. (2003), "Putting the Team Back in Virtual Teams," paper presented at the 18th Annual Conference of the Society for Industrial/Organizational Psychology, Orlando, FL.
- Cramton, C.D. (2001), "The Mutual Knowledge Problem and its Consequences for Dispersed Collaboration," *Organization Science*, 12, 346–371.
- Cramton, C.D. (2002), "Attribution in Distributed Work Groups," in *Distributed Work*, eds. P. Hinds and S. Kiesler, Cambridge, MA: MIT Press, pp. 191–212.
- Cramton, C.D., and Webber, S.S. (1999), *Modeling the Impact of Geographic Dispersion on Work Teams*, working paper, George Mason University, Washington, DC.

- Espinosa, J.A., Cummings, J.N., Wilson, J.M., and Pearce, B.M. (2003), "Team Boundary Issues across Multiple global firms," *Journal of Management Information Systems*, 19, 4, 157–190.
- Fiol, C.M. (2002), "Capitalizing on Paradox: The Role of Language in Transforming Organizational Identities," *Organization Science*, 13, 653–666.
- Fiol, C.M., and O'Connor, E.J. (2002), "Identification in Virtual Teams: From Imported to Homegrown We-ness," paper presented at the *Academy of Management Meetings*, Denver, CO.
- Fiol, C.M., and O'Connor, E.J. (2003), "Waking up! Mindfulness in the Face of Bandwagons," *Academy of Management Review*, 28, 54–70.
- Fiol, C.M., and O'Connor, E.J. (2005), "Identification in Face-to-Face, Hybrid, and Pure Virtual Teams: Untangling the Contradictions," *Organization Science*, 16, 19–32.
- Gallupe, R.B., and McKeen, J.D. (1990), "Enhancing Computer-mediated Communication: An Experimental Investigation into the Use of Group Decision Support System for Face-to-Face Versus Remote Meetings," *Information and Management*, 18, 1–13.
- Galvin, J.E., Ahuja, M.K., and Agarwal, R. (2000), *Dispositional and Situational Influences on Trust Behaviour in Virtual Teams*, working paper, Indiana University, Indianapolis.
- Galvin, J.E., McKnight, D.H., and Ahuja, M.K. (2001), *Does Experience Counteract the Effects of Disposition- and Institution-based Trust on Project Team Cooperation? A Cross-disciplinary Model*, working paper, Indiana University, Indianapolis.
- Gibson, C., and Cohen, S. (2002), "Is There Anybody Out There? The Impact of Virtuality on Individual Psychological States and Team Enabling Conditions," paper presented at the *Annual Meeting of the Academy of Management*, Denver, CO.
- Gomez, C., Kirkman, B.L., and Shapiro, D.L. (2000), "The Impact of Collectivism and In-group/out-group Membership on the Evaluation Generosity of Team Members," *Academy of Management Journal*, 43, 1097–1106.
- Handy, C. (1995), "Trust and the Virtual Organization," *Harvard Business Review*, 73, 40–50.
- Herbsleb, J., Mockus, A., Finholt, T., and Grinter, R. (2000), "Distance, Dependencies, and Delay in a Global Collaboration," in *Proceedings of the ACM Conference*, Philadelphia, PA, pp. 319–328.
- Hinds, P.J., and Bailey, D.E. (2003), "Out of Sight, Out of Sync: Understanding Conflict in Distributed Teams," *Organization Science*, 14, 6, 615–632.
- Hollingshead, A., McGrath, J., and O'Connor, K. (1993), "Group Task Performance and Communication Technology: A Longitudinal Study of Computer-mediated versus Face-to-Face Work Groups," *Small Groups Research*, 24, 307–333.
- Ishaya, T., and Macaulay, L. (1999), "The Role of Trust in Virtual Teams," *Electronic Journal of Virtualness*, 1, 140–157.
- Jarvenpaa, S.L., and Leidner, D.E. (1999), "Communication and Trust in Global Virtual Teams," *Organization Science*, 10, 791–815.
- Jarvenpaa, S.L., Knoll, K., and Leidner, D.E. (1998), "Is Anybody Out There? Antecedents of Trust in Global Virtual Teams," *Journal of Management Information Systems*, 14, 29–64.
- Jetten, J., Hogg, M.A., and Mullin, B.-A. (2000), "In-group Variability and Motivation to Reduce Subjective Uncertainty," *Group Dynamics: Theory, Research, and Practice*, 4, 2, 184–198.
- Kiffin-Petersen, S.A., and Cordery, J.L. (2003), "Trust, Individualism and Job Characteristics as Predictors of Employee Preference for Teamwork," *International Journal of Human Resource Management*, 14, 1, 93–116.
- Kirkman, B.L., Rosen, B., Gibson, C.B., Tesluk, P.E., and McPherson, S.O. (2002), "Seven Challenges to Virtual Team Performance: Lessons from Sabre, Inc.," paper presented at the *17th Annual Conference for the Society for Industrial and Organizational Psychology*, Toronto, Canada.
- Kramer, R.M. (1999), "Trust and Distrust in Organizations: Emerging Perspectives, Enduring Questions," *Annual Review of Psychology*, 50, 569–598.
- Lea, R., and Spears, R. (1991), "Computer-mediated Communication, De-individuation and Group Decision-making," *International Journal of Man Machine Studies*, 34, 238–301.
- Lewis, A.C., and Sherman, S.J. (2003a), "Hiring You Makes Me Look Bad: Social-identity Based Reversal of the In-group Favoritism Effect," *Organizational Behavior and Human Decision Processes*, 90, 262–276.
- Lewis, A.C., and Sherman, S.J. (2003b), "Perceived Entitativity and the Black-sheep Effect: When will we Denigrate Negative Ingroup Members?" working paper, The University of Utah, UT.
- Lewis, J., and Wiegert, A. (1985), "Trust as a Social Reality," *Social Forces*, 63, 967–985.
- Lind, M.R. (1999), "The Gender Impact of Temporary Virtual Work Groups," *IEEE Transactions on Professional Communication*, 42, 276–285.
- Lipnack, J., and Stamps, J. (1997), *Virtual Teams: Reaching Across Space, Time and Organizations with Technology*, Canada: John Wiley and Sons.
- Luhmann, N. (1979), "Familiarity, Confidence, Trust: Problems and Alternatives," in *Trust*, ed. D.G. Gambetta, New York: Basil Blackwell, pp. 94–107.
- Malhotra, A., Majchrzak, A., Carman, R., and Lott, V. (2001), "Radical Innovation Without Collocation: A Case Study at Boeing-Rocketdyne," *MIS Quarterly*, 25, 229–249.
- Martins, L.L., Gilson, L.L., and Maynard, M.T. (2004), "Virtual Teams: What Do We Know and Where Do We Go From Here?," *Journal of Management*, 30, 6, 805–835.

- Massey, A., Hung, Y., Montoya-Weiss, M., and Ramesh, V. (2001), "When Culture and Style aren't About Clothes: Perceptions of Task-technology 'fit' in Global Virtual Teams," in the *Proceedings of the ACM Conference*, Boulder, CO, pp. 207–213.
- Mayer, R.C., Davis, J.H., and Schoorman, F.D. (1995), "An Integrative Model of Organizational Trust," *Academy of Management Review*, 20, 709–734.
- McAllister, D.J. (1995), "Affect and Cognition-based Trust as Foundations for Interpersonal Cooperation in Organizations," *Academy of Management Journal*, 38, 24–59.
- McDonough, E., Kahn, K., and Barczak, G. (2001), "An Investigation of the Use of Global, Virtual, and Collocated New Product Development Teams," *Journal of Production Innovation Management*, 18, 110–120.
- McKnight, H., Cummings, L.L., and Chervany, N.L. (1998), "Initial Trust Formation in New Organizational Relationships," *Academy of Management Review*, 23, 473–490.
- Meyerson, D., Weick, K.E., and Kramer, R.M. (1996), "Swift Trust and Temporary Groups," in *Trust in Organizations: Frontiers of Theory and Research*, eds. R.M. Kramer and T.R. Tyler, Thousand Oaks, CA: Sage.
- Mortensen, M., and Hinds, P. (2001), "Conflict and Shared Identity in Geographically Distributed Teams," *International Journal of Conflict Management*, 12, 212–238.
- Nardi, B.A., and Whittaker, S. (2002), "The Place of Face-to-Face Communication in Distributed Work," in *Distributed Work*, eds. P. Hinds and S. Kiesler, Cambridge, MA: MIT Press, pp. 83–110.
- Ocker, R., and Fjermestad, J. (2000), High versus Low Performing Virtual Design Teams: A Preliminary Analysis of Communication, in the *Proceedings of the 33rd Annual Hawaii Conference on System Sciences*, Maui, Hawaii.
- Okhuysen, G.A., and Eisenhardt, K.M. (2002), "Integrating Knowledge in Groups: How Formal Interventions Enable Flexibility," *Organization Science*, 13, 370–386.
- O'Leary, M.C., and Cummings, J.N. (2002), "The Spatial, Temporal, and Configurational Characteristics of Geographic Dispersion in Teams," paper presented at *The Annual Academy of Management Meetings*, Denver, CO.
- Pauleen, D.J. (2003), "Lessons Learned Crossing Boundaries in an ICT-supported Distributed Team," *Journal of Global Information Management*, 11, 4, 1–19.
- Porter, L.W., Lawler, E.E., and Hackman, J.R. (1975), *Behavior in Organizations*, New York: McGraw Hill.
- Rock, K.W., Pratt, M.G., and Northcraft, G.B. (2002), "The Effects of Faultlines and Communication Media on Identification in Virtual Teams," paper presented at *The Annual Academy of Management Meetings*, Denver, CO.
- Rousseau, D.M., Sitkin, S.B., Burt, R.S., and Camerer, C. (1998), "Not So Different After All: A Cross-discipline View of Trust," *Academy of Management Review*, 23, 393–404.
- Saunders, C.S. (2000), "Virtual Teams: Piecing Together the Puzzle," in *Framing the Domains of IT Management*, ed. R.W. Zmud, Ann Arbor, MI: Educational Resources, Inc, pp. 29–50.
- Shin, Y. (2004), "A Person-environment Fit Model for Virtual Organizations," *Journal of Management*, 30, 5, 725–743.
- Snow, C.C., Snell, S.A., and Davison, S.C. (1996), "Use Transnational Teams to Globalize Your Company," *Organizational Dynamics*, 24, 50–67.
- Sole, D., and Edmondson, A. (2002), "Situating Knowledge and Learning in Dispersed Teams," *British Journal of Management*, 13, S17–S34.
- Stanton, J.M., and Steinbrenner, D.A. (2002), "Information Boundary Theory for Virtual Teams," paper presented at the *17th Annual Conference for the Society for Industrial and Organizational Psychology*, Toronto, Canada.
- Staples, D.S. (1999), "A Comparison of the Impact of Employee-manager Trust on Employees in a Remote-management and Local-management Environment," paper presented at *The Annual Academy of Management Meetings*, Chicago, IL.
- Staples, D.S. (2001), "A Study of Remote Workers and Their Differences from Non-remote Workers," *Journal of End User Computing*, 13, 3–14.
- Staples, D.S., and Webster, J. (2008), "Exploring the Effects of Trust, Task Interdependence and Virtualness on Knowledge Sharing in Teams," *Information Systems Journal*, 18, in press.
- Staples, D.S., Wong, I.K., and Cameron, A.F. (2004), "Best Practices for Virtual Team Effectiveness," in *Virtual Teams: Projects, Protocols and Processes*, ed. D. Pauleen, Hershey, PA: Idea Group Publishing, pp. 160–185.
- Swann, W.B. Jr, Polzer, J.T., Seyle, D.C., and Ko, S.J. (2004), "Finding Value in Diversity: Verification of Personal and Social Self-views in Diverse Groups," *Academy of Management Review*, 29, 1, 9–27.
- Tabachnick, B., and Fidell, L.S. (2001), *Using Multivariate Statistics*, Boston, MA: Allyn and Bacon.
- Tajfel, H., and Turner, J.C. (1986), "The Social Identity Theory of Intergroup Behavior," in *Psychology of Intergroup Relations*, eds. S. Worchel and W.G. Austin, Chicago, IL: Nelson-Hall, pp. 7–24.
- Thompson, L., and Coovert, M. (2002), "Stepping up to the Challenge: A Critical Examination of Face-to-Face and Computer-mediated Team Decision Making," *Group Dynamics: Theory, Research, and Practice*, 6, 52–64.

- Tullar, W., and Kaiser, P. (2000), "The Effect of Process Training on Process and Outcomes in Virtual Groups," *The Journal of Business Communication*, 37, 408–427.
- Vogel, D., Davison, R., and Shroff, R. (2001), Sociocultural Learning: A Perspective on GSS-enabled Global Education, *Communications of the Association for Information Systems*, 7, Article 9, retrieved on 6 August 2003 from <http://cais.isworld.org/contents.asp>
- Walther, J.B. (1995), "Relational Aspects of Computer-mediated Communication: Experimental Observations Over Time," *Organization Science*, 6, 186–203.
- Warkentin, M., and Beranek, P. (1999), "Training to Improve Virtual Team Effectiveness," *Information Systems Journal*, 9, 271–289.
- Warr, P., Cook, J., and Wall, T. (1979), "Scales for the Measurement of Some Work Attitudes and Aspects Of Psychological Well-being," *Journal of Occupational Behavior*, 52, 129–148.
- Webster, J., and Staples, D.S. (2006), "Comparing Virtual Teams to Traditional Teams: An Identification of New Research Opportunities," *Research in Personnel and Human Resources Management*, 25, 183–218.
- Zárraga, C., and Bonache, J. (2003), "Assessing the Team Environment for Knowledge Sharing: An Empirical Analysis," *International Journal of Human Resource Management*, 14, 7, 1227–1245.
- Zeffane, R., and Connell, J. (2003), "Trust and HRM in the New Millenium," *International Journal of Human Resource Management*, 14, 1, 3–11.