

The Strength of Weak Ties You Can Trust: The Mediating Role of Trust in Effective Knowledge Transfer

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Research has demonstrated that relationships are critical to knowledge creation and transfer, yet findings have been mixed regarding the importance of relational and structural characteristics of social capital for the receipt of tacit and explicit knowledge. We propose and test a model of two-party (dyadic) knowledge exchange, with strong support in each of the three companies surveyed. First, the link between strong ties and receipt of useful knowledge (as reported by the knowledge seeker) was mediated by competence- and benevolence-based trust. Second, once we controlled for these two trustworthiness dimensions, the structural benefit of *weak* ties emerged. This finding is consistent with prior research suggesting that weak ties provide access to nonredundant information. Third, competence-based trust was especially important for the receipt of tacit knowledge. We discuss implications for theory and practice.

Key words: knowledge transfer; trust; tie strength

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Introduction

Promoting knowledge creation and sharing within organizations is an increasingly important challenge for managers (Kogut and Zander 1992). Organizations that can make full use of their collective expertise and knowledge are likely to be more innovative, efficient, and effective in the marketplace (Argote 1999, Grant 1996, Wernerfelt 1984). In practice, however, knowledge transfer has proven a difficult challenge (Argote et al. 2000, Szulanski 1996). At least three separate literatures—on social networks, trust, and organizational learning/knowledge—have addressed aspects of the problem. Yet little research has considered the interrelationships between these literatures, a point with which we are principally concerned in this paper. We propose and test a theoretical model that synthesizes these streams at the dyadic level of analysis. We are particularly interested in establishing whether stronger or weaker ties provide more useful knowledge and why. To this end, we investigate the role of perceived trustworthiness as a mechanism by which strong ties enable learning. We also consider how the role of perceived trustworthiness depends on the type of knowledge transferred.

Our focus in this study lies with knowledge that improves outcomes of a knowledge seeker's work.

We use the term *receipt of useful knowledge* to denote the perceived receipt of information and/or knowledge that has a positive impact on a knowledge seeker's work. Foundational research on learning in and by organizations has focused on either cognitive development (Daft and Weick 1984) or behavioral change (Cyert and March 1963, Nelson and Winter 1982). By focusing on outcomes, our study is more consistent with the latter, behavioral tradition of organizational learning (Levitt and March 1988). Specifically, we concentrate on interpersonal knowledge transfer, which Argote (1999) has identified as a key building block of organizational learning. We do not focus, however, on people's propensity to seek out a knowledge source in the first place. This distinction is subtle but important. While there may be several reasons unrelated to trust—such as convenience—for why people seek information from others, these reasons do not necessarily result in learning.

Structural Characteristics and Knowledge Transfer Work dating to Pelz and Andrews (1966), Mintzberg (1973), and Allen (1977) indicates that people prefer to turn to other people rather than documents for information. For example, Allen (1977) found that engineers and scientists were roughly five times more

likely to turn to a person for information than to an impersonal source such as a database or file cabinet. More recently, this same tendency has been found even for people with ready access to the Internet and their firm's extensive intranet (Cross and Sproull 2004). In general, researchers have found relationships to be important for acquiring information (Burt 1992), learning how to do one's work (Lave and Wenger 1991), and solving complex problems (Hutchins 1991).

Social network theorists have focused much attention on structural properties of networks (Adler and Kwon 2002), such as structural holes at the network level (Burt 1992) and tie strength at the dyadic level (Granovetter 1973). Tie strength—a concept ranging from weak ties at one extreme to strong ties at the other—characterizes the closeness and interaction frequency of a relationship between two parties (Granovetter 1973, Hansen 1999, Marsden and Campbell 1984), here a knowledge seeker and knowledge source. At the dyadic level, theories have arisen around both extremes of the tie-strength concept, with research finding advantages to both strong and weak ties. Granovetter (1973), in his study of how people find jobs, theorized that weak ties—those typified as distant and by infrequent interaction—were more likely to be sources of novel information, because strong ties tend to be connected to others who are close to a knowledge seeker and so trafficking in information the seeker already knows. Subsequent research on the importance of weak ties has demonstrated that they can be instrumental, not only to finding a job, but also to the diffusion of ideas (Granovetter 1982, Rogers 1995), public information (Uzzi and Lancaster 2003), and technical advice (Constant et al. 1996).

On the other hand, strong ties have been claimed to be important because they are more accessible and willing to be helpful (Krackhardt 1992). Further, many studies have shown that strong ties are important conduits of useful knowledge (Ghoshal et al. 1994; Hansen 1999; Szulanski 1996; Uzzi 1996, 1997). Despite the noted benefits, however, there has been little study as to why strong ties should yield useful knowledge. Clarifying substantive relational characteristics that promote receipt of useful knowledge may help resolve discrepant findings on the benefits of weak versus strong ties. We turn to one such characteristic—trust.

Relational Characteristics and Knowledge Transfer

Mayer et al. (1995, p. 712) define trust as “the willingness of a party to be vulnerable.” Our focus here is on the closely related concept of perceived trustworthiness—that quality of the trusted party that makes the trustor willing to be vulnerable. The trust literature (see Dirks and Ferrin 2001, Mayer et al.

1995 for reviews) provides considerable evidence that trusting relationships lead to greater knowledge exchange: When trust exists, people are more willing to give useful knowledge (Andrews and Delahay 2000, Penley and Hawkins 1985, Tsai and Ghoshal 1998, Zand 1972) and are also more willing to listen to and absorb others' knowledge (Carley 1991, Levin 1999, Mayer et al. 1995, Srinivas 2000). By reducing conflicts and the need to verify information, trust also makes knowledge transfer less costly (Currall and Judge 1995, Zaheer et al. 1998). These effects have been found at the individual and organizational levels of analysis in a variety of settings.

A few researchers have looked simultaneously at the impact of structural and relational variables on the receipt of useful knowledge. For example, Levin (1999) found that strong, trusting ties usually helped improve knowledge transfer between scientists and engineers, but that trust alone could substitute when only weak ties existed. Drawing on Coleman (1988) and others, Tsai and Ghoshal (1998, p. 465) found that at the department level the “structural dimension of social capital, manifesting as social interaction ties, [helps to] stimulate trust and perceived trustworthiness, which represent the relational dimension of social capital,” which, in turn, leads to the exchange of more resources (including knowledge) between departments. Tsai and Ghoshal (1998), however, conceptualized trustworthiness as a single dimension, whereas the trust literature has come to identify multiple dimensions (Mayer et al. 1995). McAllister (1995) has demonstrated empirically the importance of two types of trust: affect based and cognition based. Similarly, Mayer et al. (1995) identify benevolence, which has a large affective component, and competence, which has a large cognitive component, as two key trust dimensions. We have chosen to concentrate on these dimensions of benevolence and competence, given the relevance of these dimensions to the knowledge-seeking context (Levin 1999).¹ We seek

¹ Mayer et al. (1995) identify yet another dimension of trustworthiness, integrity, defined as consistently adhering to a set of principles that the trustor finds acceptable. Integrity—along with the related dimensions of dependability (Zaheer et al. 1998), promise keeping (Tsai and Ghoshal 1998), and honesty (McKnight et al. 1998)—is clearly important in many situations. Parties to a market exchange, teammates counting on each other to complete certain tasks, or subordinates committing their career progression to a superior are surely affected by the perceived integrity of others. Yet, it is not clear that the usefulness of knowledge received from another person is contingent on that person's following a particular set of principles consistently. For example, malevolent integrity—a condition of low benevolence and high integrity—might apply to situations that are purely competitive, such as two boxers trying to hurt each other but still playing by the rules. However, it is unlikely that knowledge seekers would make much distinction—especially *after* seeking out a knowledge source—between someone out to harm

to expand on Tsai and Ghoshal's (1998) findings by considering trustworthiness multidimensionally. In addition, we hope to enrich their findings by further exploring interactions between these dimensions of trustworthiness and theoretically important characteristics of the knowledge exchanged.

Knowledge Characteristics and Knowledge Transfer

The organizational learning and knowledge literature often focuses on the type of knowledge transferred (Cohen and Sproull 1996, Szulanski 1996, Uzzi and Lancaster 2003, Zander and Kogut 1995). For example, researchers frequently divide organizational knowledge into two types: *explicit* knowledge—knowledge that can be codified—and *tacit* knowledge—knowledge that is difficult to articulate (Nonaka 1994, Polanyi 1966). While beneficial to an organization, tacit knowledge also turns out to be quite difficult to transfer. For example, tacit knowledge takes time to explain and learn, and so tends to slow the transfer of manufacturing capabilities (Zander and Kogut 1995) and new product development projects (Hansen 1999).

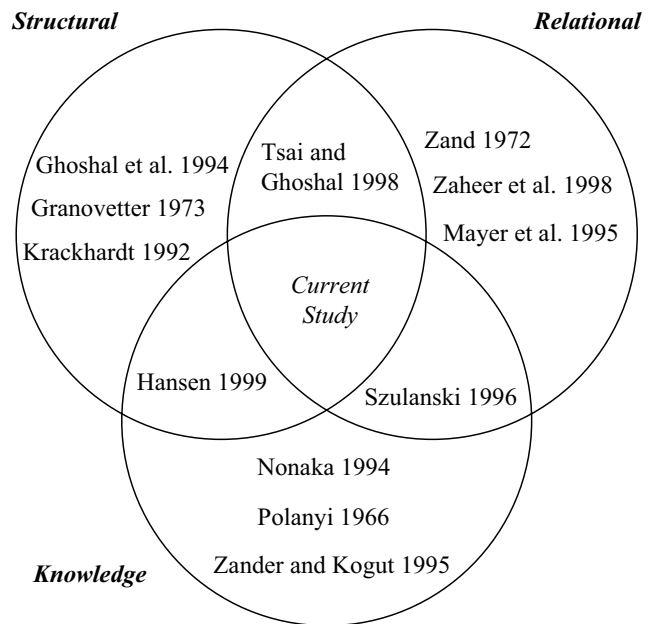
Besides the direct effect of tacit knowledge, Hansen (1999) has proposed that knowledge tacitness moderates the impact of tie strength on project outcomes. He concluded that because weak ties are less costly to maintain, having a network of mainly weak ties is advantageous for projects requiring the receipt of mostly explicit knowledge. This knowledge contingency, though, addresses performance at the network level of analysis and does not characterize the knowledge benefits flowing from *each* tie. In this paper we extend Hansen's (1999) knowledge contingency by examining its effects on perceived trustworthiness at the dyadic level.

All Three Characteristics and Knowledge Transfer

We propose that these three characteristics—structural, relational, and knowledge related—be considered in modeling knowledge sharing at the dyadic level. While scholars have addressed one or two of these, as shown in Figure 1, we propose an integrative model to resolve disparate findings for tie strength and to develop a more nuanced view of the role of perceived trustworthiness and knowledge characteristics in the knowledge-seeking context. We now turn to our hypotheses, methods for conducting the research, results, and implications of our findings.

them versus someone honest and consistent about an intention to harm them. Future researchers, however, may wish to examine this issue in more detail.

Figure 1 Selected Cites of Structural, Relational, and Knowledge-Related Characteristics and Knowledge Transfer



Theoretical Model

Tie Strength and Receipt of Useful Knowledge

Social network researchers have demonstrated benefits of both weak and strong ties to knowledge acquisition. Although contingencies have been proposed, evidence suggests that strong ties lead to greater knowledge exchange (Ghoshal et al. 1994; Hansen 1999; Szulanski 1996; Uzzi 1996, 1997). Presumably, strong ties are more likely to expend effort to ensure that a knowledge seeker sufficiently understands and can put into use newly acquired knowledge (Hansen 1999, Krackhardt 1992). Consistent with these findings, we suggest that strong ties are instrumental to providing knowledge that a knowledge seeker will use. Stated formally:

HYPOTHESIS 1. *Stronger ties—more so than weaker ones—lead to the receipt of useful knowledge.*

Perceived Trustworthiness Mediates Between Strong Ties and Receipt of Useful Knowledge

Why should strong ties be effective in providing useful knowledge? We argue, consistent with Tsai and Ghoshal (1998), that such relationships are helpful because they *tend* to be trusting. We suggest that benevolence- and competence-based trust mediate the link between strong ties and receipt of useful knowledge. Trusting a knowledge source to be benevolent and competent should increase the chance that the knowledge receiver will learn from the interaction. When knowledge seekers ask for information, they become vulnerable to the benevolence of the knowledge source (Lee 1997), e.g., in terms

of their reputation (Burt and Knez 1996). Further, defensive behaviors have been shown to block learning for both individuals and groups (Argyris 1982, Edmondson 1999). Benevolence-based trust likely shapes the extent to which knowledge seekers will be forthcoming about their lack of knowledge, even *after* seeking out the knowledge source, and so creates conditions for learning. Moreover, benevolence-based trust—with its associated learning benefits—is more likely to occur among strong ties (Currall and Judge 1995, Glaeser et al. 2000), presumably due to greater emotional bonds.

Trust in another's competence should also affect the perceived usefulness of knowledge received. Knowledge seekers who trust a source's competence to make suggestions and influence their thinking are more likely to listen to, absorb, and take action on that knowledge. People are likely to have greater trust in the competence of their strong ties for two reasons. First, as the two parties develop a strong tie, each calibrates on the other's true skills and expertise and so learns to seek advice in those domains in which the other person is competent (Rulke and Rau 2000). This narrowing process should increase competence-based trust, as restricting the domain of queries to the other party's area of expertise will lead to increasingly positive interactions. Second, strong ties tend to develop common ways of thinking and communicating (Walker 1985), and this type of shared cognition—e.g., common goals (Tsai and Ghoshal 1998), similar jargon (Levin 1999)—is associated with greater trust. Stated formally:

HYPOTHESIS 2. *The link between strong ties and receipt of useful knowledge is mediated by (a) benevolence-based trust, and (b) competence-based trust.*

Perceived Trustworthiness + Weak Ties = Useful Knowledge

As outlined above, a weak tie is structurally beneficial because it is more likely than a strong tie to provide nonredundant information (Burt 1992, Granovetter 1973). This effect is related to the information a knowledge source might have and so is conceptually independent of that source's perceived trustworthiness.² In the context of knowledge seeking, trust

² Although having a strong tie relationship with someone might mean you also trust that person (Currall and Judge 1995, Sniezek and Van Swol 2001), the two concepts—tie strength and trust—are not synonymous. For example, tie strength can be a function of work interdependence beyond the voluntary control of the individual. In such situations, a relationship can be characterized as a strong tie, yet not result in a person trusting a coworker with whom he or she is forced to work. Conversely, sometimes people *do* trust someone whom they do not know well. For example, temporary groups, with little or no prior history, have been found to develop swift trust (Meyerson et al. 1996), such as when people

reflects a *relational* variable by which learning in an interaction is enabled and enriched. In contrast, tie strength is a *structural* variable where weaker ties reflect a path along which new information or novel insights are more likely to travel in comparison to stronger ties. By way of illustration, consider scenarios where trust is low and high. In the first scenario, among knowledge sources not perceived to be all that trustworthy, one would expect to see a disproportionately large number of weak ties, as trust and tie strength are often correlated. Nevertheless, among these less-than-fully-trusted ties, the (more common) weaker ties can at least draw on their greater structural ability to provide novel and potentially useful knowledge. In contrast, those few cases of less-than-fully-trusted strong ties will provide neither a relational nor a structural benefit. In the second scenario, among knowledge sources perceived to be highly trustworthy, one would expect to see a disproportionately large number of strong ties. Yet these trusted strong ties, while providing relational benefits described in Hypothesis 2, are less likely to provide the structural benefit of nonredundant knowledge. Thus, the *most* useful knowledge would come from those instances of trusted weak ties, which can provide both a relational and structural benefit.

In sum, we argue that when trust is low, weak ties will provide more useful knowledge than strong ties, and when trust is high, weak ties will also provide more useful knowledge than strong ties. Note that we do not argue that strong ties will hurt a knowledge seeker with wrong or misleading knowledge. On the contrary, trusted strong ties are still, no doubt, helpful in the knowledge they provide. However, trusted weak ties may be even more helpful due to their added ability to provide nonredundant information. Stated formally:

HYPOTHESIS 3. *After controlling for competence- and benevolence-based trust, it is weaker ties—more so than stronger ones—that lead to the receipt of useful knowledge.*

Type of Knowledge as a Contingency

In some cases, the impact of perceived trustworthiness on receipt of useful knowledge, while positive overall, might also be contingent on the type of knowledge transferred. When the knowledge is explicit, trust in the competence of the knowledge source might not be as critical, because the knowledge stands alone and can be understood apart from the

trust others based on credentials reflecting expertise in a domain or when a third-party referral or reputation alone promotes trust. So, while trust and tie strength are related—indeed, Gulati (1994) has used tie strength as a proxy for trust and Krackhardt (1992) has described strong ties in terms of trust—the two concepts are conceptually distinct.

competence of the source. In contrast, tacit knowledge entails insights, intuitions, and beliefs that are tightly intertwined with the experience of the knowledge source (Bateson 1978, Polanyi 1966). Such knowledge is subjective and difficult to articulate (Brown and Duguid 1991, Nonaka 1994, Tyre and von Hippel 1997). As a result, acquiring tacit knowledge relies on the quality of a knowledge seeker’s relationship with a knowledge source (Simonin 1999). Thus, knowledge seekers must likely trust the competence of a source sharing tacit knowledge to a greater degree than a source sharing explicit knowledge. In contrast, benevolence-based trust is likely to always matter. If knowledge seekers believe a knowledge source may want to harm them, they will be cautious in admitting the extent of their own lack of knowledge and reluctant to learn from any transferred knowledge, regardless of its tacitness, for fear that it might be wrong or misleading.

HYPOTHESIS 4. *Competence-based trust is more important to the receipt of useful knowledge when that knowledge is tacit than when it is explicit.*

In sum, we propose a model (see Figure 2) of dyadic-level knowledge exchange whereby benevolence- and competence-based dimensions of perceived trustworthiness mediate the link between strong ties and the receipt of useful knowledge. Moreover, we argue that if we hold constant both of these dimensions of trust, structural benefits of weak ties will

emerge. We also propose that competence-based trust will be even more important when the knowledge is tacit.

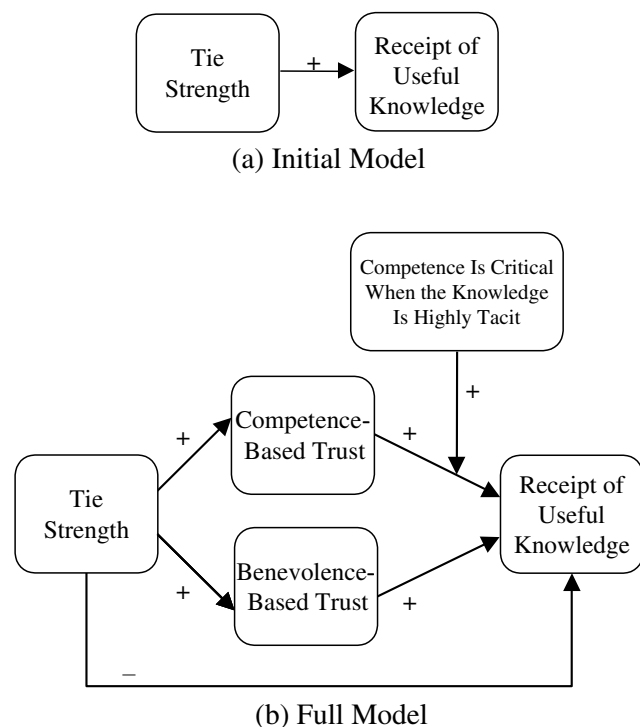
Methods

Sample

We surveyed all employees within three divisions: one in an American pharmaceutical company, one in a British bank, and one in a Canadian oil and gas company. None of the organizations financially sponsored the study. Preliminary interviews revealed that all three groups were midlevel professionals engaged in knowledge-intensive work (research and development, financial modeling, and oil exploration) who relied heavily on colleagues for information to solve problems and coordinate work. Having sites from three different industries and countries increased our confidence in the study’s external validity. We found no significant interaction effects between our predictor variables and dummy variables corresponding to the three firms (i.e., our results were the same in each firm), so we pooled the data for analysis.

A total of 127 respondents—42 from the pharmaceutical company, 41 from the bank, and 44 from the oil and gas company—completed the entire survey (response rate = 48%). Each respondent reported on four relationships, thereby generating an initial total sample of 508 observations. Respondents, 61% of whom were men, did not significantly differ by gender or office location from the group of people sent surveys (these were the only nonrespondent demographics available to us). Most respondents (70%) were in their 30s or 40s, with a median age in the early 40s. The average respondent had worked in his or her division for 5.2 years; company, 10.4 years; and industry, 15.3 years. Nearly half (47%) of the respondents had a graduate or professional degree, and more than two-thirds (68%) had graduated from college.

Figure 2 Theoretical Model



Data Collection

We used a two-part survey, administered via e-mail as a Microsoft Excel attachment, which took 40–60 minutes to complete. We split the survey for two reasons. First, to improve the response rate and the quality of responses, we wanted to lessen the burden of the overall survey by creating two 20- to 30-minute surveys instead of a more intimidating 40- to 60-minute survey. Second, this split allowed us to reduce “common methods” bias of respondents by separating responses for the outcome and predictor variables (Doty and Glick 1998, Morrison 2002). Participants were guaranteed that their responses would be held confidential and only aggregate-level data reported back to their organization. Further, all surveys were returned directly to the researchers to

reduce the likelihood of biased answers. A pretest with 20 respondents—from firms other than those we surveyed for hypothesis testing—was also conducted for instrument validation.

Using standard egocentric network survey techniques (Burt 1992, Wasserman and Faust 1994), we asked respondents, “Consider a project that you are currently involved with or that ended recently (in the past three months) that you feel holds significance for your career.” Most (77%) chose an ongoing project. The median length of project involvement, for both ongoing and completed projects, was six months. Respondents then listed up to 10 or 15 people to whom they had turned for information or knowledge to get their work done on that project. To get a balanced view of each person’s network, we asked respondents to choose the two most helpful and two least helpful advice givers from their list. We chose this approach to obtain a less biased sample than if we had simply asked respondents to pick the top four advice givers. Moreover, analysis of residuals provided assurance that this approach did not violate statistical assumptions of normality and constant variance. The rest of the survey then asked questions about the four people chosen (e.g., how much did you trust this person?). Within a week or so after completing Part A, respondents received Part B of the survey, which asked different questions about the four people (e.g., how useful was the knowledge received from each person?).

Though trust is typically reciprocated (Butler 1991), many knowledge exchanges are asymmetric, as knowledge seekers and sources can have different perceptions of the value of an interaction. As a result, we chose to focus on the knowledge seeker’s perception of usefulness. We considered using additional data sources (e.g., project results, supervisor ratings), but concluded that—at the *dyadic* level of analysis—a knowledge seeker is the best, perhaps the only, judge of the usefulness of knowledge received from a particular source. Any “common methods variance” resulting from this approach appeared to be minor, according to Harman’s one-factor test. Moreover, Doty and Glick (1998), who quantitatively examined this issue, found that bias is more pronounced when constructs are not concrete, but less pronounced when there is a time interval between data collection periods (as in our study). Overall, they concluded, “most observed relationships are 26% more positive than the true relationships. [Thus], we need to consider if reported results would still be significant if the observed relationship was 26% more negative” (p. 400). Even after such a correction, however, all of our hypothesized effects would still be at least marginally significant ($p < 0.10$) or fully significant ($p < 0.05$). Further, Brockner et al. (1997) have noted

that common methods bias is less of a concern for studies (like ours) with an interaction effect, because it shows that respondents did not unthinkingly rate all items as either high or low. Thus, we conclude that our findings are fairly robust to common methods bias.

We were also able to rule out another validity concern. A pretest respondent noted that all of the knowledge he received from one source was sound, but for unrelated reasons, the project went in a different direction and so that knowledge turned out to be useless. To ensure that our outcome variable was not confounded by such unforeseen factors, we asked, “To what extent were your answers on this Outcomes page affected by circumstances completely beyond the control of this person?” [1 = to no extent; 2 = to little extent; 3 = to some extent; 4 = to a great extent; 5 = to a very great extent]. We then interacted this *no control* variable with each of our predictor variables and found no significant effects. Thus, we conclude that our findings are robust to circumstances perceived to be beyond the control of the knowledge source.

Variables

We adapted most of the survey items (see the appendix) from preexisting scales in the literature. All multi-item constructs—including tie strength and the two trustworthiness dimensions—showed good discriminant validity based on factor analysis, using scree plots of eigenvalues, principal axis factoring with direct oblimin rotation, and all expected factor loadings above 0.4. Constructs had good convergent validity as well, with all Cronbach’s alphas above 0.70. Multi-item variables were based on an unweighted average of relevant items.

Outcome Variable. We combined eight items, adapted from Hansen (1999), Hansen and Haas (2001), Keller (1994), and Szulanski (1996), to create *perceived receipt of useful knowledge*: four items related to project efficiency in terms of time and budget and four items related to project effectiveness. These eight items asked to what extent the knowledge received from each person hurt or helped key aspects of the project’s outcomes.

Predictor Variables. We adapted the first two items for *tie strength*—closeness of a working relationship and communication frequency—from Hansen (1999). While researchers often use an emotional dimension to operationalize tie strength (Marsden and Campbell 1984), we followed Hansen’s (1999) approach of employing a work-related meaning of closeness given the organizational context. Based on pretest feedback, we clarified that the weak-tie end of Hansen’s (1999) scale included new ties with no prior contact.

To enhance reliability, we also added a third item later in Part A of the survey on interaction frequency. Because the three items used different scales, we normalized each before creating the overall variable. As a validity check, we tested tie strength in all our analyses solely based on Hansen's (1999) two unstandardized items and also based on just the two normalized items for frequency of communication and of interaction (Cronbach's alphas > 0.80), all with similar results. This latter analysis was done to rule out the alternative explanation that the closeness item somehow overlapped with perceived trustworthiness, even though factor analysis suggested no overlap.

Benevolence-based trust was adapted from three items used by Johnson et al. (1996). These items are similar to those used by Mayer and Davis (1999). *Competence-based trust* was taken from the two top-loading items used in McAllister's (1995) cognition-based trust. These two items were also used by Chattopadhyay (1999) and are similar to those used by Mayer and Davis (1999) for their ability dimension of trustworthiness.

We assessed *tacit knowledge* using Hansen's (1999) three items. To measure the interaction between competence-based trust and tacit knowledge, we multiplied the two variables together to create *competence-based trust * tacit knowledge*. To avoid a problem of multicollinearity, we used "mean centering" for competence-based trust (initial mean = 6.03) and tacit knowledge (initial mean = 4.04), a procedure which left unchanged each variable's standard deviation (Jaccard et al. 1990). Because the two trustworthiness dimensions were somewhat skewed, we re-ran all of the regressions with a logarithmically transformed version of each variable ($= -\log[8 - \text{initial score on } 1-7 \text{ scale}]$) and found even stronger results.

Control Variables. The decades-old call "for research on how formal organization hierarchy shapes informal social relations...has largely gone unanswered" (Adler and Kwon 2002, p. 27). So, to rule out alternative explanations, we controlled for the relative position of the knowledge seeker and source in the organization's formal structure in terms of *organizational proximity*, *physical proximity*, *on same project* (the relevant form of task interdependence for the work we were studying), and *hierarchical level*. For this last variable, we recoded the "does not apply" responses as missing values. To ensure that we could generalize results to knowledge sources outside the hierarchy, we re-ran the regression analyses without this control variable (i.e., with people outside of the organization included) and obtained even stronger results.

To control for people's affinity for similar others (homophily), we asked if the knowledge source and receiver were the *same gender* or *same age* plus or

minus five years. Finally, respondents with expertise might not find additional knowledge from others to be so useful, or they might feel less need than novices to trust their knowledge sources. We therefore controlled for *receiver's expertise*, based on three dyad-specific items adapted from Srinivas (2000).

Analysis Techniques

We analyzed the data using hierarchical multiple regression. A listwise deletion of missing values reduced our sample from 508 to 400 observations (and from 127 to 118 respondents). To account for any nonindependence, because each respondent reported on four knowledge sources, we included 117 dummy variables to represent the 118 respondents. Besides correcting for much of the nonindependence, these also served to control for any respondent characteristics such as age, education, gender, job tenure, company, and so on. This approach does tax our degrees of freedom, but our sample size remains more than adequate for ordinary least squares (OLS) procedures. Because this approach may not be entirely correct for nonindependence, we also analyzed our data using hierarchical linear modeling (HLM), a technique that does not rest on the assumption of independent observations. Our HLM results (not shown) were the same as or stronger than the more conservative OLS results presented here. We also tested for multicollinearity and found no evidence of it, as the variance inflation factors for our predictor variables were all less than 5 (well below the standard cutoff of 10).

Results

Table 1 shows descriptive and skewness statistics, internal reliabilities, and simple correlations among the variables used in the regression equations in Table 2. All incremental *R*-squared changes from one equation to the next were statistically significant ($p < 0.05$).

Hypothesis 1: Strong Ties

As predicted by Hypothesis 1, strong ties did have a positive and statistically significant ($p = 0.006$) overall effect on receipt of useful knowledge (Equation 2). In a separate analysis not shown here, we detected no interaction effect between tie strength and tacit knowledge, contrary to Hansen's (1999) findings for a division's mixture of strong versus weak ties. We attribute this difference to our focus on the benefits received from each dyadic tie, rather than from a portfolio of ties.

Hypothesis 2: Perceived Trustworthiness as Mediator

All four conditions were met for demonstrating that benevolence- and competence-based trust mediated the link between strong ties and perceived

Table 1 Means, Standard Deviations, Skewness, Correlations, and Internal Reliabilities^a

Variable	Mean	S.D.	Skew	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Receipt of useful knowledge	5.29	1.09	-0.75	(0.93)												
2. Organizational proximity	3.52	1.31	-0.18	0.04	—											
3. Physical proximity	4.08	1.76	0.12	0.21**	0.46**	—										
4. On same project	0.76	0.43	-1.21	0.29**	0.04	0.14**	—									
5. Hierarchical level	3.12	1.26	-0.12	-0.05	0.02	0.01	-0.10	—								
6. Same gender	0.67	0.47	-0.71	0.04	-0.14**	-0.05	0.02	-0.05	—							
7. Same age	0.42	0.49	0.34	-0.13*	-0.02	-0.04	-0.04	0.02	0.01	—						
8. Receiver's expertise	4.44	1.57	-0.33	0.12*	0.06	0.05	-0.06	0.01	-0.12*	-0.02	(0.79)					
9. Tacit knowledge	0.00	1.67	0.05	-0.39**	0.13**	-0.04	-0.26**	0.25**	-0.06	0.11*	-0.07	(0.79)				
10. Tie strength	0.00	0.91	0.17	0.28**	0.35**	0.38**	-0.02	0.09	-0.04	-0.02	0.31**	-0.04	(0.90)			
11. Benevolence trust	5.11	1.38	-0.50	0.51**	0.14**	0.27**	-0.03	0.06	0.05	-0.06	0.18**	-0.15**	0.57**	(0.90)		
12. Competence trust	0.00	1.10	-1.45	0.49**	0.11*	0.21**	0.02	0.10*	0.02	-0.15**	0.17**	-0.22**	0.41**	0.63**	(0.80)	
13. Competence * tacit	-0.40	1.83	-1.91	0.15**	0.00	0.03	-0.07	0.03	0.06	-0.10*	-0.07	0.06	-0.01	0.16**	0.35**	—

^a*n* = 400. Internal reliabilities are presented along the diagonal in parentheses.
 Two-tailed tests; **p* < 0.05; ***p* < 0.01.

Table 2 OLS Regression Results^a

Variable	Perceived receipt of useful knowledge				
	Equation (1)	Equation (2)	Equation (3)	Equation (4)	Equation (5)
Respondent controls	not reported	not reported	not reported	not reported	not reported
Organizational proximity	0.08 (0.06)	0.04 (0.06)	-0.01 (0.05)	0.01 (0.05)	0.01 (0.05)
Physical proximity	0.12*** (0.04)	0.09* (0.04)	0.06† (0.03)	0.08* (0.03)	0.08* (0.03)
On same project	0.66*** (0.15)	0.66*** (0.14)	0.60*** (0.12)	0.59*** (0.12)	0.61*** (0.12)
Hierarchical level	0.00 (0.05)	-0.01 (0.05)	-0.07† (0.04)	-0.07† (0.04)	-0.08† (0.04)
Same gender	0.15 (0.12)	0.11 (0.12)	0.11 (0.10)	0.15 (0.10)	0.16 (0.10)
Same age	-0.20† (0.11)	-0.17 (0.11)	-0.12 (0.10)	-0.14 (0.10)	-0.13 (0.10)
Receiver's expertise	-0.07 (0.06)	-0.10† (0.06)	-0.16** (0.05)	-0.14** (0.05)	-0.13* (0.05)
Tacit knowledge	-0.20*** (0.04)	-0.19*** (0.04)	-0.12*** (0.03)	-0.12*** (0.03)	-0.12*** (0.03)
Tie strength		0.21** (0.08)		-0.18* (0.07)	-0.17* (0.07)
Benevolence trust			0.35*** (0.05)	0.40*** (0.05)	0.40*** (0.05)
Competence trust			0.16** (0.06)	0.17** (0.06)	0.11† (0.06)
Competence * tacit					0.06* (0.03)
<i>R</i> ² =	0.582	0.594	0.708	0.714	0.720
Adjusted <i>R</i> ² =	0.392	0.406	0.572	0.579	0.586
Variable	Benevolence-based trust		Competence-based trust		
	Equation (6)	Equation (7)	Equation (8)	Equation (9)	
Respondent controls	not reported	not reported	not reported	not reported	
Organizational proximity	0.21** (0.07)	0.07 (0.06)	0.09 (0.06)	0.02 (0.05)	
Physical proximity	0.14** (0.05)	0.03 (0.04)	0.09* (0.04)	0.03 (0.04)	
On same project	0.16 (0.18)	0.17 (0.16)	0.02 (0.15)	0.02 (0.14)	
Hierarchical level	0.13* (0.06)	0.10† (0.05)	0.14** (0.05)	0.12* (0.05)	
Same gender	0.10 (0.15)	-0.07 (0.13)	0.03 (0.12)	-0.06 (0.12)	
Same age	-0.13 (0.14)	-0.01 (0.13)	-0.24* (0.12)	-0.18 (0.11)	
Receiver's expertise	0.21** (0.08)	0.07 (0.07)	0.12* (0.06)	0.06 (0.06)	
Tacit knowledge	-0.15** (0.05)	-0.12** (0.04)	-0.19*** (0.04)	-0.17*** (0.04)	
Tie strength		0.81*** (0.09)		0.41*** (0.08)	
<i>R</i> ² =	0.580	0.685	0.571	0.612	
Adjusted <i>R</i> ² =	0.389	0.539	0.376	0.433	

^a*n* = 400. Unstandardized coefficients shown with standard errors in parentheses.
 †*p* < 0.10; **p* < 0.05; ***p* < 0.01; ****p* < 0.001.

receipt of useful knowledge. First, tie strength alone had a positive impact ($p = 0.006$) on the outcome variable (Equation (2)). Second, tie strength had a positive impact on the mediators, benevolence- ($p < 0.001$) and competence-based trust ($p < 0.001$) (Equations (7) and (9)). Third, benevolence- ($p < 0.001$) and competence-based trust ($p = 0.009$) each had a positive impact on the outcome variable (Equation (3)). Fourth, the positive effect of strong ties on outcomes disappeared once we controlled for the positive and significant effects of the two trustworthiness dimensions (Equation (4)); i.e., although tie strength's coefficient remained statistically significant, its sign became negative (see Hypothesis 3). This result is similar to that of Branscombe et al. (1999), where a predictor variable (like tie strength here) had a direct effect on outcomes that was negative—but, simultaneously, had a positive effect on a mediating variable (like benevolence- and competence-based trust here), which in turn had a positive effect on outcomes (like receipt of useful knowledge here). Thus, the direct effect is negative but the indirect effect via the mediators is positive (see Figure 2).

Because the regression results effectively passed all four tests for mediation, we can say that the positive impact of strong ties on the receipt of useful knowledge existed because strong ties were typically associated with benevolence-based and competence-based trust. (We leave open the possibility for future research that strong ties might have both direct and indirect effects on perceived trustworthiness.) Thus, as predicted by Hypotheses 2a and 2b, taking these two dimensions of perceived trustworthiness into account removed any positive effect of strong ties.

Hypothesis 3: Weak Ties (Controlling for Perceived Trustworthiness)

As predicted by Hypothesis 3, the direct effect of strong ties on the receipt of useful knowledge was less than that of weak ties once we controlled for perceived trustworthiness. That is, we see a switch from the overall benefit of strong ties before controlling for perceived trustworthiness to the benefit of *weak* ties after controlling for perceived trustworthiness. In an analysis not shown, we found that knowledge received from strong ties still positively contributed to project outcomes (i.e., was above the neutral point of 4 on the 1–7 outcomes scale), but knowledge received from weak ties contributed even more positively. As in the Branscombe et al. (1999) study previously mentioned, these results appear to be due to a suppression effect (Cohen and Cohen 1983, pp. 94–96). The total effect (both direct and indirect) of tie strength on outcomes appeared positive in Equation (2) because the positive *indirect* effect of strong ties (via trust) was so strong that it suppressed the *direct* effect of weak ties.

Multicollinearity problems would not explain these results, given the low variance inflation factors. In addition, multicollinearity leads to unstable regression coefficients and large standard errors (Cohen and Cohen 1983, p. 116), neither of which occurred here.

Hypothesis 4: Type of Knowledge as a Contingency

As predicted by Hypothesis 4, there was an interaction effect for competence-based trust with tacit knowledge ($p = 0.021$). By inserting a high and low value (one standard deviation above and below the mean) for tacit knowledge into Equation (5), we can use *t*-tests to examine the specific nature of this interaction (Jaccard et al. 1990). Controlling for everything else in Equation (5), competence-based trust had a major impact on knowledge transfers involving highly tacit knowledge (slope = 0.21, $p = 0.006$). For knowledge of average tacitness, competence-based trust was only marginally significant (slope = 0.11, $p = 0.095$), although it was fully statistically significant when tested with HLM ($p < 0.001$) and in OLS after it was logarithmically transformed to reduce skewness ($p = 0.003$). For transfers involving codified knowledge, though, competence-based trust did not provide any benefit (slope = 0.00, $p = 0.993$). Thus, the more that a knowledge transfer involved tacit knowledge, the more crucial it was—if the knowledge received was to be of any use—that the knowledge receiver trust the competence of the source. However, when a knowledge transfer involved only well-documented information, competence-based trust was not critical. As expected, an interaction effect for benevolence-based trust was not supported.

Ruling Out Alternative Explanations

To help rule out the alternative explanation that it was friendship—and not perceived trustworthiness—that mediated the link between strong ties and receipt of useful knowledge, we included a measure of *friendship* in our survey. Because the term *friend* is ambiguous and can be used in a fairly unsystematic fashion (Fischer 1982), we sought to operationalize friendship as non-work-related interaction via two items (Cronbach's alpha = 0.62). The regression results for Equations (3)–(5) were unchanged with or without this friendship variable, which was not significant in these equations in any event. Thus, it does not appear that this study's perceived trustworthiness measures were merely proxies for nonwork friendships.

Krackhardt (1992), quoting Granovetter (1982, p. 113), noted that “strong ties have greater motivation to be of assistance and are typically more easily available.” Thus, to rule out the alternative explanation that it was a knowledge source's perceived willingness to be available—and not perceived trustworthiness—that mediated the relationship between strong ties

and effective knowledge transfer, we added a measure for *availability* to Equations (3)–(5) (not shown). This variable was a three-item measure (Cronbach's $\alpha = 0.86$) adapted from Butler (1991). When we added this variable to Equations (3)–(5), it was never statistically significant, and there was no change in statistical significance of the variables in our model. Thus, our results were robust to this alternative explanation.

Discussion and Conclusion

This study is a first step toward integrating structural, relational, and knowledge-related research on dyadic knowledge exchange. As part of this effort, we assessed the role of perceived trustworthiness as a critical mechanism underlying the knowledge benefits of strong ties. Although trust has been shown in prior research to be correlated with effective knowledge transfer (Andrews and Delahay 2000, Penley and Hawkins 1985, Tsai and Ghoshal 1998, Zand 1972), no one to our knowledge has investigated it specifically as a mediator between strong ties and receipt of useful knowledge, either as a multidimensional concept (benevolence and competence) or at the micro (interpersonal) level. In this paper, we provide empirical support for a model of knowledge transfer with three key findings. First, we show that benevolence- and competence-based trust mediate the link between strong ties and receipt of useful knowledge. Second, once we hold constant these two perceived trustworthiness dimensions, we uncover the benefit of weak ties to the receipt of useful knowledge. This finding is consistent with and refines Granovetter's (1973) argument that weak ties provide access to nonredundant information. Third, we show that while benevolence-based trust improves the usefulness of both tacit and explicit knowledge exchange, competence-based trust is especially important for tacit knowledge exchange.

It is worth noting that our three main findings held even after controlling for individual attributes, homophily, knowledge-related factors, and relative position in formal structure. Further, we replicated our findings in three different companies in different industries and countries (analysis not shown), thereby enhancing external validity. Finally, these results were confirmed using HLM and were robust to possible alternative explanations and to various ways of operationalizing a number of key variables in the analysis.

Of course, our study has limitations that should be acknowledged. For instance, we have assumed that learning has occurred if project outcomes are reported to have improved as a result of knowledge received. This behavioral view, with its focus on outcomes, is potentially narrow because we were not able to directly measure cognitive development (Fiol

and Lyles 1985, Huber 1991). A related limitation is that our measures of competence-based trust do not specifically address a knowledge source's expertise in a given domain. Because few can be expert in many areas, trusting a knowledge source's domain-specific competence might be even more relevant to receipt of useful knowledge. We hope that future research will examine these issues.

Our study also required respondents to accurately report on past perceptions of a relationship. To minimize retrospective bias, we instructed respondents to answer questions "to the best of your recollection, regardless of whether or not you had a prior relationship with this person." While we cannot rule out the alternative explanation that the knowledge transfer itself led to greater trust and that respondents then recorded this posttransfer level of trust on the survey, we took several steps to reduce this possibility. For example, we began questions with the phrase, "Prior to seeking information/advice from this person on this project" to continually emphasize to respondents that we were interested in what their thoughts and feelings were *before* the knowledge transfer. In addition, by having respondents choose only a current (77%) or recent (23%) project, we hoped to reduce problems associated with recollection. In a separate analysis not shown, we found no significant differences in any of our results between respondents who chose an ongoing project versus a completed project. This provides some comfort that retrospective accounts did not significantly affect results.

With these limitations in mind, this study's theoretical contribution is to both the social network and the knowledge/organizational learning literatures. To the social network literature, we propose and test a conceptual model (see Figure 2) to help integrate the multiple, and sometimes conflicting, findings on the benefits of strong versus weak ties. Our model refines Adler and Kwon's (2002) three-category description of social capital—opportunity (in our study, ties), motivation (benevolence), and ability (competence)—by treating these concepts as interconnected, not isolated, ideas. Our evidence provides a theoretical mechanism via benevolence- and competence-based trust that enables strong ties to yield receipt of useful knowledge. Further, we provide evidence that the characteristics of a relationship (e.g., perceived trustworthiness) are distinct from the mere existence or strength of a relationship.

As a result of this distinction between tie strength and perceived trustworthiness, we are able to introduce the concept of *trusted weak ties*, which—assuming the effects of perceived trustworthiness and weak ties were additive—yielded the most useful knowledge of all. In our study, 22% of the ties were "trusted weak ties": below average in tie strength

but above average in one or more dimensions of perceived trustworthiness. (And 18% of the ties analyzed were “not fully trusted strong ties,” i.e., above average in tie strength but below average for at least one dimension of perceived trustworthiness.) These two network perspectives, relational and structural, could benefit from continued integration. For example, in the current study, controlling for the effects of perceived trustworthiness allowed us to uncover the hidden benefits of weak ties in knowledge exchanges, benefits that had been suppressed when perceived trustworthiness was not considered as a concept separate from tie strength. We therefore join Adler and Kwon (2002) in calling for future work to place greater emphasis on trust and other relational characteristics to complement structural analyses. For example, future studies might examine the role of indirect ties or network-level properties on the formation of dyadic trust—including trusted weak ties—and the resulting effect on knowledge transfer and performance.

In contribution to the knowledge transfer and organizational learning literature, this study provides a more detailed understanding of two unique dimensions of perceived trustworthiness at the dyadic level of analysis and their effect on both explicit and tacit knowledge transfers. We also show how relational factors like competence-based trust can interact with more traditional knowledge factors such as tacit knowledge. These findings suggest a need to better understand the role of relational factors, such as trust and emotion, in facilitating or inhibiting effective knowledge transfer. Although theorists have suggested that an organization’s “absorptive capacity”—its ability to take in and make use of new knowledge—is a product of both the “character and distribution of expertise within the organization” (Cohen and Levinthal 1990, p. 132), few have focused on the distribution of expertise and the way in which social relations help *integrate* such expertise. Our study provides a better understanding of how characteristics of social relations, such as perceived trustworthiness, make the social fabric of organizations more (or less) effective in creating and transferring knowledge. Future research might blend our results with research on different forms of learning, e.g., if strong ties encourage exploration of new ideas and techniques, and weak ties, exploitation of existing ones (Uzzi and Lancaster 2003), then what role do benevolence- and competence-based trust each play in these two types of learning?

Finally, we feel our work holds significance for practitioners. With the popularization of the concept of social capital, there has been an increased interest among practitioners in the role of trust and networks in organizational settings (e.g., Cohen and Prusak

2001). Our research offers two main insights that can be helpful to practitioners. First, we offer evidence that benevolence-based trust consistently matters in knowledge exchange and that competence-based trust matters most when the exchange involves tacit knowledge. Awareness of this finding can help executives target appropriate points where investments in interventions designed to promote trust are more likely to have a payoff for the organization. Second, our results suggest that individuals and organizations could benefit from developing trusted weak ties, not just strong ties, although this strategy does carry the risk of misplaced trust. Our finding on the benefits of perceived trustworthiness plus weak ties seems particularly promising for practitioners in light of the fact that prior research has suggested that weak ties may also be less costly to maintain (Hansen 1999). Practitioners might find it fruitful to focus on ways to improve trust as a relatively inexpensive and pragmatic way to improve the flow of useful knowledge and advice in their organization. Indeed, some organizations are already undertaking such interventions by training for and assessing trustworthy behavior through evaluation procedures or by investing in processes to create a shared vision and language so that trust can flourish.

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Appendix. Survey Items^a

Perceived Receipt of Useful Knowledge. The information/advice I received from this person made (or is likely to make) the following contribution to (1) client satisfaction with this project, (2) this project team’s overall performance, (3) this project’s value to my organization, (4) this project’s quality, (5) this project’s coming in on budget or closer to coming in on budget, (6) reducing costs on this project, (7) my being able to spend less time on this project, (8) shortening the time this project took. (1 = contributed very negatively;

^aItems are verbatim. “R” indicates reverse-scored items. Part B of the survey was given about a week after Part A.

2 = contributed negatively; 3 = contributed somewhat negatively; 4 = contributed neither positively nor negatively; 5 = contributed somewhat positively; 6 = contributed positively; 7 = contributed very positively) [survey Part B]

Tie Strength. If you had no prior contact at all with this person before you sought information/advice from him or her on this project, please choose 7 for the next two questions. Otherwise, answer to the best of your recollection. Prior to seeking information/advice from this person on this project, (1) how close was your working relationship with each person? (R) (1 = very close; 4 = somewhat close; 7 = distant), (2) how often did you communicate with each person? (R) (1 = daily; 2 = twice a week; 3 = once a week; 4 = twice a month; 5 = once a month; 6 = once every 2nd month; 7 = once every 3 months or less (or never)), (3) to what extent did you typically interact with each person? (1 = to no extent; 2 = to little extent; 3 = to some extent; 4 = to a great extent; 5 = to a very great extent) [survey Part A]

Benevolence-Based Trust. Prior to seeking information/advice from this person on this project, (1) I assumed that he or she would always look out for my interests, (2) I assumed that he or she would go out of his or her way to make sure I was not damaged or harmed, (3) I felt like he or she cared what happened to me. (1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neutral, 5 = somewhat agree, 6 = agree, 7 = strongly agree) [survey Part A]

Competence-Based Trust. Prior to seeking information/advice from this person on this project, (1) I believed that this person approached his or her job with professionalism and dedication, (2) given his or her track record, I saw no reason to doubt this person's competence and preparation. (1 = strongly disagree; [etc.]; 7 = strongly agree) [survey Part A]

Tacit Knowledge. (1) Was all this information/advice sufficiently explained to you in writing (in written reports, manuals, e-mails, faxes, etc.)? (1 = all of it; 4 = half of it; 7 = none of it) (2) How well documented was the information/advice that you received from this person? Consider all the information or advice. (1 = very well documented; 4 = somewhat well documented; 7 = not well documented) (3) What type of information/advice came from this person? (1 = mainly reports, manuals, documents, self-explanatory software; 4 = half know-how, half reports/documents; 7 = mainly personal practical know-how, tricks of the trade) [survey Part A]

Organizational Proximity. Please indicate each person's location at the time of this project. (R) (1 = in the same function in this office; 2 = in the same function but in a different office; 3 = in a different function but in this office; 4 = in a different function and in a different office; 5 = outside the company) [survey Part B]

Physical Proximity. Please indicate each person's physical proximity to you at the time of this project. (R) (1 = worked immediately next to me; 2 = same floor and same hallway; 3 = same floor but different hallway; 4 = different floor; 5 = different building; 6 = different city; 7 = different country) [survey Part B]

Hierarchical Level. Please indicate each person's hierarchical level relative to your own at the time of this project. (1 = two or more levels below mine; 2 = one level below mine; 3 = equal to mine; 4 = one level above mine; 5 = two or more levels above mine; 6 = does not apply) [survey Part A]

Receiver's Expertise. Prior to seeking information/advice from this person on this project, (1) I had a full understanding of the subject matter in which I turned to this person, (2) I did not have adequate expertise to feel comfortable with the subject matter about which I turned to this person (R), (3) I was confident in my ability to perform successfully all the activities myself in the subject matter about which I turned to this person. (1 = strongly disagree; [etc.]; 7 = strongly agree) [survey Part A]

Friendship. Prior to seeking information/advice from this person on this project, (1) I would have felt awkward talking to this person about a non-work related problem (R), (2) I knew this person well outside of work-related areas. (1 = strongly disagree; [etc.]; 7 = strongly agree) [survey Part B]

Availability. Prior to seeking information/advice from this person on this project, I assumed that (1) it would generally be hard for me to get in touch with this person (R), (2) in general I could find this person if I wanted to talk to him or her, (3) he or she would usually be around if I were to need him or her. (1 = strongly disagree; [etc.]; 7 = strongly agree) [survey Part B]

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