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SOCIAL EFFECTS ON COWORKER RELIANCE AND INDIVIDUAL CONTRIBUTIONS TO INTERCULTURAL TEAMS

ABSTRACT

Which social perceptions and structures shape coworker reliance and contributions to team products? When people form an intercultural team, they launch a set of working relationships that may be affected by social perceptions and social structures. Social perceptions include beliefs about interpersonal similarity and also expectations of behavior based on professional and national memberships. Social structures include dyadic relationships and the patterns they form. In this study, graduate students from three cohorts were consistently more likely to rely on others with whom they had a professional relationship, while structural equivalence in the professional network had no effect. In only one of the cohorts, people were more likely to rely on others who were professionally similar to themselves. Expectations regarding professional or national groups had no effect on willingness to rely on members of those groups, but expectations regarding teammates' nations positively influenced individual contributions. Willingness to rely on one's teammates did not significantly influence individual contributions to the team. Number of professional ties to teammates increased individual contributions, and number of external ties decreased contributions. Finally, people whose professional networks included a mixture of brokerage and closure (higher ego network variance) made greater contributions to their teams.

INTRODUCTION

Team work involves coordinated effort by a group of people whose individual contributions must be integrated to form a unified team product. Members' social identities and expectations regarding teammates can affect their interpersonal attitudes and relations, and the nature and pattern of relationships may affect the contributions that members make to their team. For example, attraction to people who seem socially similar to us fosters positive relationships (McPherson, Smith-Lovin, and Cook, 2001), and positive interactions between members of organizational networks support problem solving and creativity (Hargadon and Bechky, 2006).

This study addresses social perceptions and relations at the dyadic level and as they impact individuals' contributions to team products. The context is a cohort-based MBA program that brings together people from diverse professional and national backgrounds. We first examine the effects of social identification, expectations about professional and national reliability, and advice relations on individuals' willingness to rely on specific colleagues. We then test effects of aggregated (team-level) perceptions and network structures on individual contributions to team products. Through this process, we examine discrete effects of direct professional relationships within and beyond the team, as well as effects of ego network structures on individuals' contributions to their teams.

THEORETICAL BACKGROUND

When people form a team, they launch a set of working relationships that may be affected by social perceptions and structures. Social perceptions include beliefs about interpersonal similarity and also expectations of behavior based on social categories. Social structures include dyadic relationships and the patterns they form. Social perceptions and structures both affect attitudes toward particular coworkers, such that they may influence willingness to rely on others.

They may also affect individuals' contributions to the team effort by creating motivation, incurring obligation, or increasing benevolence. We will discuss these processes in two stages: roles of social perceptions and professional relationships in determining willingness to rely on coworkers; and roles of social perceptions, professional relationships and ego network structures in determining individual contributions to team products. The guiding framework appears in Figure 1.

Figure 1 about here, please

Willingness to Rely on a Colleague

Willingness to rely on a colleague relates to trust, which can be defined as the truster's willingness to rely on a trustee, even when the truster is unable to monitor or control the trustee (Mayer, Davis & Schoorman, 1995; Rousseau, Sitkin, Burt & Camerer, 1998). Perceived trustworthiness develops as the truster receives information about the trustee (Becerra and Gupte, 2003). Trust can be based on affect (positive feelings toward another person), assessments of likely trustworthiness (cognition-based trust) (Lewis and Weigert, 1985; McAllister 1995), the context (McEvily, Perrone & Zaheer, 2003; Rousseau, Sitkin & Camerer, 1998; Zolin, Hinds, Fruchter & Levitt, 2004), or the history of the relationship (Zolin, Hinds, Fruchter & Levitt, 2004; Zolin and Hinds 2004). Similarly, we expect that willingness to rely on a particular colleague may be influenced by feelings and beliefs that arise from social perceptions about the other person and by collegial relations.

Social Identification and Its Effect on Perceptions of Colleagues' Reliability

We are more inclined to trust people who share the same social categories as ourselves (Kramer, 1999). Organizational identity, including characteristics that members believe are central, distinctive, and enduring (Dutton, Dukerich, & Harquail, 1994), serves to mediate how people think, feel, and behave (c.f. Gecas, 1982; Schenkler, 1995). When viewed as a process of

self-definition and self-categorization, organizational identity can strengthen how individuals categorize themselves into social groups within their organization (Ashforth & Mael, 1989). Thus, attributions of trustworthiness can be partly based upon shared organizational categories, such as national and organization membership (Kramer, 1999).

Belonging to the same organization also gives co-workers a shared organizational future, which can create the "shadow of the future" (Axelrod, 1984). This means that if a dyad is likely to meet again in the future they will trust each other more because betrayal or benevolence might be reciprocated at a later date. Hence, the more similar the social identifications of the dyad, the more perceived trustworthiness is likely to develop.

Hypothesis 1: Shared professional and national membership will positively influence willingness to rely on coworkers.

Expectations Regarding Social Collectives and Their Effects on Perceptions of Colleagues' Reliability

Opinions regarding social collectives, such as organization types or ethnic groups, are likely to be applied to members of those collectives. For example, if two people differ in national membership, each person's beliefs about people from the other's country may shape reciprocal expectations. Through this process, beliefs about organizations and national groups may influence willingness to rely on coworkers that are identified with those organizations and nations.

Hypothesis 2: Expectations regarding people from particular organization types or nations will positively influence willingness to rely on coworkers that are identified with those organizations or nations.

Professional Relationships and Their Effects on Perceptions of Colleagues' Reliability

People who work together tend to develop relationships through a process of contact, interaction, information exchange, and opinion-forming. People are attracted to each other based upon common attitudes and values, goals and objectives (Newcombe, 1961) The more activities people share, the more they will interact and develop stronger sentiments towards each other (Homans, 1950). During this process, ideas about the attributes of one's contacts develop. Although the formal structure of an organization can facilitate or even force the maintenance of professional relationships (Zucker, Darby, Brewer & Peng, 1996)), such governing processes as homophily (McPherson, Smith-Lovin, and Cook, 2001; Reagans, 2005), expediency, and instrumentality (Markovsky & Lawler, 1994; Thibaut & Kelley, 1959) are likely to play a role. In less structured environments, these factors may largely determine the development of professional relationships. As a professional relationship grows stronger, it is likely to involve increasing willingness to rely on the partner. This process may be iterative, such that ongoing professional interactions create willingness to rely on the partner, and increases in perceived reliability of the partner increase the strength of the professional relationship. As a result of this trust-building and relationship-forging process, we expect to find that the extent to which members of a dyad see themselves as having a professional relationship predicts their willingness to rely on each other. As in other kinds of relationships, the perceptions held by Alice about her relationship with Bob and her willingness to rely on him may differ from Bob's perceptions regarding Alice.

Hypothesis 3: Professional tie strength will be positively associated with willingness to rely on coworkers.

In addition to the direct effects of professional ties, it is likely that the pattern of ties surrounding two colleagues may affect their willingness to rely on each other. Several studies

have shown that connections among one's ties increase trust (e.g., Burt and Knez; 1995; Burt, 2005; Chua, Ingram, and Morris, 2005), such that a dyad's embeddedness in a network increases the likelihood that the members will believe each other to be reliable. Ferrin, Dirks, and Shah (2006) attribute this effect to mediating effects of shared network ties on organizational citizenship behaviors. Shared ties to third parties have a positive effect on behavior within dyads, so people that are connected to many of the same others might expect reliable performance from each other. In addition to the third-party influence on behavior, positive ties to the same people provide communication channels for information about each other. The similarity of two people's positions in the professional network among colleagues, then, may distinctly affect willingness to rely on each other, in addition to the effects of their direct relationship.

Hypothesis 4: Greater structural similarity in the professional network will be positively associated with greater willingness to rely on coworkers.

Individual Contributions to Teamwork

When people work with others on a task that requires integration of each person's inputs, the interpersonal perceptions and relationships are likely to influence individual contributions. Acknowledging that ability and personal motivations may affect each member's inputs, we believe that the relational aspects are critically important.

Social Identification and Its Effect on Individual Contributions to Team Products

As social identity can affect one's expectations of another, so too does it govern one's expectations of oneself. One's self concept is made up of identities, which are self-categorizations individuals make in terms of the roles, membership and categorizations of group membership (Gecas & Burke, 1995). Individuals observe their own behavior and other's reactions to it, and they actively try to reduce the discrepancy between their identities and

performance evaluations (Riley & Burke, 1995). Stryker's Identity Theory proposes that the greater one's commitment to an identity, the greater the salience of the identity (1981), which directly affects the behavioral choices made in a given situation. When people share social identities with their teammates, they are likely to feel greater kinship, and therefore greater bonding and obligation, toward the team. People who differ from their teammates along salient social dimensions may be less motivated to engage in the team's tasks.

Hypothesis 5: The greater the shared professional and national identity an individual experiences in the team, the greater will be the individual's contribution to team products.

Expectations Regarding Social Collectives and Individual Contributions to Team Products

Regardless of whether team members share professional or national membership, people who have higher expectations of their teammates' social categories are likely to contribute more to the team. A desire to work with people from social groups that are represented in a team may create a desire to demonstrate one's suitability for membership on the team. Self-discrepancy theory (Higgins, 1987) proposes that discrepancies between the actual self, as reflected by others, and the ideal self one desires produce a strong motivation to reduce the discrepancy. Therefore we propose that higher expectations regarding teammates' social categories will increase individual's performance.

Hypothesis 6: The greater the individual's expectations of people from social categories that are represented in a team, the greater will be the individual's contribution to team products.

Dyadic Professional Relationships and Their Effects on Individual Contributions to Team Products

Positive professional relationships provide useful help and advice. They create

opportunities for exchange of ideas and support, and they can create personal obligations to help each other. Further, being part of a team that includes highly esteemed others is motivating, and it may challenge members to put forth their best effort. Together, the support that is obtained through professional ties with team members and the obligation to do a good job for people with whom one has long-term relationships are likely to improve individuals' performance.

Hypothesis 7: People who have more professional ties to teammates will contribute more to the team's task.

Alongside the benefits of professional relationships, there are maintenance costs. People must invest time with their colleagues to keep the relationships strong and active. The instrumental nature of a professional tie demands exchange of information, support, or services. When a team member has many professional relationships with people outside the team, he or she may serve as a boundary-spanner, bringing helpful information to the team. The team member may also experience multiple demands for time and resources, some of which may take higher priority than the team's project. A likely cost of the outside activity is that team members who maintain many external ties have less energy available for the team effort. In addition, people who have many positive relationships outside the team may experience divided loyalties, feeling less need to perform well for the team.

Hypothesis 8: People who have more professional ties to people outside their team will contribute less to the team's task.

Network Structure and Individual Contributions to Team Products

In addition to the direct effects of professional ties, the pattern of the ties surrounding team members may affect their contributions to the team's performance. Related to the preceding hypotheses, we expect that the balance of within-team to between-team ties will affect

contributions to the team, such that having more ties to teammates than outside the team encourages greater contributions. This follows from the notion that the importance of a relationship or set of relationships is negatively affected by the number of competing relationships, so commitment to a group may be influenced by the proportion of a person's ties that are invested in the group.

Hypothesis 9: The ratio of internal to external professional ties affects commitment to the team's task, such that having more internal than external ties improves individual contributions to the team.

Finally, people who are accustomed to interacting professionally within a variety of social circles and levels of social embeddedness may develop a pattern of self-reliance and accountability. This could lead them to take responsibility for group tasks, regardless of the attitudes or relationships of their teammates. Triggered by Burt's (1992, 2005) extensive research and theorizing on structural holes, there has been wide-ranging discussion around the costs and benefits of building professional ties to people who are interconnected versus disconnected. Some people favor close-knit groups (ego network closure), and others prefer to build professional ties to people who are not connected (structural holes). The former tend to reap social support, while the latter obtain the benefits of brokerage. We propose that neither extreme is optimal for team member performance. Instead, we suggest that people who include both structural holes and close-knit groups in their ego networks are best equipped to work well and contribute to their teams.

In contrast to those whose contacts generally have interconnecting professional ties, people who also occupy structural holes have experience working without mutual contacts that might monitor and encourage helpful behaviors from partners. In contrast to those whose

contacts generally are unrelated, people who also occupy close-knit groups are accustomed to being embedded and constrained by the presence and expectations of mutual contacts. This variance in the interconnectedness of their professional contacts provides occasions to develop guardedness about others' partnering behaviors alongside conscientiousness about their own. Both of these factors should lead them to make strong contributions to team efforts.

Hypothesis 10: The greater the perceived variance in ties among one's contacts, the greater will be the individual contributions to team products.

Willingness to Rely on Teammates and Its Effect on Individual Contributions to Team Products

Trust can be essential for cooperation (Kollock, 1994). It can impact performance (Dirks, 1999; Wong and Cheung, 2005), particularly in knowledge-intensive work (Lane, 1998), but it is only relevant when there is risk in the relationship (Mayer et al, 1995). Willingness to rely on a coworker in a team setting is a particular type of trust that may serve as an indicator of the necessary effort one must exert to produce an acceptable outcome. At the extreme, this may relate to the free rider problem, in which an individual shirks his or her duties knowing that others in the group will perform them (Hardin, 1971). People who believe that their teammates are unreliable may feel that it is necessary to complete a greater share of the team's work. In contrast, reliable teammates are more likely to carry their weight on a group project, so there is less need for other members to invest extra effort to insure success. Viewing willingness to rely on teammates as a barometer of necessary level of effort, we suggest a negative relationship with contribution to the team's performance.

Hypothesis 11: Greater willingness to rely upon coworkers will predict lower contribution to a team product.

METHODS

Participants were new students in an MBA program where each had been assigned to a cohort that would attend classes and complete their introductory courses together. All but two of the students were military officers, ranging in rank from Lieutenant Junior Grade (minimum of 18 months in service) to Commander (typically about 16 years in service). Several branches of the military, which tend to inspire strong social identification and inter-service rivalries, were represented in all cohorts. The effects of service membership go beyond national boundaries, such that members of any country's Navy have had many similar experiences, as have members of any country's Army or Air Force or Marines. Each branch of military service has distinct reputations among themselves and in the eyes of the other service members. As might be expected in a largely military environment, the majority of students were male.

Data Collection Procedures

Individual and relational data were collected in three Organizational Behavior classes with the primary purpose of providing feedback to students about individual differences and teaching them to analyze social networks. Participants in each cohort were organized into teams of 4 to 6 members per team, resulting in 18 teams across the three cohorts.

Need for achievement, need for affiliation, and need for power were measured online during the first week of classes and results were discussed the following week. Relationship measures were obtained online six to seven weeks later, at the students' convenience. During the interim, students formed project teams that completed a brief organizational analysis and presented their results to the class. These interim projects were not graded, but each team received feedback about its presentation. The teams then selected an organization and conducted "a broad analysis of the organization's environment, culture, structural constraints and

opportunities, motivational and leadership challenges, power and influence issues, and future directions." Each team member was required to analyze one of these aspects of the organization, including relevant strengths, weaknesses, opportunities, threats, and recommended interventions, and to submit his or her report to team members and to the professor. Individual reports were graded by the professor, and they were synthesized and expanded by the team to produce a complete assessment of the organization. Teams presented their analyses and recommendations in week 10 for cohort 1 and in week 11 for cohorts 2 and 3. Everyone on the team received the same grade for their analysis and presentation. We obtained permission from the university's institutional review board to use archival data from the courses, with all identifiers removed, for this study. The work context and group composition make this course a good data source for the study (Zolin, Fruchter & Levitt, 2003). The work context was more realistic since studies focused upon military topics and the student wore military uniforms at least one day per week. The workgroup composition was realistic since the students, who were mainly active duty military officers, were mature and advanced in their careers.

Measurement Methods

Variables are measured at the individual and dyadic levels, and then aggregated as appropriate to the team level. Because some network concepts can be represented through a variety of measures, and to guard against the possibility that measurement decisions could influence our conclusions, we use multiple measures of some constructs.

Measures of Professional and National Membership and Expectations

Country of origin and professional membership were noted. *Categorical expectations* were measured by asking participants to imagine that they needed a rapid response team and to rank each branch of military service and each country that was represented in their cohort in the order in which they would choose to contact them. Cohort one included people from seven

countries, but cohorts two and three included only two non-Americans each. As a result, we were unable to assess effects of national identification, and our ability to discern effects of nationality-based expectations was limited. Professional composition of the three cohorts appears in Table 1.

To test effects of *shared professional identity* on willingness to rely on particular colleagues, we matched individuals within each cohort according to their professional membership, creating binary matrices in which a 0 at the junction of Alice's row and Bob's column indicates that they have different professional membership and a 1 indicates that they have the same professional membership. We averaged these values across each person's teammates to test the overall effect on that individual's contribution to the team's product. *Country rankings* were converted to dyadic matrices in which each cell contains the ranking ascribed by the row person to the country of the column person. *Professional rankings* were similarly converted to dyadic matrices. As with the professional membership data, average values for teammates' country and professional rankings were used to test effects on individual contribution to the team's product.

Table 1 about here, please

Relationship Measures

All participants were asked to complete an online survey about their relationships with others in their cohort. This exercise was not graded, and there was no penalty for noncompliance. Participants were asked to select (from a list) the names of everyone from their cohort whom they knew. These names then populated subsequent pages of the survey. After completion of the survey, names were automatically replaced with numbers by the surveying software, and each person was told his or her identifying number. Results were discussed during a networks analysis lesson.

Professional relationships with colleagues. Working with the list of names that they had

chosen, participants then used a 1-to-5 scale to indicate the extent to which they had "a professional relationship with each of the people" they had selected, as follows: 1 = minimal relationship, 3 = moderate relationship, 5 = extensive relationship. People whom they did not indicate that they knew were coded as zero. When aggregated for each cohort, these individual responses formed a matrix of directed professional relationships, with values ranging from 0 (no relationship) to 5.

Willingness to rely on colleagues. Respondents also indicated beside each name how willing they would be "to rely upon this person if a rapid response was required?" using a 1-to-7 rating scale in which 1 = not at all willing, and 7 = completely willing. These data were recoded by subtracting 4 from each value, such that a neutral response of 4 in the original scale became zero in the recoded scale, and below-neutral responses became negative. This allowed us to accurately code people whom the respondent didn't know with zeros to represent a neutral attitude. When aggregated for each cohort, these individual responses formed a matrix of directed reliance relationships, with values ranging from -3 (unwilling to rely on this person) through 0 (neutral) to 3 (completely willing to rely on this person).

Perceived variance in connections among colleagues. Finally, respondents were presented with paired names of their contacts and asked to indicate the extent to which those contacts interact with each other for professional purposes. Respondents were told that they could leave the information blank for any pairs where they did not know of a relationship, and those answers would default to zero. As before, the scale ranged from 1 (weak relationship) to 5 (strong relationship). To represent variance in the connectedness of each person's contacts, we calculated the variance in tie strengths within these perceived ego networks. This measure does not include direct ties from the respondent to his or her contacts, so this measure is distinct from the individual's number of ties (within teams or throughout the cohort) and the balance of ties

within versus between teams.

Number of professional relationships with teammates. Respondents' ties to their teammates (within-team ties) were counted from the professional relationship network and used to predict individual contribution to the team.

Number of professional relationships with people from other teams. Respondents' ties to cohort members outside their team (between-team ties) were counted from the professional relationship network and used to predict individual contribution to the team.

Balance of within-team to between-team professional relationships. We measured the ratio of within-team to between-team relationships using Krackhardt's E-I index (Krackhardt & Stern, 1988), which is calculated as (E – I)/(E + I), where E represents external ties and I represents internal ties. This elegant measure ranges from -1 if all ties are internal to the team to 1 if all ties are external. The three samples varied somewhat on the proportion of their ties that were within versus between teams. Sample 1 included 76 within-team ties and 306 between-team ties, producing an E to I score of .602 for the whole network. In Sample 1, team E to I indices ranged from .429 to .676, and individuals' E to I indices ranged from -.333 to .789. Sample 2 included 114 within-team ties and 230 between-team ties, producing an E to I score of .337 for the whole network. In Sample 2, team E to I indices ranged from .20 to .44, and individuals' E to I indices ranged from -.429 to .6. Sample 3 included 110 within-team ties and 260 between-team ties, producing an E to I score of .405 for the whole network. In Sample 3, team E to I indices ranged from .176 to .619, and individuals' E to I indices ranged from -1 (all of the person's ties being within the team) to .68. As an alternate measure, we created a dummy variable to indicate whether (1) or not (0) the person had more between-team than within-team ties.

Extent of reliance on teammates. To represent each respondent's general perception about teammate reliability, we calculated each person's average willingness to rely on his or her

teammates. As an alternate measure, we also counted the number of teammates whom each person reported willingness to rely on.

Individual Contribution to the Team

All participants were responsible for clearly defined segments of their team's research and analysis, and their individual reports were submitted to team members as foundations for the team's comprehensive analysis and recommendations. These reports were graded by the professor using a consistent rubric. We used the grades on the *individual reports* to represent their contributions to their teams. Because academic ability and general motivation seemed likely to influence the students' performance on these reports, we controlled for their performance on individual aspects of the course.

Control Variables

We adapted information from the course records to control for intrinsic motivations, general academic performance, and perceived conflict among team members.

Motivating needs. Motivating needs (based on McClelland) were measured using Likert scales. Because the questions intended to measure needs were not pretested for reliability, we conducted factor analysis on all (15) items, checked reliabilities of the resultant subscales, and dropped any items that did not load cleanly on one of the three factors. Then we averaged the responses for all items included in each factor to produce a scale score for each need. *Need for achievement* included three items (Cronbach's alpha = .71). *Need for affiliation* included four items (Cronbach's alpha = .80). Need for power included three items (Cronbach's alpha = .73).

General academic performance. General academic performance, intended to control for ability and overall academic motivation, was represented by the total of each person's scores on quizzes that were given during the quarter.

Perceived conflict. Perceived conflict was coded from each person's end-of-quarter

assessment of the group process in his or her team. Reported conflict was associated with areas such as personality, gender, national culture and organizational differences. Each mention of conflict was coded and assigned a value of 1. Values ranged from 0 (no reported conflict) to a maximum of 2 (two different conflicts in the team).

RESULTS

Effects of social identity, professional and national expectations, and professional relationships on willingness to rely on particular colleagues were tested at the dyadic level using the quadratic assignment procedure in UCINET 6 (Borgatti, Everett, and Freeman, 2002). Effects of these variables (uniquely aggregated to the team level for each respondent) and individuals' ego network measures on individual contributions to the team were tested using standard correlation procedures and OLS regression.

Predicting Willingness to Rely on Particular Coworkers

Correlations among dyadic variables for all three samples appear in Table 2. Results of QAP regressions predicting willingness to rely on one's coworkers appear in Table 3, and they are summarized in Figure 2.

Hypothesis 1 was weakly supported. We found a significant relationship between shared professional identity and willingness to rely on coworkers only in cohort 2 (See table 3, 1: ß=.04, n.s., 2: ß=.07, p=.04, 3: ß=-0.04, n.s.).

Hypothesis 2, that expectations of a coworker's national (Table 3, 1: ß=-.05, n.s., 2: ß=-.04, n.s., 3: ß=.30, n.s.) and professional identity (Table 3, 1: ß=.04, n.s., 2: ß=.07, n.s., 3: ß=.18, n.s.) would predict willingness to rely on that person was not supported.

Hypothesis 3 was supported in all three cohorts, where we found that the greater the professional relationship, the greater was the willingness to rely on a coworker (Table 3, 1: ß=.65, $p<.001$, 2: ß=.54 $p<.001$, 3: ß=.72, $p<.001$).

Hypothesis 4, regarding structural similarity, was not supported. Although structural similarity correlates positively with willingness to rely on a coworker in all samples, this relationship does not appear in regressions that include the direct professional relationships (Table 3, 1: ß=0.0, n.s., 2: ß=-.06, n.s., 3: ß=-.03, n.s.). We conclude that the direct relationship, not similar embeddedness in the network, is responsible for perceptions of reliability.

Tables 2 and 3, Figure 2 about here, please

Predicting Individual Contributions to Team Performance

Correlations among variables predicting individual contribution to team performance appear in Table 4. Mean and standard deviation for each variable appear on the diagonal. OLS regression results appear in table 5, and they are summarized in Figure 3.

Control Variables

To be sure that any effect from the hypothesized variables on contribution to the team was distinct from their relationship with general academic performance, we controlled for individuals' total scores on all course quizzes. We first tested effects of hypothesized variables on academic performance and found few significant relationships. Regressing academic performance on all of the predictor variables, including detailed reliance scores and E to I index, we obtained an R^2 of .308, reflecting a significant positive effect of number of ties outside team ($p = .046$) and marginally significant effects of number of ties to teammates ($p = .072$) and standard deviation in perceived ties among ego's contacts ($p = .086$). When we substituted the number of reliable teammates and the dummy variable for "more external than internal ties" for the more detailed team variables, we obtained nearly the same results. Producing an R^2 of .291, number of ties outside team ($p = .066$) and ties to teammates ($p = .088$) had marginally significant positive effects on individual academic performance. Not surprisingly, this indicates that high academic performance is positively related to number of professional advice ties.

Hypothesized effects on Individual Contributions to Team Performance

Regression results indicate that individual contribution to the team's performance is strongly related to the pattern of professional ties. Table 5 shows coefficients for variables in models that include the detailed reliance scores and E to I index. Substituting the number of reliable teammates and the dummy variable for "more external than internal ties" for the more detailed team variables, we obtained similar results (R^2 = .486), with all significant coefficients maintaining their signs. Because the control variables were largely nonsignificant, we reran the regressions without them and again found the same significant predictors (R^2 = .410 using detailed reliance and E to I scores; R^2 = .421 using the simplified measures).

Hypothesis 5, that shared professional identity in the team would increase individuals' contributions to team performance (See Table 5, Model 2: ß= -0.126, n.s.), was not supported.

Hypothesis 6 was supported for expectations of teammates' professional groups, which were positively and significantly related to individuals' contributions to team performance (Table 5, Model 2: ß=-.025, p< .05.). Expectations of national groups did not predict individual contributions (Table 5, Model 2: ß=-0.120, n.s.).

Hypothesis 7 was supported, as the number of professional ties to teammates positively influenced individual contributions to the team product (Table 5, Model 2: ß=.406, p=.001).

Hypothesis 8 was supported, as the number of professional ties to people outside the team negatively influenced individual contributions to the team product (Table 5, Model 2: ß=-.665, p<.01).

Hypothesis 9 received mixed support, and the relationship between the balance of external to internal ties and individual contributions was more complicated than expected. E to I scores correlated negatively with individual contributions, as expected (Table 4, r=-.24, p<.05),

indicating that people who have more external than internal professional ties tend to contribute less to their team's products. This variable is highly correlated with the number of external ties (Table 4, r=.88, p<.001), and when both variables are included in a regression equation, the E to I score coefficient changes its sign (Table 5, Model 2: ß=.545, p<.05). When the direct negative effect of external ties is controlled, the ratio of external to internal ties appears to have a positive compensating effect.

Hypothesis 10 was supported. Greater perceived variance in ties among one's contacts increased individual contributions to team performance. The standard deviation in an individual's ego network (excluding his or her direct ties) positively influenced contribution to the team (Table 5, ß=.274, p< .01).

Hypothesis 11, that greater willingness to rely upon coworkers would reduce the individual's contribution to the team product, was not supported (Table 5, ß=.055, n.s.).

Summary of Results

When all variables are included in dyadic regression equations, only the professional ties have a consistent, positive effect on willingness to rely on particular coworkers ($p < .001$ in all samples). Membership in the same type of organization had a positive effect ($p = .041$), and structural equivalence had a marginal negative effect ($p = .079$) in one of the three samples.

Contribution to team performance increased when individuals had more within-team ties, fewer external ties, and greater variance in the interconnectedness of their professional contacts. Additionally, higher expectations of teammates' organization types increased individual contributions to the team.

DISCUSSION

The strong effect of ongoing professional ties on interpersonal reliance supports the

concept that social relations create a “Shadow of the Future”. The long-term relationship creates trust because the individuals have prior experience with each other, and they know that they will continue to interact in the future. The interactions that built a positive professional relationship also established positive expectations. Further, organizational citizenship behaviors that are not rewarded immediately may be rewarded at a later date. It appears that willingness to rely on colleagues is more closely influenced by dyadic ties than by categorical perceptions, as evidenced by the lack of effects from social identities and expectations.

Contrary to our expectations, willingness to rely on teammates did not predict individual contributions to the team, neither did general academic performance, social identity, or individual need for achievement, affiliation, or power. Individual contributions were instead predicted by positive perceptions of coworkers’ professional organizations, the number of ties to teammates, the number of external ties (negative effect), and the amount of variance in ties among ego’s contacts. These relationships probably operate through a combination of positive expectations, personal commitment to members of the team, support from colleagues on the team, and self-sufficiency that has developed through experience with colleagues in a variety of social structures. In general, individual contributions to team efforts seem to be more a function of the network connections than of trust or social identification.

The more one expects from teammates, the more one may feel obliged to contribute and hope to gain. The more one is professionally connected to teammates, the more commitment may be evoked and assistance may be provided by teammates. In contrast, external connections can distract attention and commitment from the team effort. This could indicate a potential downside to the boundary spanner role, such that team members with numerous external ties might invest less effort in the team.

Probably the most interesting result of this work is that individuals who perceive some of

their professional partners to be strongly interconnected and others to be unconnected tend to make higher contributions to team efforts than individuals who report that most of their professional partners are similarly connected (or similarly unconnected). We have reasoned that this occurs because of distinct social experiences that take place in close-knit groups versus stand-alone relationships. People who participate in cliques while acting as social brokers experience the costs and benefits of both, and they may learn flexible and successful partnering skills in the process. More research is needed to explore this effect, which may extend to other aspects of performance.

Contributions and Managerial Implications

This study contributes to the theory on trust and collaboration in teams by identifying relative impacts of social network structures and social identities. At the dyadic level, social embeddedness influenced trust, while social identity did not. At the team level, social embeddedness influenced the individual's contribution to the team, but trust did not. These results reflect concepts from complex responsive processes, which indicate that "Knowledge is the act of conversing..." and therefore "[o]rganizational policies that disrupt relational patterns between people, however, could seriously damage its knowledge generating capacity." (Stacey, 2001, p. 98).

Although more research is needed, these findings indicate that managers should be interested in discovering and maintaining the social connectedness between individuals and teams, rather than focusing solely on the development of trust. Of particular significance is the finding that more variance in the interconnectedness of one's professional contacts predicts stronger contributions to a team. This implies that directives to exploit more structural holes or to develop more cliques could have unintended and unfortunate consequences for teams. Until further research fine-tunes these findings, we recommend that managers encourage people to

participate in a close-knit professional group and also to occupy a few structural holes.

Limitations and Future Research

Although the graduate school context provides genuine team tasks and clear measures of individual performance, it clearly differs from other organizational settings. Similarly, the focus on military officers distinguishes this study from others that involve civilian populations. Together, the limited setting and range of participant organizations place boundaries around the application of our results. A broader population base in a variety of circumstances is needed to determine the generalizeability of these findings. Further exploration of the effects of brokerage, closure, and balanced ego network strategies on team contributions is warranted. Explicit tests of mechanisms through which ego network structures affect team contributions could advance networks theory while providing helpful guidance for team leaders and organizational decision makers.

CONCLUSIONS

We asked how social perceptions and structural embeddedness affect individual contributions to team performance. Because we thought that perceived reliability of teammates might partially mediate some social effects, we first tested effects of social perceptions and relationships on people's willingness to rely on specific coworkers. Then we tested effects of social perceptions, direct professional relationships, ego network structures, and teammate reliance on individuals' contributions to their teams' products. We found that professional network connections affected coworker reliance and contributions to teams, but that willingness to rely on teammates did not affect individual contributions. The role of professional ties exceeded that of social identification and expectations in fostering collegial reliance and contribution to teams. Not surprisingly, ties to teammates increased contributions to the team, while external ties decreased contributions. The more novel and interesting result is that people

who balanced their professional network between structural holes and cliques had a tendency to be stronger team players than those who favored one extreme or the other. In a world that increasingly depends on teams, this phenomenon introduces a new stream of conversation to the discussion of closure and brokerage in networks.

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TABLE 1.

Professional composition of the three cohorts

	Cohort 1	Cohort 2	Cohort 3
Air Force	5	11	10
Army	3	4	0
Civilian	1	0	1
Marine	0	10	3
Navy	16	4	15
Total	25	29	29

TABLE 2

QAP Correlations among Dyadic Variables

	COHORT 1	1	2	3	4	5
1	Willingness to rely on coworker					
2	Shared professional identity	0.028				
3	Professional ranking	0.056	-0.527***			
4	Country ranking	0.015	-0.090	0.109		
5	Professional relationship	0.648***	0.011	0.063	0.097	
6	Professional relationship structural equivalence	0.229***	0.026	0.016	0.047	0.349***
	COHORT 2	1	2	3	4	5
1	Willingness to rely on coworker					
2	Shared professional identity	0.159***				
3	Professional ranking	-0.097*	-0.565***			
4	Country ranking	-0.095**	-0.153**	0.225**		
5	Professional relationship	0.529***	0.192***	-0.170***	-0.119**	
6	Professional relationship structural equivalence	0.220***	0.129*	-0.133**	-0.173***	0.488***
	COHORT 3	1	2	3	4	5
1	Willingness to rely on coworker					
2	Shared professional identity	0.059				
3	Professional ranking	-0.028	-0.475***			
4	Country ranking	0.006	-0.013	0.502***		
5	Professional relationship	0.700***	0.135**	-0.078	-0.030	
6	Professional relationship structural equivalence	0.346***	0.067	-0.084*	-0.011	0.523***

* $p < .05$, ** $p < .01$, *** $p < .001$

TABLE 3.

Results of QAP Regressions predicting willingness to rely on coworkers

	Cohort 1		Cohort 2		Cohort 3	
	Beta Coefficient	p-value	Beta Coefficient	p-value	Beta Coefficient	p-value
Shared professional identity	0.04	0.31	0.07	0.04	-0.04	0.18
Professional ranking	0.04	0.29	0.03	0.25	-0.01	0.45
Country ranking	-0.05	0.11	-0.04	0.10	0.03	0.33
Professional relationship, direct tie	0.65	0.00	0.54	0.00	0.72	0.00
Professional relationship, structural equivalence	0.00	0.47	-0.06	0.08	-0.03	0.19
Model R-sq and p-value	0.42	0.00	0.29	0.00	0.49	0.00

TABLE 4.

Descriptive Statistics and Correlations among Variables Predicting Individual Contributions to Team Performance.

Mean Standard Deviation	1	2	3	4	5	6	7	8	9	10	11
1. Individual Contribution to Team	16.8 2.4										
2. Average Ranking of Teammates' Countries	-0.36***	1.6 1.2									
3. Average Perceived Teammate Reliability	-0.07	0.16	1.5 1.5								
4. Number of Teammates Perceived to be Reliable	0.19	-0.02	0.43***	2.5 1.5							
5. Percent of Teammates, Same Org. Type as Ego	-0.25*	0.27*	0.12	0.07	0.4 0.3						
6. Average Ranking of Teammates' Organization Types	-0.28*	0.42***	0.07	-0.08	-0.00	2.7 1.3					
7. Std. Deviation in Perc. Ties among Ego's Contacts	0.28**	-0.11	0.00	0.14	-0.10	0.05	0.8 0.5				
8. Number of Ego's Prof. Ties Outside Team	-0.26*	0.17	0.04	0.01	0.09	0.09	0.01	9.6 5.0			
9. Number of Ego's Prof. Ties to Teammates	0.43***	-0.28*	0.02	0.41***	-0.13	-0.23	0.05	-0.12	3.6 0.8		
10. Ratio of Ego's External to Internal Prof. Ties	-0.24*	0.23*	0.02	-0.09	0.07	0.14	0.02	0.88***	-0.36***	0.4 0.3	
11. More Ties Between Than Within Teams (0/1)	-0.01	0.13	-0.11	-0.10	0.08	0.10	0.10	0.65***	-0.14	0.79***	0.8 0.04

*** Significant at the 0.001 level (2-tailed). ** Significant at the 0.01 level (2-tailed). * Significant at the 0.05 level (2-tailed).

TABLE 5.

Regression Models Predicting Individual Contribution to Team

	Model 1 Control Variables		Model 2, Including Relational Variables	
	Beta Coefficient	p-value	Beta Coefficient	p-value
Academic Performance	0.031	0.792	0.012	0.908
Conflict Severity	0.106	0.360	0.204	0.036
Need for Affiliation	-0.072	0.563	-0.170	0.099
Need for Achievement	-0.057	0.655	-0.113	0.279
Need for Power	0.036	0.778	0.062	0.555
Average Perceived Teammate Reliability			0.055	0.566
Average Ranking of Teammates' Organization Types			-0.251	0.022
Average Ranking of Teammates' Countries			-0.120	0.280
Percent of Teammates, Same Orgn Type as Ego			-0.126	0.213
Number of Ego's Prof. Ties Outside Team			-0.665	0.004
Number of Ego's Prof. Ties to Teammates			0.406	0.001
Ratio of Ego's External to Internal Prof. Ties			0.545	0.021
Std. Deviation in Perc. Ties among Ego's Contacts			0.274	0.005
Model R-sq and p-value	0.022	0.888	0.486	0.001

FIGURE 1.

Proposed Relations among Dyadic Variables and Individuals' Contributions to Team Products

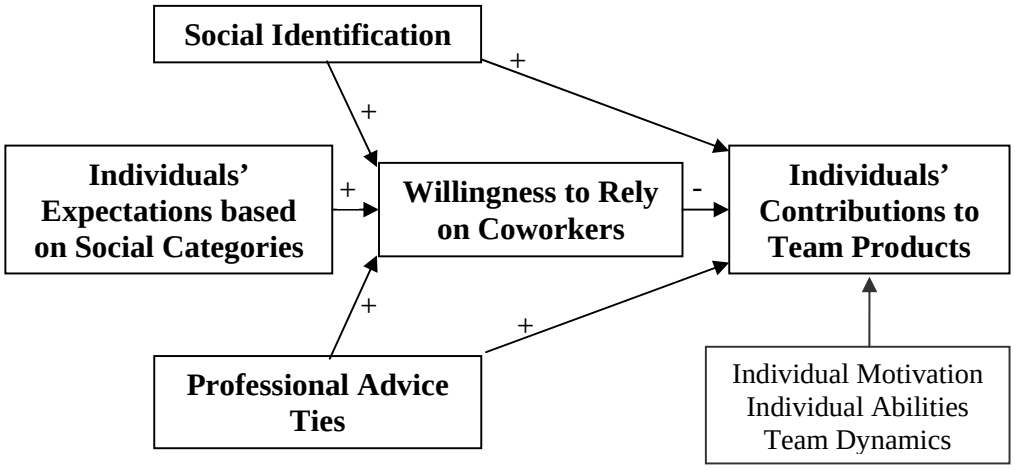
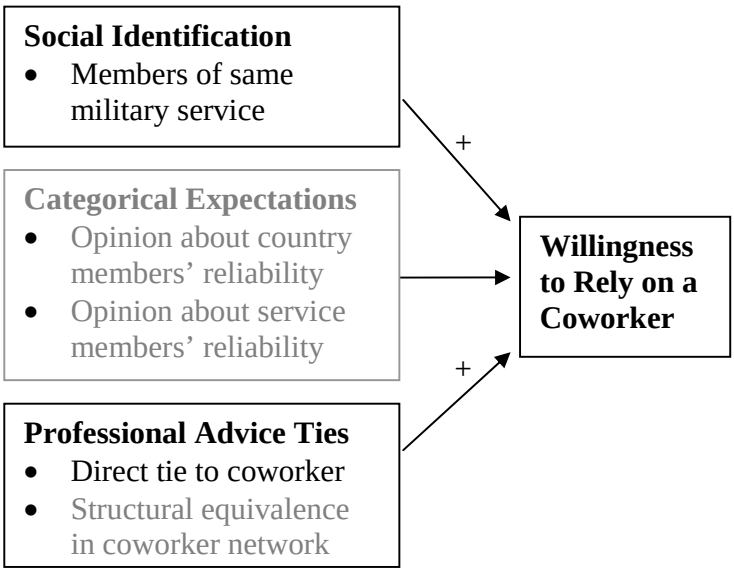


FIGURE 2.

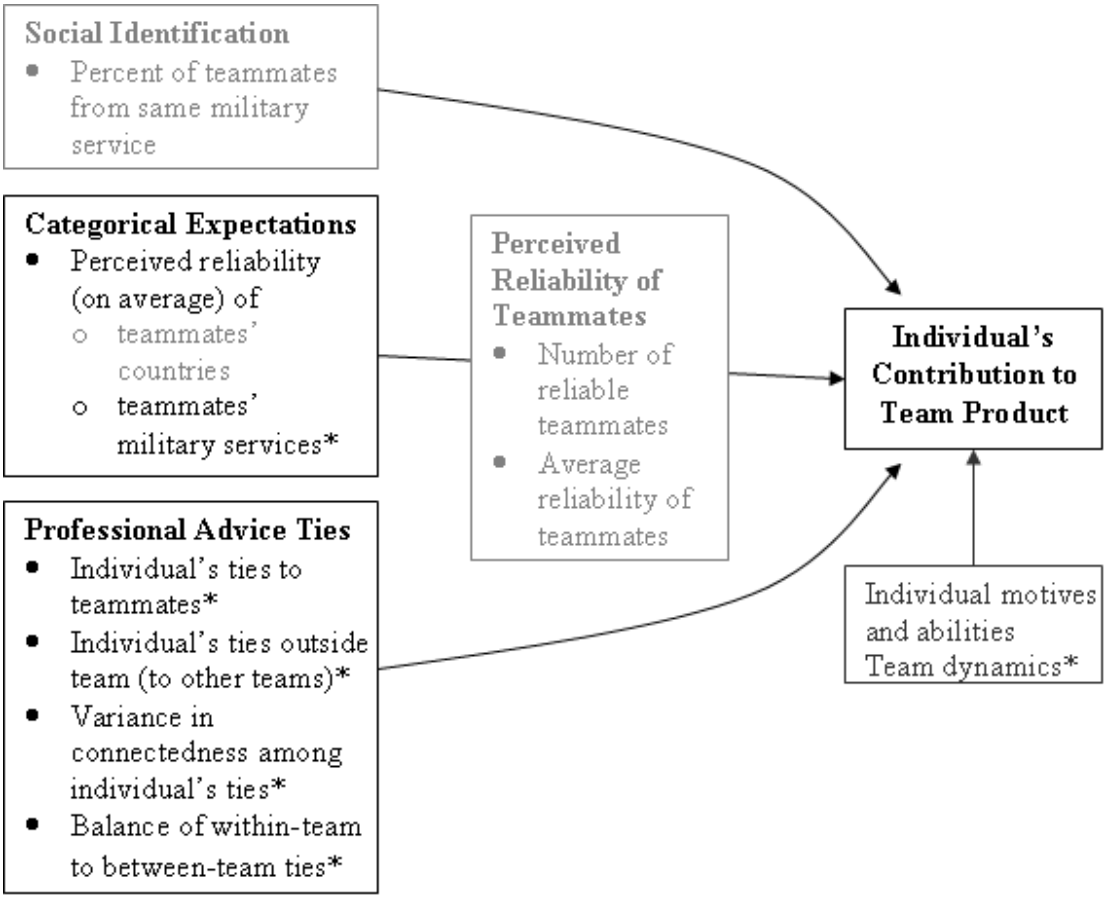
Dyadic Model Predicting Willingness to Rely on Coworkers*



* Variables that were not significant in any of the samples appear in gray type.

FIGURE 3.

Model Predicting Individuals' Contributions to Team Products*



* Variables that significantly predict individuals' contributions to the team products are marked with asterisks. Marginally significant predictors are unmarked. Variables that are not significant appear in gray type. The expected role of perceived teammate reliability as a mediator was not supported.