



Organization Science

Publication details, including instructions for authors and subscription information:
<http://pubsonline.informs.org>

A Social Composition View of Team Creativity: The Role of Member Nationality-Heterogeneous Ties Outside of the Team

Jill E. Perry-Smith, Christina E. Shalley

To cite this article:

Jill E. Perry-Smith, Christina E. Shalley (2014) A Social Composition View of Team Creativity: The Role of Member Nationality-Heterogeneous Ties Outside of the Team. *Organization Science* 25(5):1434-1452. <https://doi.org/10.1287/orsc.2014.0912>

Full terms and conditions of use: <https://pubsonline.informs.org/Publications/Librarians-Portal/PubsOnLine-Terms-and-Conditions>

This article may be used only for the purposes of research, teaching, and/or private study. Commercial use or systematic downloading (by robots or other automatic processes) is prohibited without explicit Publisher approval, unless otherwise noted. For more information, contact permissions@informs.org.

The Publisher does not warrant or guarantee the article's accuracy, completeness, merchantability, fitness for a particular purpose, or non-infringement. Descriptions of, or references to, products or publications, or inclusion of an advertisement in this article, neither constitutes nor implies a guarantee, endorsement, or support of claims made of that product, publication, or service.

Copyright © 2014, INFORMS

Please scroll down for article—it is on subsequent pages



With 12,500 members from nearly 90 countries, INFORMS is the largest international association of operations research (O.R.) and analytics professionals and students. INFORMS provides unique networking and learning opportunities for individual professionals, and organizations of all types and sizes, to better understand and use O.R. and analytics tools and methods to transform strategic visions and achieve better outcomes.

For more information on INFORMS, its publications, membership, or meetings visit <http://www.informs.org>

A Social Composition View of Team Creativity: The Role of Member Nationality-Heterogeneous Ties Outside of the Team

Jill E. Perry-Smith

Goizueta Business School, Emory University, Atlanta, Georgia 30322, jill.perry-smith@emory.edu

Christina E. Shalley

Georgia Institute of Technology, Scheller Business College, Atlanta, Georgia 30308, christina.shalley@scheller.gatech.edu

We sought to understand team member informal social network ties outside of the team as a way to achieve cognitive variation within the team, thereby facilitating creativity. Specifically, we take a configural perspective, which emphasizes individual team members and the heterogeneity and strength of their outside ties. We theorize that these characteristics of outside ties are important because they amend members' schemas and the team's cognitive architecture. Results of a study of 82 long-term MBA project teams suggest that both outside ties with nationality-heterogeneous individuals and weak outside ties independently facilitate team creativity. In addition, nationality-heterogeneous outside ties that are weak rather than strong are associated with higher team creative performance.

Keywords: social networks; team creativity; outside ties; nationality; tie strength

History: Published online in *Articles in Advance* May 27, 2014.

Introduction

Increasingly, organizations are using teams as their primary work units (Mesner-Magnus and DeChurch 2009), and teams are considered key for organizations' effectiveness and competitive advantage (Mathieu et al. 2008). At the same time, in a global, dynamic, knowledge-based work environment, organizations depend on creative ideas from their employees, and creativity has been argued to be the key enabler for performance, growth, and competitiveness (Amabile 1996, Oldham and Cummings 1996, Woodman et al. 1993, Zhou and Shalley 2008). For example, a global study by IBM (2010) revealed that 60% of the surveyed chief executives considered creativity to be a top priority for their organizations. Also, creative choices have been argued to lie at the foundation of firm-level strategies driving skills and market position (Porter 1991). Since individuals are increasingly working in teams, understanding how teams can develop creative ideas seems to be critical for enhancing their viability and effectiveness (Drazin et al. 1999, Shalley and Perry-Smith 2008). Most of the prior research has examined creativity at the individual level, but given these trends, team creativity appears to be a key factor to understand to help organizations survive and thrive. In particular, understanding how teams should be composed to achieve the diverse perspectives and cognitive variation necessary for creativity is critical.

Although important, creativity can be difficult to achieve and has long been recognized as requiring unique psychological processes in comparison to other kinds of

performance outcomes. Whereas historically, psychologists focused on individual factors such as personality (see Barron and Harrington 1981 or Runco 2004 for a review), more organizationally oriented scholars focused on the social psychological and contextual factors that facilitate or constrain creativity (e.g., Oldham and Cummings 1996, Shalley 1995, Tierney et al. 1999). In particular, the social nature of creativity is increasingly recognized. Starting with seminal theories describing creativity as a social process (Amabile 1983, Woodman et al. 1993), this view has expanded to a decidedly relational and social interactive view of individual creativity (e.g., Brass 1995, Perry-Smith and Shalley 2003). Although this perspective has not been specifically applied to teams, team-based creativity is an inherently social activity, as reflected in a few studies. For example, Hargadon and Bechky (2006) described how the emergence of creativity shifts from individuals to informal collectives. Other work has investigated the extent team members socialize with one another outside of work (Gilson and Shalley 2004) and the effect of team member closeness on creativity (Hulsheger et al. 2009). Notably, this work focuses only on relationships *among* team members and the quality of these interactions. However, members may be affected by relationships with people outside of the team, even though these individuals are not physically part of the team.

Social network research on teams highlights that teams are composed of a collection of individuals with a variety

of relationships *outside* of the team (e.g., Krackhardt and Stern 1988, Oh et al. 2004), in addition to relationships with team members (e.g., Sparrowe et al. 2001). This perspective indicates that external ties affect general, although not creativity-specific, performance in a variety of fields and contexts, some of which are technical fields where creativity is one component of performance (e.g., Ancona and Caldwell 1992b, Cummings 2004). As a result, a more inclusive interpersonal relationship view of team creativity, which considers that each member has a distinct set of relationships beyond the team, is warranted. The external team social capital perspective provides the foundation for our investigation. For example, one view of teams and networks applicable to creativity is that networks serve as an importation source such that teams import ideas or relevant information from contacts outside of the team into the team domain (e.g., Hansen 1999, Murray 2004). Since nonredundant ties structurally indicate unique sources of information and ideas, more of these ties are expected to facilitate more information and thus better ideas and performance (Burt 2004). However, in considering the particulars of creativity, we extend this perspective by suggesting an alternative but complementary mechanism.

Although nonredundancy is important for creativity, we propose that there is more that team member *outside* ties can provide the team. Specifically, we see team members' external ties as enhancing their capacity to think creatively; ties can actually serve to alter schemas so that members develop cognitive habits and skills that help them approach problems creatively. Our view is reminiscent of Podolny's (2001) "prism" view, but instead of suggesting that networks influence the way others view a focal actor, we suggest that networks influence the way the focal actor views the world—in this case, the way he or she approaches problems. It is the members' cognitive approaches to problems—or more formally, the complexity and flexibility of his or her schemas (i.e., creative capacity)—that ultimately determine the creativity of the team. In emphasizing individual team member schemas as the initiating point, we employ a configural approach to team creativity rather than the more typical global approach to teams and networks. The traditional view is premised on a global perspective that assumes that the flow of content from external ties is additive and that redundancy in content at the team level is not helpful. In this case, the team is seen as the primary unit, and the accumulation of content stocks are implicitly assumed to be most relevant at the team level. In contrast, our focus is on individual team members and the compilation of members' ties outside of the team, consistent with a configural perspective (Kozlowski and Klein 2000, Burton-Jones and Gallivan 2007). Specifically, we suggest that the more unique perspectives or diverse viewpoints to which different team members are exposed, the more conducive their schemas will be to creatively solving

problems. The question then becomes, what types of outside ties provide this type of cognitive stimulation that can broaden and change members' schemas?

We suggest that the heterogeneity of member outside contacts and the strength of the relationship with these contacts are critical. Emerging work (Leung et al. 2008, Maddux and Galinsky 2009) suggests that multicultural experiences enhance critical components of creative cognition, such as conceptual expansion, cognitive adaptability, and remote association. This work suggests that nationality is a highly important and theoretically relevant characteristic of a team member's relationships that should be considered for creativity. In particular, with increased globalization, individuals are increasingly likely to interact with people of varying nationalities at work. However, a growing body of research describes the complexities associated with working on teams with individuals from different countries (e.g., Dahlin et al. 2005, Gibson and Gibbs 2006, van Dick et al. 2008). Interestingly, although there are intuitive benefits to creativity of interacting with diverse others, a variety of social psychological barriers makes the realization of these benefits less likely. For example, this work finds that nationality heterogeneity *within* teams is negatively related to team innovation and learning unless certain conditions exist. Notably, we focus instead on the nationality heterogeneity of team members' ties *outside* of the team, which we term "out-tie *N*-heterogeneity."

In addition to their nationality, we consider the strength of members' outside ties and investigate nationality heterogeneity among weak ties and strong ties separately, over and above the nonredundancy associated with tie strength. We argue that the cognitive benefits are more likely to be realized when nationality heterogeneity exists among weak ties rather than strong ties. More specifically, we conceptualize and calculate heterogeneity metrics separately for both weak and strong ties to examine their differential effects on team creativity. As a result of our approach of focusing on the relative contribution of different kinds of ties, we are able to isolate the effects of weak ties that are heterogeneous from strong ties that are heterogeneous.

Overall, our perspective highlights an alternative avenue to achieving the cognitive variation within teams that creativity scholars emphasize and managers desire. For managers interested in creativity, a critical question is who should be on the team to maximize creativity and what aspects of diversity should be emphasized or at least managed. Our approach tackles this question from the perspective of the individual team member's outside ties that are likely to alter the member's schemas and thus affect the team's creativity. Our social psychological point of view emphasizes a complementary mechanism to those typically suggested by network scholars. We take a configural perspective, emphasizing individual team members, rather than the team as a global unit,

and the heterogeneity of outside nationality ties that can amend member schemas and the team's cognitive architecture. In doing so, we reframe the question to be about the strength of outside ties and the nationality of alters as the relevant member characteristics that managers should attend to when placing individuals on teams. Our assumption is that this will allow organizations to achieve some of the creative and impactful decisions that have become so desirable yet are often elusive.

Theory and Hypotheses

Creativity has been defined in a number of ways and has been referred to as generative creativity (Fleming et al. 2007), idea generation (Osborn 1957), a process of engagement in creative acts (Drazin et al. 1999), or a necessary precursor to innovation (Woodman et al. 1993, Yuan and Woodman 2010). Our approach to creativity is grounded in the social psychological view of creativity (Amabile 1983, Shalley 1995) as the novelty and usefulness of ideas, processes, or solutions. Our view is that creativity is important in a variety of jobs and professions (Shalley et al. 2000) and, accordingly, has been applied to numerous organizational contexts (e.g., Cattani and Ferriani 2008, Fleming et al. 2007, Zhou and George 2001). We particularly emphasize creativity as a means to solving difficult and complex problems, similar to those knowledge workers are often required to solve. As Quinn (2005) described, knowledge work involves solving complex and varied problems where often there is not a single correct solution (Orlikowski 2002, Schon 1983). In this context, creativity is often required to come up with a solution that maximizes the benefits of contradictory constraints while minimizing their costs (Catmull 2008). Additionally, constant creativity is required because not only are the problems difficult, where commonly used solutions do not suffice, but workers find themselves repeatedly facing new and different problems and challenges.

Notably, consistent with prior organizational creativity research (Shalley and Zhou 2008), our conceptualization of creativity includes usefulness or appropriateness and thus assumes that solutions are only considered creative when they are both novel and useful solutions to the problem. This differs from psychological approaches to creativity that emphasize idea generation (e.g., Diehl and Stroebe 1987) in the form of the number of novel, but not necessarily useful, ideas generated. Our approach also differs from sociological approaches to innovation. For example, research on social networks and innovation has focused on the transference, importation, or diffusion of ideas or products throughout a network (Rogers 1983), the development of technology based innovations such as patents or new products as a function of various network structures (e.g., Ahuja 2000, Tsai 2001), and the role of networks in high-tech industries (Powell et al. 1996).

Although highlighting the distinctions between creativity and innovation is important for conceptual clarity, we recognize that in some cases the difference between the two is blurred. For example, a knowledge worker may modify or tailor ideas from other areas to form a creative solution to the focal problem and thus recombine existing ideas and information (Schumpeter 1934, Hargadon and Sutton 1997). Nevertheless, we focus on creativity as an inherently social psychological process, and our emphasis is on the extent network ties facilitate creative cognition that helps teams generate creative solutions to the focal problem.

Cognition plays a central role for creativity, because to come up with creative ideas or solutions, individuals have to engage in a number of cognitive processes such as using broad categories to organize information in the mind (i.e., broad categorization), making connections between seemingly disconnected ideas (i.e., remote associations), and generating ideas that span a variety of categories and perspectives (i.e., cognitive flexibility) (Koestler 1964, Shalley and Perry-Smith 2008, Ward 1995). Individuals' cognitive structures form the information they take in from the world. These cognitive structures are then used to make sense of their surroundings and to solve problems. Specifically, schemas are cognitive structures that contain knowledge about a stimulus, including its attributes and the relationship between attributes (Fiske and Taylor 2008). Schemas influence the way events are understood, what is attended to in problem solving, and how complex situations are processed. They provide selection criteria for regulating attention and help guide the encoding, storage, and retrieval of information. The way individuals process information is to a large part determined by the schemas they hold concerning other people, situations, events, and themselves (Fiske and Taylor 2008). Schemas are typically based on prior experience and can carry immediate affective tags. When individuals are exposed to relevant stimuli, schemas are activated. In solving problems, a team member can access different schemas that can vary in breadth and content. If individuals have more complex schemas, this can provide the material needed for generating creative ideas (Dane 2010). Small situational changes have been found to produce related changes in the way individuals process information about others and situations (Fiske and Taylor 2008). As experiences happen and new information or perspectives are presented, new schemas are developed and old schemas can be changed or modified. When this occurs, it can essentially rewire the brain and lead to schema revision. The structure of schemas held among team members represents the team's cognitive architecture. Specifically, we define the team's cognitive architecture as the compilation of the different schemas, processing styles, and interconnections that each team member brings to the team.¹

We emphasize cognitive architecture as the theoretical mechanism explaining how ties outside of the team affect

team creativity rather than the more commonly explicated nonredundancy mechanism. Team members not only interact with other team members but are simultaneously situated in a broader context of informal social relationships in their environment (Ancona and Caldwell 1992a, b; Geletkanycz and Hambrick 1997; Oh et al. 2004; Reagans and Zuckerman 2001). We use the term “outside ties” to reference relationships between team members and individuals not on the same team. Research focused on relationships outside of the team primarily emphasizes the instrumental resources such relationships are likely to provide, such as information, referrals, and political support (e.g., Ancona and Caldwell 1992a, Cummings 2004, Murray 2004). We build on the notion of the criticality of external relationships by proposing that outside team relationships can influence cognition within the team and, more specifically, the team’s cognitive architecture. By focusing on a seemingly task-irrelevant category (i.e., nationality), we focus less on the transfer of problem-specific information or task-specific resources and more on how individuals transfer ways of thinking and approaching problems via schemas across team boundaries.

In social terms, individual creativity benefits from general exposure to others’ insights that may involve task-relevant conversations that are not necessarily task specific. Task-relevant conversations are general conversations about work or discussions of general problems that may not be specific to the team’s task (Perry-Smith 2006) and are not required by the task (e.g., Hansen 1999). Specifically, we focus on advice ties. The act of seeking advice implies that the focal actor values and pays attention to the alter’s comments in contrast to ties that may be purely social in nature. For example, a pure friend may be someone with whom a team member socializes but never discusses work problems; the team member may not even value the friend’s opinion. This is important because it is not only whether a team member interacts with nationality-heterogeneous others outside of the team but also the extent the relationship provides the capacity for her to attend to their perspectives. Notably, we focus on informal, discretionary conversations outside of the team driven by individual team members and the effects on member schemas, rather than on formal conversations conducted by team leaders only (e.g., Mehra et al. 2006). Thus, we emphasize team *member* advice ties with other individuals outside of the team. Within this informal advisory set, we specifically focus on the extent members have outside ties to heterogeneous individuals, which we refer to as “out-tie heterogeneity,” and the extent to which these ties are strong or weak. Our central premise is that a team member’s out-tie heterogeneity and the strength of these connections alters her cognitive schemas, and ultimately the team’s cognitive architecture, in ways that facilitate creativity.

Nationality-Heterogeneous Outside Ties (Out-Tie *N*-Heterogeneity)

Nationality is a particularly interesting demographic category for understanding creativity that differs from other demographic categories. Nationality reflects cultural norms that result in distinct approaches to problems, orientations, and interaction styles, which Sanchez-Burks et al. (2009, p. 222) refer to as “differences in deep-seated relational cognition.” Individuals with different national origins may possess different values, cognitive scripts, and norms related to how work can be done (Cox et al. 1991, Dahlin et al. 2005, Erez and Earley 1993, Leung et al. 2008). In addition, these individuals may experience different communication styles because some countries rely more heavily on body language, facial expressions, and such than do other countries (Tan et al. 1998). Thus, via seeking advice from individuals representing diverse nationalities, individuals are exposed to different approaches to problems and novel perspectives as well as diverse interaction styles.

In addition, nationality simultaneously reflects a visible and potentially salient social category and thus may invoke in-group versus out-group processes consistent with social identity theory (Tajfel and Turner 1979, Turner 1975). In particular, nationality has been described as a superordinate determinant of identity that is more salient to identification processes than other characteristics (Dahlin et al. 2005, Earley and Mosakowski 2000, Hambrick et al. 1998). In other words, although many bases of identity exist, such as gender, professional affiliation, or regional differences within a country, nationality is considered to represent an overarching identity that takes priority in shaping perceptions and behaviors. Thus, when a person’s informal social group contains individuals reflecting diverse nationalities, he or she interacts with others from a variety of socially constructed groups. We will refer to the heterogeneity with respect to the nationality of a team member’s contacts outside of the team as “out-tie *N*-heterogeneity,” and we use the term “configural” (Burton-Jones and Gallivan 2007, Kozlowski and Klein 2000) to represent our emphasis on *member* heterogeneity.

A team member’s informal outside advice ties that reflect nationality differences (i.e., out-tie *N*-heterogeneity) are expected to affect two general aspects of the team’s cognitive architecture by affecting individual team members’ schemas. First, heterogeneous nationality advice ties will facilitate more flexible schemas. Exposure to people with different approaches, perspectives, and ways of handling problems could lead individuals to develop a broader set of cognitive pathways that interconnect different schemas, leading to more cognitive flexibility and increasing the ability to make unique associations. For example, behavior is rooted in habits, which we learn over time and tend to repeat when activated by certain stimuli. To generate creative ideas and solutions, we need

to break out of habitual thinking and see the world in a different and potentially broader way. Since the creative cognitive process involves conceptual combination and reorganization of two or more schemas (Mumford and Gustafson 1988), if schemas are broad and more flexible, they can be combined in unique ways that could lead to novel ideas. Given that values, social behavior, and conceptualizations of self can differ across countries (e.g., Hofstede 1980, Markus and Kitayama 1991, Triandis 1989), when a person seeks advice from individuals of heterogeneous nationalities, this can cause deeper cognitive processing and lead to both the activation of different schemas and the combining of schemas into more complex entities. In essence, schemas are thought to have a level of activation that can spread among related schemas so that new and only somewhat related schemas may be activated, leading to new schema combinations. Therefore, interacting with a range of diverse others can help to broaden an individual's way of thinking, loosening previously connected schemas and facilitating his or her making connections among other schemas.

Second, seeking advice from individuals representing heterogeneous nationalities will facilitate more complex schemas, expanding the capacity for cognitive breadth and depth to engage in a problem. Individuals desire social and cognitive balance when interacting with others, so they expect those who belong to different social categories, whether these categories are task irrelevant or relevant (Phillips 2003), to have different views and even to disagree with them (Phillips and Loyd 2006, Phillips et al. 2004). Consequently, individuals process information more deeply and are more motivated when working with those in different social categories in comparison to when individuals work with those in the same social category (Lount and Phillips 2007, Sommers 2006). This is primarily because individuals are motivated to maintain their expectations of higher-quality performance among in-group members (i.e., same social category). As a result, they think more extensively about a problem in anticipation of receiving an alternative perspective from those in different social categories. As one example, if a focal actor discusses a problem related to a technological breakthrough with a contact who represents a different nationality (task irrelevant), the focal actor is more likely to expect the contact to disagree with her in comparison to a contact with the same nationality. As a result, the focal actor will more thoughtfully process and attend to information related to the technological breakthrough prior to interacting with the diverse nationality contact in anticipation of potential push back and disagreement. This deeper cognitive processing and consideration of various alternatives and overall more complex thinking is an essential cognitive component of creativity (Amabile 1983, Koestler 1964, Shalley and Perry-Smith 2008). Thus, even if an actor does not receive diverse information or perspectives from her nationality-heterogeneous outside

ties, salient social category differences such as nationality are likely to affect schemas in ways that facilitate creativity.

Cognitive skills can take the form of general abstract processes that then can be transferred to different situations, such as flexible and broader schemas originating at the member level and ultimately manifesting at the team level. Work in the area of cognitive psychology and learning (e.g., Argote et al. 2000, Singley and Anderson 1989, Ward et al. 1999) describes how individuals' experiences in one activity affect their performance on another, related yet different activity. For example, Singley and Anderson (1989) described how various cognitive skills, such as ways to go about solving problems, can be learned in one situation and then applied to another task. Similarly, Pettigrew's contact theory (see Pettigrew 1998 for a review) suggests that social relationships not specifically related to the task at hand may shape how an individual approaches problems and interacts with others in a different context, in this case, the focal team. Consistent with these perspectives, Leung et al. (2008) argued that multicultural experiences increase a person's "readiness" to engage in creative cognition in other situations by fostering a "habitual tendency" to engage in creative thought processes (p. 173). Similarly, we argue that the repeat process of seeking advice leads to the development of portable schemas that team members can invoke within their team. Similar to the notion that team members bring their own functional expertise and experience to the team and that these characteristics may influence the way they approach problems, we view each teammate as carrying with him perspectives and habits fostered as a result of his social interactions. Thus, flexible and complex schemas arising from seeking advice from nationality-heterogeneous others outside of the team are enacted within the team and become part of the team's cognitive architecture.

Within the boundaries of the team, these cognitive processes affect the creativity of the entire team in two ways. First, the member with broader, more flexible schemas can provide important sparks that may encourage creative outcomes. For example, this may include a team member voicing an odd idea or a team member challenging a fast consensus by suggesting a different alternative. In addition, this team member may help his or her team make sense of a wide variety of discrete pieces of data by suggesting a resolution that brings everything together. These acts themselves may result in creative group outcomes, particularly the more members share similar cognitive strategies (Shalley and Perry-Smith 2008). Second, we expect approaches to problems used by one team member to affect approaches used by others. According to Bandura's social cognitive theory (1986), individuals learn by observing role models' behavior patterns, modes of thought, and work standards. Members with more flexible and broad schemas, because of their

outside ties, serve as creative role models. As these members display creative processes, other members can vicariously learn similar processes such as breaking sets, pursuing alternative paths, using broad categorizations, and so on. Once other team members see a member using different lenses, they may be more likely also to try this approach. A few studies have found that the presence of creative role models increases individuals' subsequent creativity (Shalley and Perry-Smith 2001, Zhou 2003).

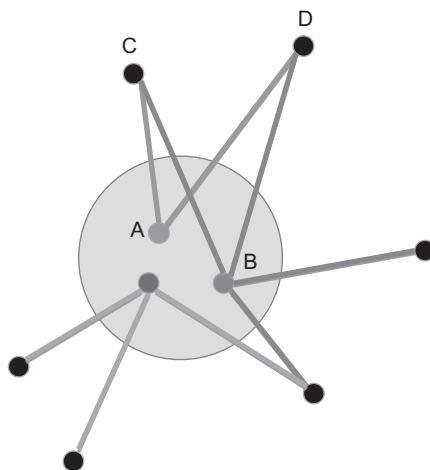
HYPOTHESIS 1A. *Over and the above the nationality heterogeneity within the team, configural (member) out-tie N-heterogeneity is positively associated with team creativity.*

We have argued that creativity beneficial schemas originating with individual team members are potentially transferable from one member to the rest of the team, leading to the further development of the team's cognitive architecture. In multilevel research, configural approaches highlight the constituent parts rather than the collective whole (Burton-Jones and Gallivan 2007, Kane and Borgatti 2011, Kozlowski and Klein 2000). The level of origin is the lower level, although the effects manifest at the higher level, which is conceptualized as an ensemble of lower level parts (Kane and Borgatti 2011). In addition, lower-level units (i.e., individuals) are not expected to be isomorphic, so the emphasis is on the compilation of lower level elements (Burton-Jones and Gallivan 2007, Kozlowski and Klein 2000) into a higher-level unit (i.e., the team). Consistent with a configural perspective of teams, our emphasis has been on the compilation of team member outside-tie heterogeneity. Figure 1(A) displays

our configural approach. Here, the heterogeneity of each member's ties is considered separately. In this case, the central question is, to whom is each member connected outside of the team and how diverse is each member's contacts?

However, an alternative is that the global nature of outside ties may be primary. In particular, consider the predominant flow perspective of networks (Borgatti and Halgin 2011). One premise of this perspective is that the accumulation of flow matters. In this case, ties from different team members to the same outside-tie alter provide minimal to no value because the alter's flow has already been accumulated by one team member; therefore, duplicate flow is not useful. Information, in particular, can be thought of as accumulating in this way such that a team's receiving the same information twice from the same alter via different members is redundant and not necessarily helpful. For example, take alters C and D in Figure 1(A), which depicts the configural approach. Both members A and B are connected to C and D. Whereas the configural approach would count each of these ties separately, the global approach suggests that counting alters C and D separately for each member would inappropriately duplicate (i.e., double-count) the team's heterogeneity stock and access to resources provided by C and D. This logic is represented in Figure 1(B), which displays the global perspective. The central question inherent in this perspective is, what is the global tie heterogeneity available to the team rather than the compilation of members' tie heterogeneity? Here, the individual members are less important and the heterogeneity among the team's six outside contacts is considered. In contrast, our rationale

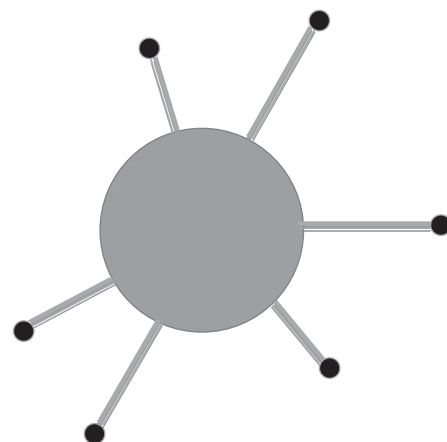
Figure 1(A) Configural Out-Tie Heterogeneity



Key question: What is the heterogeneity of each members' ties outside of the team?

Assumption: The effect of heterogeneity on a member is independent of other members' ties. The effect of heterogeneity on the team flows through individual team members.

Figure 1(B) Global Out-Tie Heterogeneity



Key question: What is the heterogeneity of the team's contacts outside of the team?

Assumption: Ties from multiple team members to the same outside contact provide redundant flow, so each outside entity is counted only once. Outside ties directly affect the team as a whole.

focuses on the team's cognitive architecture, and we posit that the heterogeneity experienced by each individual member is primary, regardless of whether or not other team members have access to the same alters. According to our arguments, a tie is only less valuable to the *member*, and ultimately the team, when it does not provide heterogeneity to the member and is less likely to alter the way she sees the world (e.g., her cognitive schemas). Thus, our logic implies that the extent to which teams are composed of members with outside nationality heterogeneity (i.e., configural) is key rather than the extent the team as a unit (i.e., global) has diverse alters from whom the team seeks advice.

HYPOTHESIS 1B. *Over and above global out-tie N-heterogeneity, configural out-tie N-heterogeneity is positively associated with team creativity.*

Weaker Outside Ties

In addition to out-tie *N*-heterogeneity, the strength of outside ties is relevant. Granovetter (1973) articulated that weak ties can be advantageous because they provide access to disconnected others and new information. Although subsequent emphasis has been on nonredundancy as the proximal mechanism (e.g., Borgatti and Halgin 2011, Burt 1992), we suggest that weak outside ties will facilitate the creativity of the team beyond nonredundancy. These ties will first affect the schemas of individual team members and then ultimately manifest at the team level, consistent with our configural approach.

Strong ties tend to involve interactions between similar individuals because individuals have a natural affinity for people with similar world views and feel relatively more discomfort when interacting with people with different worldviews (Byrne 1971). As a result, weaker outside ties are more likely to provide exposure to perspectives that differ from the focal actor than are stronger ties. In addition, whereas close friends serve the important function of validating each other's views (Cross and Sproull 2004, Reis and Shaver 1988), weaker contacts are more likely to question one another's judgments. Both different perspectives and less agreement could increase the flexibility of members' schemas. For example, when individuals consider different perspectives, this causes multiple and different schemas to be activated, reconfiguring the linkages between these schemas and increasing their breadth and flexibility. When different schemas are activated, they can spread among related schemas so that new and only somewhat related schemas may be activated leading to new combinations. This should facilitate their ability to make connections between seemingly unrelated areas (e.g., remote association) and help them to reconcile differing perspectives, which enables them to think autonomously from their outside contacts (Coser 1975, Perry-Smith and Shalley 2003). A number of studies has found that weaker connections

are positively associated with individual creativity (Baer 2010, Perry-Smith 2006, Zhou et al. 2009).

For teams in particular, weaker outside ties provide the benefits of broad exposure and complex schemas without the potentially negative effects that stronger outside ties may have on internal team viability (Baldwin et al. 1997, Keller 2001, Nelson 1989, Oh et al. 2004). When members have strong outside ties, these ties may pull their energy, attention, and loyalty away from the team, which may undermine the ability to work collaboratively for the good of the team. That is, those with strong ties may be more embedded in their social network outside of the team and have more difficulty going against the norms of their informal social group outside of the team since stronger ties are associated with social influence processes (Perry-Smith and Shalley 2003). Thus, when an individual has weaker outside connections, the result is the development of broader and more flexible schemas that facilitate creative outcomes when working within the team, without the potentially negative effects expected with stronger outside ties.² Similar to the process we described previously, the flexible and complex schemas initiating with individual team members because of their outside ties will ultimately manifest at the group level. This is expected to occur as individual members with weak outside ties invoke creative problem solving within the team. These members influence the team's creative outcomes as well as serve as creative role models for other team members.

HYPOTHESIS 2. *Configural weak tie strength (i.e., teams composed of members with weaker outside ties) is positively associated with team creativity.*

The Strength of Nationality-Heterogeneous Outside Ties

Although we expect strength and out-tie *N*-heterogeneity to independently affect team creativity, we also consider their combination to account for the notion that a team member's nationality ties may range from strong to weak. Consistent with our configural arguments, we first emphasize the effect of strength of nationality ties on individual team members as the initiating point for the effect of outside ties on creativity. One line of reasoning is that stronger ties will result in a deeper experience with and understanding of diverse cultures and cognitive styles. Research on multicultural experiences suggests that this greater immersion with other cultures facilitates creativity (Leung et al. 2008, Maddux and Galinsky 2009). Cultural knowledge is complex, tacit, and not easily codified. Such knowledge is much more likely to be shared with stronger rather than weaker ties (Hansen 1999). Given more nuanced exposure and enriched cultural knowledge, individuals with strong ties to others of heterogeneous nationalities should more easily translate and understand different norms and problem solving approaches that may

arise when interacting with their diverse ties. In general, these stronger connections may promote greater comfort with different ways of thinking and an enhanced ability to bridge differences. An implicit assumption of this logic is that nationality-heterogeneous ties that are strong minimize the previously argued disadvantage of strong ties for creativity—homogeneity of perspectives—because the combination of nationality heterogeneity and tie strength provides the combined advantage of deep exposure to different nationalities. However, the remaining disadvantages of strong ties, such as social influence processes that may promote conformity, persist, leading to the activation of simpler and less flexible schemas. Also, strong ties can cause enhanced loyalty outside of the team and may undermine team synergies. Thus, we advance an alternative logic—that *strongly* tied heterogeneous nationality contacts will not provide the basis for distinct perspectives expected of nationality-heterogeneous ties in general.

The central premise is that although strong nationality ties provide exposure to different cultures, tendencies toward similarity among stronger ties and social influence processes overpower the potential cognitive benefits of this cultural exposure. Weak nationality ties, in contrast, come without the cost of stronger ties while maximizing the broader, more flexible schemas associated with nationality tie heterogeneity. Given the desire for cognitive and social balance, individuals expect acquaintances to disagree (Phillips and Loyd 2006). When acquaintances also reflect different nationalities, this provides greater impetus for the complex schema structures described earlier. For example, if an individual's informal discretionary social reality involves advice seeking episodes with individuals from many different countries, she may find that her role in reconciling conflicting views becomes more important since she cannot simply adopt the views of her contacts. Instead, she must think independently to form a solution, and this can involve accessing multiple and different schemas, which helps to broaden her way of thinking, loosening previously connected schemas and making connections among other schemas. With nationality-heterogeneous ties that are strong, in contrast, the closer relationship supersedes any expected differences due to nationality. For example, individuals perceive greater similarity with friends rather than acquaintances (Lydon et al. 1997, Selfhout et al. 2009), and although a team member and her outside contacts may be from different countries, there typically is some basis of similarity other than nationality (e.g., similar personality, similar life or professional goals) that cements their closer relationship.

In addition, weaker nationality ties are less constraining and provide room for more flexible and less rigid schemas than do stronger nationality ties because with these ties, contacts play less of a role in supporting and directly influencing an advice seeker's ideas. In contrast, strong nationality contacts, such as friends, may discuss issues as

they arise with a team member while she is processing and coming to a potential resolution, thereby helping her form opinions. This process of “talking out loud” and getting advice at earlier stages is consistent with the trust and emotional intimacy inherent in stronger ties (e.g., Levin and Cross 2004). However, instead of the heterogeneous outside ties reflecting access to different perspectives, norms, and so on, the ties access similar perspectives, although each tie reflects a different nationality. This kind of deep exposure to similar perspectives strengthens the linkages between existing schemas, making it more difficult to alter schemas and reducing the likelihood that new linkages with other schemas will form. Therefore, the heterogeneity of weak nationality outside ties, without the potential for social influence and conformity, provides greater room for autonomous and flexible schemas. The effect on individual member schemas ultimately manifests at the team level. As these cognitive skills become part of team members' schemas, members with weak nationality ties can affect the team's cognitive architecture, which increases the wide lens available to the team to consider issues and ultimately their creativity. Thus, out-tie *N*-heterogeneity among weak ties will facilitate team creativity.

HYPOTHESIS 3. *There is a positive relationship between configural out-tie N-heterogeneity among weak ties and team creativity.*

Methods

We tested our hypotheses by studying all first-year MBA project teams engaged in a semester-long collaborative consulting project at a large southeastern university. Participants were full-time students who were required to complete the project as part of a required MBA course. Thus, we have complete network data, bounded by the MBA class, so that we could assess relationships within teams as well as outside relationships. We collected the data using a combination of survey and third-party ratings. Participants were given the option to voluntarily participate in the research project by completing a survey at the end of the semester when they handed in their project. The survey contained network, demographic, and control measures. Since participation in the study was voluntary, as an added incentive to participate, respondents were given the option of receiving a network map of their class and their position in the network, with 89% of those participating requesting this.

Students were assigned to teams that ranged in size from four to six by the MBA program office to maximize diversity, and they worked in these teams for all of their courses throughout their first semester; thus, they had a strong experience of being team members. Their consulting task, used in the present research, was to analyze a significant managerial problem within a firm and offer a detailed, comprehensive solution. Given

the importance of creativity for a variety of tasks and professions (Shalley et al. 2000), including those related to complex problem solving and knowledge work, this setting provided a relevant performance outcome where teams had to think creatively to balance a variety of constraints and a complex assortment of information to come up with what they thought was the one best solution. For these teams the group dynamics and task structure are similar to those of project teams in organizations in which they have to integrate into the team environment and work to successfully complete the collaborative project. This included a variety of activities such as problem identification, decision making, generation of solutions, selection of a solution and action plan, and the generation of a report.

Of those asked to participate, 389 out of 455 individuals responded for an overall response rate of 85.5%. Forty percent were from countries other than the United States (see the appendix for a complete listing of the countries); their average age was 27.8, with an average of five years' work experience. Seventy percent of respondents were male, and 57.3% were Caucasian; 25.4% of non-Caucasians were Asian. We eliminated teams with less than a majority of individuals responding (teams with fewer than three respondents), resulting in 91% of the sample representing 82 usable teams out of the original 90.³ We had a greater than 80% response rate at the team level, as has been used in prior studies (e.g., Mehra et al. 2006). The 8 teams dropped did not differ significantly from the 82 teams on any important characteristics.

Measures

Creativity. Consistent with our conceptualization of creativity and the research setting, our measure of creativity reflects the novelty and usefulness of the team's project solution. Knowledgeable observers rated the creativity of each team's final project, which occurred after their network data were obtained. This approach to measuring creativity is based on Amabile's (1983) consensual assessment technique and is widely used in creativity research (e.g., Shalley 1995, Shalley and Perry-Smith 2001, Zhou 1998). It is based on the premise that experts know creativity when they see it, and thus, a product is creative when experts substantially agree that the work is creative. Two doctoral students and two professors independently rated the creativity of the final projects. Raters had relevant graduate degrees, work experience, and full knowledge of the task assignment. In addition, all raters were experienced, having previously rated creativity in other studies, and were reminded of the definition of creativity (i.e., novel and useful). They were instructed to remember that although creativity encompasses novelty and usefulness, creativity is different than overall performance, quality, appeal of the project, and so on. None of the raters had contact with the participants, other than

rating their projects, so they had no knowledge of their interaction patterns. Two items were used to assess overall creativity with a scale of 1 ("not at all creative") to 7 ("highly creative"). The items were creativity (i.e., novelty and usefulness) of solutions and creativity (i.e., the novelty and usefulness) of analysis. The interrater reliability for the experts' ratings of creativity was calculated using $r_{wg(2)}$ (James et al. 1993) with a mean $r_{wg(2)} = 0.82$ and a median $r_{wg(2)} = 0.88$. Each team's creativity score is an average of the two items ($r = 0.52, p < 0.001$).

Network Ties. To understand each team member's advice ties within the MBA class, we first asked participants, "Of your classmates, who do you tend to go to for help or advice on school related matters? (This may include course content, assignments, the overall program, trouble with another student or professor, etc.)" This was modified from extant social network research (Brass 1985, Burkhardt 1994, Perry-Smith 2006) and was intended to capture general conversations that an individual may be exposed to versus advice only on the team's task. This is consistent with the idea that relevant exposure for creativity may not necessarily be purposeful but may arise in the course of conversations about a variety of topics (Perry-Smith 2006). In addition, we wanted to capture informal relationships outside of those formally required for the project (i.e., discretionary advice ties). To aid responses, we provided a list of students in the first-year class to enhance accuracy and reliability (Marsden 1990). The survey booklet contained 17 spaces for respondents to write in names. Our intention was to provide many more lines than would generally be required so that the selection of names was not restricted, which is generally supported by the number of names reported. The average number of individuals selected was 5.8, with only two indicating 17 names; only three respondents indicated more than 17. We delineated a respondent's advice ties as within versus outside team ties using membership lists provided by the MBA program office.

Given the respondent's set of advice contacts, as a next step we asked, "How close are you with each person?" to obtain a measure of the strength of each advice tie (where 1 = "acquaintance," 2 = "casual friend," 3 = "friend," and 4 = "good friend"). Our measure of strength is consistent with the widely used emotional closeness-based approach to tie strength (e.g., Lin et al. 1981) described by Granovetter (1973) in his original conceptualization of strength. Although other measures of tie strength, such as frequency or duration, have been used, closeness based on friendship is often used (e.g., Marsden and Campbell 1984, Seibert et al. 2001). Our two-stage approach of initially obtaining an individual's direct advice ties and then assessing the strength of those ties is consistent with a number of studies (e.g., Hansen 1999, Perry-Smith 2006). We chose this approach because we not only wanted to distinguish friends from acquaintances but

first wanted to make sure that we captured the set of individuals from whom respondents sought advice. In this way, we include only relationships that involve discourse about school topics and exclude relationships that may be close but purely social in nature. This is particularly important given that we focus on personal ties that are not required to complete the task. Thus, our tie strength variables measure the strength of advice ties.

Configural out-tie N-heterogeneity: As part of the survey, each respondent was asked to provide his or her country of origin, in addition to other demographic data. We view country of origin as reflecting national affiliation consistent with prior work (e.g., Dahlin et al. 2005), which reports a high degree of consistency between nation of birth and other measures of country affiliation such as citizenship and native language. Thirty-three countries were represented (see the appendix). We combined these data with the contact data to understand the demographic composition of each respondent's ties outside of his or her team. We excluded from this measure any reported ties to alters within a respondent's team. To assess the extent to which these direct outside ties represented a variety of different countries, we used Blau's (1977) index of heterogeneity, which is defined as follows:

$$H = \left(1 - \sum p_i^2\right),$$

where p is the proportion of the team's direct outside contacts representing a particular country and i is the number of different countries represented.

We aggregated to the team level by calculating the proportion of team members with nationality heterogeneity of outside ties above the mean ($M = 0.26$, $S.D. = 0.27$). We chose this approach because it is consistent with our conceptual notion that individual team members provide creative sparks based on their exposure from advice contacts outside of the team. Our primary emphasis is the heterogeneity to which each member is exposed rather than the overall heterogeneity among the team's set of unique outside contacts. This is consistent with the mechanism that team creativity is enhanced by the broad and flexible schemas individual members bring to the team.

As an alternative to heterogeneity based on country of origin, we grouped countries into culturally similar categories using GLOBE (House et al. 2004). Instead of using 33 different countries to calculate heterogeneity, we categorized the countries into broader cultural regions. This resulted in 11 categories, which included Anglo, Eastern Europe, Germanic Europe, Confucian Asia, Southern Asia, Latin America, Latin Europe, Middle East, Nordic Europe, Sub-Saharan Africa, and "Other." We applied Blau's formula using the 11 categories of countries rather than individual countries. For example, outside contacts from Japan and Korea were not counted

as representing separate categories. Instead, with the GLOBE-based approach, these contacts represented the same category of Confucian Asia. All results using these culturally similar categories were the same as the results using the 33 different countries reported herein.

Global out-tie N-heterogeneity: With our configural measure of nationality heterogeneity, a team of three where each member is connected to the same diverse five people (i.e., a total of 5 unique outside contacts) would receive a nationality heterogeneity value equal to another team of three where the members are each connected to five different people (i.e., a total of 15 unique outside contacts) who are diverse. Although this is consistent with our proposed configural mechanism, an alternative is that outside heterogeneity affects team creativity because of the enhanced quantity of different ideas and inputs to which a team has access. This would call for the first team in the example above receiving a lower heterogeneity score (i.e., based on 5 diverse contacts) and the second team receiving a higher heterogeneity score (i.e., based on 15 diverse contacts). To account for this, we calculated a global heterogeneity score based on the unique set of individuals to whom the team is exposed to distinguish our aggregated individual configural approach from a collective team-input global approach. To do this, we considered only the unique individuals outside of the team from whom all team members sought advice. We then applied Blau's index of heterogeneity to this set of outside contacts. In our example above, this approach is based on five outside contacts in the case of the first team only. Similar to configural heterogeneity, we calculated global heterogeneity using GLOBE's cultural categories. The results using this measure were the same as the results reported herein.

Configural weak tie strength: To obtain a configural measure of weak outside ties, we calculated the proportion of team members with weaker ties outside of the team. First, for each team member, we averaged the strength of their reported outside ties by first excluding within team ties. Next, for each team, we calculated the proportion of team members with average outside-tie strength that was below (i.e., weaker than) the mean ($M = 2.83$, $S.D. = 0.99$). This approach is consistent with our conceptualization that individual members provide creative insights and the potential to bridge distinct ideas based on their experience with outside contacts. Thus, we are interested in teams that have a greater proportion of people with weaker outside ties versus the average strength for the entire team, which may mask the team's social capacity via individuals with weaker outside ties.

Weak and strong out-tie N-heterogeneity (configural): We calculated the nationality heterogeneity of outside ties using Blau's index of heterogeneity, as described previously for configural heterogeneity. However, we performed this calculation twice for each team: *weak*

out-tie N-heterogeneity reflects the nationality heterogeneity of team members' weaker ties and *strong out-tie N-heterogeneity* reflects the nationality heterogeneity of team members' stronger ties. Ties were determined to be weak or strong using a mean split ($M = 2.97$). All ties above the mean were considered strong (3 = "friend" and 4 = "good friend") and ties below the mean were considered weak (1 = "acquaintance" and 2 = "casual friend").

Control variables: We included a number of control variables.

First, we controlled for the effects of other types of heterogeneity over and above nationality heterogeneity. We measured outside-tie heterogeneity for gender (*out-tie G-heterogeneity*), undergraduate major (*out-tie M-heterogeneity*), and age (*out-tie A-heterogeneity*).⁴ These variables account for the fact that nationality heterogeneity among ties outside of the team may pick up the extent that individuals tend to have a variety of diverse ties on other dimensions. We also controlled for heterogeneity within the team. One possibility is that heterogeneous outside ties reflect the heterogeneity that exists within the team. We controlled for the heterogeneity of nationality ties within the team (*team nationality heterogeneity*) as well as within team heterogeneity in terms of other relevant demographic variables (*team gender heterogeneity*, *team major heterogeneity*, and *team age heterogeneity*). We used Blau's (1977) index of heterogeneity for all within team and outside heterogeneity control variables.

Second, in addition to heterogeneity within the team, we controlled for the density of intrateam advice ties. Consistent with network research (e.g., Balkundi and Harrison 2006), we controlled for *team density* to account for within-team closeness. Density was measured as the sum of the total tie strength of advice ties within the team divided by the total possible tie strength (Scott 2000). We used the asymmetrical within team matrix of closeness ties and replaced missing values with the team average. We then used the following formula:

$$C = \frac{\sum_{i=1}^n S_i}{S_m(n(n-1))},$$

where S_i is the reported closeness in terms of tie strength, S_m is the maximum strength, and n is the number of individuals within the team.

Third, we controlled for individual factors such as work experience and intrinsic motivation. *Work experience* was controlled for since more experienced teams may have more task knowledge to be more creative (Amabile 1996). This variable was measured as the average number of years of work experience. We controlled for *intrinsic motivation* given it is a widely theorized individual-level factor expected to facilitate creativity (Amabile 1983). In addition, intrinsically motivated individuals are more likely to seek advice from others (Mueller and Kamdar 2011).

Consistent with previous research (Perry-Smith 2006, Tierney et al. 1999), we modified the enjoyment and engagement dimension of Amabile et al. (1994) to make sense within the research context. Participants responded to four survey questions (e.g., "I enjoy analyzing organizational problems," "I like my assignments to provide me with opportunities to increase my knowledge and skills") on a scale of 1 ("very inaccurate") to 7 ("very accurate") ($\alpha = 0.81$). We calculated intrinsic motivation as the average intrinsic motivation among team members.

Finally, we controlled for relevant characteristics of ties outside of the team. We controlled for the total number and structural properties of outside ties. *Total outside ties* was controlled because we wanted to distinguish tie strength from the overall tendency to connect with people outside of the team. This was measured by counting the total number of outside ties for each team by summing individual outside ties. We controlled for the extent outside ties were *redundant*, as is the case when contacts are connected to one another, so that we could capture the effects of tie strength over and above the expected structural properties of weaker ties. Our measure of nonredundancy is based on Burt's (1992) measure of constraint, used by previous researchers (e.g., Reagans and McEvily 2003, Seibert et al. 2001) but applied to the team level. Using the unique individuals outside of the team from whom team members seek advice, we calculated constraint using the following formula:

$$c_{ij} = \left(p_{ij} + \sum p_{iq} p_{qi} \right)^2,$$

where p_{ij} is the proportion of team i 's relations invested in outside contact j , p_{iq} is the proportion of team i 's relationships invested in outside contact q , p_{qi} is the proportion of outside contact q 's relations invested in j , and q is the number of team i 's outside contacts that are also connected to team i 's contact j . Overall, for each tie between a team and outside contact, this measure calculates the extent indirect connections surround the contact, which occurs the more a team's outside contacts are connected to one another (i.e., are redundant). To calculate overall team constraint, we summed c_{ij} for each tie between the team and an outside contact. Finally, we calculated 1 minus c_{ij} to represent lack of constraint or degree of nonredundancy.^{5,6}

Analysis

The hypotheses were tested via ordinary least squared (OLS) regression. All of the control variables were entered (Model 1), followed by the independent variables (Models 2 and 3). Table 2 summarizes the OLS regression results. Since several of the variables were correlated, we checked the variance inflation factors (VIFs) to assess the level of multicollinearity. None of the VIFs was greater than 10, and the mean VIF for each model was not considerably more than 1, which suggests that multicollinearity is not severe (Chatterjee and Price 1991).

Table 1 Means, Standard Deviations, and Correlations

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 Team creativity	3.43	0.82																	
2 Configurational out-tie N-heterogeneity	47.83	26.48	0.25*																
3 Global out-tie N-heterogeneity	0.49	0.20	0.05	0.56**															
4 Weak outside ties	39.88	24.04	0.20†	−0.08	−0.03														
5 Strong out-tie N-heterogeneity (configural)	43.03	29.32	0.06	0.73***	0.49***	−0.12													
6 Weak out-tie N-heterogeneity (configural)	31.09	36.15	0.24*	0.48***	0.27*	0.26*	0.27*												
7 Team nationality heterogeneity	0.51	0.17	0.22*	0.20†	0.34**	0.10	0.02	0.10											
8 Team gender heterogeneity	0.36	0.19	−0.01	0.11	−0.05	−0.06	0.05	0.14	0.08										
9 Team age heterogeneity	0.67	0.12	0.02	0.05	0.20†	−0.05	−0.04	0.01	0.19†	−0.06									
10 Team major heterogeneity	0.66	0.14	0.00	−0.19†	−0.11	−0.05	−0.25*	−0.17	0.22*	−0.10	0.21†								
11 Team member intrinsic motivation	5.92	0.37	0.17	0.03	0.14	0.02	0.12	0.01	0.01	−0.24*	0.10	−0.04							
12 Team member work experience	4.96	1.23	−0.11	0.17	0.35**	−0.01	0.07	0.22*	−0.01	−0.30**	0.27*	0.05	0.10						
13 Team density	0.40	0.21	0.13	0.01	−0.11	−0.23*	0.15	−0.04	−0.11	−0.07	0.03	−0.03	0.01	−0.11					
14 Nonredundancy of outside ties	0.83	0.11	0.04	0.31***	0.32**	−0.15	0.35***	0.15	0.00	−0.10	0.56**	0.10	0.23*	0.25*	0.04				
15 Total outside ties	22.89	13.76	0.10	0.26*	0.06	−0.02	0.44***	0.20†	−0.06	−0.09	0.03	−0.30**	0.24*	0.13	0.24*	0.50***			
16 Out-tie G-heterogeneity	49.39	26.71	0.00	0.42***	0.19	−0.13	0.46***	0.18†	0.03	0.12	0.00	−0.22†	0.12	0.15	0.12	0.39***	0.58***		
17 Out-tie A-heterogeneity	54.19	29.00	0.06	0.42***	0.01	−0.08	0.41***	0.22†	0.05	0.06	−0.01	−0.13	0.04	0.00	0.19†	0.41***	0.64***	0.62***	
18 Out-tie M-heterogeneity	70.57	23.11	−0.10	0.33**	0.21†	0.00	0.37**	0.13	−0.08	−0.13	0.25*	−0.19†	0.08	0.12	0.06	0.44***	0.38**	0.52***	0.44***

Note. $N = 82$.

† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Results

Table 1 reports the Pearsons' correlations among all variables. Table 2 summarizes the OLS regression results. We proposed with Hypothesis 1A a positive and significant relationship between configural out-tie *N*-heterogeneity and team creativity. As shown in Model 2, configural out-tie *N*-heterogeneity is significantly related to team creativity ($p < 0.05$). Thus, Hypothesis 1A was supported.

Hypothesis 1B proposed that configural out-tie *N*-heterogeneity will be related to team creativity over and above the nationality heterogeneity of the overall team (global out-tie *N*-heterogeneity). In Model 3, we entered global nationality heterogeneity, which was not significantly related to team creativity ($p > 0.05$), but the effect of configural out-tie *N*-heterogeneity remains significantly related to creativity ($p < 0.01$). Thus, Hypothesis 1B was supported.

Hypothesis 2 proposed a positive and significant relationship between outside weak ties and team creativity. As shown in Model 2, weaker outside ties (configural) are significantly related to team creativity ($p < 0.05$). Thus, Hypothesis 2 was supported.

Hypothesis 3 proposed that out-tie *N*-heterogeneity among weaker ties will have a positive relationship with team creativity. As shown in Model 4, the relationship between weak out-tie *N*-heterogeneity is significantly related to team creativity ($p < 0.05$), and the relationship

between strong-out-tie *N*-heterogeneity is not significantly related to team creativity ($p > 0.05$). Thus, Hypothesis 3 was supported.

Supplementary Results

One alternative explanation is that our results are driven by degree of foreignness rather than nationality heterogeneity. Given that the context of the study is the United States and that this represents the predominant country of origin, the results may be driven by exposure to foreign nationals rather than heterogeneity in general. To assess this, we created a measure of the number of distinct non-U.S. countries among the team's outside ties. We also controlled for the extent team members represented non-U.S. countries by calculating within team heterogeneity among foreign nationals. The number of non-U.S. countries among outside ties was not significantly related to team creativity ($b = -0.07$, $t = -1.06$, $p > 0.05$). As a final assessment of the role of foreignness, we added our original nationality heterogeneity measure (i.e., based on all countries including the United States) with the count of non-U.S. outside ties and internal team foreignness. The effect of nationality heterogeneity persisted, even controlling for foreignness ($b = 0.01$, $t = 3.02$, $p < 0.01$). This result suggests that the effects of nationality heterogeneity are not driven by foreignness.

Table 2 Results of Regression Analysis for Team Creativity

	Model 1	Model 2	Model 3	Model 4
Constant	1.15 (1.81)	0.83 (1.72)	0.56 (1.72)	1.39 (1.77)
Control variables				
Team nationality heterogeneity	1.19* (0.59)	0.57 (0.59)	0.91 (0.64)	0.97 (0.59)
Team gender heterogeneity	-0.15 (0.56)	-0.26 (0.53)	-0.28 (0.52)	-0.42 (0.56)
Team age heterogeneity	-0.04 (1.07)	0.41 (1.02)	0.24 (1.02)	0.24 (1.08)
Team major heterogeneity	-0.38 (0.77)	0.14 (0.74)	-0.09 (0.76)	-0.11 (0.77)
Team member intrinsic motivation	0.35 (0.27)	0.34 (0.25)	0.36 (0.25)	0.35 (0.26)
Team member work experience	-0.08 (0.09)	-0.12 (0.08)	-0.09 (0.09)	-0.14 (0.09)
Team density	0.49 (0.48)	0.67 (0.46)	0.67 (0.46)	0.50 (0.47)
Nonredundancy of outside ties	0.54 (1.40)	0.09 (1.36)	0.65 (1.42)	0.24 (1.41)
Total outside ties	0.00 (0.01)	0.01 (0.01)	0.00 (0.01)	0.00 (0.01)
Out-tie G-heterogeneity	0.00 (0.01)	0.00 (0.01)	0.00 (0.00)	0.00 (0.01)
Out-tie A-heterogeneity	0.00 (0.01)	0.00 (0.01)	0.00 (0.00)	0.00 (0.01)
Out-tie M-heterogeneity	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.00)	-0.01 (0.01)
Independent variables				
Weak outside ties		0.01* (0.00)	0.01* (0.00)	
Configural out-tie <i>N</i> -heterogeneity		0.01** (0.00)	0.01** (0.00)	
Global out-tie <i>N</i> -heterogeneity			-0.86 (0.65)	
Weak out-tie <i>N</i> -heterogeneity (configural)				0.01* (0.00)
Strong out-tie <i>N</i> -heterogeneity (configural)				0.00 (0.00)
R^2 change		0.13**	0.02	0.07†
F change		6.03	1.72	2.80
R^2	0.14	0.27	0.29	0.21
F	0.90	1.75†	1.76†	1.21
N	82	82	82	82

Note. Unstandardized coefficients are reported with standard errors in parentheses.

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

Discussion

The purpose of the present research was to understand the role of team members' informal contacts outside the team as a way to achieve cognitive variation within the team, which was expected to facilitate team creativity. Specifically, we examined the heterogeneity of team members' outside nationality ties as well as the extent these ties reflected closer versus more distant, weaker relationships. Consistent with our hypotheses, we found that team creativity was maximized when teams were composed of members with nationality diverse outside ties (configural out-tie *N*-heterogeneity). This effect existed over and above the nationality heterogeneity within the team and the global outside-tie nationality heterogeneity by the team as a unit (global out-tie *N*-heterogeneity). Our results also indicate that teams composed of members with weaker outside ties were more creative than were teams composed of members with stronger outside ties. Regardless of the characteristics of the outside contact (e.g., their heterogeneity) or the structure among contacts (i.e., their redundancy), tie strength of outside contacts appears to be a relevant factor in understanding team creativity. We also examined whether for team creativity nationality heterogeneity of outside ties should be among members' weak rather than strong contacts. As expected, the results revealed that heterogeneity among weaker contacts is significantly related to team creativity but that heterogeneity of stronger outside contacts is not.

Theoretical Contributions

Our findings contribute to theorizing related to social views of creativity. In particular, we have applied the network approach to the external environment of teams and found that team member informal contacts outside of the team can facilitate the team's creativity. Our results highlight the critical role of the social context for team creativity, and specifically that relationships and experiences outside the team can be as important and sometimes more important than relationships within the team. Our study emphasized informal advice ties, rather than ties that are formally prescribed because of work tasks, and the heterogeneity and strength of these ties. Studies in the team creativity literature have not generally taken an in-depth view of informal social interactions between members and others outside of the team, although one study explored the extent team members socialized with one another (Gilson and Shalley 2004). Furthermore, it is interesting that our nationality heterogeneity measure is not merely tapping whether team members know individuals from different countries of origin; rather, our measure indicates who members seek out and rely on for advice and the country of origin of those named. This is an important distinction since a person may have contact with heterogeneous others but may not be involved in discussions with them, may not value their perspectives, and may not be cognitively engaged in

trying to understand their viewpoints. Notably, although seeking advice specifies the nature of the relationship, it does not necessarily imply a strong tie.

Our results emphasize the importance of strength of ties. Conceptually, we argued that weak and strong advice outside ties would have differential effects on team creativity, and we empirically were able to calculate heterogeneity metrics separately for weak and strong ties. As expected, we did not find that stronger, more emotionally close connections with a nationality-heterogeneous set of outside contacts were best. In contrast, our results suggest that weaker connections with a nationality-heterogeneous set of outside contacts have a positive effect on team creativity. It appears that the potential for greater immersion with those from other cultures provided by closeness, as suggested by research on multicultural experiences (Leung et al. 2008, Maddux and Galinsky 2009), does not offset social influence processes and conformity suggested by perceived similarity. Thus, although immersion in multicultural experiences may under certain conditions facilitate creativity, when it comes to its value for social relationships, nationality heterogeneity among weaker ties appears to be most beneficial. Furthermore, the procedure we used for calculating heterogeneity for weak and strong ties is valuable to evaluate the relative contribution of different kinds of ties. Also, the approach we use avoids the problem of using a more typical moderation argument in which weak ties are interacted with heterogeneous ties, since one could have many weak ties and many heterogeneous ties but the ties that are with heterogeneous others may not be the weak ones. Future research should examine this with other alter characteristics, such as functional area or hierarchical level within an organization.

Although our results are consistent with the strength of weak ties perspective (Granovetter 1973) and the positive effects of weak ties for creativity in particular (Baer 2010, Perry-Smith 2006, Zhou et al. 2009), in emphasizing teams, the present research suggests interesting extensions and clarifications. Our theorizing suggests that weak outside ties provide cognitive resources to teams, which highlights an alternative to the informational and political resources typically emphasized with outside ties (e.g., Brown and Eisenhardt 1995, Oh et al. 2004, Reagans and Zuckerman 2001). Moreover, since we controlled for nonredundancy of ties, we provide a strong test of the value of weak ties over and above nonredundancy. Specifically, our results are consistent with our arguments that exposure to heterogeneous outside others affects the creative cognition of the team member by broadening and deepening the cognitive schemas held, and this different way of viewing a problem and perspective taking can then be transferred to her work in the team. Therefore, team member schemas, and ultimately the overall cognitive architecture of the team, may be noteworthy facilitators of creativity rather than only the nonredundancy associated with weak nationality ties. Furthermore, it is not just

the collective amount of heterogeneity that a team is exposed to that matters. Our stronger results for the configural nationality heterogeneity measure suggest that the impetus for creativity may flow through the individual team members, which is consistent with our configural perspective conceptual arguments. In our case, it may be relevant that we focused on informal discretionary ties versus ties that were formally required to do the work. With the latter, the collective amount of heterogeneity may be more important because that heterogeneity may more directly increase the team's task-specific knowledge pool. We also focused on a task-irrelevant characteristic, which was appropriate given our arguments. We encourage future researchers to expand on our findings and simultaneously investigate configural versus global theories, since direct tests of the assumptions and logic inherent in both would be informative.

Finally, our emphasis on nationality heterogeneity is noteworthy. The role of nationality in creativity has been underexplored, although studies have recently begun to explore creativity in non-Western contexts (e.g., Farmer et al. 2003, Gong et al. 2009, Zhou et al. 2009). According to Gibson and Gibbs (2006), nationality is a superordinate determinant of identity and is more likely to be salient compared with other bases of identity. As a result, nationality is an important social category, and social category differences, even task-irrelevant ones, can affect cognitive processing (Phillips 2003). Furthermore, nationality differences represent deep-level differences, such as ways of making decisions, gathering information, and initiating assumptions used to judge appropriate behavior (e.g., Cox et al. 1991, Dahlin et al. 2005). Thus, connections to people with diverse viewpoints and perspectives should provide more access to unique approaches. Since individuals also rely on these diverse individuals for advice, along with being cognitively stimulated, they become more cognitively flexible as they interact, which may affect how they view work tasks and problems.

Practical Implications

Our results provide suggestions for practice. First, managers may find it interesting to know that even if their employees are not working on diverse teams, the "benefits of diversity" may be realized through the transport of experiences outside of the team with diverse others. Therefore, in addition to focusing on team composition with regard to heterogeneity, managers should also explore whether their employees are embedded in an outside network of heterogeneous ties on a number of dimensions, such as nationality or educational background. Our findings are particularly relevant given the findings of research that suggests there are many complexities associated with obtaining creativity via internal team heterogeneity due to process losses and other unintended consequences (e.g., Chatman et al. 1998, Lovelace et al. 2001); as such, the often touted benefits of team heterogeneity are not

frequently achieved (Joshi and Roh 2009, Van Der Vegt and Bunderson 2005). From a social perspective, given that team members are typically not isolated from people outside of the team and are part of a broader social system (e.g., Allen 1984, Ancona and Caldwell 1992a, Oh et al. 2004), outside social ties can provide diverse perspectives and cognitive flexibility that can facilitate team creative outcomes. Overall, our findings indicate that heterogeneous work environments and opportunities to engage in work-relevant conversations with diverse others may be as important for creativity as heterogeneity within the team, whether or not the teams themselves are heterogeneous.

Limitations, Future Research, and Conclusions

Although this research provides several important contributions, we also need to highlight some potential limitations. First, we studied MBA student teams working on a semester-long project. We could argue that this sample represents a situation where team membership is very salient (i.e., since students are on the same team across all their semester courses and grades are based on their team work) and in terms of task structure and group dynamics that these student teams closely resemble work environments of project teams in organizations; yet future research will need to demonstrate whether our results generalize to actual project teams in organizations or would generalize to other types of work teams. Second, one alternative explanation for our results is that it could be the personal qualities of the team member that is generating creativity or some other unmeasured variable that simultaneously affects creativity and nationality heterogeneity. Although we did not measure multiple personality factors that have been associated with creativity, such as openness to experience or creative personality, we were able to partially rule out this possibility by controlling for individual factors such as intrinsic motivation and work experience. We encourage future researchers to continue to look at other possible personal factors and, in particular, alternative designs such as controlled experiments with random assignment. Third, our results are cross-sectional in nature since all our survey measures were collected at one point in time. Therefore, it is possible that instead of these network patterns causing creativity, teams that were more creative were able to develop more heterogeneous ties for other reasons. Future research could attempt to study this with longitudinal designs that would help to rule out reverse causality explanations. Finally, we did not directly test our proposed cognitive architecture mechanism, although our test of configural versus global outside ties provides suggestive evidence. This problem of missing mechanisms is common across social network studies. Nevertheless, future researchers are encouraged to directly test and isolate the theorized mechanisms.

In summary, our results contribute to the understanding of creativity within teams, a social view of creativity,

and in general social network research. We go beyond task focused communication among team members and formal communication outside the team (e.g., between team leaders) and focus on discretionary advice ties and the associated level of closeness. We emphasize configural outside ties and member schemas as relevant mechanisms through which ties outside of the team affect creativity. Our conceptualization suggests how a person's social experiences outside of the team, particularly with individuals with heterogeneous nationalities, may inform team outcomes. In this way, teams may not appear to be very heterogeneous but may be filled with diversity "ambassadors" who, via their members' outside exposures, carry with them a cognitive orientation through their schemas that manifests within the team.

Acknowledgments

The authors thank Pamela Tierney and Giuseppe Labianca for helpful feedback. They also thank Steve Borgatti and the anonymous reviewers for their insightful comments and guidance.

Appendix. List of Participants' Countries of Origin

Argentina	Jamaica
Azerbaijan	Japan
Brazil	Korea
Bulgaria	Malaysia
Canada	Morocco
China	Nigeria
Colombia	Pakistan
Croatia	Philippines
Ecuador	Poland
El Salvador	South Korea
Estonia	Spain
Germany	Taiwan
Ghana	Thailand
Great Britain	Ukraine
Grenada	United States
India	Venezuela
Israel	

Endnotes

¹It is important to stress that the team's cognitive architecture is not the same as a team's shared mental model, which is more of a global rather than configural construct. Although team cognitive architecture is the compilation of members' schemas, a team's shared mental model consists of shared information that all members of the team hold in common (Cannon-Bowers et al. 1993).

²It is possible that extremely weak ties may not provide enough exposure to affect a member's schemas and ultimately the team's cognitive architecture. Although this is possible, since we emphasize advice ties, we expect weak ties to not be so weak that they are not meaningful. Although weak, the interaction involves the actor seeking the alter's advice on some regular although infrequent basis.

³We eliminated one team because of a negative r_{wg} resulting from a high level of disagreement among raters. To check the sensitivity of excluding this team, we ran an alternative analysis

that included the team, and the results were the same as the results reported herein.

⁴We excluded outside-tie race heterogeneity because of its high correlation with nationality heterogeneity ($r = 0.60$). In this sample, respondents were asked to indicate their predominant racial/ethnic background. The categories they wrote into this open-ended question included Arab, black, East Asian, Hispanic, South Asian, white, and Native American.

⁵All calculations are based on symmetrical binary (1 = tie, 0 = no tie) ties, where a tie exists between outside contacts if either member of the dyad reported a contact with the other.

⁶We also calculated constraint among each team member's outside contacts. We then measured nonredundancy as the proportion of members with nonredundancy values above the mean. Using this version of nonredundancy did not alter the results.

References

- Ahuja G (2000) Collaboration networks, structural holes, and innovation: A longitudinal study. *Admin. Sci. Quart.* 45:425–455.
- Allen TJ (1984) *Managing the Flow of Technology: Technology Transfer and the Dissemination of Technological Information Within the R&D Organization* (MIT Press, Cambridge, MA).
- Amabile TM (1983) *The Social Psychology of Creativity* (Springer-Verlag, New York).
- Amabile TM (1996) *Creativity in Context* (Westview, Boulder, CO).
- Amabile TM, Hill KG, Hennessey BA, Tighe EM (1994) The work preference inventory: Assessing intrinsic and extrinsic motivational orientations. *J. Personality Soc. Psych.* 66:950–967.
- Ancona DG, Caldwell DF (1992a) Bridging the boundary: External activity and performance in organizational teams. *Admin. Sci. Quart.* 37:634–665.
- Ancona DG, Caldwell DF (1992b) Demography and design: Predictors of new product team performance. *Organ. Sci.* 3:321–341.
- Argote L, Ingram P, Levine JM, Moreland RL (2000) Knowledge transfer in organizations: Learning from the experience of others. *Organ. Behav. Human Decision Processes* 82:1–8.
- Baer M (2010) The strength-of-weak-ties perspective on creativity: A comprehensive examination and extension. *J. Appl. Psych.* 95:592–601.
- Baldwin TT, Bedell MD, Johnson JL (1997) The social fabric of a team-based MBA program: Network effects on student satisfaction and performance. *Acad. Management J.* 40:1369–1397.
- Balkundi P, Harrison DA (2006) Ties, leaders, and time in teams: Strong inference about the effects of network structure on team viability and performance. *Acad. Management J.* 49:49–68.
- Bandura A (1986) *Social Foundations of Thought and Action: A Social Cognitive Theory* (Prentice-Hall, Englewood Cliffs, NJ).
- Barron F, Harrington DM (1981) Creativity, intelligence, and personality. *Annual Rev. Psych.* 32:439–476.
- Blau PM (1977) *Inequality and Heterogeneity: A Primitive Theory of Social Structure* (Free Press, New York).
- Borgatti SP, Halgin DS (2011) On network theory. *Organ. Sci.* 22:1168–1181.
- Brass DJ (1985) Men's and women's networks: A study of interaction patterns and influence in an organization. *Acad. Management J.* 28:327–343.
- Brass DJ (1995) Creativity: It's all in your social networks. Ford CM, Gioia DA, eds. *Creative Action in Organizations* (Sage, Thousand Oaks, CA), 94–99.

- Brown SL, Eisenhardt KM (1995) Product development: Past research, present findings, and future directions. *Acad. Management Rev.* 20:343–378.
- Burkhardt ME (1994) Social integration effects following a technological change: A longitudinal investigation. *Acad. Management J.* 37:869–898.
- Burt RS (1992) *Structural Holes* (Harvard University Press, Cambridge, MA).
- Burt RS (2004) Structural holes and good ideas. *Amer. J. Sociol.* 110:349–399.
- Burton-Jones A, Gallivan MJ (2007) Toward a deeper understanding of system usage in organizations: A multilevel perspective. *MIS Quart.* 31:657–679.
- Byrne D (1971) *The Attraction Paradigm* (Academic Press, New York).
- Cannon-Bowers JA, Salas E, Converse SA (1993) Shared mental models in expert team decision making. Castellan NJ Jr, ed. *Current Issues in Individual and Group Decision Making* (Lawrence Erlbaum Associates, Hillsdale, NJ), 221–246.
- Catmull E (2008) How Pixar fosters collective creativity. *Harvard Bus. Rev.* 86(September):65–72.
- Cattani G, Ferriani S (2008) A core/periphery perspective on individual creative performance: A social networks and cinematic achievements in the Hollywood film industry. *Organ. Sci.* 19:824–844.
- Chatman JA, Polzer JT, Barsade SG, Neale MA (1998) Being different yet feeling similar: The influence of demographic composition and organizational culture on work processes and outcomes. *Admin. Sci. Quart.* 43:749–780.
- Chatterjee S, Price B (1991) *Regression Analysis by Example*, 2nd ed. (John Wiley & Sons, New York).
- Coser R (1975) The complexity of roles as a seedbed of individual autonomy. Coser L, ed. *The Idea of Social Structure: Papers in Honor of Robert K. Merton* (Harcourt Brace, New York), 237–263.
- Cox TH, Lobel SA, McLeod PL (1991) Effects of ethnic group cultural differences on cooperative versus competitive behavior on a group task. *Acad. Management J.* 34:827–847.
- Cross R, Sproull L (2004) More than an answer: Information relationships for actionable knowledge. *Organ. Sci.* 14:446–462.
- Cummings JN (2004) Work groups, structural diversity, and knowledge sharing in a global organization. *Management Sci.* 50:352–364.
- Dahlin KB, Weingart LR, Hinds PJ (2005) Team diversity and information use. *Acad. Management J.* 48:1107–1123.
- Dane E (2010) Reconsidering the trade-off between expertise and flexibility: A cognitive entrenchment perspective. *Acad. Management Rev.* 35:579–603.
- Diehl M, Stroebe W (1987) Productivity loss in brainstorming groups: Toward the solution of a riddle. *J. Personality Soc. Psych.* 53:497–509.
- Drazin R, Glynn MA, Kazanjian RK (1999) Multilevel theorizing about creativity in organizations: A sensemaking perspective. *Acad. Management Rev.* 24:286–307.
- Earley PC, Mosakowski E (2000) Creating hybrid team cultures: An empirical test of transnational team functioning. *Acad. Management J.* 43:26–49.
- Erez M, Earley PC (1993) *Culture, Self-Identity, and Work* (Oxford University Press, New York).
- Farmer SM, Tierney P, Kung-McIntyre K (2003) Employee creativity in Taiwan: An application of role identity theory. *Acad. Management J.* 46:618–630.
- Fiske ST, Taylor SE (2008) *Social Cognition: From Brains to Culture* (McGraw-Hill, New York).
- Fleming L, Mingo S, Chen D (2007) Collaborative brokerage, generative creativity, and creative success. *Admin. Sci. Quart.* 52:443–475.
- Geletkanycz MA, Hambrick DC (1997) The external ties of top executives: Implications for strategic choice and performance. *Admin. Sci. Quart.* 42:654–681.
- Gibson CB, Gibbs JL (2006) Unpacking the concept of virtuality: The effects of geographic dispersion, electronic dependence, dynamic structure, and national diversity on team innovation. *Admin. Sci. Quart.* 51:451–495.
- Gilson LL, Shalley CE (2004) A little creativity goes a long way: An examination of teams' engagement in creative processes. *J. Management* 30:453–470.
- Gong Y, Huang JC, Farh JL (2009) Employee learning orientation, transformational leadership, and employee creativity: The mediating role of employee creative self-efficacy. *Acad. Management J.* 52:765–778.
- Granovetter MS (1973) The strength of weak ties. *Amer. J. Sociol.* 6:1360–1380.
- Hambrick DC, Davison SC, Snell SA, Snow CC (1998) When groups consist of multiple nationalities: Towards a new understanding of the implications. *Organ. Stud.* 19:181–205.
- Hansen MT (1999) The search-transfer problem: The role of weak ties in sharing knowledge across organizational subunits. *Admin. Sci. Quart.* 37:422–447.
- Hargadon AB, Bechky BA (2006) When collections of creatives become creative collectives: A field study of problem solving in groups. *Organ. Sci.* 17:484–502.
- Hargadon AB, Sutton RI (1997) Technology brokering and innovation in a product development firm. *Admin. Sci. Quart.* 42:716–749.
- Hofstede G (1980) *Culture's Consequences: International Differences in Work-Related Values* (Sage, Beverly Hills, CA).
- House RJ, Hanges PJ, Javidan M, Dorfman PW, Gupta V, eds. (2004) *Culture, Leadership, and Organizations: The GLOBE Study of 62 Societies* (Sage, Newbury Park, CA).
- Hulsheger UR, Anderson N, Salgado JF (2009) Team-level predictors of innovation at work: A comprehensive meta-analysis spanning three decades of research. *J. Appl. Psych.* 94:1128–1145.
- IBM (2010) Capitalizing on complexity: Insights from the global chief executive officer study. Report, IBM Global Business Services, Somers, NY.
- James LR, Demaree RG, Wolf G (1993) r_{wg} : An assessment of within-group interrater agreement. *J. Appl. Psych.* 78:306–309.
- Joshi A, Roh H (2009) The role of context in work team diversity research: A meta-analytic review. *Acad. Management J.* 52:599–627.
- Kane GC, Borgatti SP (2011) Centrality-IS proficiency alignment and workgroup performance. *MIS Quart.* 35:1063–1078.
- Keller RT (2001) Cross-functional project groups in research and new product development: Diversity, communications, job stress, and outcomes. *Acad. Management J.* 44:547–555.
- Koestler A (1964) *The Act of Creation* (Macmillan, New York).
- Kozlowski SWJ, Klein KJ (2000) A multilevel approach to theory and research in organizations. Klein KJ, Kozlowski SWJ, eds. *Multilevel Theory, Research, and Methods in Organizations* (Jossey-Bass, San Francisco), 3–90.
- Krackhardt D, Stern RN (1988) Informal networks and organizational crises: An experimental simulation. *Soc. Psych. Quart.* 51:123–140.

- Leung AK, Maddox W, Galinsky AD, Chiu CY (2008) Multicultural experience enhances creativity: The when and how. *Amer. Psychologist* 63:169–181.
- Levin DZ, Cross R (2004) The strength of weak ties you can trust: The mediating role of trust in effective knowledge transfer. *Management Sci.* 50:1477–1491.
- Lin N, Ensel WM, Vaughn JC (1981) Social resources and strength of ties: Structural factors in occupational status attainment. *Amer. Sociol. Rev.* 46:393–405.
- Lount RB, Phillips KW (2007) Working harder with the out-group: The impact of social category diversity on motivational gains. *Organ. Behav. Human Decision Processes* 103:214–224.
- Lovelace K, Shapiro DL, Weingart LR (2001) Maximizing cross-functional new product teams' innovativeness and constraint adherence: A conflict communications perspective. *Acad. Management J.* 44:779–793.
- Lydon JE, Jamieson DW, Holmes JG (1997) The meaning of social interactions in the transition from acquaintanceship to friendship. *J. Personality Soc. Psych.* 73:536–548.
- Maddux WW, Galinsky AD (2009) Cultural borders and the mental barriers: The relationship between living abroad and creativity. *J. Personality Soc. Psych.* 96:1047–1061.
- Markus HR, Kitayama S (1991) Culture and self: Implications for cognition, emotion, and motivation. *Psych. Rev.* 98:234–253.
- Marsden PV (1990) Network data and measurement. *Annual Rev. Sociol.* 16:435–463.
- Marsden PV, Campbell KE (1984) Measuring tie strength. *Soc. Forces* 63:482–501.
- Mathieu M, Maynard MT, Rapp T, Gilson LG (2008) Team effectiveness 1997–2007: A review of recent advancements and a glimpse into the future. *J. Management* 34:410–476.
- Mehra A, Dixon AL, Brass DJ, Robertson B (2006) The social network ties of group leaders: Implications for group performance and leader reputation. *Organ. Sci.* 17:64–79.
- Mesner-Magnus JR, DeChurch LA (2009) Information sharing and team performance: A meta-analysis. *J. Appl. Psych.* 59:535–546.
- Mueller JS, Kamdar D (2011) Why seeking help from teammates is a blessing and a curse: A theory of help seeking and individual creativity in team contexts. *J. Appl. Psych.* 96:263–276.
- Mumford MD, Gustafson SB (1988) Creativity syndrome: Integration, application, and innovation. *Psych. Bull.* 103:27–43.
- Murray F (2004) The role of academic inventors in entrepreneurial firms: Sharing the laboratory life. *Res. Policy* 33:643–659.
- Nelson RE (1989) The strength of strong ties: Social networks and intergroup conflict in organizations. *Acad. Management J.* 32:377–401.
- Oh H, Chung M, Labianca G (2004) Group social capital and group effectiveness: The role of informal socializing ties. *Acad. Management J.* 47:860–875.
- Oldham GR, Cummings A (1996) Employee creativity: Personal and contextual factors at work. *Acad. Management J.* 39:607–634.
- Orlikowski WJ (2002) Knowing in practice: Enacting a collective capability in distributed organization. *Organ. Sci.* 13:249–273.
- Osborn AF (1957) *Applied Imagination*, revised ed. (Scribner, New York).
- Perry-Smith JE (2006) Social yet creative: The role of social relationships in facilitating individual creativity. *Acad. Management J.* 49:85–101.
- Perry-Smith JE, Shalley CE (2003) The social side of creativity: A static and dynamic social network perspective. *Acad. Management Rev.* 28:89–106.
- Pettigrew TF (1998) Intergroup contact theory. *Annual Rev. Psych.* 49:65–85.
- Phillips KW (2003) The effects of categorically based expectations on minority influence: The importance of congruence. *Personality Soc. Psych. Bull.* 29:3–13.
- Phillips KW, Loyd DL (2006) When surface and deep-level diversity collide: The effects of dissenting group members. *Organ. Behav. Human Decision Processes* 99:143–160.
- Phillips KW, Mannix EA, Neale MA, Gruenfield DH (2004) Diverse groups and information sharing: The effects of congruent ties. *J. Experiment. Soc. Psych.* 40:497–510.
- Podolny JM (2001) Networks as the pipes and prisms of the market. *Amer. J. Sociol.* 107:33–60.
- Porter ME (1991) Towards a dynamic theory of strategy. *J. Management* 12:95–117.
- Powell WW, Koput KW, Smith-Doerr L (1996) Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology. *Admin. Sci. Quart.* 41:116–145.
- Quinn RW (2005) Flow in knowledge work: High performance experience in the design of national security technology. *Admin. Sci. Quart.* 50:610–641.
- Reagans R, McEvily B (2003) Network structure and knowledge transfer: The effects of cohesion and range. *Admin. Sci. Quart.* 48:240–267.
- Reagans R, Zuckerman EW (2001) Networks, diversity, and productivity: The social capital of corporate R&D teams. *Organ. Sci.* 12:502–517.
- Reis H, Shaver P (1988) Intimacy as an interpersonal process. Duck SW, ed. *Handbook of Personal Relationships* (John Wiley & Sons, New York), 367–389.
- Rogers EM (1983) *Diffusion of Innovations* (Free Press, New York).
- Runco MA (2004) Creativity. *Annual Rev. Psych.* 55:657–687.
- Sanchez-Burks J, Bartel CA, Blount S (2009) Performance in intercultural interactions at work: Cross-cultural differences in response to behavioral mirroring. *J. Appl. Psych.* 94:216–223.
- Schon DA (1983) *The Reflective Practitioner: How Professionals Think in Action* (Basic Books, New York).
- Schumpeter J (1934) *The Theory of Economic Development* (Harvard University Press, Cambridge, MA).
- Scott J (2000) *Social Network Analysis: A Handbook* (Sage, Thousand Oaks, CA).
- Seibert SE, Kraimer ML, Liden RC (2001) A social capital theory of career success. *Acad. Management J.* 44:219–237.
- Selfhout M, Denissen J, Branje S, Meeus W (2009) In the eye of the beholder: Perceived, actual, and peer-rated similarity in personality, communication, and friendship intensity during the acquaintanceship process. *J. Personality Soc. Psych.* 96:1152–1165.
- Shalley CE (1995) Effects of coaction, expected evaluation, and goal setting on creativity and productivity. *Acad. Management J.* 38:483–503.
- Shalley CE, Perry-Smith JE (2001) Effects of social-psychological factors on creative performance: The role of informational and controlling expected evaluation and modeling experience. *Organ. Behav. Human Decision Processes* 84:1–22.

- Shalley CE, Perry-Smith JE (2008) The emergence of team creative cognition: The role of diverse outside ties, sociocognitive network centrality, and team evolution. *Strategic Entrepreneurship J.* 2:23–41.
- Shalley CE, Zhou J (2008) Organizational creativity research: A historical review. Zhou J, Shalley CE, eds. *Handbook of Organizational Creativity* (Lawrence Erlbaum Associates, Hillsdale, NJ), 3–31.
- Shalley CE, Gilson LL, Blum TC (2000) Matching creativity requirements and the work environment: Effects of satisfaction and intention to leave. *Acad. Management J.* 43:215–2323.
- Singley MK, Anderson JR (1989) *The Transfer of Cognitive Skill* (Harvard University Press, Cambridge, MA).
- Sommers SR (2006) On racial diversity and group decision making: Identifying multiple effects of racial composition on jury deliberations. *J. Personality Soc. Psych.* 90:597–612.
- Sparrowe R, Liden RC, Wayne SJ, Kraimer ML (2001) Social networks and the performance of individuals and groups. *Acad. Management J.* 44:316–325.
- Tajfel H, Turner JC (1979) An integrative theory of intergroup conflict. Austin WG, Worchel S, eds. *The Social Psychology of Intergroup Relations* (Brooks/Cole, Monterey, CA), 7–24.
- Tan BCY, Wei K-K, Watson RT, Clapper DL, McLean ER (1998) Computer-mediated communication and majority influence: Assessing the impact in an individualistic and collectivistic culture. *Management Sci.* 44:1263–1278.
- Tierney P, Farmer SM, Graen GB (1999) An examination of leadership and employee creativity: The relevance of traits and relationships. *Personnel Psych.* 52:591–620.
- Triandis HC (1989) The self and social behavior in differing cultural contexts. *Psych. Rev.* 96:269–289.
- Tsai W (2001) Knowledge transfer in intra-organizational networks: Effects of network position and absorptive capacity on business unit innovation and performance. *Acad. Management J.* 44:996–1004.
- Turner JC (1975) Social comparison and social identity: Some prospects for intergroup behavior. *Eur. J. Soc. Psych.* 5:5–34.
- Van Der Vegt GS, Bunderson JS (2005) Learning and performance in multidisciplinary teams: The importance of collective team identification. *Acad. Management J.* 48:532–547.
- van Dick R, van Knippenberg D, Hägele S, Guillaume YRF, Brodbeck FC (2008) Group diversity and group identification: The moderating role of diversity beliefs. *Human Relations* 61: 1463–1492.
- Ward TB (1995) What's old about new ideas? Smith SM, Ward TB, Finke RA, eds. *The Creative Cognition Approach* (MIT Press, Cambridge, MA), 157–178.
- Ward TB, Smith SM, Finke RA (1999) Creative cognition. Sternberg J, ed. *Handbook of Creativity* (Cambridge University Press, New York), 189–212.
- Woodman RW, Sawyer JE, Griffin RW (1993) Toward a theory of organizational creativity. *Acad. Management Rev.* 18:293–321.
- Yuan F, Woodman RW (2010) Innovative behavior in the workplace: The role of performance and image outcome expectations. *Acad. Management J.* 53:323–342.
- Zhou J (1998) Feedback valence, feedback style, task autonomy, and achievement orientation: Interactive effects of creative performance. *J. Appl. Psych.* 83:261–276.
- Zhou J (2003) When the presence of creative coworkers is related to creativity: Role of supervisor close monitoring, developmental feedback, and creative personality. *J. Appl. Psych.* 99:413–422.
- Zhou J, George JM (2001) When job dissatisfaction leads to creativity: Encouraging the expression of voice. *Acad. Management J.* 44:682–696.
- Zhou J, Shalley CE (2008) Expanding the scope and impact of organizational creativity research. Zhou J, Shalley CE, eds. *Handbook of Organizational Creativity* (Lawrence Erlbaum Associates, New York), 347–368.
- Zhou J, Shin SJ, Brass DJ, Choi J, Zhang ZX (2009) Social networks, personal values, and creativity: Evidence for curvilinear and interaction effects. *J. Appl. Psych.* 29:1544.

Jill E. Perry-Smith is an associate professor of organization and management at Emory University's Goizueta Business School. She received a Ph.D. in organizational behavior from Georgia Institute of Technology. Her research focuses on creativity as a social process, in particular how social network theories and ideas inform the study of individual and team creativity. In addition, she explores the interface between the work and non-work domains and the effect on individual and organizational outcomes.

Christina E. Shalley is the Thomas R. Williams-Wells Fargo Professor of Organizational Behavior at the Scheller College of Business, Georgia Institute of Technology. She received her Ph.D. from the University of Illinois at Urbana-Champaign. Her research interests include investigating the effects of various social and contextual factors in enhancing employee creativity for both individuals and teams.