A SOCIAL COMPOSITION VIEW OF TEAM CREATIVITY: THE ROLE OF MEMBER NATIONALITY HETEROGENEOUS TIES OUTSIDE OF THE TEAM

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ABSTRACT

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 member's schemas and the team's cognitive architecture. Results of a study of eighty-two MBA long-term 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.

Increasingly, organizations are using teams as their primary work units (Mesner-Magnus & DeChurch, 2009), and teams are considered key for organizations' effectiveness and competitive advantage (Mathieu, Maynard, Rapp, & Gilson, 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 & Cummings, 1996; Woodman, Sawyer, & Griffin, 1993; Zhou & Shalley, 2008). For example, a recent 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, Glynn, & Kazanjian, 1999; Shalley & 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 in order 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. While historically, psychologists focused on individual factors such as personality (see Barron & Harrington, 1981 or Runco, 2004 for reviews), more organizationally oriented scholars focused on the social psychological and contextual factors that facilitate or constrain creativity (e.g. Oldham & Cummings, 1996; Shalley, 1995; Tierney, Farmer & Graen, 1999). In particular, the social nature of creativity is increasingly recognized. Starting with seminal theories describing creativity as a social process (Amabile, 1983; Woodman, Sawyer & Griffin, 1993), this view has expanded to a decidedly relational and social interactive view of individual creativity (e.g. Brass, 1995; Perry-Smith & 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 & Bechky (2006) describe 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 & Shalley, 2004) and the effect of team member closeness on creativity (Hulsheger, Anderson & Salgado, 2009). Notably, this work focuses only on relationships *amongst* 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. Krakhardt & Stern, 1988; Oh, Chung & Labianca, 2004), in addition to relationships with team members (e.g., Sparrowe, Liden, Wayne & Kramer, 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 & Caldwell, 1992(b); 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 non-redundant 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.

While non-redundancy 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 member's cognitive approaches to problems, or more formally the complexity and flexibility of his or her schemas (i.e., creative capacity), that ultimately determines 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 which assumes that the flow of content from external ties is additive and 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 & Klein, 2000; Burton-Jones & 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, Maddux, Galinsky & Chiu, 2008; Maddux & 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, Weingart & Hinds, 2005; Gibson & Gibbs, 2006; van Dick, van Knippenberg, Hagele, Guillaume, & Brodbeck, 2008). Interestingly, although there are intuitive benefits to creativity of interacting with diverse others, a variety of social psychological barriers make 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 member's ties *outside* of the team, which we term "out-tie N-heterogeneity."

In addition to their nationality, we consider the strength of member's outside ties and investigate nationality heterogeneity among weak ties and strong ties separately, over and above the non-redundancy 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 in order 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 member's schemas and thus affect the team's creativity. Our social psychological point of view emphasizes a complimentary 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 manager's 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, Mingo & Chen, 2007), idea generation (Osborn, 1957), a process of engagement in creative acts (Drazin, Glynn, & Kazanjian, 1999), or a necessary precursor to innovation (Woodman, Sawyer, & Griffin, 1993; Yuan & 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, Gilson, & Blum, 2000) and accordingly, has been applied to numerous organizational contexts (e.g. Fleming et al., 2007; Cattani & Ferriani, 2008; Zhou & 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 (2006) describes, knowledge work involves solving complex and varied problems where there often 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 & 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 & 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, Koput, & Smith-Doerr, 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 & 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 in order 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 & 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 & 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 of themselves (Fiske & 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 their 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 & 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 teams' cognitive architecture. Specifically, we define the teams' cognitive architecture as the compilation of the different schemas, processing styles, and their 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 non-redundancy mechanism. Team members not only interact with other team members but simultaneously are situated in a broader context of informal social relationships in their environment (Ancona & Caldwell, 1992(a); Ancona & Caldwell, 1992 (b); Geletkanycz, & Hambrick, 1997; Oh, et al, 2004; Reagans & 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 & Caldwell, 1992; 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 teams' 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, but 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 other's 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

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

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 or not a team member interacts with nationality heterogeneous others outside of the team but 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 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, Bartel, & Blount (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, Lobel, & McLeod, 1991; Dahlin, Weingart, & Hinds, 2005; Erez & Earley, 1993; Leung et al, 2008). In addition, these individuals may experience different communication styles as some countries rely more heavily on body language, facial expressions, and so on, than other countries (Tan, Wei, Watson, Clapper, & McLean, 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 &

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 & Mosakowski, 2000; Hambrick, Davison, Snell, & Snow, 1998). In other words, although many bases of identity exist, such as gender, professional affiliation, or regional differences within 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" (Kozlowski & Klein, 2000; Burton-Jones & Gallivan, 2007) 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 teams' cognitive architecture by affecting individual team member's 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. In order 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 & 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 to the combining of schemas into more complex entities. Essentially, schemas are thought to have a level of activation, which 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, Mannix, Neale, & Gruenfield, 2004; Phillips & Loyd, 2005). 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 & 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 him/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 & 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, Ingram, Levine, & Moreland, 2000; Singley & Anderson, 1989, Ward, Smith, & Finke, 1999) describes how individuals' experiences in one activity affects 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 and colleagues (2008) argue 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 each team member brings their 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 them perspectives and habits fostered as a result of their 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 teams' 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 the team member who challenges reaching 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 & 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 model's behavior patterns, modes of thought, and work standards. Members with more flexible and broad schemas, due to 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 & 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 multi-level research, configural approaches highlight the constituent parts rather than the collective whole (Kozlowski & Klein, 2000; Burton-Jones & Gallivan, 2007; Kane & Borgatti, 2011). 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 & 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 (Kozlowki & Klein, 2000; Burton-Jones & Gallivan, 2007) 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 1A 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.

Insert Figure 1

However, an alternative is that the global nature of outside ties may be primary. In particular, consider the predominant flow perspective of networks (Borgatti & 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 1A, which depicts the configural approach. Both members A and B are connected to C & D. While the configural approach would count each of these ties separately, the global approach suggests that counting alters C & D separately for each member would inappropriately duplicate (i.e., double count) the team's heterogeneity stock and access to resources provided by C & D. This logic is represented in Figure 1B, 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 member's 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 focuses on the teams' 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 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) articulates that weak ties can be advantageous, because they provide access to disconnected others and new information. Although subsequent emphasis has been on non-redundancy as the proximal mechanism (e.g., Burt, 1992; Borgatti & Halgin, 2011), we suggest that weak outside ties will facilitate the creativity of the team beyond non-redundancy. 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 world views (Byrne, 1971). As a result, weaker outside ties as compared to stronger ties are more likely to provide exposure to perspectives that differ from the focal actor. In addition, while close friends serve the important function of validating each other's views (Cross & Spruill, 2004; Reis & Shaver, 1988), weaker contacts are more likely to question one another's judgments. Both different perspectives and less agreement could increase the flexibility of member's 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 & Shalley, 2003). A number of studies have 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, Bedell, & Johnson, 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 & Shalley, 2003). Thus, when an individual has weaker outside connections, the result is the development of broader and more flexible schemas that facilitates 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 due to 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

While 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 & Galinsky, 2009). Cultural knowledge is complex, tacit and not easily codified. Such knowledge is much

[2] It is possible that extremely weak ties may not provide enough exposure to affect a member's schemas and ultimately the team's cognitive architecture. While 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.

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 minimizes 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 persist such as social influence processes which may promote conformity, leading to the activation of simpler and less flexible schemas. Also, strong ties can cause enhanced loyalty outside of the team which 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 while 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 & Lloyd, 2005). 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 help 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, Jamieson & Holmes, 1997; Selfhout, Denissen, Branje & Mecus, 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 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 & 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 4 to 6 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, Gilson, & Blum, 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 percent. Forty percent were from countries other than the United States (see Appendix 1 for a complete listing of the countries); their average age was 27.8, with an average of 5 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 less than 3 respondents), resulting in 91% of the sample representing 82 usable teams out of the original 90.[3] We had over an 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 was 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 & 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 and 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

[3] We eliminated one team due to 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 which included the team, and the results were the same as the results reported herein.

creativity (i.e. the novelty and usefulness) of analysis. The interrater reliability for the expert's ratings of creativity was calculated using $r_{wg(2)}$ (James, Demaree & Wolf, 1993) with a mean $r_{wg(2)}$ =.82 and a median $r_{wg(2)}$ =.88. Each team's creativity score is an average of the two items (r=.52, p<.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 seventeen spaces for respondents to write in names. Our intention was to provide many more lines then 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 2 indicating 17 names; only three respondents indicated more than 17. We delineated a respondent's advice ties into 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" (1 = *acquaintance*, 2 = *casual friend*, 3 = *friend*, 4 = *good friend*) to obtain a measure of the strength of each advice tie. Our measure of strength is consistent with the widely used emotional closeness based approach to tie strength (e.g. Lin, Ensel & Vaughn, 1981), described by Granovetter (1973) in his original conceptualization of strength. Although other measures of tie strength have been used, such as frequency or duration, closeness based on friendship is often used (e.g. Marsden & Campbell, 1984; Seibert et al., 2001). Our two staged 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 choose this approach because we did not only want 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 their 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 Appendix 1). We combined this 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:

$$H = (1 - \Sigma p_i^{\,2}),$$

where *p* is the proportion of the team's direct outside contacts g 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= .26, S.D. = .27). We choose 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 amongst 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. While this is consistent with our proposed configural mechanism, an alternative is that outside heterogeneity effects 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 five diverse contacts) and the second team receiving a higher heterogeneity score (i.e. based on fifteen 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) the mean (M= 2.83, S.D. = .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 member's 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*, 4 = *good friend*) and ties below the mean were considered weak (1 = *acquaintance*, 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

[4] We excluded outside tie race heterogeneity because of its high correlation with nationality heterogeneity (r=.60). In this sample, respondents were asked to indicate their predominant racial/ethnic background. The race categories they wrote into this open ended question included: Arab, Black, East Asian, Hispanic, South Asian, White, and Native American.

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, 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 & 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 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 & Kamdar, 2011). Consistent with prior research (Tierney et al, 1999; Perry-Smith, 2006), we modified Amabile, Hill, Hennessey and Teighe's (1994) enjoyment and engagement dimension to make sense for 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 = .81). We calculated intrinsic motivation as the average intrinsic motivation amongst team members.

Lastly, 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 non-redundancy is based on Burt's (1992) measure of constraint, used by previous researchers (e.g. Seibert, Kraimer & Liden, 2001; Reagans & McEvily, 2003) 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:

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

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, and p_{qj} is the proportion of outside contact q's relations invested in j. 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. Lastly, we calculated 1 minus c_{ij} to represent lack of constraint or degree of non-redundancy.[5] [6]

[5] All 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.

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

Analysis

The hypotheses were tested via ordinary least squared (OLS) regression. All of the control variable 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 were greater than 10, and the mean VIF for each model was not considerably more than 1, which suggests that multicollinearity is not severe (Chatterjee & Price, 1991).

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 ($p<.05$). Thus, Hypothesis 1a was supported.

Insert Tables 1 and 2

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 ($p>.05$), but the effect of configural out-tie N-heterogeneity remains significantly related to creativity ($p<.01$). 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 ($p<.05$). 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 3, the relationship between weak out-tie N-heterogeneity is significantly related to team creativity ($p<.05$), and the relationship between strong-out-

tie N-heterogeneity is not significantly related to team creativity ($p>.05$). 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-US countries among the team's outside ties. We also controlled for the extent team members represented non-US countries by calculating within team heterogeneity among foreign nationals. The number of non-US countries among outside ties was not significantly related to team creativity ($b=-.07$, $t=-1.06$, $p>.05$). As a final assessment of the role of foreignness, we added our original nationality heterogeneity measure (i.e. based on all countries including the US) with the count of non-US outside ties and internal team foreignness. The effect of nationality heterogeneity persisted, even controlling for foreignness ($b=.01$, $t=3.02$, $p<.01$). This result suggests that the effects of nationality heterogeneity are not driven by foreignness.

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 member's 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 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 teams' 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 due to 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 & 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, while 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 was best. In contrast, our results suggest that weaker connections with a nationality heterogeneous set of cross- cutting 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 & 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 in order 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.

While 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 & 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 non-redundancy associated with

weak nationality ties. Furthermore, it is not just the collective amount of heterogeneity that a team is exposed to that matter. 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 as 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 upon 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 for creativity has been underexplored, although studies have recently begun to explore creativity in non-Western contexts (e.g., Farmer, Tierney, & Kung, 2003; Gong, Huang, & Farh, 2009; Zhou, Shin, Brass, Choi, & Zhong, 2009). According to Gibson and Gibbs (2006), nationality is a superordinate determinant of identity and is more likely to be salient in comparison to 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, Lobel & McLeod, 1991; Dahlin, Weingart & Hinds, 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, besides 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, Polzer, Barsade, & Neale, 1998; Lovelace, Shapiro, & Weingart, 2001), and as such, the often touted benefits of team heterogeneity are not frequently achieved (Joshi & Roh, 2009; Van Der Vegt & Bunderson, 2005). From a social perspective, given that team members typically are not isolated from people outside of the team and are part of a broader social system (e.g. Ancona & Caldwell, 1992; Allen, 1984; 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

While 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. Although we would argue that this sample represents a situation where team membership is very salient (i.e., since they are in 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. Nonetheless, 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.

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APPENDIX

Country of Origin

ARGENTINA	JAMAICA
AZERBAIJAN	JAPAN
BRAZIL	KOREA
BULGARIA	MALAYSIA
CANADA	MOROCCO
CHINA	NIGERIA
COLOMBIA	PAKISTAN
CROATIA	PHILLIPINES
ECUADOR	POLAND
ELSALVADOR	SKOREA
ESTONIA	SPAIN
GERMANY	TAIWAN
GHANA	THAILAND
GREAT BRITAIN	UKRAINE
GRENADA	USA
INDIA	VENEZUELA
ISRAEL	

FIGURE 1

Figure 1A

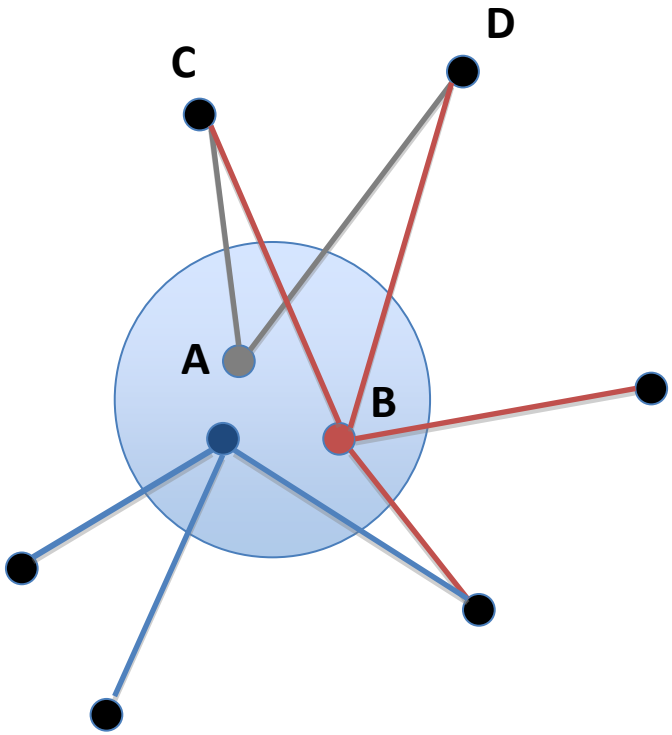
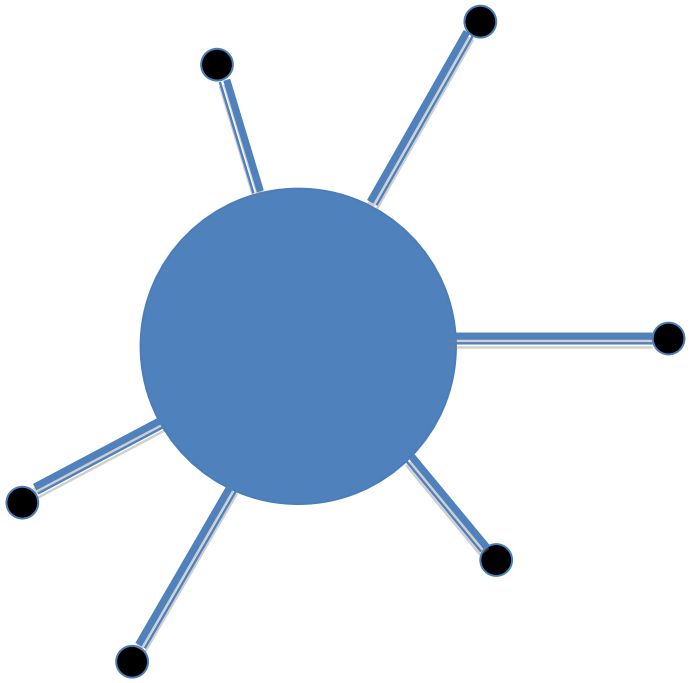


Figure 1B



Configural Out-Tie Heterogeneity

Key Question: What is the heterogeneity of *each member's* ties outside of the team?

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

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.

TABLE 1

MEANS, STANDARD DEVIATIONS, AND CORRELATIONS

	Variable	Mean	s.d.	1	2	3	4	5	6	7
1	team creativity	3.43	0.82							
2	configural 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 t	-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 t	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 t	-0.05	-0.04	0.01	0.19 t
10	team major heterogeneity	0.66	0.14	0.00	-0.19 t	-0.11	-0.05	-0.25 *	-0.17	0.22 *
11	team member intrinsic motivation	5.92	0.37	0.17	0.03	0.14	0.02	0.12	0.01	0.01
12	team member work experience	4.96	1.23	-0.11	0.17	0.35 **	-0.01	0.07	0.22 *	-0.01
13	team density	0.40	0.21	0.13	0.01	-0.11	-0.23 *	0.15	-0.04	-0.11
14	non redundancy of outside ties	0.83	0.11	0.04	0.31 ***	0.32 **	-0.15	0.35 ***	0.15	0.00
15	total outside ties	22.89	13.76	0.10	0.26 *	0.06	-0.02	0.44 ***	0.20 t	-0.06
16	out-tie G-heterogeneity	49.39	26.71	0.00	0.42 ***	0.19	-0.13	0.46 ***	0.18 t	0.03
17	out-tie A-heterogeneity	54.19	29.00	0.06	0.42 ***	0.01	-0.08	0.41 ***	0.22 t	0.05
18	out-tie M-heterogeneity	70.57	23.11	-0.10	0.33 **	0.21 t	0.00	0.37 **	0.13	-0.08

N=82

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

TABLE 1 (CONTINUED)

MEANS, STANDARD DEVIATIONS, AND CORRELATIONS

	Variable	8	9	10	11	12	13	14	15	16	17
1	team creativity										
2	configural out-tie N-heterogeneity										
3	global out-tie N-heterogeneity										
4	weak outside ties										
5	strong out-tie N-heterogeneity (configural)										
6	weak out-tie N-heterogeneity (configural)										
7	team nationality heterogeneity										
8	team gender heterogeneity										
9	team age heterogeneity	-0.06									
10	team major heterogeneity	-0.10	0.21 t								
11	team member intrinsic motivation	-0.24 *	0.10	-0.04							
12	team member work experience	-0.30 **	0.27 *	0.05	0.10						
13	team density	-0.07	0.03	-0.03	0.01	-0.11					
14	non redundancy of outside ties	-0.10	0.56 **	0.10	0.23 *	0.25 *	0.04				
15	total outside ties	-0.09	0.03	-0.30 **	0.24 *	0.13	0.24 *	0.50 ***			
16	out-tie G-heterogeneity	0.12	0.00	-0.22 t	0.12	0.15	0.12	0.39 ***	0.58 ***		
17	out-tie A-heterogeneity	0.06	-0.01	-0.13	0.04	0.00	0.19 t	0.41 ***	0.64 ***	0.62 ***	
18	out-tie M-heterogeneity	-0.13	0.25 *	-0.19 t	0.08	0.12	0.06	0.44 ***	0.38 **	0.52 ***	0.44 ***

N=82

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

TABLE 2

RESULTS OF REGRESSION ANALYSIS FOR TEAM CREATIVITY [a]

	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)
non redundancy 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 N-heterogeneity		0.01 (0.00) **	0.01 (0.00) **	
global out-tie N-heterogeneity			-0.86 (0.65)	
weak out-tie N-heterogeneity (configural)				0.01 (0.00) *
strong out-tie N-heterogeneity (configural)				0.00 (0.00)
R^2 change		0.13 **	0.02	0.07 [t]
F change		6.03	1.72	2.80
R^2	0.14	0.27	0.29	0.21
F	0.90	1.75 [t]	1.76 [t]	1.21
N	82	82	82	82

[a] Non standardized coefficients are reported with standard errors in parentheses

[t] p<.10
* p<.05
** p<.10