



**Innovating at the World's
Crossroads:
How Multicultural Networks
Promote Creativity**

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**Innovating at the World's Crossroads:
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ABSTRACT

This research examines the effects of multicultural social networks on individuals' creative performance. Combining network analysis with experimental methods, two studies using different samples found that networks' degree of cultural heterogeneity positively predicts creativity on tasks that draw on varied cultural-knowledge resources but not on other tasks. The results also indicate that a culturally heterogeneous network increases the likelihood of receiving culture-related novel ideas from others in the network whether or not they share one's culture of origin. This finding sheds light on the mechanisms that underlie multicultural networks' effects on creativity. Theoretical and practical implications for creativity and networking are discussed.

Key words: creativity, network, culture, diversity, multiculturalism

Recent research has found links between multiculturalism and creativity (Antonio, Chang, Hakuta, Kenny, Levin, & Milem, 2004; Cheng, Sanchez-Burks, & Lee, 2008; Leung & Chiu, 2008; Leung & Chiu, in press; Leung, Maddux, Galinsky, & Chiu, 2008; Maddux & Galinsky, 2009). One broad theme in this emerging body of work is that exposure to different cultures offers access to diverse ideas, promotes openness to new perspectives, and helps people link apparently disparate ideas to generate new ones. Various forms of multicultural exposure have been found to promote creativity. Maddux and Galinsky (2009) found evidence that living abroad and being immersed in a culture different from one's own promotes creative problem solving. Leung and Chiu (in press) documented that mere exposure to foreign cultural icons in laboratories or via foreign films and foods can also promote creative thoughts.

People, however, do not necessarily need to travel aboard or be primed by cultural icons to be exposed to multiple cultures; one's social network is another source of multicultural experience. In this research, I combine social network analysis and experimental methods to study the effects of multicultural networks on creative performance, identifying boundary conditions as well as underlying mechanisms. As a mode of exposure to diverse cultures, social networks differ from other modes of cultural exposure that have been studied (Leung and Chiu, in press; Maddux & Galinsky, 2009). A distinctive feature of a network is that it facilitates a variety of concurrent social exchanges, drawing on ongoing interpersonal relationships with a range of individuals (Coleman, 1990). Specifically, networks facilitate the exchange of a variety of valued resources, ranging from work advice and financial aid to friendship and career mentoring. Such exchanges offer exposure to how people from other cultures think about and approach various life issues; they also allow for direct comparison of cultural differences. Additionally, cultural diversity in one's network may provide informational cues that one is

receptive to foreign cultures, prompting others to discuss ideas and information about other cultures with him or her. Multicultural networks therefore represent a unique platform for access to a range of knowledge systems, potentiating creative thinking.

Prior measures of multicultural exposure, such as living and traveling abroad (Maddux & Galinsky, 2009) and having close friends from abroad (Leung & Chiu, 2008), to some extent imply multicultural networks—for instance, living abroad tends to generate a network of foreign acquaintances—but those studies did not directly examine the effects of multicultural networks. Thus it remains unclear whether and how multicultural networks influence creativity. Does greater cultural heterogeneity in a network lead to greater individual creativity? If so, does the effect of network cultural heterogeneity on creativity apply to all types of creativity tasks or only certain types of creativity task? What might be some of the mechanisms that underlie this relationship?

This research tests two competing hypotheses about how multicultural networks might influence creative performance. One is that individuals with more culturally heterogeneous networks will be more creative, but only at tasks that draw on multiple cultural-knowledge systems (Cheng et al., 2008). This argument rests on the premises that culturally heterogeneous networks facilitate a flow of novel ideas related to other cultures and that these ideas are useful only for certain types of tasks. Hence, the creativity enhancing effect of network cultural heterogeneity is domain specific. The alternative hypothesis is that individuals with more culturally heterogeneous networks will be creative at a broad range of tasks, because such networks promote cognitive complexity and thus creativity in general (Maddux & Galinsky, 2009; Tadmor & Tetlock, 2006).

In two egocentric network surveys of different samples (media professionals and university students), I measured the cultural heterogeneity of participants' social networks and then assessed their creative performance on a range of tasks, some that required a global mindset (i.e., knowledge resources from different cultures) and some that did not. In the second survey, I began to investigate the underlying mechanisms. One mechanism proposed in the literature is that multicultural exposure increases creativity by promoting a flow of novel ideas and concepts from cultures other than one's own (henceforth referred to as culture-related novel ideas) (Leung et al., 2008). The implicit assumption underlying this theory is that novel ideas come from contacts who are culturally different from oneself since these contacts have access to cultural knowledge and experience that one does not possess. Intuitive as this proposal might seem, the flow of novel ideas in exchange relationships has seldom been directly measured. An alternative theory is that culture-related novel ideas might not necessarily come from culturally different contacts but from all contacts in general because, inferring from the degree of cultural diversity in one's network, they perceive one to be highly receptive to such new ideas. To test this theory, in addition to measuring networks' cultural heterogeneity, I measured dyadic relationships within these networks to examine the content of novel ideas that participants received. If multicultural networks only promote creativity at tasks that draw on diverse cultural knowledge, one would expect a positive association between network heterogeneity and a flow of culture-related novel ideas but not other types of novel ideas. Importantly, this approach also allows me to ascertain the sources of culture-related novel ideas.

This research makes three key contributions. By providing evidence of a positive relationship between networks' degree of multiculturalism and specific domains of creativity, it expands research at the nexus of social networks, culture, and creativity. Network researchers

have long argued that network features such as functional heterogeneity (Perry-Smith, 2006) can increase creativity (Brass, 1995; Perry-Smith & Shalley, 2003). Cross-cultural researchers have also begun linking multicultural exposure to creativity (e.g., Leung et al., 2008). My research connects these two non-overlapping streams of investigation, both of which aim to better understand the antecedents of creativity. Second, by examining whether the positive effect on creativity of a multicultural network extends to tasks of all types or only those that draw on ideas from different cultural domains, this research contributes to current debate about the conditions under which multiculturalism influences creativity. Third, this research sheds light on a mechanism—the flow of culture-related novel ideas—that potentially underlies the link between multicultural networks and creativity, paving the path for future research on how multiculturalism stimulates creative performance at the workplace.

THEORETICAL BACKGROUND

Over the last several decades, creativity researchers have documented the effects on creativity of various individual characteristics (e.g., intrinsic motivation and personality) and contextual factors (e.g., leadership and organizational climate). Creativity is commonly defined as the creation of a new product or idea that satisfies some value functions (Amabile, 1983; Runco, 2004). One recent development in creativity research arises from the work of cross-cultural psychologists. Chiu and Hong (2005) argue that multicultural experiences serve to increase individuals' sensitivity to knowledge and ideas originating in other cultures. This attitude in turn increases individuals' propensity to recruit ideas, concepts, and perspectives from other cultures when working on creative tasks.

One way to gain multicultural experience or exposure is via one's social networks. Over the last century, globalization and mass migration have made it unnecessary to travel abroad to encounter individuals from different cultural backgrounds. Multinational workplaces and international student bodies at universities both provide ample opportunities to forge multicultural social networks. Interacting regularly and in a variety of ways with people from other cultures offers diverse perspectives on how people from other cultures think about and tackle personal and work-related issues. Multicultural networks also provide access to knowledge and ideas that may be unavailable in one's own culture.

Owing to differences in values and norms, ideas from different cultures are not always compatible. Because networks provide for concurrent access to multiple perspectives (compared, for instance, to living in a single foreign country and being exposed only to its perspective), the different points of view of members of one's network become especially salient. Individuals who encounter incompatible ideas via social contacts of different cultures may try to make sense of and even reconcile these ideas. Over time, exposure to conflicting ideas may increase individuals' receptivity to novel perspectives and to ideas from different cultures in general.

Effects on Creativity of a Network's Cultural Heterogeneity

In this research, I argue that a network's degree of cultural heterogeneity matters. The more one's network includes individuals from different cultural backgrounds, the more one is exposed to and stimulated by ideas and perspectives different from one's own. These new ideas might come from (a) culturally different social contacts or (b) culturally similar contacts who perceive one to be highly receptive to culture-related new ideas because they see that one's network is culturally diverse. Regardless of the source of ideas, the increased flow of divergent

ideas would strengthen the effects of multicultural exposure on creative thinking. Thus, it seems reasonable to expect a positive relationship between the network's degree of cultural heterogeneity and creativity. But we must pursue this argument further and ask whether the positive effect on creativity of a multicultural network extends to tasks of all types or only those that draw on ideas, knowledge, and perspectives from different cultural domains.

Tadmor and Tetlock (2006) argue that multicultural experiences help individuals recognize and integrate viewpoints grounded in diverse cultures, and consequently enhance their cognitive complexity—that is, their ability to tolerate and even reconcile conflicting ideas and perspectives (Suedfeld & Bluck, 1993). Leung and colleagues (2008) propose that exposure to foreign cultures may also destabilize an individual's routine knowledge structure, thus spurring divergent thinking. Some cross-cultural researchers have found evidence that multicultural exposure has positive effects on a variety of tasks, including negotiation, idea generation, remote association of ideas, and imagination tasks like drawing depictions of aliens (Leung & Chiu, 2008; Leung & Chiu, in press; Maddux & Galinsky, 2008). Taken together, these studies suggest that if multicultural networks indeed have a positive effect on creativity, it should be generalizable to a wide range of tasks that require creative thinking.

Other research suggests, however, that the positive effect of multicultural exposure on creativity may be more circumscribed (Cheng et al., 2008). In their study of biculturals (individuals with extensive experience in two cultures), for example, Cheng and colleagues (2008) argue that the effect on creative performance of multicultural experience is restricted to tasks belonging to specific cultural domains in which the individual has bicultural experience. These researchers found evidence of creativity only in tasks that require applying knowledge systems from both cultures. In an experiment involving fusion cuisine, for instance, Cheng and

colleagues (2008) found that Asian-Americans who identified highly with both Asian and American culture were more creative than those who did not identify with both cultures at generating recipes using both Asian and American ingredients but not at a task using only Asian or only American ingredients.

Cheng and colleagues' (2008) central argument is that the creativity-promoting effects of multicultural exposure involve accessing different cultural-knowledge systems: if a given task does not call for knowledge resources from different cultures, it is unlikely that an individual will be more creative simply by virtue of having had more multicultural experiences. Hence, there is ground to expect that the positive effect of a culturally heterogeneous network on an individual's creativity is domain specific, restricted to tasks that call for knowledge resources from different cultures. Inherent in this argument, of course, is the assumption that a network enables the flow of ideas of all sorts, but that the multicultural composition of a network in particular determines the flow of culture-related ideas.

Critics of this view counter that accessing different cultural-knowledge systems does more than merely provide input for the creative process; exposure to different cultures also has the more profound effect of shaping individuals' basic cognitive processes, rendering them more complex, open, integrative, and flexible (Maddux & Galinsky, 2009; Tadmor & Tetlock, 2006). If this is true, one would expect exposure to a multicultural network to predict creative performance on a broad range of creative-thinking tasks, not just those that call for knowledge from other cultures. Drawing on these two lines of argument, I propose two competing hypotheses.

***Hypothesis 1a:** The positive effect of cultural heterogeneity in an individual's network on his or her creativity is restricted to tasks that draw on knowledge resources from different cultures.*

***Hypothesis 1b:** The positive effect of cultural heterogeneity in an individual's network on his or her creativity applies to a broad range of creativity-related tasks and is not restricted to tasks that draw on knowledge resources from different cultures.*

Unpacking the Mechanisms

Whichever of the above hypotheses is supported, it is useful and important to investigate further what underlies the positive effect on creativity of multicultural networks (assuming there is one). So far, studies have established a link between multicultural experience and creativity, but our understanding of the underlying mechanisms is still partial (Maddux, Adam, & Galinsky, 2010; Maddux & Galinsky, 2009). In a recent study, Maddux and colleagues (2010) argued that multicultural learning—acquisition of knowledge and understanding of other cultures—might be one mechanism that accounts for the effect on creative performance of prior multicultural exposure. In a series of experiments they found that, for individuals who have lived abroad, recalling useful multicultural learning experiences increased their ability to solve creativity-related tasks like the remote-association test in laboratory settings. Another study, by Maddux and Galinsky (2009), found that the effect on creativity of living overseas was mediated by individuals' degree of adaptation to the foreign culture(s) to which they were exposed.

A common theme of existing studies on how multiculturalism impacts creativity is the absorption of culture-related ideas and perspectives via exposure to foreign cultures. Building on this line of thinking, and on prior research showing that networks are a source of novel

information (Burt, 2004), I argue that a similar mechanism is likely to play a role in how multicultural networks engender creativity. Social exchanges with individuals from different cultures in one's network would be likely to expose one to culture-related novel ideas. When a network is highly culturally heterogeneous—when many of its members are from different cultures—the probability of exposure to culture-related novel ideas should also increase.

***Hypothesis 2:** The more culturally heterogeneous an individual's network, the more likely he or she will receive culture-related novel ideas from contacts in the network.*

But we need to ask further: where do these novel ideas come from? Do they necessarily originate with network members culturally different from oneself? Can individuals from one's own culture also be a source of culture-related novel ideas? Network research has long recognized that networks not only serves as conduits for resource flow but also a signalling mechanism that conveys important information about the actor (Baum & Oliver, 1992; Podolny, 2001). For example, Podolny (2001) argued that firms' network configurations provide informational clues about their status in the market, signalling the relative quality of their products. Drawing on such network research, I argue that a multicultural network does not merely serve the straightforward function of providing conduits to receive new ideas from others but also provide cues about individuals' personal characteristics and propensity. Recent experimental research found evidence that racial diversity of white students' social networks influence how black students perceive them (Wout, Murphy, & Steele, 2010). More specific to the current thesis, emerging research by Jang and colleagues (2010) found that people perceive those with culturally diverse online social networks to be more creative.

In the present research context, a highly culturally heterogeneous network signals to observers that one is open-minded and highly receptive to foreign cultures. Specifically, a person's network contacts may form impressions of his or her network cultural heterogeneity via multiple pathways. One pathway is through direct observations – contacts observed that this person frequently socialize or collaborate with many culturally diverse others. Another pathway is through direct interaction with this person who reveals, in one way or another, his or her associations with culturally different others. Finally, contacts may personally know other culturally diverse contacts in this person's network. This impression about one's network cultural heterogeneity, regardless of how it was formed, would encourage contacts who are culturally similar to oneself to share culture-related ideas they have acquired elsewhere. To give an example, an American who has culturally diverse business associates and co-workers gives the impression that he or she is worldly, cosmopolitan, and open to diverse cultures; this impression in turn increases the likelihood that an American co-worker recently returned from Cambodia would share insights gained from the trip with him or her. Hence, people with culturally heterogeneous networks are likely to receive culture-related novel ideas via members of their networks, but the sources of such ideas are not necessarily limited to those who are culturally different.

Hypothesis 3: An individual is likely to receive culture-related novel ideas from contacts within his or her culturally heterogeneous network, regardless of whether those contacts belong to one's own or a different culture.

The next section describes two studies I conducted to test these hypotheses. Study 1, an egocentric network survey of media professionals, aims to test the competing hypotheses H1a

and H1b about the effects of multicultural networks on creativity. Study 2, an egocentric network survey of university students, aims to replicate the findings of Study 1 and to test hypotheses H2 and H3 about the underlying mechanisms.

METHOD: STUDY 1

Procedure

Seventy-two media professionals (48 percent male, average age 51.6) all members of a professional club in a large east-coast U.S. city, participated in this study. 82 percent identified themselves as European-Americans, 4 percent as Europeans, 6.4 percent as African-Americans, and 2.1 percent as Latino; the rest belonged to other ethnic groups (Asian-American, East Asian, Middle Eastern etc.). The participants, all of whom worked and lived in the United States at the time of the study, voluntarily completed an online survey and were entered in a drawing; the prizes were \$100 vouchers redeemable at the club's restaurant. The survey was promoted as an effort to better understand members' interactions and activities at the club, and to solicit their opinions about the ongoing public debate on the future of the newspaper industry.

The survey had two parts. The first part asked participants to list up to 15 contacts whom they deemed important in their professional networks. There were no restrictions on the provenance of these contacts; they could belong to any context and did not need to work at the participant's current or past employer. Contacts also need not be members of the club. Participants listed an average of 8.7 contacts. For each contact, the participant furnished further details including the contact's cultural background and gender; participants also indicated relationship among their contacts. The survey's second part solicited participants' thoughts on the future of the newspaper industry in open-response (free-text) format. At the time of the study, the future of the newspaper industry and of journalism had been subjects of widespread public

debate for two years (e.g., Alterman, 2008; Myers, 2008). Thus it is safe to assume that participants would have discussed the topic with members of their networks.

Manipulations

In the second part of the survey, which solicited participants' thoughts on the future of the newspaper industry, participants were randomly assigned (using a random-number generator) to one of three conditions, each representing a variation of the task. In the *local* condition, participants were asked to imagine that they ran a local newspaper serving a medium-sized metropolitan area with a population of 1 million in the U.S.; the newspaper had a daily circulation of 150,000. The task was to propose a novel business model addressing the newspaper's current challenges, with a focus on how to collect and disseminate news and information while making the newspaper profitable. In the *global* condition, participants were asked to imagine that they ran a wire service that collected and disseminated news around the world. The task was to propose a novel business model addressing the wire service's current challenges, with a focus on how to collect and disseminate news and information. I used the term "wire service" here because discussions with the management of the club suggested that the notion of a global wire service makes more sense to media professionals at the club than the notion of a global newspaper – there is no newspaper that would be truly considered as global by journalists. Finally, in the *imagination* condition, participants were asked to imagine and describe how a typical newspaper will be run 50 years in the future, with a focus on how to collect and disseminate news and information. These three variations allowed me later to measure creativity in different contexts: a local context that does not call for a multicultural or global mindset, a global context requiring a multicultural and global mindset, and an abstract context allowing for free-ranging imagination.

Key Measures

Cultural heterogeneity in participants' networks. I measured the degree of cultural diversity in participants' network using Blau's (1977) heterogeneity index, which is computed based on the function $1 - \sum i (Squared (proportion of category i))$, where i is the proportion of the group in the i^{th} category. In this research, the categories are different cultural groups; there were eight such categories (European American, African American, Asian American, European, Asian, Middle Eastern, Latino, and other). A high score on this index indicates cultural heterogeneity, or variability in the cultural backgrounds of network members; a low score represents greater cultural homogeneity.

Creativity. Creativity of the proposals regarding the newspaper industry was assessed by a peer rating method, based on Amabile's (1982) consensual assessment technique¹. Three media professionals who did not participate in this study were recruited to rate every proposal generated in the current study. These raters indicated on a 7-point scale the extent to which each proposal is (a) novel, (b) fresh, and (c) creative. The reliability of these items among the three raters were 0.73, 0.77, and 0.78 respectively. Given the reasonable reliability of each item, I averaged the scores across the three raters to derive a mean score for each item. Reliability among these three averaged items is high with Cronbach's alpha at 0.98. I next took the average of these three items to derive an overall creativity score. This method of using external raters to measure creativity is widely used in organizational behavior research (e.g., Choi, & Thompson, 2005; Goncalo, & Staw, 2006; Gino, Argote, Miron-Spektor, & Todorova, 2010).

¹ A perennial issue in creativity evaluation is determining what criteria to use. Amabile (1982) eschewed the need to identify specific criteria by using an amorphous definition of creativity. In this approach, judges use their own criteria in making creativity judgments. "A product or response is creative to the extent that appropriate observers independently agree it is creative." (Amabile, 1982, p.1001). With this approach, the criterion problem is avoided but outcomes from creativity research can still be evaluated as long as social consensus about their creativity can be reached.

Control Variables

Past multicultural experiences. I asked participants to list other countries they had visited or lived in and the duration of their stays, and derived two variables from this information: (a) number of countries visited or lived in for six months or more,² (b) and amount of time in months spent outside the United States.

Network size. Individuals with large networks might be exposed to more diverse ideas, which might in turn influence their level of creativity. Thus I controlled for a participant's network size, operationalized as the total number of contacts in his or her network.

Network density. Prior research has found that individuals with sparse networks tend to be more likely to generate creative ideas (Burt, 2004). Thus it is important to control for the density of an individual's network. I derived density by dividing the number of reported connections among contacts by the total number of potential connections among contacts.

Work experience. More experienced individuals may be more likely to have been exposed to diverse sets of ideas, and thus more likely to generate creative ideas. Alternatively, experience might constrain thinking and lower creativity. Thus I controlled for the number of years of a participant's work experience.

Gender. Some creativity researchers have found gender differences in creative achievement in many domains (Helson, 1990). I controlled for an individual's gender (coded 1 for male and 0 for female).

Analytical Strategy

² I did not differentiate between living in and visiting other countries because it is unclear where to draw the line in terms of duration.

I analyzed the data at the participant (ego) level using ordinary-least-square regression. To test the effects of network cultural heterogeneity on different types of creative tasks, I used contrast coding to capture types of tasks. Because there were three types of tasks, I used two indicators: (a) *Global versus imagination* (coded 1, 0, and -1 for the global, local, and imagination conditions respectively) to represent the comparison between the global task and the imagination task, and (b) *Global versus others* (coded 2, -1, and -1 for the global, local, and imagination conditions respectively) to represent the comparison between the global task and the other two tasks.

Results

Table 1 presents descriptive statistics and correlations among the key variables. Table 2 presents results on the effects of a network's degree of cultural heterogeneity on three types of creativity tasks. Model 1 presents the effects of network cultural heterogeneity and the key control variables. Model 2 adds the predictors for the different types of tasks (*Global versus imagination* and *Global versus others*). Network cultural heterogeneity did not show any significant main effect on creativity in either model. Model 3 adds the *network cultural heterogeneity x global versus others* interaction term to test whether network cultural heterogeneity predicts creativity only for a task that requires a global mindset. This interaction was significant in the expected direction ($b = 1.45$; $p < 0.05$). Specifically, network cultural heterogeneity positively predicts the novelty of proposed ideas for the global condition ($b = 4.00$, $p < 0.05$) but not for the local ($b = 0.49$, $p = 0.76$) or imagination conditions ($b = -0.30$, $p = 0.86$). Taken together, these results suggest that culturally heterogeneous networks have a positive effect on creativity; this effect is

restricted, however, to tasks that require thinking globally and drawing on different cultural knowledge systems. Hypothesis 1a is supported but hypothesis 1b is not.

METHOD: STUDY 2

Study 1 demonstrated the basic effect that having a multicultural network increases creativity in tasks that draw on different cultural-knowledge resources. Contrary to previous research (Leung et al., 2008; Maddux & Galinsky, 2009), however, neither living overseas nor visiting foreign countries had any impact on creativity. A key difference between this study and earlier research is that the latter tended to use student participants (average age below 30) whereas Study 1's participants were mature professionals with extensive work experience (average age over 50). A possible explanation is that multicultural exposure gained from traveling and living overseas may have stronger effects on the creativity of younger, more impressionable individuals than on that of those with more life experience. For the latter, the individuals they surround themselves with on a daily basis (i.e., their social networks) may matter more.

Study 2 extends the first study in two ways. First, I seek to replicate the effects on creativity of multicultural networks demonstrated in Study 1 using a different sample: students at a large east-coast university. By using a sample that closely resembles those of earlier studies (Leung et al., 2008; Maddux & Galinsky, 2009), I could further test the effects of prior multicultural exposure on creativity. Second, I seek to better understand the mechanism underlying the link between multicultural networks and creativity; specifically, I test the hypotheses that individuals with multicultural networks are more likely to receive culture-related

novel ideas, and that these ideas are not necessarily conveyed by network members who are culturally different.

Procedure

Two hundred ten undergraduate and graduate students (50 percent male, average age 21) completed a two-part study for \$25 compensation. Forty-eight percent identified themselves as European-Americans, 14 percent as African-Americans, 14 percent as Asian-Americans, and 7 percent as Latino; the rest affiliated with other ethnic groups (East Asian, Middle Eastern, etc.). The first part of the study called for completing a social-network survey similar to that in Study 1. Participants listed an average of 11.6 network contacts, resulting in 2246 data points. In the second part of the study, participants were asked to generate ideas for an advertising campaign.

Manipulation

The second part of the study was presented to participants as unrelated to the network survey. I asked participants to generate ideas for an advertisement introducing a new brand of fruit-flavored water called “Berrie.” Participants were assigned (using a random number generator) to one of three conditions, each representing a variation of the task. In the *local* condition, participants were told that the advertisement would be used at a local sports event attended by athletes and spectators from various counties within their state. In the *global* condition, participants were told that the advertisement would be used at a sports event attended by athletes and spectators from countries representing every major continent. In both conditions, I told participants that the ideas they generated should be as innovative as possible and that the advertisement should appeal to as many athletes and spectators as possible. Finally, in the

imagination condition, participants were told to draw consumers' attention to "Berrie," and to introduce the drink in an unconventional way. Their task was to generate as many unusual ways as possible to describe each of the four fruits (apple, cherry, kiwi, and strawberry) used in the drink.

Key Measures

Network cultural heterogeneity. As in the previous study, I measured the degree of cultural diversity in participants' networks using Blau's (1977) heterogeneity index.

Creativity of ideas. I measured creativity using an approach similar to that of the previous study: two raters blind to the hypotheses of the study independently used a 7-point scale to judge the extent to which each idea was (a) novel, (b) unique, (c) unconventional, and (d) creative. Correlations between the two raters on the four evaluation criteria were above 0.70. I combined these scores (averaged across ideas by a single rater and then between raters) to derive a creativity index for each participant.

Receipt of culture-related novel ideas. In addition to characterizing their relationships to each listed network contact, participants also supplied the most novel idea they had heard from each contact within the preceding three months. The instruction was "What is the most novel idea that you have heard from this person within the last 3 months? Describe the idea in one or two sentences." The purpose of this measure is to tap the range of the content of the novel ideas that participants receive from their networks. I focused on the most novel ideas because such ideas are more vivid and thus easier to recall with accuracy than less novel ones.

A research assistant first read all the ideas for an overview of the key categories represented; a basic set of categories was then generated. If distinctions within categories emerged during coding, new categories were created and all items in the obsolete category were recoded using the new categories. In total, 15 major categories emerged (examples include culture, academic advice, general knowledge, business opportunities, and philosophy of life). If an idea spanned multiple categories, it was coded as belonging to all such categories (e.g., “Studying abroad to gain better perspective on the subject of theater in country X” would be coded under both “academic advice” and “culture”).³

Because my thesis is that the effect of multicultural networks on creative performance hinges on the exposure of individuals with culturally diverse networks to ideas and perspectives from other cultures, culture-related ideas are of key interest. Ideas were coded as culture-related if they contained elements touching on cultures, race, or countries outside of the United States. Examples of ideas coded as culture-related include “singing traditional Urdu songs in Farsi,” “how to make kimchi,” “Hong Kong culture and interesting facts about the various places she has traveled recently (Vietnam, India),” and “Samoan cultural information.” I created a dummy variable for each idea and coded this variable 1 if it was related to culture and 0 otherwise.⁴ I also summed the number of culture-related new ideas that each participant received from his or her listed network contacts.

³ It is important to note that whether or not the ideas were truly novel was immaterial. The governing assumption is that the ideas were novel to the participant, and the task was to categorize them based on their content.

⁴ Because a few participants (3 percent) were international students, for whom American culture might be considered foreign, I also created a category for “USA culture-related.” Examples of ideas so coded include “the Texas club scene,” and “people who live in cities on the coasts have more culture than those who don't.” Because there were so few non-U.S. participants, this variable did not have any material impact on the results.

Cultural difference between participants and their contacts. I asked participants to indicate the cultural background of each listed member of their networks. The categories were European-American, African-American, Asian-American, European, Asian, Middle Eastern, Latino, and other. I compared the participant's cultural background with that of each contact to derive a dummy variable, coded 1 if different and 0 if the same.

Participant-Level Control Variables

As in Study 1, I measured and controlled for participants' gender, network density, network size, and years of work experience (if any). I also controlled for the participants' age because the impact of past multicultural experience on creativity might depend on one's life experience. Additionally, I measured participants' past multicultural exposure by asking them to list non-U.S. countries they had visited or lived in and the duration of their stays. I derived two variables from this information: (a) number of countries visited or lived in for six months or more, and (b) time in months spent outside the United States.

Dyadic-Level Control Variables

Content of network ties. The nature of the tie between participant and contact can affect a participant's likelihood of engaging a contact in creativity-related behaviors like sharing ideas and working on innovation-related projects. To control for the type of resources that flow between contact and participant, I asked participants to indicate which of the following resources they obtained from each network member: (a) economic resources, (b) friendship and social enjoyment, (c) information or advice for getting tasks done, and (d) information on career

guidance and opportunities. The content of network ties was captured using dummy codes, i.e., coded 1 if the resource in question was being obtained from the contact and 0 otherwise.

Contacts' embeddedness. Scholars of networks have argued that embeddedness fosters the sharing of information and knowledge (Reagans & Zuckerman, 2001; Uzzi & Lanchester, 2003). To control for the degree of a contact's embeddedness in the participant's network, I asked participants to indicate the existence of relationships between listed contacts by filling in a half-matrix in which each cell represented the relationship between two contacts. A given contact's embeddedness is the number of observed ties between him or her and other network members divided by the total number of possible ties with other members (excluding the participant).

Other participant–contact characteristics. Other features of the participant-contact relationship could influence our results. Gender differences may disrupt communication between the two, inhibiting idea sharing. Frequent interaction may increase the likelihood of sharing certain types of ideas. To control for such influences, I collected data on contacts' gender (coded 1 if the same gender as the participant, 0 if not). I also measured the frequency of interaction between the two by asking “About how often do you talk with the person?” (1 = daily, 2 = weekly, 3 = monthly, and 4 = not often).

Analytical Strategy

I analyzed the data at both the participant level and the dyadic (participant–contact) level. The participant-level dependent variables are (a) the degree of creativity exhibited in the task of generating ideas for an advertisement and (b) the total number of culture-related novel ideas

received from network contacts over the preceding three months. The dyadic-level dependent variable is whether or not a participant received a culture-related novel idea from a given contact within the preceding three months.

For the participant-level analysis on creative outcomes, I used ordinary-least-square regression. I test the effects of network cultural heterogeneity on different types of creative tasks, using the same kind of contrast coding used in Study 1 to capture types of tasks. I also test whether the degree of cultural heterogeneity in networks influence the number of culture-related novel ideas which participants receive from their network contacts. Because this dependent variable is a count measure, I used negative binomial regression for this analysis. For the dyadic-level analyses the dependent variable is binary, with a value of 1 if a culture-related novel idea is received from a given contact and 0 otherwise. Because the data contain hierarchically nested variables (up to 15 dyadic relationships are nested with a given participant), non-independence of observations is a methodological concern (Hausman, Hall, & Griliches, 1984; Klein, Dansereau, & Hall, 1994). In response, I used STATA's *probit* regression with robust cluster on the participant to control for the influence of a given participant on multiple observations. This approach allows for estimating dyadic-level effects within egocentric networks (Hoffman, Griffin, & Gavin, 2000) and estimate effects for key participant-level variables, particularly the degree of cultural heterogeneity in the network.

Results

Table 3 presents descriptive statistics and correlations among the main variables. Table 4 reports the effects of the degree of network cultural heterogeneity on the three creativity tasks. Model 1 presents the effects of network cultural heterogeneity and the key control variables.

Model 2 adds the predictors for different types of tasks (*Global versus imagination* and *Global versus others*). In neither model did network cultural heterogeneity exhibit any significant main effect on creativity. Model 2, however, showed two main effects: ideas generated in the global condition were judged to be less creative than those in the imagination condition ($b = -1.06$; $p < 0.01$) but more creative than those in *both* the imagination condition and the local condition combined ($b = 0.28$; $p < 0.05$). Model 3 adds the *Network cultural heterogeneity x Global versus others* interaction term to test whether network cultural heterogeneity predicts creativity only for a task that requires a global mindset. This interaction was significant in the expected direction ($b = 0.44$; $p < 0.05$). Specifically, network cultural heterogeneity positively predicts the novelty of proposed ideas for the global condition ($b = 1.12$ $p < 0.05$) but not for the local ($b = -0.51$, $p = 0.40$) or imagination conditions ($b = -0.21$, $p = 0.75$). This finding represents further support for the thesis that a multicultural network promotes creativity only on tasks that require thinking globally and drawing on different cultural knowledge resources. Thus hypothesis 1a is supported but hypothesis 1b is not. Consistent with Study 1, neither the number of countries that participants had lived in for six months or more nor the total amount of time spent abroad predicted creative performance on any of the three tasks.

Next, I test whether the cultural heterogeneity of participants' networks predicts the type of novel ideas they receive from people in their networks. Table 5 presents the results. As I predicted, cultural heterogeneity in participants' networks has a positive effect on the receipt of culture-related novel ideas ($b = 1.27$, $p < 0.05$). But network cultural heterogeneity had no effect on receipt of other types of novel ideas; results for a sample selection of these idea categories appear in Table 5. To pinpoint where culture-related novel ideas come from, I further analyze the data at the dyadic level, controlling for a host of participant/contact variables. Table 6 shows that

the cultural heterogeneity of participants' networks significantly predicts the likelihood that a culture-related novel idea is received from a network contact ($b = 0.57$; $p < 0.05$). It is noteworthy that the receipt of culture-related novel ideas is not predicted by whether or not the other person is culturally different ($b = 0.10$; $p > 0.10$). Nor does network cultural heterogeneity have any effect on the likelihood of receiving novel ideas of other types; results for a sample selection of these idea categories appear in Table 6. Overall, these results suggest that individuals whose networks are highly culturally heterogeneous are more likely to receive culture-related novel ideas, and that these ideas do not necessarily come from culturally different network contacts. Thus there is support for hypothesis 2 and 3.

Finally, I conducted further tests to determine whether the number of culture-related novel ideas that participants received from their networks mediates the effect of network cultural heterogeneity on creative performance. Although network cultural heterogeneity has a positive effect on both the number of culture-related novel ideas received ($b = 0.57$; $p < 0.05$) and creativity in the global-condition task, which requires drawing on other cultural-knowledge resources ($b = 1.12$ $p < 0.05$), the mediation effect was not significant. Specifically, when I added the number of culture-related novel ideas that each participant received into a model that regressed creativity on network cultural heterogeneity in the global-condition task, the effect of network cultural heterogeneity on creativity remained positive and significant ($b = 1.24$; $p < 0.05$). I discuss this finding in the next section.

DISCUSSION

In two egocentric network surveys, I found evidence that networks' degree of cultural heterogeneity exerts a positive effect on creativity in tasks that draw on varied cultural-

knowledge resources; for other tasks, network cultural heterogeneity had no effect on creative performance. I also found that the more culturally heterogeneous one's network, the more likely one is to receive culture-related novel ideas from network members; importantly, these ideas do not necessarily come from contacts who are culturally different.

Theoretical Implications

This research makes several theoretical contributions. As noted earlier, emerging research has found a positive relationship between multicultural experiences and creativity (Leung et al., 2008; Leung & Chiu, 2008; Maddux & Galinsky, 2009). However, prior measures of multicultural experience such as living abroad tend to be broad, conflating many different types of cultural exposures (e.g., making foreign friends, eating foreign food, exposure to foreign cultural icons, and experiencing local customs etc). It is unclear exactly what aspects of such multicultural experiences accounted for the observed increase in creativity in these studies. Thus, it is important that research be more specific about the type of multicultural experience. My research demonstrates that a culturally diverse social network can also improve creative performance, but only in specific domains. This finding identifies multicultural network as a specific channel from which one could gain cultural knowledge that matters for creativity.

My research further identifies a key boundary condition within which the effects of multicultural network on creativity are likely to operate: when the task at hand draws on diverse cultural knowledge. This finding enriches existing research that has identified other boundary conditions such as time pressure and individual variations in propensity for cognitive closure (Leung et al., 2008; Leung & Chiu, in press). Leung and Chiu (in press) have found, for instance, that individuals under time pressure are more likely to anchor their thinking on familiar ideas

from their own cultures than to draw on less-familiar ideas from other cultures. In conjunction with prior research, my findings showed that situational factors help determine when multicultural exposure will positively impact creativity.

The finding that multicultural networks did not engender creativity in different types of tasks appears to run counter to an earlier finding that living abroad has broad implications for creativity (Maddux & Galinsky, 2009). One possible explanation is that living abroad and having a multicultural network are qualitatively different multicultural experiences. Living abroad provides an intense experience of immersion in and adaptation to a foreign culture. Such an experience may well have a deep influence, permanently altering one's cognitive habits and promoting creative thinking ability in general. By contrast, a multicultural network represents a relatively low-intensity but persistent and simultaneous exposure to a range of cultures. An individual can engage or disengage network members at will, but they remain available to consult when the need arises. Ideas and perspectives gleaned from culturally diverse members of one's network might also be recalled to mind in a later problem-solving situation that calls for multiple cultural perspectives.

It is also intriguing that past experience living abroad did not affect creative performance, prior research to the contrary (Maddux & Galinsky, 2009). This result is somewhat unexpected. A closer look at the data reveals some clues. In Study 1, the average number of countries that participants had lived for 6 months or more was 0.91, and the average number of months spent overseas was 118 (9.8 years). Hence, the participants are well-traveled, and most had lived overseas for an extended time. In Study 2, by contrast, few participants had much overseas experience: the average number of countries lived in for 6 months or more was only 0.15, and

total time spent abroad was 19 months (1.6 years). Compare these profiles with those of participants in Maddux & Galinsky's (2009) studies, who had lived overseas between 2.61 and 6.64 years. It is plausible that the effect on creativity of living overseas is greatest when one's stay is of moderate duration. Too little experience living abroad is not likely to activate the apparent creativity effect (Study 2); conversely, extended experience abroad (Study 1) might have diminishing returns to creativity because exposure to foreign cultures only fosters divergent thinking for a time-limited period.

This research also offers some initial evidence on what might drive the effects of multicultural networks on creativity. It appears that a multicultural network may promote creativity via multiple mechanisms. I hypothesized that, in addition to facilitating the receipt of culture-related novel ideas from culturally different others, a multicultural network may signal one's open-mindedness to foreign cultures. This argument received some support. Results from Study 2 showed that network cultural heterogeneity predicted the number of culture-related novel ideas that individuals received from their networks, but these ideas were not necessarily gleaned from culturally different others. This finding suggests that culturally similar others could be a source of culture-related novel ideas as well and this effect might be due to their perceptions that a given individual whose network is culturally diverse would be interested in these ideas.

The number of culture-related novel ideas, however, did not mediate the effect of a network's cultural heterogeneity on creative performance in a task that draws on different cultural knowledge. A plausible explanation is that the culture-related novel ideas reported by participants in Study 2 were not directly relevant to the task they were asked to perform. According to the theory of motivated cultural cognition (Chiu, Morris, Hong, & Menon, 2000),

individuals do not passively absorb and apply knowledge from other cultures. Instead, they view ideas from different cultures as intellectual resources, and selectively apply these ideas to the immediate challenges of problem solving (Chiu & Hong, 2005). According to this line of reasoning, not all culture-related novel ideas would be useful in a given context. It is also possible that culture-related novel ideas that might be useful to the task at hand were not reported, since participants were asked to report only *one* novel idea received from each contact. Hence, measuring novel ideas received in the preceding three months, though appropriate for testing my main hypotheses (H2 and H3), may not capture the entire mechanisms that drive creative performance on a specific task.

There may be other explanations for my findings. Regarding the finding that culturally different contacts are not necessarily the source of culture-related novel ideas in multicultural networks, one explanation could be that individuals with multicultural networks gradually become more culturally sensitive. It could therefore be their culturally sensitive behavior that draws others to share culture-related ideas with them, as distinguished from the signals that their multicultural networks sent. This explanation, however, raises a further question: do multicultural networks help people develop cultural sensitivity, or are culturally sensitive people more likely to cultivate multicultural networks? This question and others that might be provoked by the present research, along with its empirical evidence, should open up a fruitful line of investigation into how multiculturalism shapes creativity.

This research also offers some additional food for thought about unresolved questions in current research. One such question about the link between multicultural exposure and creativity has to do with causality. It is possible that innately creative people are more likely to seek out

multicultural experiences. My findings, however, do not support this hypothesis: if it were the case, we should see positive associations between multicultural networks and creativity in all three task conditions. My findings support Maddux and Galinsky's (2009) general argument that exposure to foreign cultures indeed helps people become more creative. Finally, this research highlights the role of intercultural relationships in promoting creativity. Most research on intergroup relations focuses on tensions and conflict (Stephan & Stephan, 1985; Thomas, Bonieci, Vescio, Biernat, & Brown, 1996). My research, by contrast, explores how intercultural differences can actually produce positive outcomes. Drawing on this and other recent research that has found multiculturalism to promote creativity (Leung et al., 2008; Maddux & Galinsky, 2009), research in cultural psychology and intergroup relations could move beyond documenting intercultural difficulties to explore how cultural differences can be put to more positive use.

Methodological Innovations

The design of these studies also embodies two methodological innovations in organizational research. First, these studies are among the first to combine methods from laboratory experiments with social-network analysis, an approach that allows the researcher to examine the effects of network-level variables under different conditions—in this case, different creativity tasks. Second, I measured the flow of specific ideas in the dyadic relationships that constitute professional networks. Social-network research tends to focus on the effects of structural variables, and to pay relatively little attention to the content of the ties that make up these networks. Although some recent research has begun to measure the types of resources (e.g., task advice and friendship) that flow in networks (Chua et al., 2008), these are the first studies to measure the specific ideas that individuals receive from others in their networks. Results

presented in Table 5 and 6 show that individuals received a wide range of novel ideas from their network contacts, and that some of these ideas are predicted by important variables like network size and density. This methodological approach is potentially useful in the study of knowledge sharing in social networks.

Practical Implications

This research has practical implications for managers and employees in the era of globalization. Creating a multicultural workplace is often touted as a strategy to foster organizational creativity. This advice, though intuitively appealing, should be selectively prescribed. Managers can most realistically expect enhanced creative performance from a multicultural workforce on tasks that call for combining ideas and knowledge from different cultural perspectives. On other types of task, the effects on creativity of having a culturally diverse workforce would probably be more uncertain and indirect; managers might be better served in these situations to seek other drivers of creativity to improve creative performance.

Understanding how multicultural networks foster the flow of culture-related novel ideas can nevertheless provide managers some additional tools for increasing organizational creativity. For instance, managers could create more opportunities (such as organizing an “international day” event) for employees of different cultures to exchange ideas. Managers could also explore how to better enable the flow of ideas across cultural lines. A recent study found trust to be a key facilitator of intercultural idea exchange (Chua, Morris, & Mor, 2010). Hence, creating an organizational climate that fosters psychological safety and trust would be especially helpful.

Limitations and Future Research

As with all research, these studies have limitations. In hindsight, the measurement of novel-idea flow, although innovative and supportive of testing certain hypotheses (H2 and H3), was inadequate to capture the flow of ideas between individuals fully enough to test how creative performance on particular tasks comes about. My method relied on participants to select the ideas they wished to report, and was thus subject to recall biases and social-desirability biases. For example, participants might have reported not the most novel ideas but those that impressed them mostly strongly. Or a controversial or provocative idea might have gone unreported. These and other biases in idea reporting could further explain why the number of culture-related novel ideas did not mediate the effect of multicultural networks on creative performance. Future research could build on my methodology to improve idea-reporting measurement.

The precise mechanism underlying the relationship between multicultural networks and creativity remains unclear. This research found some initial evidence that the flow of culture-related novel ideas might explain why multicultural networks engender creative performance on tasks that require diverse cultural knowledge, but this thesis needs to be further verified. Researchers should also systematically pursue and investigate other accounts that seem plausible. It would be valuable to establish, for example, whether having a multicultural network has any effect on individuals' intercultural competence. If multicultural networks indeed increase intercultural competence, what role does an individual's intercultural competence play in improving creativity? Recent research on cultural intelligence and creativity suggests that cultural metacognition—reflective thinking about one's own cultural knowledge and assumptions— might be crucial if multiculturalism is to have a positive impact on teams'

creative use of varied cultural knowledge (Crotty & Brett, 2009). One hypothesis is that individuals with high cultural metacognition are better positioned than others to reap the benefits of multicultural networks because they are better able to track and monitor opportunities for cultural cross fertilization. Alternatively, it is plausible that individuals with high intercultural competence are more likely to develop multicultural networks and share culture-related ideas with their network contacts, prompting them to reciprocate by sharing other culture-related ideas from their own experiences.

Another potential mechanism is that individuals with culturally diverse social networks are exposed to culture-related novel ideas which in turn hone their cognitive complexity but only in specific aspects – e.g., the ability to reconcile, bridge, and combine ideas from different cultures. This type of cognitive complexity is domain specific accounting for creative performance only in tasks that draw on diverse cultural knowledge systems. Future research can test this mechanism more explicitly by including a measure of cognitive complexity that differentiates general cognitive complexity from cultural cognitive complexity. Future research can also examine how exposure to multiple cultures hones cognitive complexity over time. Perhaps cultural cognitive complexity improves first, followed by general cognitive complexity.

Conclusion

This research, combining social network analyses and experimental approaches, presents empirical evidence on how maintaining a multicultural network can positively impact creative performance in specific domains. The idea that cultural diversity can promote creativity in certain types of tasks has both theoretical and practical importance. Yet theories about the specific forms that cultural diversity takes—whether in the form of team composition, network

profile, or past experiences—and about the associated mechanisms and boundary conditions that underlie its effects on creativity, are still in flux. The studies reported here contributed to furthering this stream of research.

TABLE 1: Study 1 Descriptive Statistics and Correlations

Variable	Mean	SD	Min	Max	1	2	3	4	5	6	7	8	9
1. Creativity	3.40	1.48	1	6.22	1.00								
2. Network cultural heterogeneity	0.20	0.21	0	.65	0.14	1.00							
3. Network size (number of ties)	8.71	4.83	3	15	0.03	0.13	1.00						
4. Number of countries lived in (6 months or more)	0.91	1.78	0	10	-0.13	0.07	0.19	1.00					
5. Time spent abroad (in months)	118	233	0	1228	0.18	0.00	0.02	0.46*	1.00				
6. Network density	0.44	0.34	0	1	0.04	-0.08	-0.19	0.01	0.03	1.00			
7. Participant's work experience	28.40	14.38	0	62	-.22	0.02	-0.08	0.20	0.09	0.00	1.00		
8. Gender (participant is male)	0.48	0.50	0	1	0.20*	-0.07	-0.16	-0.05	0.15	-0.15	0.26*	1.00	
9. Participant's age	51.56	14.93	19	80	-0.25*	-0.03	-0.06	0.26*	0.07	0.02	0.93*	0.24*	1.00

* $p < 0.05$

TABLE 2: Study 1 Regression Results for Participant Creativity

	Model 1	Model 2	Model 3
<u>Key predictors</u>			
Network cultural heterogeneity	1.08 (0.82)	1.04 (0.81)	1.39 (0.79)+
Global vs. imagination	-	0.40 (0.41)	0.46 (0.40)
Global vs. others (imagination & local)	-	0.05 (0.25)	0.01 (0.24)
Network cultural heterogeneity x global vs. others	-	-	1.45 (0.63)*
<u>Control variables</u>			
Network size (number of ties)	0.02 (0.04)	0.03 (0.04)	0.06 (0.04)
Time spent abroad (in months)	0.00 (0.00)	0.002 (0.001)+	0.002 (0.001)+
Number of countries lived in (6 months or more)	-0.19 (0.12)	-0.20 (0.12)	-0.20 (0.12)+
Network density	0.43 (0.54)	0.26 (0.54)	0.38 (0.53)
Participant's work experience	-0.01 (0.04)	-0.02 (0.04)	-0.03 (0.03)
Gender (participant is male)	0.20 (0.38)	0.24 (0.38)	0.48 (0.38)
Participant's age	-0.01 (0.04)	0.01 (0.04)	0.01 (0.04)
Intercept	3.85 (1.03)**	3.23 (1.06)**	2.76(1.04)**
R-squared	0.16	0.22	0.28
Number of observations	72	72	72

Note: Standard errors are reported in parentheses. Coefficients are non-standardized.

** $p < 0.01$; * $p < 0.05$ + $p < 0.10$

TABLE 3: Study 2 Descriptive Statistics and Correlations (dyadic level)

Variable	Mean	SD	Min	Max	1	2	3	4	5	6	7	8	9	10
1. Creativity	2.96	1.19	1.08	6.03	1.00									
2. Network cultural heterogeneity	0.39	0.23	0	.83	-0.03	1.00								
3. Contact provides culture-related novel idea	0.05	0.22	0	1	-0.01	0.07*	1.00							
4. Network size (number of contacts)	11.62	3.13	6	15	-0.12*	0.01	-0.02	1.00						
5. Network density	0.53	0.27	0	1	0.04	-0.09*	-0.01	-0.11*	1.00					
6. Contact's embeddedness	0.53	0.32	0	1	0.03	-0.07*	-0.00	-0.09*	0.86*	1.00				
7. Number of countries lived in (6 months or more)	0.15	0.41	0	2	-0.06*	0.05*	0.01	0.08*	-0.01	-0.01	1.00			
8. Participant's work experience	3.17	3.22	0	16	-0.04	-0.15*	-0.04	0.11*	-0.07*	-0.06*	-0.01	1.00		
9. Alter is of different culture	0.40	0.49	0	1	0.01	0.41*	0.05*	0.00	-0.05*	-0.07*	0.01	-0.09*	1.00	
10. Contact is of different gender	0.35	0.48	0	1	0.02	-0.01	0.00	0.01	-0.07*	-0.06*	-0.00	0.06*	-0.02	1.00
11. Contact is source of economic resources	0.16	0.37	0	1	0.08*	-0.08*	0.01	-0.05*	0.06*	0.11*	-0.05*	0.05*	-0.11*	0.08*
12. Contact is source of career guidance	0.36	0.48	0	1	0.04	-0.00	0.03	-0.06*	-0.05*	-0.05*	-0.03	-0.03	0.00	0.03
13. Contact is source of task advice	0.53	0.50	0	1	0.07*	-0.01	0.02	-0.02	-0.08*	-0.03	-0.04	-0.06*	-0.04*	-0.05*
14. Contact is source of friendship	0.86	0.34	0	1	-0.01	-0.06*	0.00	0.08*	0.13*	0.17*	0.06*	-0.01	-0.06*	-0.07*
15. Interaction frequency	2.00	0.97	1	4	-0.02	0.04	-0.01	0.05*	-0.21*	-0.29*	0.03	0.10*	0.03	0.02
16. Participant's gender (male)	0.48	0.50	0	1	0.05*	0.05*	-0.01	-0.11*	0.16*	0.13*	0.04	-0.07*	0.06*	-0.12
17. Participant's age	21.27	2.73	18	30	-0.10*	-0.12*	-0.05*	0.08*	-0.14*	-0.12*	0.07*	0.59*	0.00	0.06*
18. Time spent abroad (in months)	19.38	46.46	0	306	-0.07*	0.23*	0.07*	-0.01	0.05*	0.05*	0.30*	0.00	0.12*	0.01

	11	12	13	14	15	16	17	18
11. Contact is source of economic resources	1.00							
12. Contact is source of career guidance	0.36*	1.00						
13. Contact is source of task advice	0.21*	0.38*	1.00					
14. Contact is source of friendship	-0.17*	-0.27*	-0.00	1.00				
15. Interaction frequency	-0.05*	0.07*	-0.12*	-0.25*	1.00			
16. Participant's gender (male)	0.05*	-0.03	-0.02	0.02	-0.04*	1.00		
17. Participant's age	0.05*	0.06*	-0.00	-0.09*	0.21*	-0.09*	1.00	
18. Time spent abroad (in months)	-0.04*	-0.02	-0.04*	0.01	-0.04	0.04	0.07*	1.00

** $p < 0.01$ * $p < 0.05$ + $p < 0.10$

TABLE 4: Study 2 Regression Results for Participant Creativity

	Model 1	Model 2	Model 3
<u>Key Predictors</u>			
Network Cultural Heterogeneity	-0.10 (0.38)	0.19 (0.33)	0.18 (0.33)
Global vs Imagination	-	-1.06 (0.19)**	-1.04 (0.19)**
Global vs Others (Imagination & Local)	-	0.28 (0.11)*	0.09 (0.15)
Network Cultural Heterogeneity x Global vs Others	-	-	0.45 (0.23)*
<u>Control Variables</u>			
Gender (participant is male)	0.10 (0.17)	0.02 (0.15)	-0.01 (0.15)
Number of countries lived abroad (6 months or more)	-0.06 (0.23)	-0.15 (0.20)	-0.13 (0.20)
Time spent abroad (months)	0.002 (0.002)	-0.001 (0.002)	-0.001(0.002)
Network size	-0.04 (0.03)	-0.04 (0.02)+	-0.04 (0.02)+
Network Density	0.21 (0.32)	0.07 (0.28)	0.11 (0.28)
Participant's age	-0.03 (0.04)	-0.01 (0.03)	0.00 (0.03)
Work Experience	-0.002 (0.03)	-0.01 (0.03)	-0.02 (0.03)
Intercept	3.91 (0.88)**	3.52 (0.78)**	3.52 (0.77)**
R-Squared	0.03	0.25	0.27
Number of Observations	205	205	205

Note: Standard errors are reported in parentheses. Coefficients are non-standardized.

** $p \leq 0.01$; * $p \leq 0.05$

TABLE 5: Number of Each Type of Novel Ideas Received (participant-level)

Type of idea	Dependent variable	Sample of other idea categories					
	Culture - related	Leisure-related	Business opportunities	General knowledge	Academic advice	Work/career advice	Philosophy of life
<u>Key predictor</u>							
Network cultural heterogeneity	1.27(0.53)*	-0.32 (0.32)	0.70 (0.67)	-0.23 (0.54)	-0.62 (0.54)	-0.81 (0.46)+	-1.02 (0.64)
<u>Control variable</u>							
Network size	0.07 (0.04)+	0.10 (0.02)**	0.16 (0.05)**	0.00 (0.04)	0.10 (0.04)**	0.04 (0.03)	0.11 (0.05)*
Network density	-0.01 (0.43)	0.73 (0.28)**	0.74 (0.55)	-0.20 (0.45)	-0.25 (0.47)	-0.64 (0.38)+	0.15 (0.57)
Gender (male)	-0.19 (0.23)	0.16 (0.15)	0.13 (0.29)	-0.21 (0.24)	-0.03 (0.25)	0.05 (0.21)	-0.57 (0.30)*
Number of countries lived in (>6 months)	0.03 (0.28)	0.00 (0.20)	0.03 (0.37)	-0.26 (0.31)	0.00 (0.33)	-0.13 (0.27)	0.41 (0.38)
Time spent abroad (in months)	0.003 (0.002)+	0.001 (0.001)	-0.005 (0.004)	0.001 (0.003)	0.000 (0.003)	0.005 (0.002)*	-0.007 (0.005)
Participant's age	-0.08 (0.06)	-0.06 (0.04)+	0.13 (0.07)*	0.10 (0.05)+	0.01 (0.05)	0.05 (0.05)	-0.05 (0.07)
Work experience	-0.01 (0.05)	0.02 (0.03)	-0.12 (0.06)*	-0.08 (0.05)+	0.00 (0.05)	-0.03 (0.04)	-0.02 (0.06)
Intercept	-0.13 (1.31)	0.50 (0.80)	-5.20 (1.62)	-2.15 (1.26)	-1.54 (1.29)	-0.91 (1.09)	0.25 (1.61)
LR Chi-squared	19.11*	30.42**	15.95*	6.05	10.09	13.15	18.06*
R-Squared	0.05	0.04	0.03	0.01	0.02	0.02	0.03
Number of participants	209	209	209	209	209	209	209

** $p < 0.01$ * $p < 0.05$ + $p < 0.10$

TABLE 6: Probit Maximum Likelihood Estimation on Receipt of Novel Ideas from Each Contact (dyadic-level)

Type of idea	Key dependent variable	Sample of other idea categories					
	Culture - related	Leisure-related	Business opportunities	General knowledge	Academic advice	Work/career advice	Philosophy of life
<u>Key Predictor</u>							
Network cultural heterogeneity	0.61 (0.27)*	-0.12 (0.23)	0.09 (0.29)	-0.06 (0.25)	-0.39 (0.31)	-0.48 (0.26)+	-0.33 (0.32)
<u>Control variables</u>							
Contact is of different culture	0.11 (0.10)	-0.18 (0.08)*	0.14 (0.12)	0.01 (0.12)	0.05 (0.11)	0.06 (0.12)	-0.09 (0.09)
Contact's embeddedness	0.01 (0.17)	0.43 (0.14)**	0.22 (0.18)	-0.22 (0.18)	-0.05 (0.18)	-0.33 (0.17)*	0.25 (0.26)
Number of countries lived in(>6 months)	-0.02 (0.15)	-0.05 (0.11)	0.08 (0.12)	-0.03 (0.19)	-0.03 (0.12)	0.02 (0.12)	0.15 (0.20)
Time spent abroad (in months)	0.002 (0.001)	0.000 (0.001)	-0.001 (0.001)	0.000 (0.002)	0.000 (0.001)	0.003 (0.001)**	-0.003(0.002)
Network size	-0.01 (0.02)	0.00 (0.02)	0.02 (0.02)	-0.05 (0.02)**	0.01 (0.02)	-0.03 (0.02)	0.01 (0.02)
Intercept	-1.76 (0.37)**	-1.06(0.26)**	-1.87 (0.38)**	-0.40 (0.29)	-1.94 (0.33)**	-0.69 (0.28)*	-1.43 (0.41)**
Wald chi-squared	18.07	52.60	23.31	28.43	25.63	60.23	30.35
Number of Observations	2233	2233	2233	2233	2233	2233	2233

** $p < 0.01$ * $p < 0.05$ + $p < 0.10$

Note: Control variables for the content of network ties, interaction frequency, and gender not presented due to space constraints.

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