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Not Just How Much You Know: Interactional Effect of Cultural Knowledge and Metacognition on Creativity in a Global Context

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ABSTRACT The ability to think and solve problems creatively in a multicultural environment is critical for success in the 21st century. Integrating research on creative cognition and cultural intelligence, we examine the interactional effects of two cognitive capabilities – cultural knowledge and cultural metacognition – on individuals' creativity in multicultural teams. We propose that although cultural knowledge is useful for creativity, too much knowledge can be detrimental because of cognitive overload and entrenchment. This inverted U-shaped relationship however, is moderated by cultural metacognition. Results of our study support our hypothesis of an inverted U-shape relationship between cultural knowledge and creativity. As expected, we found that the curvilinear effect of cultural knowledge occurs only for individuals with low metacognition. For high cultural metacognition individuals, cultural knowledge has no effect on creativity. These findings offer new insights and practical implications for creativity in today's global environment.

KEYWORDS creativity, cultural intelligence, cultural metacognition, knowledge, teams

INTRODUCTION

As the world economy becomes increasingly integrated across nations, solving business problems inevitably requires taking a global multicultural perspective. For example, as a Hollywood film studio contemplates the next summer blockbuster, it frequently takes into consideration not only the entertainment tastes of the North American market but also that of moviegoers in emerging markets such as China and India. Similarly, many consumer products are now targeted at a global marketplace, making it critical that these products are developed and marketed in a way that appeals to customers from diverse cultural backgrounds around the world. Given this trend in international business, it has become more important than ever that individuals in global organizations are able to think creatively in a multicultural setting.

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Creativity is commonly defined as the production of ideas that are both novel and useful (Amabile, 1983). A key insight in creativity research is that creativity is not necessarily about producing an idea that never existed before. Rather, creativity oftentimes involves combining existing ideas and knowledge in novel ways that are useful toward solving practical problems (Baughman & Mumford, 1995; Chua & Iyengar, 2008; Mobley, Doares, & Mumford, 1992). In a global multicultural context, creativity typically involves making non-obvious connections among ideas from different cultures to derive new effective solutions to problems. This implies that individuals who have a broad range of cultural knowledge and perspectives are more likely to develop creative ideas and solutions than individuals who have limited cultural knowledge.

There is some research that supports this argument. For instance, studies have shown that biculturals, people who grew up knowing two cultures well, tend to be more creative than those who know only a single culture because they can look at problems from multiple perspectives (Benet-Martínez, Lee, & Leu, 2006). Individuals who have lived abroad (e.g., Leung, Maddux, Galinsky, & Chiu, 2008; Maddux & Galinsky, 2009; Tadmor, Galinsky, & Maddux, 2012); worked in diverse countries (Godart, Maddux, Shipilov, & Galinksy, 2015); and who have more culturally diverse social networks (Chua, 2015) are found to be more creative at solving tasks that require global perspectives. Implicit in these studies is the argument that the more cultural knowledge one has, the more likely one can be creative because there will be more ways to look at a problem and more knowledge to draw on and recombine to generate new ones.

Yet, the intuitive notion that more cultural knowledge is useful for creativity lacks an important consideration – the potential dark side of 'too much' knowledge (Frensch & Sternberg, 1989; Hall, Ariss, & Todorov, 2007; Kossowska, Matthaeus, & Necka, 1996), and in particular, the effects of cognitive overload (Camerer, Loewenstein, & Weber, 1989) and cognitive entrenchment (Dane, 2010; Frensch, & Sternberg, 1989; Lewandowsky, Little, & Kalish, 2007). In our research, we challenge the 'more is better' assumption by integrating research on creative cognition, which focuses on how individuals use cognitive resources and processes to produce new and useful ideas (Finke, Ward, & Smith, 1992; Ward, 2001); and cultural intelligence, which posits that cultural knowledge and cultural metacognition are cognitive capabilities essential for intercultural effectiveness (Chua, Morris, & Mor, 2012; Earley & Ang, 2003; Klafehn, Banerjee, & Chiu, 2008; Van Dyne, Ang, Ng, Rockstuhl, Tan, & Koh, 2012). We argue that although having more cultural knowledge aids creativity in a global multicultural context, high levels of cultural knowledge could lead to cognitive overload (Camerer et al., 1989; Hall et al., 2007) and cognitive entrenchment (Dane, 2010; Frensch & Sternberg, 1989; Lewandowsky et al., 2007), in turn lowering creativity. To address this backlash of too much cultural knowledge, individuals need to have cultural metacognition – a heightened sense of awareness of the assumptions and contexts that underlie their cultural knowledge, enabling them to better

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navigate the large knowledge space as they search for creative combinations of ideas.

The present research makes three significant contributions. First, we provide a more direct examination of the role of cultural knowledge in creativity. Although several studies have postulated a link between cultural knowledge and creativity (e.g., Godart et al., 2015; Leung & Chiu, 2008; Leung et al., 2008), cultural knowledge has not been directly assessed for its effect on creativity. Instead, international experience is commonly used as a proxy indicator for cultural knowledge, with the assumption that cultural knowledge increases with one's exposure to foreign cultures. This assumption, however, can be questionable since not all international experiences translate into experiential learning and hence, cultural knowledge (Ng, Van Dyne, & Ang, 2009). By explicitly measuring cultural knowledge in this study, we offer direct evidence on the role of cultural knowledge on creativity. Second, we offer a revised view on the relationship between cultural knowledge and creativity by challenging the 'more is better' assumption. We argue and test that too much cultural knowledge can actually be detrimental to creativity. Third, drawing on the creative cognition perspective (Finke et al., 1992; Ward, 2001) and cultural intelligence (CQ) research (Ang & Van Dyne, 2008; Earley & Ang, 2003), we identify an important moderator – cultural metacognition – that could mitigate the negative effects of too much cultural knowledge.

In the ensuing sections, we elaborate our theoretical arguments and describe a study that supports our thesis. In line with our creative cognition approach, we focused on the two *cognition*-related dimensions of cultural intelligence – cultural knowledge (cognitive CQ) and cultural metacognition (metacognitive CQ) because they represent individuals' mental ability in dealing with cultural ideas and information. The other two dimensions of CQ (motivational and behavioral) implicate interpersonal interactions and therefore are less relevant in this research because we are primarily interested in individual-level creative performance.

THEORETICAL DEVELOPMENT AND HYPOTHESES

The creative cognition approach views 'creativity as arising from cognitive processes applied to existing cognitive structures' (Ward, 2001: 352). This approach toward understanding human creativity proposes that new and useful ideas come from the interplay between the generative process of producing potential ideas and exploring their viability in given problem contexts (Fink et al., 1992; Ward, 2001). Specifically, the generative process involves acquiring and accessing information and knowledge, and recombining them to produce new ones. The exploratory process involves searching one's knowledge space for novel and potentially useful combinations of ideas, and judging the viability of potential solutions. According to Ward (2001), in order for these cognitive processes to result in creative performance, two factors are critical: (a) richness of the individual's knowledge structure, and (b)

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sensitivity toward how knowledge can be combined and how potential ideas are selected. Below, we draw on these tenets of the creative cognition perspective to theorize the effects of individuals' cultural knowledge and cultural metacognition on creativity.

Cultural Knowledge and Creativity

Cultural knowledge refers to the schemas that individuals have developed regarding cultural institutions, norms, practices and conventions in different cultural settings (Ang et al., 2007; Van Dyne et al., 2012). Schemas are structures that contain descriptions or facts of a concept, including its attributes and the relationships amongst these attributes (Fiske & Taylor, 1991). Individuals with more cultural knowledge have a larger quantity of culture-related attributes and relationships that are stored in categories for organizing and interpreting bits of information (cf. Mumford & Connelly, 1991), compared to those with less cultural knowledge.

Consistent with creative cognition arguments (Ward, 2001), one would expect that the amount of cultural knowledge should be positively associated with creativity in a global setting. This is because the more one is knowledgeable of the different ways of thinking and doing things in different cultures (i.e., cultural knowledge), the more s/he is likely to extend his/her conceptual boundaries of a particular concept, a process known as creative conceptual expansion (Ward et al., 1997). This cognitive flexibility enables the individual to form associations between seemingly different concepts to derive novel and useful ideas (e.g., Amabile, 1983; Chua, 2015; Godart et al., 2015; Maddux & Galinsky, 2009).

Yet, a body of psychological research has also demonstrated the negative effects of having too much knowledge (Camerer et al., 1989; Hall et al., 2007). In particular, cognitive overload is an effect that is relevant to our present research. Prior research has established that humans have limited cognitive capacity (Chua & Iyengar, 2008; Iyengar & Lepper, 2000; Miller, 1956). For example, Chua and Iyengar (2008) found that people given large amount of resources did not produce more creative outputs as conventional wisdom would suggest. The positive link between more resources and creativity occurs only for people who are experienced in navigating the task domain and given explicit creativity instructions. This is because a large amount of resources creates a large search space that can overwhelm and confuse people who do not know how to sieve through the options and pick the right resources for their tasks.

Similarly, we argue that cognitive overload might occur for individuals who possess a large amount of cultural knowledge. This effect can occur for individuals who have vast knowledge about multiple cultures (breadth), or have deep knowledge about one culture (depth) (Godart et al., 2015). In both cases, these individuals have a greater level of inputs and 'raw materials' to work with.

As research on expertise and creative problem solving has suggested (e.g., Wiley, 1998), the amount of domain knowledge (in this case, cultural knowledge) forms

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the 'mental set' that serves as a boundary, within which the person searches for possible combination or reorganization of information (e.g., attributes of culture) that will produce a novel solution. The attributes contained within this mental-set serve as the 'raw material' for individuals to generate creative ideas (Dane, 2010). When domain knowledge is limited, there is little potential for individuals to arrive at interesting combination of attributes because there is only a small quantity of attributes in their schema to work with. As domain knowledge increases, individuals have more attributes in their schema that allows for more possible combinations of ideas.

However, when domain knowledge is extensive, the number of possible combinations of attributes increases exponentially (Mumford, Blair, Dailey, Leritz, & Osburn, 2006). This can pose a cognitive overload for individuals and reduce their processing capacity to make novel and appropriate connections between pieces of information. Moreover, the difficulties in the search process (due to a large search space) can be emotionally frustrating and de-motivating, further hampering the creative process (Chua & Iyengar, 2008).

Additionally, 'too much' knowledge can lead to what some researchers called cognitive entrenchment (Becker, 2005; Dane, 2010; Frensch & Sternberg, 1989; Lewandowsky et al., 2007). Specifically, Dane (2010) argued that as individuals gain knowledge and expertise in a given area or field, the associated domain schemas – the structure of knowledge in the given domain – become more complex, but at the same time, also more stable and inflexible. This high level of stability and inflexibility in domain schemas, however, can hamper the conceptual recombination and re-organizational of existing ideas, a process that creativity researchers commonly regard as a key driver of new idea generation (e.g., Baughman & Mumford, 1995; Chua & Iyengar, 2008; Guilford, 1950; Rietzschel, Nijstad, & Stroebe, 2007). For instance, individuals who have extensive knowledge of multiple cultures may perceive a certain cultural pattern (e.g., many Asian cultures are indirect) that may over time, become entrenched in their knowledge structure that makes it difficult to change. Similarly, individuals who have deep knowledge of one culture can also develop stable mental schemas about this culture, rendering it difficult for them to challenge and break out of these set mental frames to develop new ideas that involved this particular culture.

Hence, we predict that when individuals possess a large amount of cultural knowledge, their creative performance in a multicultural context could actually suffer due to cognitive limitations arising from cognitive overload and cognitive entrenchment.

Hypothesis 1: There is an inverted U-shape relationship between cultural knowledge and creativity in a multicultural context such that some level of cultural knowledge is associated with higher creativity, but beyond a certain level, more cultural knowledge is associated with lower creativity.

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Moderating Effect of Cultural Metacognition

The unintended effect of cognitive overload and knowledge entrenchment on creativity however, can be mitigated by an individual's cultural metacognition – the level of conscious cultural awareness and control over one's thought processes directed at acquiring, comprehending, and calibrating cultural knowledge (Ang et al., 2007; Earley & Ang, 2003; Klafehn et al., 2008; Thomas, 2006). Specifically, cultural metacognition reduces the unintended effects of too much knowledge by promoting self-regulated mental processes such as awareness and checking (Van Dyne et al., 2012). Awareness refers to 'knowing about cultural thinking and knowledge of self and others in real time' (Van Dyne et al., 2012: 299). With a heightened sensitivity to the cultural context and problem which s/he is faced with at that point in time, the individual is able to assess which aspects of culture are more relevant, and hence, apply the appropriate knowledge to derive novel and useful ideas. In addition, checking, which refers to 'reviewing assumptions and adjusting mental maps when actual experiences differ from expectations' (Van Dyne et al., 2012: 299), enables the individual to critically evaluate and enhance their use of cultural knowledge in order to suit the real-time situation better.

These self-regulatory processes help individuals overcome the burden of cognitive overload during creative work. Individuals with high cultural metacognition are better able to organize, sieve through the large amount of cultural knowledge they possess, make sense of them, and determine their applicability to the given context. In other words, cultural metacognition helps individuals navigate their search process for a creative solution by applying knowledge that is most useful for the given situation and problem. With a more manageable subset of applicable and relevant cultural knowledge, individuals have better chances of deriving novel and useful solutions for problems through recombination of ideas from diverse cultures. Thus, we expect a positive relationship between cultural knowledge and creativity for high cultural metacognition individuals. Our argument is consistent with Amabile's (1983) proposal that 'an increase in domain-relevant skills can only lead to an increase in creativity, provided that the domain-relevant information is organized appropriately' (364).

Cultural metacognition can also attenuate the effects of cognitive entrenchment. Individuals with high cultural metacognition are highly aware of the assumptions and gaps that underlie their stockpile of cultural knowledge (Ang et al., 2007). As a result, they constantly monitor their cultural knowledge and adjust them as they gain new or disconfirming experiences and knowledge about various cultures (Van Dyne et al., 2012). This process is critical in combating cognitive entrenchment because existing knowledge is regularly reviewed and updated. Thus, they are less likely, compared to their low cultural metacognition counterparts, to develop stable and inflexible cultural knowledge schemas.

By contrast, individuals with low cultural metacognition are less adept at regulating the solution search process and the use of their cultural knowledge;

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they are also more entrenched in their existing cultural knowledge and less likely to be aware of the limitations and incompleteness of their knowledge. Thus, high cultural knowledge becomes a liability for their creativity. For these individuals, we expect the inverted U shape relationship proposed in H1.

Hypothesis 2: The inverted U-shape relationship between cultural knowledge and creativity is moderated by cultural metacognition such that the inverted U-shape relationship occurs only for individuals with low metacognition. For individuals with high cultural metacognition, cultural knowledge is positively related to creativity.

METHOD

Participants and Procedure

Participants were 89 final year business students enrolled in a fourteen-week international organizational behavior course at a business school in Singapore (44% male; average age = 22.19 years; SD = 2.06 years). Seventy of these participants (79%) were foreign students from 15 countries (Australia, Belgium, Canada, China, Czech Republic, Germany, India, the Netherlands, Norway, Russia, Spain, Sweden, Switzerland, Ukraine, and the US). Participants were randomly assigned to teams at the start of the course. Team sizes ranged from 57 people (average = 6.36; SD = 0.63).

Throughout the course, participants worked with their team members on tasks involving cross-cultural issues. The first type of group task involved resolving a series of cross-cultural dilemmas in business cases that were presented to the groups. In these cases, the dilemmas centered on cultural values (e.g., low vs high power distance), and the groups were required to propose win-win solutions to address the dilemmas. For instance, a case typically involves a failed interaction between two parties with different cultural values. After identifying the source of conflict, participants had to suggest as many solutions as possible that would satisfy both parties in terms of their value preferences. The second type of group task (a final group project) required the group to create and resolve one cross-cultural dilemma based on two countries that were assigned to them (e.g., China & Brazil). Groups then had to identify one relevant 'subjective' element of culture (i.e., cultural value) and one 'objective' element of culture (e.g., religious system, or legal system), and to develop their own business case centered on differences in these two cultural elements. They were also required to propose a solution to resolve the dilemma in their story. In sum, these tasks offered many opportunities for participants to demonstrate their creative thinking, as well as to observe creative thinking in their team members.

We collected data on participants' multicultural experience, personality, and demographics at the beginning of the course via an online survey. Twelve weeks later, we collected social network data that assessed participants' social ties with

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others enrolled in the class, to control for the possible effects of a culturally diverse network on creativity. Specifically, participants were presented with a list of 89 names, and asked to indicate who (excluding themselves) they knew and had interacted with in the program. For each identified contact, participants answered questions regarding the quality of interaction such as interaction frequency and the type of resources (task advice, information, or social enjoyment) they received from the contact. This roster approach is commonly used to elicit sociometric network data in social network analysis research (Wasserman & Faust, 1994).

We assessed participants' cultural knowledge and cultural metacognition with three observer ratings seven weeks into the course. Using observer ratings allows us to avoid problems associated with self-reports. One challenge with self-report of one's knowledge and abilities has to do with positive illusions wherein people have inflated evaluations of themselves (Tayler & Brown, 1988; Pronin, 2008; Pronin, Gilovich, & Ross, 2004). Such illusions stem in part from people's heightened awareness of their own motivations and intentions when judging themselves (Kruger & Gilovich, 2004). Research has also found that unskilled individuals often have difficulties recognizing their own abilities, leading to inflated self-assessments (Kruger & Dunning, 1999). Observer ratings can circumvent these issues, as observers are less likely to engage in motivated or self-enhancing cognition when judging others; rather they tend to rely primarily on observable outward behaviors of the target (Kruger & Gilovich, 2004). Observer ratings should therefore give us a more accurate assessment of participants' cultural knowledge and metacognitive habits.

The three observers were members randomly selected from the team. As the group discussions and team project required all team members to work interdependently with each other, a random selection of raters allowed us to ensure reliability in the ratings while minimizing survey fatigue for raters. At the end of the course, *all* team members rated each other on creativity as part of the peer evaluation system. On average, each person received five ratings on their creativity.

Key Measures

Cultural knowledge. We used the 6-item cognitive CQ scale from Ang et al.'s (2007) CQS. Sample items include: this person knows the 'legal and economic systems of other cultures', 'religious beliefs of other cultures', 'arts and crafts of other cultures'. Cronbach's alpha was 0.81. Rwg was 0.89; ICC(1) was 0.60, $p < 0.00$; and ICC(2) was 0.82, $p < 0.00$.

Cultural metacognition. We measured cultural metacognition using the 4-item subscale adopted from the Ang et al. (2007)'s metacognitive CQ subscale. The items include this person is (a) 'conscious of the cultural knowledge he/she uses when interacting

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with people with different cultural backgrounds', (b) 'conscious of the cultural knowledge he/she applies to cross-cultural interactions', (c) 'adjusts his/her cultural knowledge as he/she interacts with people from a culture that is unfamiliar to me', and (d) 'checks the accuracy of his/her cultural knowledge as he/she interacts with people from different cultures'. Cronbach's alpha was 0.91. Rwg was 0.90, and ICC(1) was 0.77, $p < 0.00$.

Creativity. Participants' creativity was measured with five items. Sample items include: this person (a) 'is a good source of creative ideas', (b) 'often has a fresh approach to problems', and (c) 'searches out new processes, techniques, or ideas to improve team performance'. We adopted these items from Zhou and George's (2001) study, focusing on items that are relevant to the present context. Cronbach's alpha for the scale was 0.95. Rwg was 0.89, and ICC(1) was 0.81, $p < 0.00$. Participants completed these items as part of peer feedback for their teammates. These items in essence constitute peers' assessments of each participant's creativity.

Control Variables

Multicultural experiences. Because participants' cultural experiences could influence their ability to think creatively in a multicultural context (Leung et al., 2008; Maddux & Galinsky, 2009), we controlled for a host of related variables including the number of languages they speak, the number of countries they have lived in for more than 6 months, the number of countries they have visited, and their prior experiences interacting with foreigners (1= no experience; 2 = moderately experienced; 3 = very experienced) (Ang et al., 2007).

Social connections. Recent research found culturally diverse networks to have positive impact on creativity (Chua, 2015). To control for this effect, we measured the size of the participants' social networks and the degree of cultural diversity within the networks. Network size is the number of students identified in the network survey. Cultural diversity is measured with Blau's (1977) heterogeneity index based on nationality. This variable ranged from 0 to 1; the higher the value, the greater the degree of cultural diversity.

Personality and demographics. Prior research found that certain personality dimensions are predictive of creativity (George & Zhou 2001). To control for the effects of personality, we assessed the Big-Five personality variables using the public domain International Personality Item Pool (IPIP) developed by Goldberg (1998). The IPIP is a 50-item instrument that measures the five factor model, with 10 items for each personality factor. Each item was assessed using a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Cronbach's alphas were 0.85 for Emotional Stability, 0.90 for Extraversion, and 0.72 for Openness to New Experience, 0.81 for Agreeableness, and 0.80 for Conscientiousness. Additionally, we controlled for age

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(years) and gender (male coded as '1', female as '0') to rule out potential influences of these demographic variables.

Analyses and Results

Table 1 presents the descriptive statistics and correlations for key variables. Because cultural knowledge and cultural metacognition are highly correlated (r = 0.67), we checked for multicollinearity by examining the variance inflation factor (VIF) of these two variables after regressing creativity on all the variables. The VIF for cultural knowledge and cultural metacognition are both 2.17 (below 5), suggesting that multicollinearity is not a serious concern (Menard, 1995). As our participants worked in teams, we used random effects regression to account for the nested nature of our data (Klein, Dansereau, & Hall, 1994). Specifically, we used the 'xtreg' command in STATA for our analyses. Table 2 presents the regression results.

Hypothesis 1 proposed an inverted U-shape relationship between cultural knowledge and creativity. Model 1 in Table 2 indicates that cultural knowledge has a positive relationship with creativity ($\beta = 0.29$, $p < 0.05$). Model 2 adds a quadratic term for cultural knowledge and results indicate a significant effect suggesting an inverted U-shape curvilinear relationship as predicted ($\beta = -0.51$, $p < 0.01$). Thus, H1 is supported.

Hypothesis 2 proposed that cultural metacognition moderates the U-shape relationship between cultural knowledge and creativity. To test this hypothesis, we first add cultural metacognition in Model 3, and the product term between cultural metacognition and the quadratic term for cultural knowledge in Model 4. For completeness, we also included a lower-level interaction term involving cultural metacognition and cultural knowledge.

Results in Model 3 shows a significant main effect for cultural metacognition on creativity ($\beta = 0.41$, $p < 0.01$), with the quadratic effect of cultural knowledge remaining significant ($\beta = -0.40$, $p < 0.01$). Results in Model 4 indicated a significant interaction between cultural metacognition and the quadratic term for cultural knowledge on creativity ($\beta = 0.30$, $p < 0.01$). Cultural metacognition continues to be positively associated (albeit marginally significant) with creativity ($\beta = 0.24$, $p < 0.10$). The pattern of interaction is depicted in Figure 1 (low/high metacognitive CQ lines are based on values minus/plus one standard deviation from the mean). Further analyses indicate that the inverted U-shape relationship between cultural knowledge and creativity occurs only for individuals with low (cultural knowledge: $\beta = -0.51$, $p = 0.16$; cultural knowledge squared: $\beta = -0.95$, $p < 0.01$) but not high cultural metacognition (cultural knowledge: $\beta = -0.37$, $p = 0.26$; cultural knowledge squared: $\beta = 0.26$, $p = 0.49$). Contrary to our expectation that there will be a positive relationship between cultural knowledge and creativity for individuals with high cultural metacognition, our results show that cultural knowledge has no significant effect on creativity. Hence, H2 receives partial support.

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Table 1. Correlations and descriptive statistics (N=89)

	Variables	*Mean*	*SD*	*Min*	*Max*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
1	Creativity	6.07	0.89	2.52	7.00	**0.95**						
2	Cultural Knowledge	4.65	0.73	2.56	6.33	0.24*	**0.81**					
3	Cultural Metacognition	4.84	0.89	2.25	6.58	0.48*	0.67*	**0.91**				
4	Network cultural diversity	0.60	0.21	0.00	0.85	0.16	0.07	0.14	1.00			
5	Network size	22.21	10.12	5.00	52.00	0.13	0.16	0.13	− 0.25*	1.00		
6	Age	22.19	2.03	19.00	35.00	− 0.13	− 0.07	− 0.01	− 0.23*	− 0.05	1.00	
7	Gender (Male = 1, Female = 0)	0.44	0.50	0.00	1.00	− 0.05	− 0.10	0.05	0.23*	− 0.08	0.20	1.00
8	Number of languages known	2.64	0.92	1.00	6.00	0.00	0.05	0.07	0.18	− 0.14	0.14	0.07
9	Experience interacting with foreigners	2.16	0.50	1.00	3.00	− 0.09	− 0.07	− 0.05	− 0.09	− 0.04	0.16	0.22*
10	Number of countries lived (>6 mths)	2.00	1.03	1.00	5.00	0.02	0.03	0.07	− 0.06	− 0.03	0.26*	.22*
11	Number of countries visited	13.40	8.34	0.00	40.00	0.06	− 0.16	0.03	− 0.32*	0.14	0.39*	0.21
12	Extraversion	3.62	0.64	2.00	5.00	− 0.05	− 0.07	0.04	− 0.29*	− 0.02	0.18	− 0.09
13	Agreeableness	4.09	0.44	2.80	5.00	0.03	0.04	0.15	− 0.02	− 0.11	0.08	− 0.28*
14	Conscientiousness	3.35	0.56	2.10	4.90	− 0.13	0.12	0.01	0.04	− 0.10	− 0.02	− 0.13
15	Emotional Stability	3.34	0.65	1.40	4.60	− 0.15	− 0.08	− 0.01	− 0.13	0.03	0.22*	0.33*
16	Openness	3.53	0.45	2.20	4.60	− 0.22*	− 0.08	− 0.01	− 0.16	0.11	0.12	0.19
17	Team size	6.42	0.60	5.00	7.00	0.18	0.03	0.05	0.08	0.03	− 0.04	− 0.01

		8	9	10	11	12	13	14	15	16	17	
8	Number of languages known	1.00										
9	Experience interacting with foreigners	0.17	1.00									
10	Number of countries lived (>6 mths)	0.13	0.49*	1.00								
11	Number of countries visited	− 0.01	0.38*	0.41*	1.00							
12	Extraversion	− 0.10	0.14	0.10	0.35*	**0.90**						
13	Agreeableness	− 0.02	− 0.14	0.01	0.09	0.23*	**0.81**					
14	Conscientiousness	0.05*	− 0.21	− 0.09	− 0.05	0.09	0.36*	**0.80**				
15	Emotional Stability	0.03	− 0.02	0.05	0.08	0.09	− 0.18	− 0.03	**0.85**			
16	Openness	0.10	0.31*	0.11	0.28*	0.31*	0.20	− 0.17	0.17	**0.72**		
17	Team size	0.03	− 0.07	− 0.11	− 0.09	− 0.07	0.08	− 0.10	0.12	− 0.17	1.00	

Notes: * $p<0.05$; bold numbers in diagonal are reliability statistics (Cronbach's alpha).

Table 2. Random effects regression results (N=89)

Dependent variable = Creativity	*Model 1*	*Model 2*	*Model 3*	*Model 4*	*Model 5*
Key predictors					
Cultural Knowledge	0.29 (0.13)*	0.26 (0.12)*	−0.08 (0.16)	−0.34 (0.18)$^{+}$	−0.31 (0.13)*
Cultural Knowledge-Squared	–	−0.51 (0.13)**	−0.40 (0.13)**	−0.19 (0.27)	−0.16 (0.20)
Cultural Metacognition	–	–	0.41 (0.13)**	0.24 (0.14)$^{+}$	0.06 (0.11)
Cultural Knowledge × Metacognition	–	–	–	0.00 (0.21)	0.11 (0.17)
Cultural Knowledge-Squared × Metacognition	–	–	–	0.30 (0.09)**	0.28 (0.07)**
Control variables					
Network cultural diversity	0.80 (0.53)	1.00 (0.48)*	0.72 (0.47)	0.74 (0.44)$^{+}$	–
Network size	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.00 (0.01)	–
Age	−0.06 (0.05)	−0.06 (0.05)	−0.05 (0.04)	−0.06 (0.04)	–
Gender (Male = 1, Female = 0)	0.01 (0.23)	−0.06 (0.21)	−0.14 (0.20)	−0.14 (0.19)	–
Number of languages known	0.00 (0.10)	−0.02 (0.10)	−0.03 (0.09)	−0.02 (0.09)	–
Experience interacting with foreigners	−0.18 (0.24)	−0.29 (0.22)	−0.23 (0.21)	−0.27 (0.20)	–
Number of countries lived (>6 mths)	−0.01 (0.11)	−0.02 (0.10)	−0.01 (0.09)	0.00 (0.09)	–
Number of countries visited	0.03 (0.01)*	0.05 (0.01)**	0.04 (0.01)**	0.03 (0.01)**	–
Extraversion	0.08 (0.16)	−0.10 (0.16)	−0.12 (0.15)	−0.09 (0.14)	–
Agreeableness	0.23 (0.27)	0.15 (0.25)	−0.01 (0.24)	−0.01 (0.24)	–
Conscientiousness	−0.40 (0.19)*	−0.35 (0.17)	−0.25 (0.17)	−0.28 (0.16)$^{+}$	–
Emotional stability	−0.10 (0.16)	−0.02 (0.15)	−0.08 (0.14)	−0.09 (0.14)	–
Openness	−0.53 (0.26)*	−0.55 (0.24)*	−0.39 (0.23)$^{+}$	−0.22 (0.22)	–
Team size	0.15 (0.16)	0.12 (0.15)	0.14 (0.14)	0.12 (0.13)	–
Within R-Square	0.047	0.110	0.135	0.249	0.194
Between R-Square	0.638	0.778	0.814	0.817	0.557
Overall R-Square	0.263	0.394	0.465	0.535	0.351
Overall R-Square change	–	0.131	0.071	0.070	–

Notes: $^{+}$p<0.01; * p<0.05, ** p<0.01; numbers in parenthesis are standard errors.

For robustness check, we also conducted the above analyses without the control variables and found the same results (see Table 2 column 5). Specifically, all the effects involving the key predictors in Table 2 were statistically significant. Next, we ran additional analyses that included measures of behavioral and motivational CQ in our models (including control variables). These CQ variables did not have any significant effect on individual creativity and the above patterns of results pertaining to our two hypotheses remained statistically significant. We also checked whether a quadratic term involving cultural metacognition would influence our findings. Results indicated that when both quadratic terms for cultural knowledge and cultural metacognition were simultaneously included in a model, only the quadratic term for cultural knowledge was significantly associated with the outcome

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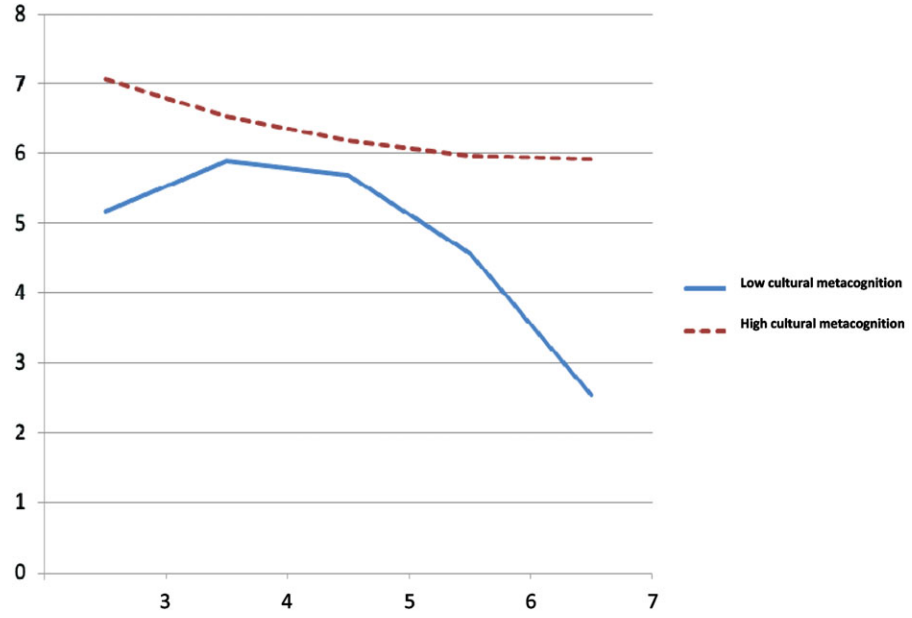

Figure 1. Inverted U-shape relationship between cultural knowledge and creativity – Moderated by cultural metacognition
Note: The above graph is plotted using resultant regression coefficients; low/high metacognitive CQ lines are based on values minus/plus one standard deviation from the mean.

variable. Taken together, these additional analyses provide greater confidence that our results are robust.

DISCUSSION

Theoretical and Empirical Implications

We make several contributions with the present research. First, we directly assess individuals' cultural knowledge to empirically establish its relationship with creativity. We find that cultural knowledge has a positive relationship with creativity (before accounting for cultural metacognition). Second, and more importantly, we demonstrate that although having cultural knowledge helps one become more creative in a multicultural global setting, too much cultural knowledge can be detrimental to creativity. This finding is the first in the creativity literature to challenge the conventional 'more is better' assumption, and provides a revised view of how cultural knowledge shapes creativity.

Third, we highlight cultural metacognition as an important but under-researched individual cognitive factor that mitigates the negative consequence of too much cultural knowledge on creativity. Our study shows that cultural metacognition has a positive main effect on creativity. In addition, the detrimental effect of excessive cultural knowledge on creativity occurs only for individuals with low cultural

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metacognition. This finding is consistent with theories of creative problem solving which emphasizes that domain knowledge alone is insufficient (Anderson, 1985); metacognitive processes such as solution monitoring and knowledge utilization are highly critical for creative performance (Anderson, 1985; Newell & Simon, 1972; Sternberg, 1986).

Interestingly and contrary to our expectations, cultural knowledge has no effect on creativity for individuals with high cultural metacognition. Empirically, the non-significant relationship between cultural knowledge and creativity for high cultural metacognition individuals could be due to two data-related artifacts. First, we noticed that in our sample, there is already a minimum level of cultural knowledge (2.56). In other words, all our participants have some level of cultural knowledge to start with and are not totally ignorant of other cultures. If we had participants with lower cultural knowledge, we might notice the positive effect between cultural knowledge and creativity even for high metacognition individuals. Second, we noticed that for high cultural metacognition individuals, the degree of creativity is generally high (between 6 and 7 out of a maximum creativity rating of 7). Therefore, there might be a ceiling effect wherein the creativity scores could not go further beyond 7.

A theoretical, and more interesting, explanation of the unexpected finding is that individuals with high cultural metacognition might be highly aware of the gaps in their cultural knowledge, creating an opportunity for them to generate novel ideas based on these gaps (Rietzschel et al., 2007; Ward, Patterson, Sifonis, Dodds, & Saunders, 2002). For example, when working on a problem involving Chinese and American cultures, a high cultural metacognition individual who might not be deeply knowledgeable about both cultures can use his or her knowledge gap as a starting point or stimulus to search for new ideas or inspirations to address the problem at hand. Additionally, the knowledge gap might prompt the individual to develop new ideas about Chinese and American cultures by recombining the existing knowledge in unconventional ways. This explanation highlights the generative potential of metacognition in the absences of knowledge resources.

Overall, our findings demonstrated that while both cultural knowledge and cultural meta-cognition are important for creativity in a multicultural context, cultural metacognition is especially critical. This is because high cultural metacognition facilitates the processing of a large amount of cultural knowledge, thus preventing cognitive overload and cognitive entrenchment. These findings are robust as we had controlled for a number of factors known to affect creativity, including multicultural experiences (Godart et al., 2015; Leung et al., 2008; Maddux & Galinksy, 2009), social networks (Chua, 2015), and personality (George & Zhou, 2001). As such, our study builds upon existing creativity research to test new relationships involving cultural knowledge and cultural metacognition on creativity.

Besides creativity, our study also advances research on cultural intelligence. In a review paper on future directions for cultural intelligence research, Gelfand, Imai, and Fehr (2008) highlighted, amongst several suggestions, the need to understand

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the dark side of cultural intelligence, and how cultural intelligence factors *interact* with each other to predict outcomes of interest. Our study responds to these two directions simultaneously by showing that too much cultural knowledge can inhibit creativity; and that cultural metacognition can mitigate the dark side of cultural knowledge. Given that this study is one of the first to examine the interactive effects of the two types of cognitive capabilities on creativity, we believe it opens up avenues for more research, as well as offers important practical insights.

Last but not least, our study also provides several findings that corroborate with emerging theories about how multicultural exposure shapes creativity. For instance, consistent with Chua's (2015) study that culturally diverse networks aid creativity in tasks requiring global perspectives, our study similarly shows that cultural diversity in networks of participants working in highly culturally diverse teams enhances their creativity (see Table 2, model 4). Our finding that participants' international experience, assessed as the number of countries they visited, is positively related to creativity, is also consistent with Godart et al.'s (2015) finding that breadth of foreign exposure (i.e., number of countries visited) is positively associated with fashion creative directors' performance. In sum, our study not only provides support for new hypotheses regarding cultural knowledge and metacognition, but also offers replication for other important effects on creativity in multicultural settings.

Limitations and Future Research Implications

As with all research, there are limitations with our study. First, our sample size is somewhat small and our measures of interest were obtained from the same sources (teammate ratings). We mitigated potential common method bias with a multi-wave data collection design. It is worth noting that despite the small sample size and longitudinal design, our ability to find significant results indicate fairly strong effects.

Second, we acknowledge that the amount of cultural knowledge one possesses can be difficult to assess. In our study, we used multiple raters to avoid issues associated with self-assessment, such as overconfidence, as well as to increase the reliability of the measure. Yet, peer assessment may not fully capture the cultural knowledge that individuals possess. Future research can replicate our findings by using alternative measures such as an objective test on cultural knowledge. An example is the global awareness profile inventory (Corbitt, 1998), which tests a person's knowledge of geography, culture, economics and politics around the world.

Future research could also look into expanding the theoretical depth of our arguments on cultural knowledge. Specifically, when individuals encounter difficulties with too much cultural knowledge, is it the *breadth* or *depth* of the body of knowledge that matters? For example, a person might know about 10 different cultures moderately whereas another person might know about 3 cultures very well. Does the negative effect of too much cultural knowledge on creativity occur for the breadth or depth dimension of the cultural knowledge? Our speculation

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is that both high breadth and depth in cultural knowledge would contribute to cognitive overload and cognitive entrenchment, thereby dampening creativity. These speculations are worth further investigation.

Third, the present research did not provide empirical evidence to support the proposed underlying mechanisms. Future research could examine the mechanisms through which high cultural metacognition individuals manage their cultural knowledge. We had theorized that these individuals are better at regulating the use of their knowledge so that they are more efficient and effective in sieving through the knowledge they possess and making sense of what knowledge is applicable given the situation or problem. Future research could test these specific mechanisms in laboratory experiments, where these processes can be manipulated and measured.

In this study, we have chosen to examine only the cognitive capabilities of CQ because of our focus on individuals' creativity based on the creative cognition perspective. Interestingly, our additional analyses to test the robustness of our results show that motivational CQ and behavioral CQ did not affect creativity. Based on the trait activation theory (Tett & Gutterman, 2000), one explanation is that non-cognitive capabilities of CQ are more likely to be activated in situations involving cross-cultural interactions, whereas our dependent measure focuses on individuals' creativity. Future research could expand our current focus to examine the effects of motivational CQ and behavioral CQ, especially in creativity contexts that involve extensive information sharing and interpersonal interactions. Further, emerging research has found that multicultural networks promote creativity in the global context (Chua, 2015). This suggests that motivational and behavioral CQ could indirectly affect creativity through the cultivation of multicultural social networks.

The present study, conducted with students from 15 countries working together on assignments and projects requiring cultural knowledge and creative problem solving, offers a realistic setting to test our theory on the interactive effects of cultural knowledge and metacognition. Yet a drawback is that our sample is primarily students. Would the effects hold in real-world organizations? Future research could assess the generalizability of our findings by using other samples such as multicultural R&D teams in business organizations.

Finally, we noted the significant negative correlation between openness and creativity. Although the negative relationship is not robust in our regression analyses, it is worth considering this unexpected effect. One possibility is that participants have an overly positive evaluation of their openness, rating themselves highly on openness items such as 'I have excellent ideas', and 'I am quick to understand things'. Of the 5 personality traits, openness is the closest to creativity. The negative correlation between openness and creativity might reflect the Kruger and Dunning (1999) effect wherein unskilled (uncreative) individuals are often unaware that they are lacking in these skills (creativity skills). Additionally, although prior research consistently predicts a positive effect of openness on creativity, effects of personality on behavior outcome is highly dependent on the specific situational contexts (George & Zhou, 2001). In our study, which involves

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multicultural teams working on global tasks, it is possible that individuals' cultural competence such as cultural knowledge and cultural metacognition play more central roles than personality. Future research can investigate whether personality interacts with cultural competencies to predict performance in a multicultural work environment.

Practical Implications

The present research has clear practical implications. Conventional wisdom suggests that to be effective in a multicultural context, people need to acquire as much knowledge about other cultures as possible. Ignorance is often the seed of cultural faux pas and ineffectiveness. Hence, most cultural effectiveness training emphasizes acquiring knowledge. Although we recognize the importance of amassing cultural knowledge, we found that knowledge itself is insufficient and too much knowledge could even be detrimental to creativity at high amounts. Our research highlights that to be effective in a multicultural context (in this case to be creative), individuals need to possess cultural knowledge and perhaps more importantly, cultural metacognition. This means that as individuals interact with others from different cultures, they develop a real-time awareness of the situation in order to better identify knowledge that is applicable to the situation (as opposed to pure stereotypes), and/or to acquire new knowledge when the situation is unfamiliar to him/her.

One way to increase cultural metacognition is to practice perspective taking through active questioning of how different people may perceive the same situation differently (Nardon & Steers, 2008; Van Dyne et al., 2012). The more one attempts to see things from different cultural perspectives, the more likely one can create a new and common meaning to the situation, which will also facilitate the formation of richer cultural knowledge structures. Another way is by engaging a 'cultural mentor' – someone who is well-versed in a given culture and able to help correct inaccurate assumptions about that culture (Osland & Bird, 2000).

Our findings are especially relevant to the Chinese context. As Chinese businesses become more globalized, employees increasingly have to work across cultural boundaries. However, to date, cross-cultural training in China is still evolving and often judged as insufficient (Shen & Darby, 2006; Wood & El Mansour, 2009; Zhu & Wang, 2015). Much of the effort is focused on helping employees gain knowledge about foreign cultures within a classroom context, with little emphasis on other skills. Yet teachers of cross-cultural management have warned that theoretical cultural knowledge alone can lead to 'sophisticated stereotyping' – the reduction of a complex culture to a shorthand description (Osland & Bird, 2000). We recommend that Chinese firms should take a more sophisticated approach toward improving employees' cross-cultural capabilities. Besides equipping employees with the necessary knowledge about foreign cultures, training programs should also contain components to help them develop cultural metacognition.

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