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Abstract

Research suggests that living in and adapting to foreign cultures facilitates creativity. The current research investigated whether one aspect of the adaptation process—multicultural learning—is a critical component of increased creativity. Experiments 1–3 found that recalling a multicultural learning experience: (a) facilitates idea flexibility (e.g., the ability to solve problems in multiple ways), (b) increases awareness of underlying connections and associations, and (c) helps overcome functional fixedness. Importantly, Experiments 2 and 3 specifically demonstrated that functional learning in a multicultural context (i.e., learning about the underlying meaning or function of behaviors in that context) is particularly important for facilitating creativity. Results showed that creativity was enhanced only when participants recalled a functional multicultural learning experience and only when participants had previously lived abroad. Overall, multicultural learning appears to be an important mechanism by which foreign living experiences lead to creative enhancement.

Keywords:

creativity, culture, adaptation, learning, living abroad

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Culture is an inherent part of the social world. From the moment of birth, people are continuously educated and socialized as to the culturally appropriate linguistic, cognitive, affective, and behavioral skills necessary to engage in proper, socially sanctioned behaviors. As individuals develop and learn more about their own culture, this knowledge becomes deeply ingrained and automatized, helping individuals make sense of their social environment and coordinate their behavior with others from the same culture with relatively little effort (Chiu & Hong, 2006). These socialization experiences then predispose individuals to respond to environmental cues in culturally normative ways.

Although culture-specific knowledge is useful in simplifying the social world and allowing individuals to coordinate their behavior with each other, culture can also constrain a number of psychological processes, potentially impairing novelty and innovation. Because culture consists of routinized responses and knowledge structures, it can make familiar and common psychological responses highly salient, thereby obstructing obtaining and retrieving novel ideas (Ip, Chen, & Chiu, 2006). Thus, culture serves both as a coordination device and as a constraint on thought and behavior.

Given the psychological constraints of culture, recent research has explored whether exposure to or experiences

across *different* cultures can positively affect psychological outcomes such as creativity, which is typically defined as something that is novel and useful (e.g., Amabile, 1996). For example, Maddux and Galinsky (2009) found that individuals who had lived abroad (though not those who had traveled abroad) performed better on a range of creative tasks—discovering creative insights, drawing creative pictures, coming up with creative solutions in dyadic negotiations, and making creative associations between ideas—compared to individuals who had not lived abroad. In addition, Leung and Chiu (2010) found that, after being shown a slide show comparing American and Chinese cultures in the laboratory, participants were subsequently more creative on a story-writing task than participants who were simply shown slides about only American culture or only Chinese culture.

However, the effects of multicultural experiences are not unmoderated and unmediated: Research has found that

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creative enhancements are most likely to occur when individuals have a certain type of mind-set or approach during their multicultural experience. For example, Leung and Chiu (2008) showed that creativity was positively influenced by multicultural experiences but only when individuals were above a certain threshold of openness to experience, and Tadmor, Tetlock, and Peng (2009) found that expatriate experiences produced more complex thinking only when the expatriates identified with both their home culture and their host culture. Similarly, Maddux and Galinsky (2009) found that the effect of living abroad on creativity was mediated by the extent to which individuals adapted to the foreign culture(s) they had lived in. Thus, there seems to be something critical about the ability of individuals to integrate or adapt to a foreign culture while living abroad to derive a creative benefit from the experience. The question then becomes: What is it about adaptation to foreign environments that is critical for facilitating the creative process?

Adaptation and Creativity

Adaptation—also known as acculturation, adjustment, or integration—can be defined as a change in attitudes, beliefs, norms, values, and behaviors to be more consistent with that of a local, foreign culture (Berry, 1990, 1997; Furnham & Bochner, 1986; LaFramboise, Coleman, & Gerton, 1993; Liebkind, 2000; C. Ward, 1996). The adaptation process may be critical for creativity, as such a process can ultimately change individuals' behaviors and thoughts to be more multifaceted and complex. However, not everybody who goes abroad is motivated or able to adapt; encountering a different culture and an unfamiliar environment can be a stressful experience (e.g., Gil, Vega, & Dimas, 1994), and people may feel overwhelmed by seemingly insurmountable cultural differences, leading to culture shock, which only a subset of individuals are able to overcome successfully (C. Ward, Bochner, & Furnham, 2001). To manage the ensuing difficulties, some people actually cling to their own cultural beliefs, norms, and values even tighter than would otherwise be the case (Chao, Chen, Roisman, & Hong, 2007; Leung & Chiu, 2008). As a result, exposure to a foreign culture can lead to either greater flexibility or greater rigidity.

Notably, several factors have been associated with successful adaptation in previous research, including having social interactions with host country individuals (Kosic, Kruglanski, Pierro, & Mannetti, 2004; C. Ward, 1996); learning about the foreign culture (Hong, Morris, Chiu, & Benet-Martinez, 2000; Searle & Ward, 1990; C. Ward, 1996); possessing certain personality traits such as assertiveness, sociability, and extraversion (Padilla & Perez, 2003); having high socioeconomic status (Nicassio, 1983); having the ability to speak multiple languages (Elkholy, 1981); and being relatively young (Penaloza, 1994). At this point, however, it

is unclear which aspects of the adaptation process are the most useful for enhancing creativity.

Learning and Its Impact on the Creative Process

One intriguing possibility in explaining how adaptation to new cultures may facilitate creativity is multicultural learning. Learning involves acquiring new information and skills through study, instruction, or experience (Learning, 2009). Indeed, research has shown that acquiring new information and new understanding can change basic psychological processes and even how the brain is wired (for a review, see Doidge, 2007). For example, neurological research shows that London taxi drivers develop a larger hippocampus (the area of the brain that stores spatial representations) the longer they have been working (Maguire et al., 1999). And amazingly enough, blind individuals are able to marshal progressively larger areas of the *visual cortex* as they practice using their fingertips to read Braille (Pascual-Leone & Torres, 1993).

Culturally determined psychological tendencies can also noticeably shift when individuals learn about or adapt to new cultures. Although research has shown that Japanese are better than Americans at relative (compared to absolute) spatial judgment tasks (whereas Americans show the opposite pattern), Americans living in Japan perform these relative tasks similarly to Japanese (Kitayama, Duffy, Kawamura, & Larsen, 2003). Conversely, Japanese living in the United States respond to absolute spatial judgment tasks as accurately as Americans, and significantly better than Japanese living in Japan (Kitayama et al., 2003). Moreover, activation in brain areas that correspond to either a heightened contextual or object focus are correlated with the extent to which individuals have acculturated to East Asian or Western countries (Hedden, Ketay, Aron, Markus, & Gabrieli, 2008).

If intensive cultural learning experiences are powerful enough to alter brain structure and basic perceptual tendencies, such experiences may affect the creative process as well. Although creative *output* is typically defined as something novel and useful (e.g., Amabile, 1996), the act or *process* of *producing something creative* involves a number of different factors and mechanisms, any one or any combination of which can potentially lead to a creative outcome. These creative processes include generating novel ideas (e.g., Guilford, 1950), flexibly framing or solving the same problem in multiple ways (e.g., Friedman & Foerster, 2001; Galinsky & Moskowitz, 2000; Guilford, 1950; Markman, Lindberg, Kray, & Galinsky, 2007), producing new insights to existing problems (e.g., Schooler & Melcher, 1995), destabilizing routinized knowledge structures (Leung, Maddux, Galinsky, & Chiu, 2008), and recombining different existing ideas to make novel connections between concepts (Mednick, 1962; T. B. Ward, Smith, & Finke, 1999). Indeed, previous research has postulated that many of these creative processes can be

triggered or stimulated by multicultural experiences (Leung et al., 2008; Maddux & Galinsky, 2009; Maddux, Leung, Chiu, & Galinsky, 2009).

In the current article, however, we propose that most if not all of these creative processes are necessarily predicated on the ability of individuals to learn about their new culture in the first place. As noted earlier, research has found that creative enhancements are most likely to occur when individuals are motivated to engage themselves with their new culture, either through an open mind-set (Leung & Chiu, 2008) or behavioral adaptation (Maddux & Galinsky, 2009); when individuals are more close-minded or do not adapt themselves, the relation between multicultural experience and creativity is less robust. These findings suggest that cultural learning may be a necessary part of the adaptation process for subsequent creative enhancement to take place. Thus, although exposure to different cultures may be a critical factor in producing enhanced creativity, mere exposure may not, in and of itself, produce enduring psychological changes affecting creativity unless one has acquired, understood, and cognitively integrated new information about a foreign culture.

In particular, it is important to note that learning about a foreign culture engages people in exactly the kind of psychological processes that are critical for engaging creative processes and producing deeper structural changes in the brain. When people learn about a new culture, they are highly likely to challenge the culture-specific assumptions from their home culture; destabilize routinized, culturally constrained responses; integrate and combine new ideas into existing cognitive structures; make novel connections between ideas; and have major new insights. Indeed, neurological research has shown that for structural changes in the brain to occur following learning experiences, individuals must pay close attention to the new stimuli: The more closely individuals focus their attention during a new learning experience, the more likely that experience produces a permanent change in the brain (Kilgard & Merzenich, 1998). Thus, because learning about other cultures involves understanding and integrating what is new and different, which can lead to subsequent changes in how individuals think and behave, learning in a multicultural context should help facilitate the utilization of novel ideas and different knowledge elements provided by multicultural experience to facilitate creativity.

Finally, we suggest that once such multicultural learning experiences have occurred, reactivating or reproducing these experiences should also reactivate the behavioral and cognitive scripts (e.g., Bargh, 1989; Langer, Blank, & Chanowitz, 1978; Srull & Wyer, 1979) that were established during the initial encoding experience(s), leading to higher creative output as the original learning experiences are made salient. Indeed, Maddux and Galinsky (2009, Study 3) demonstrated that priming individuals to recall and write about the experience of having lived abroad temporarily produced more

creativity compared to individuals who were primed to think about other experiences, such as being in their hometown or at the supermarket, even though all participants in the study had lived abroad and presumably had enhanced creative abilities. Thus, although living abroad produces chronic changes in individuals' ability to be creative, reactivating such creative-enhancing experiences should produce concomitant increases in creativity in the moment.

Overview of the Current Research

The current research presents three experiments exploring how learning experiences in foreign cultures affect creativity. In all experiments, we primed various aspects of multicultural learning and examined how mentally recreating such experiences affected different types of creativity, including the ability to flexibly solve the same problem in multiple ways, noticing underlying connections and associations between concepts, and solving problems that require ignoring typical frames or functions.

Furthermore, we believe that the effect of learning on cognition requires direct experiences from which to draw. Indeed, constructs, processes, and experiences cannot be made accessible if they were not previously available in memory (Higgins, 1996). As a result, Experiments 1 and 2 involved participants who had previously lived abroad to ensure such individuals have the relevant experiences available to activate and make accessible via priming tasks (see Maddux & Galinsky, 2009). However, Experiment 3 involved both participants who had lived abroad and those who had not lived abroad to empirically explore whether the effects on creativity of recalling learning experiences in foreign cultures are more robust for those who had actually lived abroad. Across the experiments, we sought consistent evidence that learning in a multicultural context is a critical engine driving the link between foreign culture experiences and creativity.

Experiment 1: Multicultural Learning and Flexible Problem Solving

The main goal for Experiment 1 was to explore the effect of learning in a multicultural context compared to learning in one's home cultural context. As noted earlier, priming within-culture learning experiences can constrain creativity by increasing the salience of preexisting, routinized, and chronically salient responses. By contrast, multicultural learning experiences can enhance creativity by destabilizing routinized cognitive responses; highlighting differences in beliefs, values, and norms; and thus increasing one's ability to go beyond conventional ways of thinking and acting (Leung et al., 2008). Thus, we predicted that recalling multicultural rather than within-culture learning experiences would be more likely to facilitate creativity.

We propose that priming such experiences should be particularly likely to affect creativity tasks that demand the ability to overcome functional fixedness to discover multiple solutions to the same problem (e.g., Guilford, 1950). Indeed, we believe that this is one of the most salient problems in adapting to a foreign culture, the overcoming of which could produce enduring cognitive changes that can affect creativity. For example, as noted in Maddux and Galinsky (2009), in some cultures like China, it is polite to leave food on one's plate at the end of a meal because it signals that the host has been generous and one has had enough to eat; in the United States, however, the same behavior is considered rude, typically signaling that one has not enjoyed the meal. By repeatedly experiencing such "aha" moments of insight (Schooler & Melcher, 1995), individuals with knowledge of both cultures should be more likely to have the insight that there can be more than one solution to a given problem. To this end, we chose a creativity task designed to test flexibility in solving the same problem (Friedman & Foerster, 2001). We predicted that participants, all of whom had lived abroad, would produce more flexibility in solving these word fragments when recalling a learning experience that happened in a foreign culture rather than within their own home culture.

Method

Participants and design. Forty-three participants (18 male, 25 female) from a large university in Paris, France, participated in the experiment in exchange for a movie coupon. The experiment description indicated that participants needed to have lived abroad previously to be eligible. All participants in the final sample had such an experience ($M = 39.55$ months, $SD = 74.30$). The design consisted of two between-subjects conditions: multicultural learning versus within-culture learning.

Priming task. Participants were asked to take part in two ostensibly unrelated experiments. The cover story indicated that the first experiment (actually the priming task) was a cognitive generation experiment and that we were interested in participants' ability to recall the details of a certain event. Participants were randomly assigned to one of two experimental conditions. In the multicultural learning condition, participants were asked to recall and write about a time in which they learned something new about a *different* culture. In the within-culture learning condition, participants were asked to recall and write about a time in which they learned something new about *their own* culture. In both conditions, participants were instructed to write about these experiences in detail and to describe exactly what happened, how they felt, and what they thought about during this experience. After completing the priming task, participants handed in their materials to the experimenter and received the materials for the creativity task.

Creativity task. Participants were then asked to complete a second, ostensibly unrelated experiment on cognitive ability

(actually the dependent measure of creativity) that involved a word-completion creativity exercise adapted from Friedman and Foerster (2001). This task consisted of two columns of 15 word fragment pairs in French.¹ All fragments were missing one letter, and each row of two words contained the same word fragments. Importantly, however, there were exactly two different solutions for each row. For example, the ninth row was "_OUTARDE; _OUTARDE," which could be solved with either *moutarde* (mustard) or *routarde* (backpacker). Participants were given 1 min to complete as many word fragments as possible and were timed by an experimenter.

The conceptual challenge inherent in this task is that when the first word fragment is solved, it makes certain semantic associates of the word more salient, thus interfering with the retrieval of a semantically distinct second word. Importantly, word pairs were chosen so that each possible answer was semantically distinct from the other possible answer. Thus, the critical test of creativity in this task is whether participants are able to discover multiple solutions for the same word fragment. Similar to other creative insight tasks, this task is one in which individuals must try to overcome the common creative barrier of "functional fixedness," the tendency to see an object as performing only one (rather than multiple) functions, or seeing a problem as having only one solution. Our main dependent measure was the number of correctly solved pairs because it directly assesses the ability to come up with multiple novel and useful responses and demonstrates the ability to overcome the functional fixedness established by generating the initial answer (Friedman & Foerster, 2001).

Additional measures. Following the creativity task, participants were administered a questionnaire asking them to rate the extent to which they felt confident about each task (1 = *not confident at all*, 5 = *extremely confident*), the difficulty of each task (1 = *very difficult*, 5 = *very easy*), the amount of effort they exerted during each task (1 = *no effort at all*, 5 = *enormous effort*), the extent to which they liked each task (1 = *did not like at all*, 5 = *liked extremely*), and their mood during each task (1 = *very bad*, 5 = *very good*). These items were included to rule out the possibility of potential artifacts of our manipulations (Friedman & Foerster, 2001).

Results and Discussion

We conducted an initial one-way ANOVA with experimental condition as our independent variable and the number of correctly solved word fragment pairs as our dependent measure. Consistent with predictions, performance for word fragment pairs significantly differed across conditions, such that priming multicultural learning experiences ($M = 7.36$, $SD = 3.27$) led to more correctly solved word fragment pairs than priming within-culture learning experiences ($M = 5.00$, $SD = 3.49$), $F(1, 42) = 5.25$, $p = .03$, $d = .71$.² This effect remained significant, $F(1, 42) = 4.45$, $p = .04$, $d = .91$, even

when controlling for the number of correctly solved word fragment singles, which did not differ across conditions, $F(1, 42) = 0.95, p = .336, d = .30$ (see Figure 1).³

Supplementary analyses were conducted to examine whether confidence, difficulty, effort, liking, and mood varied across experimental conditions. However, a series of one-way ANOVAs with condition as the independent variable and confidence, difficulty, effort, liking, and mood as the dependent variables revealed no significant effects across conditions for both the priming and the creativity tasks, $ps > .42$.

Thus, the results of Experiment 1 provided initial experimental evidence that for a sample of participants who had all lived abroad, recalling learning experiences in a different culture facilitated creativity compared to priming within-culture learning experiences, suggesting that learning about a foreign culture is important for creative enhancement.

Experiment 2: Functional Multicultural Learning and Creative Associations

The main goal for Experiment 2 was to explore what it is about learning in a multicultural context that drives creative stimulation. Some hints as to how this might occur are provided by previous research as well as the results from Experiment 1. For example, the very nature of the word completion task in Experiment 1 suggests that people who are primed to recall a multicultural learning experience are better able to find multiple solutions for the same problem. This effect is consistent with the finding that living abroad is associated with an increased ability to solve insight creativity tasks, such as the Duncker candle problem, that necessitate being able to see certain objects (i.e., a box of tacks) as providing multiple functions (i.e., not only as a repository for sharp objects, but also as a candle holder; Maddux & Galinsky, 2009). Such an effect is also consistent with work showing that bicultural individuals—those who highly identify themselves with two different cultures—show higher integrative complexity when approaching problems compared to individuals who identify themselves with only a single culture (Tadmor, Tetlock, et al., 2009).

We believe such effects are analogous to one of the major challenges in adapting to a new country: learning not only *that* cultural differences exist but also learning *why* those cultural differences exist in the first place, in other words, what the underlying functions of such differences are. As noted earlier, leftover food on a plate can signal very different ideas in China and the United States (i.e., a compliment or a criticism). For an American expatriate in China, then, learning the underlying function of leaving food on one's plate can not only help overcome the creative barrier of functional fixedness, but it can also provide broader cultural insights such as understanding the importance of indirect communication, relationship maintenance, and face-saving. This deeper understanding of why something as simple as

food on a plate is a sign of respect may then lead to novel insights into how to creatively approach problems in other interpersonal situations as well. And the repeated occurrence of such deeper learning experiences (which are most likely if one lives abroad, pays close attention to his or her surroundings, and adapts himself or herself to the new culture) may eventually lead to enhanced creative abilities. Someone who has encountered the same behavior without an appreciation of its function is, we believe, less likely to experience enhanced creativity. Thus, we reasoned that there may be not only something important about multicultural learning per se but also something important about *functional* multicultural learning in particular (i.e., learning about the underlying reasons for observed foreign rituals, rules, and behaviors) for enhancing creativity.

Given the results of Experiment 1 as well as the suggestive evidence from previous research, we conducted two subsequent experiments to specifically investigate the role of functional learning about different cultures as a critical factor in how multicultural experiences facilitate creativity. In Experiment 2, we primed participants to think about an experience in which they learned about either (a) the underlying reasons why people from a different culture behave the way they do or (b) the underlying reasons for a behavior in their own culture. We predicted that creativity would be facilitated for participants primed to think about the functional multicultural learning experience compared to the functional within-culture learning experience.

Another important purpose of Experiment 2 was to address the lack of a control condition in Experiment 1, which did not allow us to discern whether multicultural learning experiences facilitated creativity, whether within-culture learning experiences diminished creativity, or whether both effects occurred simultaneously. Thus, to provide more compelling evidence for the creative benefits of multicultural learning experiences, we included a control condition in Experiment 2 to isolate the locus of this effect. Finally, we included a condition priming participants to recall learning a new sport (see Maddux & Galinsky, 2009, Study 5) to ensure that our predicted effects were occurring over and above any facilitative effects of recalling a general learning experience.

Method

Participants and design. One hundred fifty-two undergraduates (67 male, 85 female) at a large midwestern university in the United States participated in the experiment in exchange for a monetary payment of \$10. Participants voluntarily signed up for the experiment on a university research website, with the instructions indicating that to be eligible, participants needed to have lived abroad previously. As in Experiment 1, all participants in the final sample had such an experience ($M = 36.27$ months, $SD = 57.26$). The design

consisted of four between-subject conditions: functional multicultural learning versus functional within-culture learning versus new sport learning versus control.

Priming task. Participants were asked to take part in two ostensibly unrelated experiments. The cover story indicated that the first experiment (actually the priming task) was a memory experiment and that we were interested in participants' ability to recall the details of previous events. Participants were randomly assigned to one of the four conditions. In the functional multicultural learning condition, participants were asked to recall and write about a multicultural experience in which they learned the underlying reasons why people from a *different* culture behave the way they do. In the functional within-culture learning condition, participants were asked to recall and write about a time in which they learned the underlying reasons why people from *their own* culture behave the way they do. In these two conditions, participants were asked to write why what they learned was new to them. In the new sport learning condition, participants were asked to recall and write about a time they learned a new sport. In the control condition, participants were asked to recall and write about the last time they visited the supermarket (see Gruenfeld, Inesi, Magee, & Galinsky, 2008; Maddux & Galinsky, 2009; Rucker & Galinsky, 2008). Participants in all four conditions were instructed to write about these experiences in detail and to describe exactly what happened, how they felt, and what they thought about the experience.

Creativity task. After completing the priming task, participants were instructed to complete a second, ostensibly unrelated test of cognitive ability, which served as our test of creativity. This was the Remote Associates Task (RAT; Mednick, 1962), a test of associational thinking involving multiple triads of words that can be logically linked by a fourth word. This task assesses individuals' ability to discover an underlying link that connects multiple disparate concepts, another important creative process that can be stimulated by multicultural experiences (Leung et al., 2008).

Participants were given two examples: For the triad of words *manners-round-tennis*, participants were told that the correct answer was *table* (i.e., table manners, round table, table tennis). For the triad of words *playing-credit-report*, participants were told that the correct answer was *card* (i.e., playing card, credit card, report card). Participants were then presented with an additional list of 17 more triads and were instructed to solve as many of these 17 triads as possible. The number of correctly solved triads served as our main dependent measure of creativity.

Results and Discussion

A one-way, between-subjects ANOVA using priming condition as the independent variable and number of correctly solved RAT triads as the dependent variable was our main analysis. Results indicated a significant effect for priming

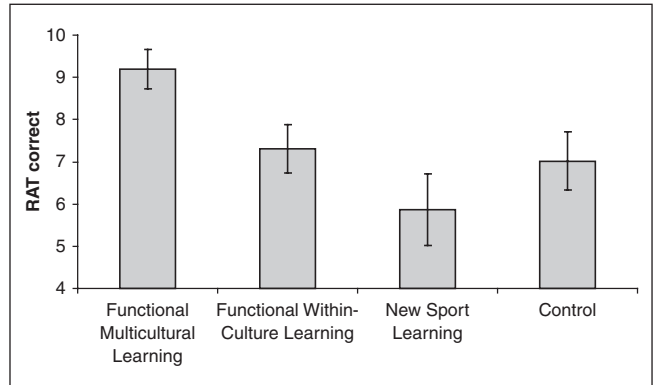


Figure 1. Mean correctly solved triads (with error bars) in the Remote Associates Task (RAT) as a function of experimental condition: Experiment 2

condition, $F(3, 149) = 4.75, p < .01$. Pairwise mean comparisons indicated that, as predicted, participants in the functional multicultural learning condition ($M = 9.09, SD = 3.03$) solved more triads correctly than did participants in the functional within-culture learning condition ($M = 7.31, SD = 3.06$), $F(1, 70) = 6.53, p = .01, d = .63$; the new sport learning condition ($M = 5.87, SD = 4.09$), $F(1, 64) = 13.93, p < .001, d = .98$; and the control condition ($M = 7.02, SD = 4.34$), $F(1, 81) = 6.90, p = .01, d = .59$. No other significant differences between conditions were found, $ps > .15$.

Thus, the results of Experiment 2 demonstrated that participants who reflected on the underlying reasons for a behavior in a multicultural environment were able to discover underlying associations that connected a series of three words better than participants primed to think about the underlying reasons for a behavior in their own culture. Importantly, the inclusion of the control condition allowed us to demonstrate that creativity is in fact facilitated in the multicultural learning condition, and the inclusion of the learning a new sport condition showed that this effect occurred over and above any facilitative effects of recalling a general learning experience.

Experiment 3: Functional Multicultural Learning and Creative Insight

Although the results from Experiment 2 provided further experimental evidence for our overall hypotheses, a few critical questions remain unanswered. First, both the word completion task and the RAT were related to verbal ability. In Experiment 3, therefore, we used a creativity measure unrelated to verbal ability. More importantly, since we held learning constant while varying the cultural context in both Experiments 1 and 2, we cannot yet definitively say that it was multicultural learning in particular, and not activating a multicultural mind-set in general, that enhanced creativity.

Thus, in Experiment 3 we held the multicultural context constant and varied learning.

To confirm that functional learning (i.e., learning about the underlying reasons for a novel behavior) is a critical aspect of multicultural learning responsible for enhancing creativity, in one condition we asked participants to recall and write about an experience in which they learned something novel about a foreign culture and were *able* to learn about the underlying reasons for it. In a second condition, we asked a different group of participants to recall and write about an experience in which they learned something novel about a foreign culture but were *not able* to learn about the underlying reasons for it. If functional learning is particularly critical for creative enhancement, creativity should be facilitated in the former compared to the latter condition.

It is also important to note that participants in Experiments 1 and 2 had all previously lived abroad. We believe that it is necessary for participants to have had the experience of living abroad mentally available for the priming manipulations to have an effect (Higgins, 1996). This is particularly true in the case of priming individuals with experiences in which they learned the underlying reasons of behaviors in different cultures, because such a learning experience is much more likely to have occurred for individuals who have lived abroad compared to those who have not. But this assumption needs to be explicitly tested. On the one hand, it is possible that when participants have not lived abroad and are asked to reflect on a functional multicultural learning experience, they will extrapolate from whatever cross-cultural experience they have had (e.g., through colleagues, family, friends, books, movies, music, research, or travel) to simulate such an experience that could affect creativity. On the other hand, it is possible that it may be necessary to have had a concrete and highly influential foreign experience (such as actually living in a foreign country) in which learning underlying functions occurred for enhanced creativity. This hypothesis is based on the distinction made earlier between mental availability and accessibility: For a process to be made accessible, it must first be available in memory (e.g., Higgins, 1996).

To test whether living abroad was necessary for recalling multicultural learning to facilitate creativity, Experiment 3 included participants who had and had not lived abroad. Overall, we predicted enhanced creativity for participants primed with the functional multicultural learning experience compared to those primed with the nonfunctional multicultural learning experience, but only for participants who had previously lived abroad.

Method

Participants and design. One hundred thirty-five full-time M.B.A. students (80 male, 55 female) at a large Midwestern university in the United States participated in the experiment

as part of an exercise before a single lecture on culture and communication. Approximately two thirds of the participants ($n = 92$, 68%) had lived abroad previously ($M = 34.48$ months, $SD = 83.63$). The design consisted of two between-subjects conditions: functional multicultural learning versus nonfunctional multicultural learning.

Materials and procedure. The experiment was conducted as a part of a classroom exercise. Several days before the lecture, all participants were e-mailed and asked to complete a web survey that contained exercises relevant to the lecture. Instructions in the e-mail contained a link to a website where the experiment was posted. Participants were randomly assigned to one of two conditions and each condition was posted on a separate website.

Priming task. Similar to Experiment 2, in the functional multicultural learning condition, participants were asked to recall and write about a multicultural experience in which they learned something novel about a different culture *and were able* to figure out the underlying reasons for it. Participants were asked to describe the novel event and explain why it eventually made sense to them. In the nonfunctional multicultural learning condition, participants were asked to recall and write about a multicultural experience in which they learned something novel about a different culture *but were not able* to figure out the underlying reasons for it. Participants were asked to describe the novel event and explain why it did not make sense to them.

Creativity task. After participants completed the priming task, they clicked to a subsequent web screen that contained our test of creativity: the Duncker candle problem. A test of insight creativity, this problem presented participants with a picture displaying several objects on a table: a candle, a pack of matches, and a box of tacks, all of which are next to a cardboard wall. The task was to figure out, using only the objects on the table, how to attach the candle to the wall so that the candle burns properly and does not drip wax on the table or the floor. The correct solution involves the use of the box of tacks as a candleholder; the box of tacks needs to be emptied and tacked to the wall with the candle inside. The solution to this problem is considered a measure of creative insight because it involves the ability to realize that objects can perform different, atypical functions: In this case, the box of tacks is not only a repository for tacks but also a candleholder, which is inconsistent with preexisting associations and expectations (Duncker, 1945; Glucksberg & Weisberg, 1966). Participants were told that this was a test of problem-solving ability, and they were asked to write the solution to the problem in a dialogue box immediately beneath the picture of the Duncker candle problem.

Results and Discussion

We first ran a chi-square analysis examining creative solutions across experimental condition. Consistent with predictions,

results revealed that a higher percentage of participants in the functional multicultural learning condition (65%) solved the Duncker candle problem correctly compared to participants in the nonfunctional multicultural learning condition (46%), $\chi^2(1, 135) = 5.44, p = .02$.

To address the question of whether it was necessary for participants to have lived abroad for the manipulation to affect the rate of creative solutions, we divided participants into a group who had lived abroad ($n = 92$) and a group who had not ($n = 43$). We then performed a logistic regression with condition, living abroad, and a Condition \times Living Abroad interaction term as independent variables, and the Duncker candle solutions as the dependent variable. This analysis revealed a significant interaction effect, $B = 1.49, SE = .77, Wald = 3.72, p = .05$. Subsequent chi-square analyses revealed that for participants who had previously lived abroad, creativity was facilitated in the functional multicultural learning condition (75%) compared to the nonfunctional multicultural learning condition (44%), $\chi^2(1, 92) = 8.94, p < .01$. For participants who had not lived abroad, however, this effect did not emerge: Participants in the functional multicultural learning condition were no more likely to solve the Duncker candle problem (46%) than those in the nonfunctional condition (50%), $\chi^2(1, 43) = 0.02, ns$ (see Figure 2). Although the sample size of participants who had not lived abroad in this experiment was considerably smaller than the group who had lived abroad, the fact that the percentage of creative solutions was almost identical across conditions for participants who had not lived abroad suggests our effects are considerably more reliable when individuals have had the experience of living abroad.

General Discussion

Across three experiments, the present research offers insight into one mechanism behind the positive effect of living in and adapting to a foreign culture on creativity (Maddux & Galinsky, 2009). The results indicate that multicultural learning constitutes a critical component of the adaptation process, acting as a catalyst to increased creativity. This effect was demonstrated using three measures of creativity (flexibility, association, insight) and involved MBA and undergraduate students in both France and the United States, demonstrating the robustness of our hypothesized relation.

In Experiment 1, participants who had previously lived abroad were primed to recall either a multicultural learning experience or a within-culture learning experience. Compared to participants in the within-culture learning condition, participants in the multicultural learning condition were better able to overcome retrieval blocking and solve problems (in this case, word fragments) in multiple ways. These results, as well as those from previous research (Leung et al., 2008; Maddux & Galinsky, 2009), suggest that multicultural experiences help individuals approach tasks from multiple

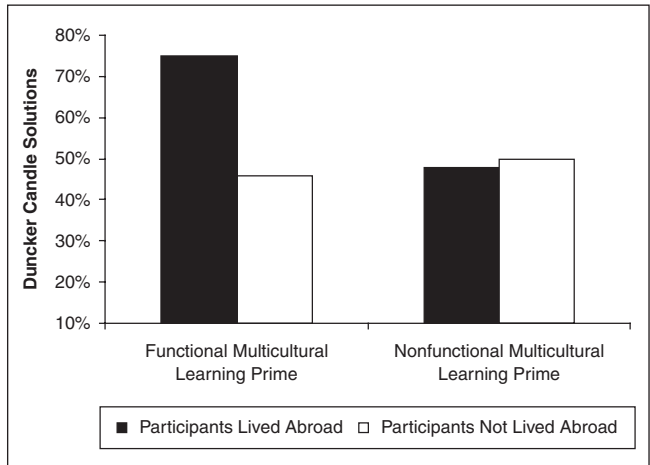


Figure 2. Percentages of correctly solved Duncker candle problems as a function of experimental condition and whether people have lived abroad: Experiment 3

perspectives and facilitate an appreciation that the same problem can have multiple solutions. Experiments 2 and 3 then examined the role of functional learning—learning about the underlying reasons or functions behind cultural differences—in stimulating creativity. In Experiment 2 we held functional learning constant and varied the multicultural context; in Experiment 3 we held culture constant and varied whether learning was functional. Across both experiments we found that only when functional learning was combined with a multicultural context did enhanced creativity result. Experiment 3 also revealed that priming functional learning in a multicultural context enhanced creativity only for participants who had previously lived abroad, suggesting that such concrete experiences need to be available in memory for them to have an effect on creativity. Although the result from a single experiment cannot definitively rule out the possibility that multicultural learning primes do not affect individuals who have not been abroad, it at least suggests that these effects are stronger and more reliable if individuals have had a concrete experience of living abroad.

The current research adds support to the idea that certain types of multicultural experiences and exposure are critical for enhancing creativity (Leung et al., 2008; Maddux & Galinsky, 2009). In particular, the current experiments verify the critical role of learning in the adaptation process and for facilitating creativity. Learning within and about a foreign culture—in particular, learning that certain behaviors one has long grown accustomed to as natural and inevitable can suddenly have very different functions in a different cultural environment—may help individuals perceive and understand why cultural differences occur. These experiences then seem to enhance cognitive complexity and flexibility, heightening the ability to approach problems from new and multiple perspectives and ultimately enhancing the creative process.

The current results make clear that temporary, situational primes can significantly alter creativity depending on whether they are related to actual multicultural learning experiences or other types of experiences related to living abroad. Indeed, this result conceptually replicates previous research showing that reactivating the experience of living or adapting abroad will produce heightened creativity compared to other, more mundane situational primes (being in one's hometown or at the supermarket), even when all participants had been abroad (see Maddux & Galinsky, 2009, Studies 3 and 5). Thus, the current results speak to the ability of the situation, temporarily at least, to alter the chronic effect of having lived abroad (Maddux & Galinsky, 2009) and suggest the possibility that sustaining the creative advantage of living abroad will be somewhat dependent on the extent to which such experiences remain salient for individuals following their repatriation.

Indeed, the repatriation experience is something that future research should seek to explicitly examine. Anecdotally at least, many expatriates indicate that the readjustment process upon returning home is often as difficult as, if not more difficult than, the process of adapting to their host country in the first place. This implies that repatriating and readapting could provide an additional or sustaining momentum for the creative process in addition to the initial experience of being abroad. Conversely, being surrounded again by a more familiar environment, customs, and norms could serve as a constraint to the creative process, particularly the more time has passed after the repatriation process. Thus, future research should investigate whether the length of time that has passed since repatriation matters and whether such time is associated with a decrease in or a permanent, trait-level boost to creative abilities.

Another direction for future research to pursue is to identify which experiences and which type of interactions with host country individuals contribute to learning while abroad. Given the results from the current research, it seems likely that any interactions that involve insight into the customs and norms of the host country, especially those that explicate the underlying reasons for different thoughts and behaviors, may be beneficial. Along these lines, it is also possible that critical elements that can help reduce prejudice in interactions between members of different racial groups, for example, elements identified by the contact hypothesis (e.g., Allport, 1954; Amir, 1969; Pettigrew, 1998; Pettigrew & Tropp, 2006) such as equal status and common goals, will also be especially beneficial in allowing a person to learn about and integrate into an unfamiliar culture, thereby enhancing functional learning and ultimately creativity. Conversely, given that power has been shown to dramatically increase reliance on one's own perspectives and decrease the influence of novel situations (Galinsky, Magee, Gruenfeld, Whitson, & Liljenquist, 2008; Galinsky, Magee, Inesi, & Gruenfeld, 2006), when the expatriate is in a powerful role or when the

home country has much higher status than the host country, the probability of functional learning may actually decrease. Similarly, it might also be that failed or negative social interactions with individuals prevent learning about a host culture, thus hindering functional learning and adaptation. If so, the success of these interactions may not only affect creativity but also influence prejudice toward host country individuals, with functional learning experiences perhaps being able to reduce prejudice as well as enhance creativity.

It also behooves future research to place the current results into the broader context of the literature on acculturation, which differentiates among four adaptation strategies: bicultural integration, which involves identifying with the host country while keeping strong ties to the home country; assimilation, which involves identification with the host country and cutting ties with the home country; separation, which involves maintaining one's home culture identity and rejecting one's host country identity; and marginalization, which involves identity separation from both home and host cultures (Berry, 1997). Findings from the current research as well as those from past work suggest that it is imperative for people to engage with two cultures simultaneously to stimulate the creative process (Leung & Chiu, 2010). Thus, integration seems to be the foreign living process most likely to enhance creativity. Indeed, more recent work has shown that individuals who highly identify themselves with both their home and host cultures are more successful at their jobs, have denser social networks, are more likely to be creative entrepreneurs, and show heightened creativity on laboratory tasks (Maddux, Galinsky, Dyer, & Gregersen, 2008; Tadmor, Galinsky, & Maddux, 2009). Thus, adaptation and learning may be important because they help individuals integrate multiple cultures into their own personal and social identities, helping them not only to develop the chronic ability to navigate two or more cultures successfully but also to enhance their creative facilities.

Finally, given the burgeoning literature on structural changes in the brain that occur during intensive learning experiences, such as career training, learning new skills, and cultural immersion (for a review, see Doidge, 2007), it would be worthwhile to explore whether neurological changes occur within areas of the brain that are responsible for the creative process during intensive foreign culture experiences. For example, researchers could do brain scans before and after individuals live abroad on international assignments or foreign exchange programs and examine whether such experiences are profound enough to lead to an enhancement or restructuring of brain areas responsible for problem solving and creativity. These and other investigations can help paint a more nuanced picture of how foreign culture experiences may not only enhance creativity but also, perhaps literally, as well as figuratively, broaden the mind.

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Notes

1. We constructed the word completion task with French words given our French participant sample. We were careful to ensure during the selection of the word fragments that each had only two possible means of completion, consistent with the Friedman and Foerster (2001) study, in which words were in German.
2. Effects in all studies remain significant even when controlling for the amount of time participants had previously lived abroad.
3. We also analyzed differences across condition for answers solved in the second column versus the first column, where second-column answers are indicative of creative responses in which participants were able to overcome retrieval blocking from the first word. Consistent with previous results (Friedman & Foerster, 2001) and consistent with our hypotheses, performance in the first column did not differ across experimental condition, $F(1, 42) = 1.90$, ns , but performance in the second column did differ across conditions, such that priming multicultural learning experiences ($M = 8.09$, $SD = 3.02$) led to more correctly solved word fragments than priming within-culture learning experiences ($M = 5.48$, $SD = 3.60$), $F(1, 42) = 6.68$, $p = .01$, $d = .91$.

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