

Creativity and Symmetry Restoration: Toward a Cognitive Account of Mindfulness

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This article proposes a cognitive account of mindfulness derived from the quantum mechanics theory of symmetry. Contributing to theory development, we show how our definition of mindfulness in terms of symmetry restoration sheds new light on the intimate connection between mindfulness and creativity, a connection well documented in both Langer's and Chinese models of mindfulness. Contributing to research, we have suggested that our cognitive approach fosters a research paradigm that (a) makes theory-driven predictions and (b) makes it possible to have direct comparison across different models of mindfulness. For demonstration, we conducted an empirical study that made direct comparison between Langer's cognitive and Chinese relational mindfulness. Implications of this study for theory and research in mindfulness are discussed.

Keywords: mindfulness, creativity, symmetry, symmetry restoration, relational cognition

In mainstream psychology, the term *mindfulness* generally conjures up the image of meditation, popularized in the clinically oriented model of Kabat-Zinn (1990). The scope of psychological understanding of mindfulness was significantly broadened by Ellen Langer (1989), who added a cognitive dimension and a laboratory approach to it. Extending Langer's cognitive and experimental approach to mindfulness, our investigation will be presented in three steps. First, we put forward a cognitive account of mindfulness derived from the quantum mechanics theory of symmetry. Second, we will demonstrate how our definition of mindfulness in terms of symmetry restoration sheds

new light on the intimate connection between mindfulness and creativity, a connection well documented in both Langer's and Chinese models of mindfulness. Third, we will present an empirical study that directly compares Langer's cognitive and Chinese relational mindfulness. Based on this preliminary study, we will argue that our cognitive approach fosters a research paradigm that (a) makes theory-driven predictions and (b) makes it possible to make direct comparison across different models of mindfulness.

Knowledge Progression

Management scholar Roger Martin (2009a, 2009b) proposed four knowledge categories—mystery (something we cannot explain), heuristic (a rule of thumb that guides us toward solution), algorithm (a predictable formula for producing an answer), and code (when the formula becomes so predictable it can be fully automated)—and claimed that there is a natural progression of knowledge categories from mystery to code. This knowledge progression plays an important role in the management of modern business.

The McDonald's Story

In 1955, at a time of the emergence of freeways and beach culture in Southern California, the McDonald brothers “stared into the face of

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a mystery: how and what do Californians want to eat?” (Martin, 2009b, p. 6). For an answer, they came up with a heuristic—the quick service restaurant. When the investor Ray Kroc bought the McDonald’s restaurant chain, he developed an algorithm—exactly how to cook a burger, exactly how to hire people, and so on. From there, it was only a short step to management by code:

Under Kroc, nothing was left to chance in the McDonald’s kitchen: every hamburger . . . weighing exactly 1.6 ounces, its thickness measured to the thousandth of an inch, and the cooking process stopped automatically after 38 seconds, when the burgers reached an internal temperature of exactly 155 degrees. (Martin, 2009b, p. 7)

Whereas contemporary business management privileges the trajectory of knowledge progression from mystery to code, Martin (2009a) advocated for the strategy of going back to mystery, a trajectory of thought that he claimed was associated with creativity. Martin (2009b) pointed out that “Advancing from mystery to code does not come without costs: by its very nature, it involves a significant narrowing of the problem space” (p. 8). That’s how at one point its competitors “drove McDonald’s into a tailspin” (p. 7). Martin explained: “While the algorithm-runner is standing still . . . other organizations [such as Taco Bell and Subway] that continue to stare into aspects of the mystery that the algorithm-runner has left out” may come up with “alternative-and potentially-superior heuristics, algorithm and code—because there will always be multiple paths out of any mystery” (p. 8).

This trajectory from mystery to code—from the plethora of possibilities to restricted, but precise implementations—is just one example of a universal process called *spontaneous symmetry breakdown*, which all things ranging from matter to cognition go through; and the reverse progression from code to mystery is an example of symmetry restoration, according to the philosopher John Bolender (2010).

Symmetry and Asymmetry

What Martin (2009a, 2009b) referred to as mystery is an example of what quantum mechanics refers to as symmetry (Bolender, 2010). The hallmark of symmetry is superposition of possibilities as best represented by Schrödinger’s cat. In the world of quantum mechanics, the

cat is both live and dead—this is a state of symmetry. In our asymmetrical world, the cat can be in either one or the other state but not both.

According to Bolender (2010), the formal definition of symmetry is invariance in transformation. More specifically, a transformation is “a rule for moving things around” (p. 10); symmetry entails no restrictions in admissible transformations. Thus the more things can be moved around in anyway (no restrictions in admissible transformations) but still look the same, the more symmetry there is. Water in a glass is an example of symmetry: “No matter which way you rotate it, and no matter to what degree, it will look the same” (p. 27). By contrast, asymmetry entails restrictions in admissible transformations. Recall the management by code in the McDonald’s kitchen in which it is not permissible for the burger to be done in whichever way. This is an example of asymmetry.

Using Schrödinger’s cat as a prototype of symmetry, unrestricted admissible transformations can be formulated by the following algorithm:

Both A and B; $A = B$

Where A stands for life and B for death, both of which are simultaneously (superposition) applicable to the cat in the world of quantum mechanics.

By contrast, the restricted admissible transformations of asymmetry can be formulated by the following algorithm:

Either A or B; $A \neq B$.

Where A stands for life and B death, which cannot be both in the asymmetrical universe we inhabit. Here the boundaries of life and death are rigid and clear such that scrambled eggs cannot come out unscrambled again, as it is the case in the world of Schrödinger’s cat.

Cognition and Symmetry Breakdown

In nature, spontaneous symmetry breakdown results in a long chain of increasing restrictions in admissible transformations. A drop of water, for instance, contains all possible patterns of a snowflake. From this plethora of possibilities (i.e., unrestricted admissible transformations), only one particular snowflake pattern emerges, when that drop of water freezes and all the other possible patterns for snowflakes are lost (severe restriction in admissible transformations).

Bolender (2010) claimed that symmetry breakdown also happens in cognition, as evidenced by the four measurement scales: nominal (A vs. not A), ordinal (the former distinction plus direction of difference, i.e., greater than and less than), interval (the former distinction plus quantifiable amount of difference), and ratio (the former distinction plus an absolute zero). Note the increasing restriction in admissible transformations with each added “plus”: In nominal scale, if 1 is assigned to males and 2 to females, switching the two numbers around makes no difference (i.e., relatively little restriction in admissible transformations); in ordinal scale, the ranking of a 2 is higher than that of a 1—the numbers cannot be switched around, but the difference between the two rankings can be big or small, leaving much latitude for variation (admissible transformations) across contexts. With increasing precision of the interval and ratio scales, there is corresponding increase in the restriction of admissible transformations—the boundary/difference between categories is not only fixed/standardized, but can also be precise to the decimal point.

The measurement scales correspond roughly to Martin’s (2009a, 2009b) four knowledge categories—mystery, heuristic, algorithm, and code. Both witness a progression from vagueness to precision in measurement, and from permeability to rigidity of boundary between categories. This is the story of spontaneous symmetry breakdown in cognition, according to Bolender (2010).

Symmetry Restoration and Creativity

A good example of the spontaneous symmetry breakdown in cognition is conventional thinking, which may be considered a form of frozen asymmetry. The rigid boundaries between conventional categories (e.g., male vs. female; us vs. them; young vs. old) may be compared with the rigidity of ice as the result of a long chain of symmetry breakdown in nature (Bolender, 2010). Conversely, symmetry restoration in cognition, akin to the messy process of ice melting into water, has the potential to undermine conventional order and structure (see Fatemi, 2014, for its implication for psychology as interpreted from the Langerian mindfulness perspective). Consider a crossword puzzle. The correct answer, based on conventional thinking,

requires severe restrictions in admissible transformations, because it consists of:

... a unique sequence of letters, so there is only one possibility and no variety at all. The variety, the number of possibilities. . . . increases a great deal when *all constraints are dropped* and nonsense words are permitted, at which stage there are two dozen possible sequences, all different. (Campbell, 1982, p. 46, emphasis added)

In this scenario, symmetry restoration would be a progression from conventional sequence of letters to nonsense words. This reminds us of Martin’s (2009a, 2009b) recipe for creativity, which consists of a reverse progression from code where rigid categories prevail to mystery where the cat can be live and dead at the same time.

Toward a Cognitive Definition of Mindfulness

The stage is now set for a formal definition of mindfulness. Mindfulness may be defined as strategies of metacognition that facilitate the process of symmetry restoration in cognition. This definition makes two universal claims:

- Mindfulness is not cognition so much as metacognition (Hart et al., 2013), which refers to strategic use of cognitive resources such as attention.
- Mindfulness has an intrinsic connection to creativity.

In the following pages, we apply this formulation to an analysis of two different models of mindfulness—nonrelational and relational.

Cognitive Mindfulness

Symmetry restoration seems to be the thread that runs throughout Ellen Langer’s (1989, 1997, 2000, 2005) training programs on cognitive mindfulness. In Langer’s framework, trait mindfulness is defined as a tendency to blur the boundaries between object categories. Conventional object categories are the result of mindless or automatic categorization, according to Langer. In her own words: “When we blindly follow routines or unwittingly carry out senseless orders, we are acting like automatons, with potentially grave consequences for ourselves and others” (Langer, 1989, p. 4; see also Langer & Imber, 1979). To mimic automatic categorization, Langer runs a module of mindlessness, which can be translated into the following terms:

Either A or B; $A = B$.

Where A and B stand for different object categories or opposite evaluations.

This algorithm has been applied to a series of exercises (Langer, 1989, 2005), all of which reinforce restriction in admissible transformations. To reinforce rigidity in thinking (A or B, but not both), participants are asked to give six explanations/evaluations for the target person's actions in a given scenario—all six explanations/evaluations should be *either* good *or* bad; *either* positive *or* negative. To reinforce rigid boundaries between object categories, participants are asked to give three common characteristics or common usages of an everyday object. Lastly, to reinforce difference or asymmetry ($A \neq B$), participants are asked to come up with three ways in which the two objects are *dissimilar* to each other.

By contrast, symmetry restoration can be written in an algorithm that counters the above agenda point by point:

Both A and B; $A = B$.

Where A and B stand for different object categories or opposite evaluations.

This is the algorithm of Langer's mindfulness training. In practical terms, to reduce restriction in admissible transformations is to undermine the rigid boundaries between object categories. This is done through training modules that reinforce the blurriness and permeability of boundaries across conventional object categories (Langer, 1997, 2000). For instance, participants are asked to give six explanations/evaluations for the target person's actions in a given scenario—three explanations/evaluations are *good/positive* and three *bad/negative*. To undermine rigid boundaries between conventional object categories, participants are asked to give three *novel* characteristics or usages of an everyday object. Lastly, to reinforce similarity ($A = B$), participants are asked to come up with three ways in which the two objects are *similar* to each other.

There is robust empirical evidence (e.g., Langer, 1989, 1997, 2005) to support Langer's claim that cognitive mindfulness fosters creativity, with far-reaching consequences for health and well-being (e.g., Langer, 2009). Outside the Langerian framework, meditation-based mindfulness is also closely associated with creativity, a connection well documented in Asian history,

and empirically supported by modern neuroscience (Horan, 2009).

Relational Mindfulness

Based on the distinction made by Paul Bloom (2007) between two distinct cognitive systems—“one for dealing with material objects, the other for social entities” (p. 149)—we may distinguish two forms of cognition: nonrelational and relational (Sundararajan, 2015). We have examined Langer's cognitive model of mindfulness, which is nonrelational. Now we turn to a relational version of mindfulness in Chinese aesthetics.

There is a widespread assumption in psychology that Asians are not as creative, or at least not as revolutionarily creative, as their Western counterparts (Sundararajan & Raina, 2015). This assumption is reflected in the observation of Crum and Lyddy (2014) that “Eastern mindfulness shines a clear light of unbiased and unattached awareness on *existing mindsets* whereas Langerian mindfulness involves a continual process of *restructuring and creating mindsets anew*” (p. 954, emphasis added). In the following section, we present (relational) mindfulness practices in Chinese aesthetics that seem to be even more radical or revolutionary in dismantling habitual mindsets than their Western counterparts.

Symmetry Restoration in Chinese Aesthetics

Relational mindfulness consists of two components—practice of meditation and its cognitive underpinnings. The importance given to meditation in Chinese aesthetics may be illustrated by a Taoist story from the *Chuang-tzu*, in which the woodcarver Khing, famous for his bell-stand, attributed his art to the elaborate preparations he went through, known as fasting of the mind (see Hsu, 1966):

After fasting for three days, I did not presume to think of any congratulation, reward, rank, or emolument. . . . After fasting five days, I did not presume to think of the condemnation or commendation (which it would produce), or of the skill or want of skill (which it might display). At the end of the seven days, I had forgotten all about myself; – my four limbs and my whole person. . . . Then I went into the forest, and looked at the natural forms of the trees. When I saw one of a perfect form, then the figure of the bell-stand rose up to my view, and I applied my hand to the work. (Legge, 1959, p. 462)

While Langer's program shares with fasting of the mind the aspiration to transcend conventional value judgments, it falls short of the latter's rigorous endeavors to transcend the ego. In Chinese aesthetics, it is only when the mind becomes selfless that creativity becomes possible. Thus to the selfless mind of the woodcarver, a perfect form emerges. Note here the artist does not "create" so much as "discover" a perfect form in nature. It is on this relation of parity between humans and nature that creativity is predicated, according to Chinese aesthetics. A further development of the symmetrical relationship between the artist and nature is found in the following statements of the landscape painter Tsung Ping (373–443): "Spirits are in essence eternal and they dwell (temporarily) in forms and respond sympathetically [*gan*] to the [similar] kinds (*lei*) [in the painter]" (cited in Munakata, 1983, p. 123). The perfect form in nature that reveals itself to the selfless mind of the artist has now become the site of a mind or spirit that can respond to and be in communion with its equal—the selfless mind of the painter. But what are *gan* and *lei*?

"Europeans emphasized man's enjoyment of nature, sometimes not above the picnic or excursion level; the Chinese revealed the possibility of a more profound relation between man and nature," wrote George Rowley (1974, p. 21), an expert on Chinese painting. This profound relationship between humans and nature is governed by the notion of *gan-lei*, which means "responding according to categorical correlations" (Goldberg, 1998, p. 35). In this compound, *gan* (responding) is contingent on *lei*, which refers to the principle of ontological parity that lies at the core of sympathetic magic (like attracts like), otherwise known as animism (Sundararajan, 2009). In sharp contrast to the Kantian dictum that "We are subjects thinking about objects" (Freeman, 2000, p. 117), the principle of *lei* (parity) renders possible a symmetrical mind-to-mind, rather than the asymmetrical mind-to-object, transaction (Sundararajan, 2015) with all kinds of objects. Thus, the Tang poet Li Po (701–762) wrote:

Never tired of looking at each other —

Only the Ching-t'ing Mountain and me. (Liu & Lo, 1975, p. 110)

With his mutual gazing with the mountain, the poet has blurred a fundamental distinction between two object categories—animate and inanimate—a distinction that even infants make (Mandler, 2004). As Meltzoff and Moore (1999) pointed out, for an infant to learn about inanimate objects, she must manipulate or mouth them, but to learn about people she must imitate them.

Animism attests to the human will to experience mind whether it is there or not (Noë, 2009, p. 28). According to Bloom (2007), the human tendency to attribute agency and intention based on minimal cues is attributable to a "hypertrophy of social cognition" (p. 149). The mind's capacity to see its double wherever it looks is, therefore, a particular penchant of relational cognition, although it may not be favorably perceived from the perspective of nonrelational cognition. This explains why animism and related phenomena are referred to by most psychologists as a form of anthropomorphism, which denotes a lapse in logical thinking. However, Waytz et al. (2010) were quick to point out that anthropomorphism has an ethical dimension. According to them, anthropomorphism entails blurring the distinction in only one particular direction—treating everything as another mind—so to avoid blurring the distinction in another, less favorable, direction, namely, treating everything as object.

Beyond the ethical dimension, animism-based thinking also reaps other benefits when the mind switches its gear from asymmetrical to symmetrical transactions with the world. This point can be illustrated by mapping our daily transaction with the world onto a hypothetical Anthropomorphism Scale anchored between 0 and 10, with 0 indicating inanimate object, corresponding to the asymmetrical I–it mode of transaction, and 10 indicating someone like me, corresponding to the I–thou mode of transaction. My transaction with a friend could span the spectrum from 9–5. Some people's transaction with their pet rock could score 8 on the Anthropomorphism Scale, while their transaction with their neighbors might be a 3. On the battlefield, soldiers could be trained to operate near 0 in their approach to the enemies. What happens when self to self transaction hovers around 0 on the Anthropomorphism Scale? The self would be relating to itself as an object, with possibly dire consequences. Muehlenkamp,

Bagge, Tull, and Gratz (2013) found self-objectification to be a contributing factor to both eating disorders and nonsuicidal self-injury. The researchers also suggested an antidote—mindfulness that enhances attunement, or, in our framework, a more symmetrical relationship, with one's own body. This thought experiment suggests that symmetry restoration in the context of relational cognition—defined as a shift from the asymmetrical mind-to-object to the symmetrical mind-to-mind transactions—may have far-reaching ramifications for health and well-being (see Sundararajan, 2015).

In sum, we have reviewed two different paths to symmetry restoration. The cognitive mindfulness paradigm of Langer restores symmetry by blurring the conventional boundaries between object categories. Relational mindfulness in Chinese aesthetics restores symmetry by blurring the ontological and epistemological dichotomies of the common-sense world so to engage in symmetrical mind-to-mind transactions with nature. To directly compare these two models of mindfulness, we conducted an empirical study.

An Empirical Study of Relational and Cognitive Mindfulness

To recapitulate, in the foregoing analysis, we proposed that our cognitive account of mindfulness has the following advantages: (a) its formulation of mindfulness as symmetry restoration sheds new light on the connection between mindfulness and creativity; and (b) it makes it possible to compare subtypes of mindfulness across different practices. To demonstrate the latter (b), we conducted two studies—Study 1 by Rahim Behrad ($n = 33$), and Study 2 by Farideh Hamidi ($n = 72$)—in Iran, because data on one of the measures (Solitude Scale; see the Measures subsection) were already collected from United States and China in a different

study (Wang, 2006). The Iranian participants were university students and staff from two different cities, Isfahan and Tehran, respectively. Table 1 shows the sample size and demographics of the two studies in Iran.

We hypothesized that the two models of mindfulness, relational and cognitive, could be induced experimentally and then compared for effects on creativity and well-being. We were particularly interested in inducing relational mindfulness experimentally to test the hypotheses that (a) the capacity of the human mind to see its double beyond the social arena can be primed; (b) symmetrical transaction with a virtual mind can reap the benefits associated with conventional cognitive mindfulness, such as creativity; and (c) relational mindfulness has unique mental health benefits of its own, such as emotional creativity, and a sense of well-being associated with affiliative fantasies.

Method

All the testing materials were translated into Persian (Farsi) under the supervision of the second author, who is a native of Iran.

Participants in both studies were randomly divided into two groups: Group A (relational mindfulness) and Group B (cognitive mindfulness). Both Groups A and B were given the same cover story, which stated that this was a test on human imagination. The study was conducted according to testing protocol as follows.

Slide Show

The same nature slides were shown concurrently for 30–45 min to Groups A and B in separate rooms. Before showing the slides, handouts with two separate instructions were distributed and read to participants. The instructions were mindset inductions, which intended

Table 1
Demographic Features of Two Studies in Iran

Mindfulness studies in Iran	Total	Group A	Group B	M_{age} , years	Age, years			
					Max	Min	Men	Women
Study 1	33	17	16	24.82	35	19	15	18
Study 2	72	35	37	20.39	29	18	57	15

Note. Max = maximum; Min = minimum.

to simulate experimentally the two paths to symmetry restoration. Group A was given a simulation of the relational path to symmetry restoration, which capitalized on the symmetrical mind-to-mind transaction with nature. By contrast, Group B followed the Langer paradigm of undermining the rigid object categories of conventional thinking by seeing the world in a new light.

Mindset Induction of Group A

Participants in Group A were given the following instructions:

The English poet Wordsworth wrote: “For there is a spirit in the woods.” Similarly, the Chinese poet Li Po wrote about his mutual gazing with a mountain:

Never tired of looking at each other —

Only the Ching-t’ing Mountain and me.

Now try to enter into the frame of mind of these poets, when you view these slides: Your task is to **feel** as much as possible **the presence** of the spirit, or mind—however you call it—of the mountains.

Mindset Induction of Group B

Participants in Group B were given the following instructions:

Take up the role of a real estate entrepreneur, when you view these slides: Your task is to **generate ideas** as to how to make **good investment** on this piece of property—how to develop this area into a first class tourist resort, for instance.

Posttest, Part I. The manipulation check consisted of writing for 15 min to answer the essay questions. The essay writing was intended to deepen the priming effect.

- A sample essay question for Group A: “Did your experience give you some insight into Li Po’s mutual gazing with his favorite mountain?”
- A sample essay question for Group B: “Did your experience give you some insight into what it takes to make a successful real-estate investment? Write down your insight.”

Posttest, Part II. The following tests were given to both groups: the Langer Mindfulness Scale (LMS; Langer, 2004), the Emotional Creativity Inventory (ECI; Averill, 1999), and the Solitude Scale (Long et al., 2003; Wang, 2006).

Stimuli

A total of 59 slides of mountain scenes were selected (see <http://www.mountainsongs.net/index.php>). Use of Chinese nature scenes on Iranian participants was intended to increase the novelty of the stimuli.

To shed some light on relational mindfulness, we used slides of mountain scenes as stimuli to test the hypothesis that the capacity of the human mind to see its double beyond the social arena can be primed. The Chinese notion of *gan-lei* (responding in kind) is consistent with what is known in psychology as empathic responding, which is best exemplified by the meeting of the minds in aesthetics between the author and the reader. According to Crozier and Greenhalgh (1992), more than aesthetics, natural environments seem especially suitable for empathic responding. The authors argued that, whereas our reactions to art are typically constrained or guided by the intentions of the artist, we are freer to choose the object of our appreciation in nature. Extending this insight of Crozier and Greenhalgh (1992), which the Chinese artists have found to be true throughout history, we hypothesized that nature scenes could serve as affordances for the empathic (i.e., symmetrical) mind-to-mind transactions (see Mindset Induction of Group A subsection above). Furthermore, we hypothesized that transaction with nature could also be asymmetrical if the asymmetrical (subject vs. object) mind-to-world transaction was induced through a thought experiment in real-estate investment (see Mindset Induction of Group B subsection above).

Measures

Langer Mindfulness Scale. This LMS includes four subscales: Novelty Seeking, Engagement, Novelty Producing, and Flexibility (Langer, 2004). The scale focuses on elements of creativity and awareness of the external environment.

Emotional Creativity Inventory. The ECI assesses the ability of people to be emotionally adaptive and innovative when in potentially challenging situations (Averill, 1999). Examples of the ECI items are: “I try to be honest about my emotional reactions, even when it causes me problems” and “I have emotional

experiences that would be considered unusual or out of the ordinary.”

Solitude Scale. Wang (2006) expanded the list of solitude experiences in Long et al. (2003) from 9–20 items. The 20-item Solitude Scale has been normed on both United States and Chinese samples (Wang, 2006). Using the 20 types of solitude experiences to assess the impact of mindfulness inductions, our instruction to both Groups A and B read as follows:

If one day you should find yourself alone in a place similar to the mountain you just viewed, how would you experience your solitude there? Please rate the likelihood of your having the types of solitude experience listed below.

Throughout history and across cultures, solitude has an intimate connection with creativity (Averill & Sundararajan, 2014). Furthermore, the capacity for relationship is essential to authentic solitude, which is defined as the ability to preserve a sense of community while alone (Averill & Sundararajan, 2014). This is consistent with the observation of Winnicott (1958) that only those who as infants were free to explore and independently occupy themselves in the security of their mothers’ presence will as adults have the capacity to be alone. The use of mountain slides as stimuli was appropriate here. A study by Wang (2006) found that, for both Chinese and American participants, the ideal setting for solitude was the natural environment, for example, beaches, mountains, woods, or lakes.

Predictions

We make the following predictions about Groups A and B:

1. On Langer’s measure of creativity and mindfulness (LMS), Groups A and B would not differ significantly.
2. On the measure of emotional creativity (ECI), Group A would score significantly higher than Group B.
3. On the measure of solitude experiences, Group A would score significantly higher than Group B on the relational components of solitude.

Results

Data were analyzed using Excel and SPSS.

Manipulation Check

In both studies, Groups A and B produced different sets of answers, suggesting that the induction of mindsets, relational and cognitive mindfulness, was successful.

- Group A (reeling the presence of the mountains). A sample of experiences from those who indicated that they experienced “to the fullest” the presence of the mountains:

Study 1 ($N = 16$): “It was like reading a novel or watching a dramatic movie. When I was watching the slides, I felt I’m flying and I’m not on the earth. I had a peak experience. I was so relax and calm and I imagined that all of the mountains, nature and me are the same. I talked with the mountains and branches of trees.”

Study 2 ($N = 33$): “It was like I visited my family that is alive and they can understand me and my characteristics.”

- Group B (role-playing the real-estate entrepreneur). A sample of experiences from those who indicated that they role-played “to the fullest” a real-estate entrepreneur:

Study 1 ($N = 15$): “It was like being a designer!”

Study 2 ($N = 35$): Terms used frequently: “park, recreational place and tourism, discovery of minerals and potentially elements, photography, and traveling.”

Involvement with the task—as measured by the question “rate the extent to which you felt the presence (or succeeded in role playing) . . .”—did not differ between the two studies.

Langer Mindfulness Scale. As predicted, results from both studies did not differ significantly between Groups A and B.

Emotional creativity as measured by ECI. Contrary to our prediction, results from both studies did not differ significantly between Groups A and B. It is possible that emotional creativity was not necessarily a function of relational cognition as we hypothesized.

Solitude experiences. In Study 1 ($N = 33$), Groups A and B results did not differ significantly. In Study 2 ($N = 72$), Group A scored significantly higher than Group B on two components of solitude experience: Freedom and Intimacy (see Table 2).

Discussion

The results suggested that relational mindfulness (Group A) can be induced in the laboratory to

Table 2
Group Comparison on Components of Solitude Scale, Study 2

Components	Groups	<i>N</i>	<i>M</i>	<i>SD</i>	<i>SE</i>
Enlightenment	A	35	22.971	4.155	0.702
	B	34	21.647	4.664	0.799
Freedom ^a	A	35	15.543	2.368	0.400
	B	34	13.500	2.852	0.489
Intimacy ^b	A	35	8.229	1.647	0.278
	B	36	7.250	1.795	0.299
Relaxation	A	35	6.286	1.949	0.329
	B	36	6.500	1.875	0.312
Loneliness	A	35	5.514	2.490	0.421
	B	36	5.028	2.524	0.421

^a $t = 3.24$, significant at $p < .01$. ^b $t = 2.39$, significant at $p < .05$.

produce outcomes comparable to cognitive mindfulness (Group B). Furthermore, relational mindfulness, relative to cognitive mindfulness, seemed to be associated with unique psychological attributes of its own, as evidenced by the relatively higher scores of Group A on the Freedom and Intimacy components of the Solitude Scale. This point can be elaborated by analysis of the 20 items of the Solitude Scale (Wang, 2006).

Theoretically, the cognitive structure of the solitude experience consists of components that can be organized along the divide between self-focus and other-focus, each with positive and negative subtypes:

- Self-focus (How solitude has positive or negative impact on the self):

Positive: Enlightenment (creativity, self-discovery, self-enrichment);

Negative: Loneliness (unwanted separation).

- Other-focus (How solitude enhances positive and reduces negative social impact):

Enhancing positive connection with others: Communion (intimacy, community, spirituality);

Reducing negative impact from others: Freedom (associated benefits of freedom from interference of others).

Empirically, factor analysis in previous studies (Long et al., 2003; Wang, 2006) yielded several factors of the solitude experience, which were labeled Enlightenment (Factor 1), Loneliness (Factor 2), Freedom (Factor 3), Relaxation (Factor 4), and Intimacy (Factor 5).

In the present study, across both samples, Groups A and B did not differ in nonsocial (self-focus) dimensions. But in the social (oth-

er-focus) dimension, Study 2 ($N = 72$), but not Study 1 ($N = 33$), showed that Group A scored relatively higher than Group B on Freedom and Intimacy. What do the solitude profiles on Freedom and Intimacy entail?

On the Intimacy factor, the following items had high loading: Reminiscence and Intimacy.

- **Reminiscence.** While alone, you think about times past, for example, you recall events you have experienced or people you have known.
- **Intimacy.** Although alone, you feel especially close to someone you care about, for example, an absent friend or lover, or perhaps a deceased relative (such as a beloved grandparent); thinking about the absent person only strengthens your feeling of closeness.

On the Freedom factor, the following items had high loading: Freedom, Daydreaming, Inner Peace, and Harmony.

- **Freedom.** While alone, you feel free to do as you wish, without concern for social rules or what others might think; you feel no need to please or impress anyone, but can be completely yourself.
- **Daydreaming.** While alone, you engage in fantasies; you enter an imaginary world where you could be anyone, and do anything your heart desires.
- **Inner peace.** While alone, you feel calm and relaxed, free from the pressures of everyday life.
- **Harmony.** While alone, you feel a sense of unity with your surroundings, as though you are a part of your environment; everything seems interconnected with everything else; for the time, at least, you are in balance with the world.

Taken together, the components of Freedom and Intimacy seem to lie at the core of what Averill and Sundararajan (2004) referred to as authentic solitude, which is characterized by the ability to forsake existing society (a tendency tapped into by the Freedom factor) for an ideal (virtual) community (a tendency tapped into by the Intimacy factor). This type of creativity that comes with the benefits of mental well-being (as indicated by items of Inner Peace and Harmony) seems to be intimately connected with relational cognition. It is not surprising, then, that the Group A (relational mindfulness) scored significantly higher than Group B (cognitive mind-

fulness) in Study 2 ($N = 72$). In Study 1 ($N = 33$), the difference between Groups A and B on Freedom and Intimacy was also in the same direction but not significant, probably due to small sample size.

Limitations and Future Research Directions

This preliminary study has many limitations, including small sample size and the lack of a control group. Replications of this study, with improved measure and design, are currently being conducted in Cambodia and Italy. Less amenable than research design is the research paradigm. This study has all the limitations of a cross-cultural study. First, it is not about culture. Cross-cultural studies are about universal claims, empirical testing of which tells us nothing specific about cultures. By the same token, this study is not about comparing mindfulness East versus West; nor is it a study of Eastern mindfulness or Chinese aesthetics, for that matter. Rather, our goal was to offer a theoretical framework that can be used for the analysis of all these forms of mindfulness.

While following the decontextualized paradigm of cross-cultural psychology, we do not necessarily share the latter's reductionist assumptions. More specifically, we do not claim that the cognitive dimension, important as it is, constitutes the essence of mindfulness practice. Quite to the contrary, we believe that although hypothesis testing can focus on only one dimension of mindfulness, understanding the practice as a cultural/historical phenomenon requires attention to all its dimensions. We are also keenly aware of the disparity between theory construction and hypothesis testing—only a fraction of the former can be tested at any given time. Our theoretical formulation of mindfulness in terms of symmetry restoration has multiple implications, of which only one—the possibility of differentiating relational from cognitive mindfulness—is empirically tested. Many other implications of our formulation—such as the link between symmetry restoration and creativity, differential consequences of parity or the lack thereof in the mind's transaction with the world, and so on—await future research to be tested.

Against the backdrop of these limitations, we make the modest claim that a potential contribution of this preliminary study lies in demonstrating the possibility of investigating mindful-

ness across different models that, so far, defy direct comparison. For instance, Hart et al. (2013) attempted to bridge the gap between two leading models of mindfulness—Langer's and Kabat-Zinn's. Hart et al. (2013) concluded that Langer's model captures the cognitive attributes of creativity, whereas Kabat-Zinn's model seems to “accentuate the metacognitive processes and the accommodating stance” (p. 461). Our study suggests that it is possible to go beyond the methodological divide—pen-and-pencil versus meditation mat; laboratory versus clinic, and so on. All mindfulness practices, including those focusing on meditation, have a cognitive component. Our study suggests the possibility that so long as the cognitive underpinnings of the practice can be identified and spelled out, it would be possible (a) to make theory-driven predictions and (b) to make direct comparisons between different models of mindfulness across the practice/method divide.

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