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Embodied Cultural Cognition: Situating the Study of Embodied Cognition in Socio-Cultural Contexts

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Abstract

Embodiment research has demonstrated that cognition is grounded in bodily interactions with the environment and that abstract concepts are tied to the body's sensory and motor systems. Building upon this embodiment perspective and advancing our understanding, we discuss the extension of embodied cultural cognition. We propose that some associations between bodily experiences and abstract concepts are not randomly formed; rather, the development of such associations is situated in a socio-cultural context, informed by cultural imperatives, values, and habits. We draw evidence supporting this view of embodied cultural cognition in body–mind linkages manifested in construal of emotions, time perception, person perception, social power, and moral reasoning. To further extend this research avenue that synthesizes the studies of embodied cognition and culture, we also suggest potential future research directions inspired by this view. This embodied cultural cognition account is useful in understanding and organizing accumulating discoveries of cultural variations in embodiments; it also highlights the social situatedness of embodied cognition and is, therefore, highly compatible with theorizing and research in social and cultural psychology.

Thomas Hardy, a renowned English writer, once asked, ''Why should a man's mind have been thrown into such close, sad, sensational, inexplicable relations with such a precarious object as his body?'' Setting aside its overly pessimistic implication, Hardy's expression hints that our mind is *grounded* in our body. All human beings are granted a body, through which we operate on our environment. In so doing, the way our body acts upon the world will over time instantiate and carry important psychological meanings, suggesting that body–environment interactions can substantively shape our everyday sense-making. Indeed, some commonly used metaphors often closely tie abstract sense-making to concrete bodily experiences (Lakoff & Johnson, 1999). For example, we describe an affectionate and kind person as having a *warm* personality, and a transgressor as having *dirty* hands.

The emerging embodied cognition research investigates the grounding of mental processes in body–environment interactions. This view offers a complementary account to traditional amodal models of cognition (Gallese, Keysers, & Rizzolatti, 2004; Lakoff & Johnson, 1999), which focus on *disembodied* mind and explain cognitive processes in terms of abstract mental representations (e.g., schema) independent from bodily activities. The modal models of cognition, in contrast, focus on *embodied* mind and ground cognitive processes in sensory and motor systems. Specifically, the embodied cognition perspective views abstract representations as closely tied to the body's sensorimotor experiences (Barsalou, 2008; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005). Esther Thelen, Schoner, Scheier, and Smith (2001) succinctly verbalized the essence of embodied cognition:

> To say that cognition is embodied means that it arises from bodily interactions with the world. From this point of view, cognition depends on the kinds of experiences that come from having a body with particular perceptual and motor capacities that are inseparably linked and that together form the matrix within which memory, emotion, language, and all other aspects of life are meshed. (p. 1)

In delineating the meaning of embodiment, Lakoff and Johnson (1999) posit that an embodied state comprises two structures: a physical structure pertaining to possessing a corporeal body, and an experiential structure pertaining to the kinds of experience people have by possessing the body (e.g., gesturing, walking, and smiling). Embodied cognition builds upon the notion that the corresponding mental representations are derived from one's bodily experiences which is rendered possible by having a physical body equipped with sensorimotor capabilities. For example, our body's sensorimotor modalities (physical structure) make it possible to experience high and low verticality (experiential structure), which is then associated with the corresponding mental representations of high and low power status (see Schubert, 2005). Making sense of the mechanisms of embodied cognition, that is, the question of how abstract concepts (e.g., power) become represented in one's bodily states (e.g., high or low vertical position), is an ongoing research endeavor. We begin this article with an overview of two possible mechanisms underlying embodied cognition – embodied simulation and conceptual metaphor – with illustrations from recent research that distinguish the two perspectives.

Next, we discuss the possibility of extending the embodied cognition perspective to studying embodied cultural cognition. We contend that it is important to situate the study of embodied cognition in a socio-cultural context (see Schubert & Semin, 2009). The notion of situated embodiment highlights the idea that the intimate link between body and its associated mental representations is not random, but can be informed by cultural norms, values, and habits in a given context (Gibson, 1979; Varela, Thompson, & Rosch, 1991). In this light, we illustrate the potential of studying embodied cultural cognition by reviewing empirical evidence of the role of culture in eliciting differing embodiment effects in different cultural and linguistic groups. We relate our discussion of embodied cultural cognition to the underlying mechanisms of embodied simulation and conceptual metaphor. Also notably, implied in the embodied cognition perspective is the possibility that both actual physical bodily states (hard embodiment) and the psychological representation of these bodily states (soft embodiment) ground the processing of cognitive and social stimuli. We discuss the distinction between soft and hard embodiments and demonstrate with empirical examples why this distinction is relevant to the study of embodied cultural cognition. Finally, we offer some possible future directions in the research avenue of employing the embodied cognition approach to studying culture and discuss its related limitations.

Understanding Embodied Cognition through Embodied Simulations and Conceptual Metaphors

In a recent review, Landau, Meier, and Keefer (2010) advocated for the important distinction between embodied simulation and conceptual metaphor. Although these two frameworks are both based on the notion that bodily states or recurring body–environment interactions are closely tied to sense-making of abstract concepts, the kinds of bodily states they build on are essentially different.

Embodied simulations

Theories of embodied cognition center on the idea of embodied simulation, which involves modality-specific representations of bodily states such as sensations and motor activities about a given concept that are acquired through direct experiences with that concept (Barsalou, 2008; Landau et al., 2010). Two examples illustrate embodied simulation. First, concepts about emotions contain modality-specific sensory representations that accompany the expression of these emotions (Susskind et al., 2008). Specifically, it was shown that the facial expression of fear augments sensory exposure, thereby allowing the person to acquire more sensory inputs to enhance vigilance and attention toward potential threats. This sensory vigilance is simulated in individuals' larger visual field, more rapid eye movements, and an increased nasal inspiration. The facial expression of disgust, in contrast, was found to diminish sensory exposure, thereby allowing the person to turn down sensory inputs to reject further encoding of aversive stimuli. This sensory rejection simulates an opposite pattern of physiological manifestations as those in reaction to fear expression. Interestingly, a similar sensory regulatory effect was observed among those who merely perceived (but did not express) these facial expressions (Vermeulen, Godefroid, & Mermillod, 2009). For perceivers, registering the concepts about emotions is sufficient to give rise to sensory reactions that customarily occur during their prior experiences of these emotions.

Second, in another recent study, Foroni and Semin (2009) found a reciprocal relationship between cognitive processing of emotion stimuli and its specific recurring bodily reactions. Their first study showed that upon reading smile-related action verbs (e.g., 'to laugh'), participants had their smiling muscle (the zygomatic major muscle), but not their frowning muscle (the corrugators supercilii muscle), activated. In a follow-up study, participants watched a series of cartoons after they were subliminally primed with emotion verbs and adjectives. While judging how funny they thought the cartoons were, some of them had to hold a pen with their lips (so they could not smile) and others were free to move their mouth (so they could smile). Participants rated the cartoons as funnier if they were subliminally primed with smiling (versus frowning) verbs *only* if they were free to smile; this effect was not observed among those who were blocked from smiling. Together, smile-related concepts activate the corresponding facial muscle, and more interestingly, blocking the bodily experience of smile by controlling the facial muscle also blocks the registration of smile-related concepts. This demonstrates an intricate feedback loop between expressing a concept and its recurring simulations of body modalities.

Conceptual metaphors

The conceptual metaphor framework is a broader perspective that examines the use of conceptual metaphors as a viable cognitive tool to help people understand abstract concepts (target) with more concrete, albeit superficially dissimilar, concepts (source; Gibbs, 1994; Lakoff & Johnson, 1999; Landau et al., 2010). Conceptual metaphors are created through entailing or mentally associating elements of the target concepts with the corresponding elements of the source concepts (Landau et al., 2010).

Many, if not all, conceptual metaphors are intimately tied with specific bodily states or bodily interactions with the world (Lakoff & Johnson, 1999). For example, moral impurity is often conceptually mapped onto physical contamination, as shown in common metaphorical expressions that describe malevolent persons as having 'dirty hands' or 'dirty mouth'. In a recent study, Lee and Schwarz (2010) put these metaphors to the test (also

see Zhong & Liljenquist, 2006). They asked participants to either imagine giving their coworker false information or true information by either leaving a voice mail or writing an email. Next, in an ostensibly unrelated marketing study, these participants rated the desirability of several products among which included mouthwash and hand sanitizer. As predicted, 'dirty mouth' participants, who lied via a voice mail, evaluated mouthwash as more desirable than did 'dirty hands' participants, who lied via an email. In contrast, 'dirty hands' participants evaluated hand sanitizer more positively than did 'dirty mouth' participants. Notably, participants who lied did not have physically dirty hands or mouth. The embodiment effects, therefore, did not seem to have derived from modal simulations of their specific bodily states (i.e., embodied simulations), but largely a result of conceptual mapping between unethical transgression (target concept) and physical contamination (source concept).

A few studies also explored if the relatively abstract notions of person perceptions and interpersonal relationships are conceptualized metaphorically in terms of more concrete tactile sensation of warmth. For instance, research showed that holding a warm (versus cold) beverage made participants more likely to perceive a person as having a 'warmer' personality (Williams & Bargh, 2008), to judge themselves as having a closer relationship with their significant others, and to perceive the world in terms of relationships (IJzerman & Semin, 2009). In a related vein, recalling of or encountering an experimentally induced episode of social exclusion led participants to estimate a lower room temperature and to desire for warm food and drinks than those who felt socially included (Zhong & Leonardelli, 2008; see also IJzerman & Semin, 2010). These findings are intriguing because they suggest that, on the one hand, physical warmth enhances the grounded capacities to perceive socially desirable personality traits and to recognize social relationships; on the other hand, the experience of social rejection regulates our sensory thermometer to desire for physical warmth.

Distinguishing embodied simulations from conceptual metaphors

To summarize, both embodied simulations and conceptual metaphors build upon the notion that abstract mental representations are closely tied to bodily states and bodily interactions with the environment. However, referring to the above reviewed examples, it is apparent that embodied simulations involve modality-specific bodily representations that tend to be exclusively tied with prior experiences with a given concept, whereas conceptual metaphors involve conceptually mapping relatively abstract target concepts onto concrete bodily related source concepts. Essentially, these source concepts (e.g., hands are dirty) can exist in their own right without evoking the target concepts (e.g., telling lies via email). Accordingly, Landau et al. (2010) distinguished embodied simulation as an *intra*conceptual mechanism and conceptual metaphor an *inter*conceptual mechanism. Broadly speaking, the two frameworks recognize the role of bodily experiences in understanding complex concepts, but whether the bodily states and their associated mental representations are linked intraconceptually or interconceptually introduces a substantial distinction between the two.

An Extension: Embodied Cultural Cognition

An interesting question then follows: How is the mapping between bodily states and mental representations developed? In our view, for some body–mind linkages, the mapping is derived from the meanings informed by the socio-cultural contexts, thus giving

rise to the possibility of *embodied cultural cognition*. The study of embodied cultural cognition represents a conceptual leap from embodied cognition by recognizing the cultural affordances that underlie the emergence of certain embodied phenomena (Cohen & Leung, 2009; Cohen, Leung, & IJzerman, 2009). It is possible that the embodiment of some socio-cognitive phenomena in the form of bodily simulations and conceptual metaphors is more prevalent in some cultures than others; it is also possible that the same socio-cognitive phenomena are embodied in culturally specific bodily simulations and conceptual metaphors. This perspective of embodied cultural cognition that acknowledges and theorizes cultural variations in embodiment resonates with the proposition of situated embodiment. In a recent special issue on embodied cognition, Schubert and Semin (2009) posit that, by recognizing the situatedness of social cognition in the socio-cultural contexts, the embodied cognition view can benefit psychological theories and research, particularly in social psychology, through promising a unifying perspective. The theorizing that embodied cognition is situated in a linguistic or cultural environment is made clear in Lakoff and Johnson's (1999) argument:

> The mind is not merely embodied, but embodied in such a way that our conceptual systems draw largely upon the commonalities of our bodies and of the environments we live in. The result is that much of a person's conceptual system is either universal or widespread across languages and cultures. (p. 6)

At first glance, Lakoff and Johnson (1999) construed embodiment as largely universal and culturally and linguistically consistent. Their argument, however, does not go against the view that the way our embodied mind is manifested might vary across languages and cultures. While humans share a common physiological makeup, the environments in which we carry our bodies to conduct everyday transactions could be very different. As Rohrer (2007) put it:

> The body of embodied cognitive science is not limited to physiological and neurophysiological influences on mind, nor to that plus the physical body's interactions with the physical world, but also incorporates the experiences of the social and cultural body as well. In other words, it has to take account of the socio-cultural context within which a particular body is situated. (p. 345)

Therefore, embodied cognition attests not merely to the link between our body and mind, but also to the bodily experiences in a culture substantiated by meaningful imperatives, expectations, and norms (Gibson, 1979; Varela et al., 1991). In other words, the body–mind linkage is informed or motivated by one's cultural experiences in such a way that ''social constructions are given bodily basis and bodily motivation is given social-cultural substance'' (Kövecses, 2000, 14).

In a commentary in response to Landau et al.'s (2010) metaphor-enriched approach, IJzerman and Koole (2011) argued that Landau et al. may have placed too much emphasis on conceptual metaphors as operating like top-down knowledge structures. They posit that conceptual metaphors are in a way constrained from the bottom-up if we take into consideration socio-cultural affordances. In this light, IJzerman and Koole (2011) introduced the notion of cultural scaffolding to account for cultural variations in conceptual metaphors. Scaffolding is a process through which humans learn about abstract concepts by mapping them onto concrete, extant knowledge structures likely to have a physical basis (e.g., temperature, size) that were acquired early in life (Williams, Huang, & Bargh, 2009). These concrete, contextualized concepts are then over time *scaffolded* onto more abstract concepts (e.g., interpersonal relation, power perception). Cultural scaffolding,

therefore, represents the kind of scaffolding that maps relatively abstract culture-related knowledge onto concrete bodily related experiences.

Interestingly, this mapping between cultural knowledge and bodily states might not be one-to-one, as Cohen and Leung (2009) noted:

> Culture's role is not simply one of encouraging certain body comportments that predispose us to think and feel certain ways. Cultural schemas, rules, and scripts also guide the way a bodily comportment leads to a particular mindset, among a number of different possible mindsets. (p. 1281)

Therefore, the link between bodily states and what cognitive structures they embody is underspecified. We will return to this point in the last section of this article.

In their article, IJzerman and Koole (2011) suggested two major sources for embodied cultural cognition to emerge. First, cultural variations in embodiments emerge from the differences in cultural norms and in the kind of social interactions habitually encountered in a given culture. As such, these norms and experiences affect the basis on which bodily states and mental structures are linked. Second, cultural variations in embodiments also arise from relatively arbitrary set of cultural conventions, giving rise to the so-called *totem embodiments* (Cohen & Leung, 2009). Totem embodiment builds upon a symbolic representation of bodily states, with the symbolic meanings acquired through socializing forces and perpetually reinforced within a cultural group. For example, the bodily expression of extending the middle finger has no inherent meaning, but has been acquired the learned association with hostility (Chandler & Schwarz, 2009) – a display of totem embodiment. We illustrate embodied cultural cognition with empirical evidence in the next section.

Research illustrations of embodied cultural cognition

We seek to review a growing body of research showcasing cultural variations in embodiment. Although this review is meant not to be exhaustive, it offers a lens into the exciting avenues of studying embodied cultural cognition.

Construal of emotion. It might be accurate to say that the identification of basic emotions is perhaps one of the least debated evidence when it comes to attest to the universality of human psychology. Ekman, Friesen, and Ellsworth (1972) made the claim that, "*every* investigator had obtained evidence for six emotions (happiness, surprise, fear, sadness, anger, and disgust combined with contempt)" after reviewing 30 years of emotion research (Ekman, 1992, 550). And 15 years later, this evidence of universality was further reaffirmed by Fridlund, Ekman, and Oster (1987). Research on emotions being embodied occupies a center stage in the emerging vernacular of the embodied cognition perspective since the phenomenal study by Strack, Martin, and Stepper (1988) who found that participants rated some cartoons as funnier if they were holding a pen in their teeth (thus producing a partial smile) as opposed to if they were holding a pen in their lips (thus producing a partial frown). Although at that time the embodied cognition notion had yet to be emerged in psychologists' common discourse, this study has often been interpreted by later researchers as one of the classics illustrating the embodiment of emotions.

In relation to the basic emotion of anger as an embodied emotion, Lakoff and Kövecses (1987) put it this way,

> if we look at the metaphors and metonymies for anger in the languages of the world, we will not find any that contradict the physiological results that they [the Ekman research team] found. (p. 220)

Particularly relevant to the conceptual metaphors of anger, in his in-depth investigation of anger expressions in Tunisian Arabic, Maalej (2004) identified three kinds of embodiment: physiological embodiment, culturally specific embodiment, and culturally tainted embodiment.

In Maalej's (2004) ethnographic work, he identified *physiological embodiment* of anger as exemplifying the conceptual metaphor that entails the mapping between anger (target concept) and the substance or fluid in a container (source concept) to highlight one's (metaphoric) physiological states during the anger experience, as in the expressions 'I am filled with anger', 'my heart is sloshing', and 'he left my blood to boil' (the latter two expressions were found in Tunisian Arabic). Although the emphasis is on the physiological change to the body, we contend that Maalej's notion of physiological embodiment tends more toward the category of conceptual metaphor than that of embodied simulation because 'heart sloshing' and 'blood boiling' are not the actual physiological simulations when we (or the Tunisian Arab native) feel angry. This view that anger is conceptually mapped onto the container metaphor was identified in diverse languages including American, Chinese, Japanese, Hungarian, Polish, and Tahitian, giving this lay anger-container metaphor a somewhat universal status cross-culturally or cross-linguistically (Kövecses, 1995; Lakoff, 1987; Lakoff & Kövecses, 1987).

Of greater relevance to the embodied cultural cognition perspective is what Maalej (2004) coined culturally specific and culturally tainted embodiments. *Culturally specific embodiment* pertains to the kind of conceptual metaphors that entail a body part that is not implicated in any related physiological change to the body. Examples of culturally specific embodiment of anger found in Tunisian Arabic include ''he broke my bones into small bits/joints'' and ''he reduced my flesh into crumbs'' (Maalej, 2004). These expressions exemplify culturally specific embodiment because the described body parts are not physiologically involved in anger (e.g., bones, flesh versus heart and blood in physiological embodiment), but is culturally relevant. For example, the feast of sacrifice during the Muslim pilgrimage visit to Saudi Arabia has the ritual of sacrificing a sheep, breaking its bones into pieces, and cutting its flesh into crumbs. These bodily representations are then experientially tied to the expression of anger largely understood in the Tunisian culture.

Culturally tainted embodiment has its origin in physiological embodiment but it is tainted culturally by culture-specific items such as practices and habits and by cultural knowledge. Examples of culturally tainted embodiment of anger observed in Tunisian Arabic include ''I found him growling like a camel'' and ''he entered in a dust storm'' (Maalej, 2004). As part of the Tunisian cultural knowledge, camels are known for their anger and spitefulness, thus an anger experience is scaffolded onto this knowledge about camels. Also interesting, dusty and violent desert storms are typical in the Arab region, thus the description of an angry person entering in a dust storm with no self-control is scaffolded onto this ecological knowledge.

Notably, Maalej (2004) argued that these distinctions are not mutually exclusive as, for example, physiological embodiment can vary across cultures as a function of how each culture metaphorically conceptualizes the bodily states experienced during anger, and culturally tainted embodiment can be subsumed under physiological embodiment because it is likely to be motivated by a bodily experience but is culturally specific. Together, this ethnographic investigation of Tunisian Arabic anger expressions presents a good case that

many conceptual metaphors (at least for anger) are culture bound. As Maalej (2004) put it, embodiments that are culturally specific are significant as ''it is [the] embodiment where the body as a physiology and the body as a cultural dimension interact and even merge'' (p. 73).

Time perception. People often think and talk about time by mapping it onto a spatial dimension. For example, English speakers predominantly use the front/back orientation to represent time, as in the expressions 'the bad times are *behind* us' and 'we look *forward* to meeting tomorrow' (Lehrer, 1990; Traugott, 1978). A recent study examined this time–space mapping through manipulating participants' physical movements (Miles, Nind, & Macrae, 2010). Consonant with the front/future and back/past conceptual metaphors, results showed that backward and forward physical movements tend to cue memories for past events and thoughts about future events, respectively.

Interestingly, other than these front/back horizontal spatiotemporal metaphors for time, Mandarin speakers also use vertical spatiotemporal metaphors, with the *up* metaphor denoting an earlier time and the *down* metaphor denoting a later time (Boroditsky, 2001). Chinese and Americans' susceptibility to think about time using horizontal and vertical spatiotemporal metaphors was tested by Boroditsky (2001) in three experiments. After being spatially primed by answering questions about two objects that were either horizontally related (e.g., a picture depicted a black worm being ahead of a white worm) or vertically related (e.g., a picture depicted a black ball being above a white ball), Mandarin- and English-speaking participants stated true or false to statements about time as fast as they could (e.g., *September comes before December*). Mandarin speakers answered temporal questions faster after vertical primes than after horizontal primes, and the reverse was true for English speakers. This result was consistent with the predominance of vertical spatial metaphors used by Mandarin speakers and predominance of horizontal spatial metaphors used by English speakers. Further, the use of different spatiotemporal metaphors to talk about time is largely learned, as it was found in follow-up studies that (i) Mandarin speakers were more biased to think about time vertically if they started learning English later in life, and (ii) after receiving a short training to think about time vertically, English speakers, like Mandarin speakers, also responded to temporal questions faster after vertical primes. Thus, the relatively abstract conceptions of time are mapped metaphorically onto concrete spatial orientations, and the preponderance of such conceptual metaphors appears to be largely shaped by language use.

Relatedly, Núñez and Sweetser (2006) also investigated the spatial construals of time in Aymara, an Amerindian language system. Aymara language presents an interesting case to contrast the common metaphoric time–space correspondence of future to front and past to back, because Aymara speakers have a different model of time wherein *future is behind ego* and *past is in front of ego* (Núñez & Sweetser, 2006). Aymara speakers' disparate way to construe time is believed to be based on their embodied experience possibly shaped by their language: In Aymara language 'eye' and 'front' are represented by the same word, it follows that past is in front because past is known (i.e., the speaker can see what is in front) and future is at the back because future is unknown (Miracle & Yapita, 1981). Together, both the Mandarin and Aymara conceptual metaphors for time offer good examples of how the fundamental concept of time could be grounded in different spatial bodily experiences largely shaped by language, an important cultural product.

Person perception. Growing research has shown that concepts as abstract as individuals' perceptions of others and themselves and of social relationships can also be grounded in

bodily experiences. For instance, social closeness has been found to be embodied in physical sensation of warmth: Holding a warm (versus cold) beverage was associated with perceptions of closer relationships and an ambiguous target having a warm personality (IJzerman & Semin, 2009; Williams & Bargh, 2008). In a related vein, recalling of or encountering an experimentally induced episode of social exclusion led participants to estimate a lower room temperature and to desire for warm food and drinks than those who felt socially included (Zhong & Leonardelli, 2008).

Menon, Sim, Fu, Chiu, and Hong (2010) extended prior research on the metaphoric representations of person perceptions to investigating cross-cultural variations in the prevalence of conceptual metaphors regarding different perceived positions of leaders relative to a collective. Specifically, the conceptual metaphor of representing leadership as *trailblazing* entails an assertive, individually agentic, and approach oriented leader; the conceptual metaphor of representing leadership as trailing behind entails a protective, group-focused, and protection-oriented leader (Menon et al., 2010). The researchers first showed that (i) when participants were given a cartoon imagery depicting a school of fish swimming, with one fish swimming ahead and another swimming behind, a higher percentage of Americans (versus Singaporeans) chose the front fish as leader, whereas a higher percentage of Singaporeans (versus Americans) chose the back fish as leader; and (ii) when participants were asked to freely draw their own images of leaders and followers, Americans represented more followers as facing the leader's back than did Singaporeans, but Singaporeans represented leaders as watching behind more followers than did Americans. Probing into participants' leader perceptions, it was found that Singaporeans perceived back leaders as more group-focused and thereby more effective, although the two cultures equally perceived front leaders as assertive and effective. Together, this research presents an interesting case of cross-cultural variations in the prevalence of conceptual metaphors that mentally map different leadership styles onto a front or back physical position spatially. People are likely to learn about these conceptual metaphors in relation to specific managerial settings that require leaders to either seize reward and opportunity (thus leading from the front) or to be vigilant and protection oriented (thus leading from the back).

The metaphoric conceptualizations of approach oriented leadership as trailblazing at the front and protection-oriented leadership as trailing behind are based on nonarbitrary associations. It is because a front position is largely conducive for exercising one's own will and seizing on opportunities as they present and a back position can well facilitate vigilance and protection. Some embodied concepts, however, are grounded in arbitrary bodily expressions [i.e., *totem* embodiments as Cohen and Leung (2009) called it]. Uncovering the relationships between arbitrary bodily expressions and their associated mental concepts explicates that these relationships are clearly culturally learned (Chandler & Schwarz, 2009), supporting the cultural specificity of embodied cognition.

A recent study by Chandler and Schwarz (2009) demonstrates one example of learned movement – concept association or totem embodiment. They posit that 'giving the middle finger' and 'thumbs up' are arbitrary bodily expressions with a Western origin, with the former bodily expression acquiring the culture-specific meaning of hostility and the latter acquiring the meanings of approval and optimism. As expected, they found that participants with their middle finger extended while reading about an ambiguously hostile person rated the person as more hostile than those with their index finger extended. Interestingly, the 'thumbs up' embodiment effect merged only among female participants, with those having their thumb up while reading the ambiguously hostile person gave the person a more favorable overall rating. We contend that this gender difference further

attests to the cultural specificity of embodiment, as the researchers argued, women more readily pick up the prosocial connotation of 'thumbs up' than men do in potentially adverse interactions because they are more socialized into the cultural expectation to pursue the 'tend-and-befriend' strategies to mitigate interpersonal threats. We discuss gender-related (and religion-related) embodied cognition next.

Gender- and religion-related embodiments. Cultures do not only limit to national cultures but also encompass the culture collectively shared by the people in a gender group or a religion. As such, it is highly possible to find gender specific and religion-specific embodiments, with the two genders and different religious groups seeing the social reality differently after experiencing a certain bodily state infused with gender-related expectations or religious imperatives.

Regarding gender-specific embodiment, the findings of gender variability in the embodiment of power offer excellent illustrations. In two studies, Schubert and Koole (2009) showed that men making a fist activated an empowered explicit and implicit self-concept as exemplified in their perceived self as being more assertive and socially esteemed. The effect among women appeared to be the reverse of men's. Another series of studies found that making a fist, an embodiment of powerful gesture for men and an embodiment of powerless gesture for women, has substantial implication for bodily feedback (Schubert, 2004; see also IJzerman & Cohen, 2011). Specifically, for both genders, making a gesture of bodily force (fist) activated power-related concepts in a Stroop task; for men only however, making a fist was associated with higher hope for control in hypothetical situations and the perception of an ambiguously acting male target as more kind and less hostile. Women displayed the opposite patterns as men. The authors explained this gender disparity in terms of cultural expectations and socialization of gender roles, with men culturally expected to use bodily force to gain power and control over others and women culturally expected to refrain from using bodily force unless it becomes their last resort. Therefore, unlike men who tend to associate physical coercion with having power, women tend to associate physical coercion with power loss, fear, and diminished control (Schubert, 2004).

Like gender-related embodiments, it is conceivable to have embodiment effects specific to a certain religious group. Highly relevant to religion-specific embodiment, Cohen and Leung (2009) discussed a recent study that involved students who identified themselves as a Muslim, Protestant, Hindus, or Jew. Participants were asked to unwittingly embody the motion of hand washing, or more specifically, the act of removing physical contamination, through rubbing their hands as the study was disguised as one about hand temperature and hand–eye coordination. Assuming this hand washing gesture, participants gave their moral instance on purity-related offenses having to do with committing physical contamination *acts* (e.g., eating the pet hamster for dinner) or endorsing blasphemous or other improper *beliefs* (e.g., fantasizing having sex with an inappropriate target).

As predicted, across different religious groups, embodying hand washing (versus not) made participants judge acts of physical contamination more severely. More interestingly, in judging blasphemous and improper beliefs, the embodiment effect only emerged among Muslims and Protestants for their religion also placed great emphasis on proper beliefs as well as deeds. In other words, as the four religious groups all emphasize good deeds, they equally condemn contamination-related acts when embodying hand washing. However, cultural differences in embodiment emerge in the condemnation of blasphemous and improper beliefs because immoral beliefs are as mentally polluting as immoral deeds for Muslims and Protestants, but not for Hindus and Jews. Embodying

hand washing increases the likelihood that individuals see the world through the lens of their religion, exemplifying more drastically the differences between religious ideals.

Embodied cultural cognition in a dynamic way. As the nature of embodiment is motivated by cultural presuppositions and conventions, logically it follows that embodied cultural cognition can be a dynamic process, with bicultural or multicultural individuals flexibly switching their cultural frames of mind in response to their experiential embodied state that bears substantial cultural meanings. A recent study by Leung and Cohen (2011a) demonstrates this dynamic nature of embodied cultural cognition in moral reasoning.

In a recent commentary, Narvaez (2010) advocated that the embodied dynamism of moral reasoning is imperative in a truly synthetic moral psychology theory (see also Haidt, 2010). The bodily foundation of our moral reasoning comes about as ''we think in and through our bodies, making our reason primarily unconscious, metaphorical, and imaginative'' (Narvaez, 2010, 185). In one study, Leung and Cohen (2011a) examined how the experiential embodied state affects how people reason as a moral being. Specifically, they compared the embodiments of particularistic and universalistic values among Asian Americans with those of European Americans to empirically test the dynamic embodiment of culturally important moral values. Particularistic morality is framed in terms of an individual's obligations and duties to related others, thus allowing social relationships to override rules at times; universalistic morality is framed in terms of an individual's strict compliance with abstract rules and laws and her belief that they are universally applicable to everyone and in every situation (Trompenaars, 2003; Zurcher, 1968). All cultures are likely to house a moral ethic of particularism *and* a moral ethic of universalism; however, one ethic might be more dominant than the other in a given culture. Past research suggests that particularism is the relatively more dominant moral discourse in East Asia and universalism the more dominant moral discourse in the United States (Trompenaars & Hampden-Turner, 1997; Zurcher, 1968). If we consider bicultural Asian Americans, who have extensive exposure to both Asian and American cultures, it is reasonable to argue that they have access to both particularistic and universalistic moral worldviews to a greater extent than monocultural European Americans and East Asians do (Hong, Morris, Chiu, & Benet-Martinez, 2000).

In the study, a hugging posture was used to embody particularism and a rigid, straight back posture was used to embody universalism. The researchers posit that to some people, particularly East Asians, the hug is not simply a friendly socializing gesture, but a way to express selfless and unconditional affection to close others. Given that both moral discourses are held legitimate among bicultural Asian Americans, but only the universalistic discourse is deemed legitimate among European Americans, it was hypothesized that 'hugging' (versus upright and control) Asian Americans, but not European Americans, would assume a higher particularistic obligation to their close others; 'upright' (versus hugging and control) Asian Americans and European Americans, however, would more readily uphold the universalistic principle of honesty.

To test these hypotheses, participants were put into a corresponding posture (hug, straight back, or sit as a control) intermittently while working on two counterbalanced tasks: (i) a dilemma task described misdeeds committed by a friend or family member which measured participants' particularistic tendencies to cover for their close other's misdeeds, (ii) a memory task was set up that allowed participants to copy words from an 'accidentally' exposed word list which gauged how readily participants adhered to the universalistic principle of honesty. As predicted, Asian Americans, given their dual access to both moral codes, switched their moral frames in response to embodying a hug or a

rectitude pose. Somewhat surprisingly, with universalism as the only legitimate moral ethos in their culture, both the hug and the rectitude poses failed to produce corresponding effects among European Americans. As the researchers reasoned, unlike their Asian American counterparts, European Americans do not have dual moral frames to switch in and out of, so embodying the moral pose did not cue the corresponding moral code.

Embodying cultural cognition through soft embodiment. Thus far, we have presented embodied cultural cognition as being derived mainly from the actual *physical* body interacting with the world. On a similar vein, it is conceivable that embodied cognition can also be derived from the *psychological* representation of the body interacting with the world (Leung & Cohen, 2007; Zajonc & Markus, 1984). This psychological representation of bodily experiences comes about as we form mental imagery of the way we conduct our bodies (Boroditsky & Ramscar, 2002; McGlone & Harding, 1998).

A clever study demonstrated this soft embodiment effect. Boroditsky and Ramscar (2002) examined how people's abstract perception of time is built on their concrete bodily experience. In their study, they found that people who had just *imagined* themselves moving through space by sitting in an office chair on wheels were more likely to perceive themselves as moving forward through time (versus time as passing them by) than did those who had *imagined* using a rope to maneuver the chair to move toward them (Study 1, 2002). The researchers posited that having people *think* about their spatial motion, giving rise to a psychological representation of the body moving forward through space as opposed to the body actually moving, can affect their perception about time.

The mental models of the way our bodies move can instantiate an understanding of our place in the physical world that is culturally meaningful and relevant (Cohen, Hoshino-Browne, & Leung, 2007; Cohen & Leung, 2009). In a series of studies, Leung and Cohen (2007) examined how cultural imperatives are softly embodied through adopting a psychological perspective (a first- or third-person perspective) to mentally represent the self in time and space (see also Libby & Eibach, 2002; Nigro & Neisser, 1983; Wu & Keysar, 2007). To broadly characterize the differences in the cultural imperatives of different groups in an oversimplified way, the dominant cultural imperative in Western societies emphasizes paying attention to one's own needs and feelings so as to find out what one 'truly' wants, whereas the dominant cultural imperative in East Asian societies emphasizes paying attention to how they look to other people so as to accommodate to and harmonize with others (Kim & Cohen, 2010). In pursuit of these culturally meaningful goals, Westerners tend to habitually adopt a first-person perspective, mentally modeling situations, particularly social ones, from an egocentric point of view; Easterners tend to adopt a third-person perspective, mentally modeling situations from their close other's point of view (Morling, Kitayama, & Miyamoto, 2002; Wu & Keysar, 2007).

This patterned use of psychological perspective by people with East Asian or American cultural background is reflected in the use of deictic words (e.g., come, go) when they mentally model or visualize their place in a social (versus nonsocial) situation. As Black, Turner, and Bower (1979) noted, 'come' implies motion *toward* the position in space that we are 'occupying' in our mental model, whereas go implies motion *away* from the position we are 'occupying' in our mental model. Interestingly, Leung and Cohen (2007) showed that European Americans tended to describe actions as *coming toward themselves* but as *going toward others* (implying a first-person perspective) when they visualized narratives or spontaneously constructed narratives. In contrast, Asian

Americans were more likely to describe actions as *going toward themselves* but *coming toward others* (implying a third-person perspective). Further, European Americans understood motion metaphors through a sense of their *own* motion through time and space, whereas Asian Americans did so through a sense of *their friend's* motion. Together, through assuming a first- or third-person point of view, people of American or East Asian descent psychologically comport their body differently to map out a sense of place, motion, and time in their mental models of everyday situations and events. Thus, taking a certain perspective attests to a soft embodiment experience that is culturally meaningful and encouraged.

What Is Needed to Further the Embodied Cognition Approach to Culture?

Building off the embodied cognition account to extend to the study of embodied cultural cognition is an avenue that awaits much future research. We discuss a few issues inspired by the review of research findings on cultural variability in embodiments, and we believe that if these issues are addressed, this will bring the embodied cultural cognition approach to the next level.

Embodied cultural cognition as reflected in conceptual metaphors (versus embodied simulations)

Notably, much of the research relevant to embodied cultural cognition that we reviewed tends to reflect cultural variability in conceptual metaphors, not embodied simulations. This could be attributed to two possibilities. First, human species have very similar bodies and neurophysiological makeup the world over. Embodied simulations, building upon the experiential correlations between mental representations about a given concept and the modality-specific bodily states directly tied with the concept, might be characteristic of people across cultures, given their highly similar organismic experiences. Second, embodied simulations might be more likely to pertain to the kind of body–mind linkage that is more basic and evolutionary prepared. Evolution might have predisposed humans, and even other animal species, to such body–mind linkage that innately serves to enhance physiological adaptations and thus these embodiments are relatively universal (i.e., prewired embodiments; see Cohen & Leung, 2009; also see Fiske, 2004). Future research can explore whether some instances of embodied simulations are reflections of embodied cultural cognition.

The same bodily states can be cultural or not cultural

As mentioned in the earlier section, the link between bodily states and what cognitive structures they embody is not one-to-one and therefore is underspecified. Take, for example, the hand rubbing gesture in the study on religion-specific embodiment of purity values discussed in Cohen and Leung (2009). In the context of the moral judgment task, the hand rubbing gesture led different religious groups to embrace purity ideals. Put those people in an examination hall and ask them to rub their hands while awaiting a difficult math task, it is unlikely that this same hand rubbing gesture will conjure a stance of purity and sacredness; rather, the rubbing may embody intense nervousness in this anxiety-arousing testing situation. Hand rubbing is neither inherently associated with the cultural meaning of purity nor is it inherently associated with the physiological signal of nervousness. These meaning associations, however, are not arbitrary either because hand rubbing as in the act of hand washing can conceptually map well onto the target concept of moral

cleanliness and that in the act of fidgeting can conceptually map well onto the target concept of nervousness. Whether the same hand rubbing gesture entails the endorsement of moral purity or the discharge of nervous energy might be largely dependent on the situation and individual characteristic. In this light, taking into account the interactions among culture, person, and situation could further advance the understanding of embodied cultural cognition.

The Culture × Person × Situation interaction account in embodied cultural cognition

We contend that the nature of mental structure given body is better understood by putting the body–mind linkages into perspective by jointly considering the norms and practices in a culture, an individual's idiosyncratic profile, and situational press, which is succinctly captured by the Culture × Person × Situation (CuPS) interaction approach proposed by Leung and Cohen (2011b). The above reviewed empirical evidence on embodied cultural cognition points toward the pertinent cultural norms and habitual interactions encountered in a given culture as underlying the cultural variations in embodiments. However, not all individuals in a culture are prototypical members of the culture; they may buy into the pertinent norms and ideals in the culture or they may reject it. In the CuPS framework, people are active agents within a cultural system, reacting toward or *against* the dominant cultural theme (Leung & Cohen, 2011b). Therefore, while we are aware of the between-culture variations in the display of embodied cognition, we should also acknowledge within-culture variations by attending to atypical cultural members or rejectionists.

Relatedly, what infuses embodied cultural cognition with a sense of dynamism is the situational press. If we recall the study conducted by Leung and Cohen (2011a) on bicultural Asian Americans who embodied particularism through a hug and universalism through a rectitude pose, these bicultural individuals could switch their moral frames to react to moral dilemmas differently when they were embodying one moral code or the other. Therefore, individuals can embody a culturally relevant cognition dynamically, with the situation calling upon a particular bodily state or the other that is meaningful in the given situation.

Embodied cultural cognition as the socialization tool

Carrying forward cultural worldviews in the body implies that embodiment can make a given culture's instantiated values and assumptions relatively resistant to change. Those cultural imperatives being embodied are able ''to pass from practice to practice without going through discourse or consciousness'' and people have ''no difficulty in grasping the rationale … and in making it (their) own'' (Bourdieu, 1977, 87–8). While the embodied cultural values are less likely to be subject to reflection and challenge, they nonetheless implicitly instantiate an approach to understanding the world, and because of this, they may be all the more powerful.

One interesting question then follows: Whereas individuals can be relatively more conveniently socialized into a culture through imitating or observing others who physically embody its values and assumptions (i.e., hard embodiment), individuals may not have ready access into others' mental models. It would be interesting to learn about how they are socialized into a culture through psychologically embodying its imperatives and assumptions (i.e., soft embodiment). Addressing these questions would be pivotal to advance understanding on cultural learning and cultural change.

Conclusion

In this article, we sought to build upon and extend the emerging vernacular of embodied cognition to advance our understanding of embodied cultural cognition. We believe that incorporating the embodiment perspective in the study of culture is a highly viable tool to help shed new light to the study of socio-cultural phenomena, bridging and unifying theorizing and research in different sub-disciplines in psychology. Being embedded or situated in a socio-cultural context, our body's architecture has been engineered to help us function effectively in this world. And our body interface (both actual and imagined) can be culturally socialized to support us to make sense of the world, to smoothly navigate everyday transactions, and to optimize our adaptive survival in the culture.

Short Biographies

Angela Ka-yee Leung is an assistant professor of Psychology at the Singapore Management University. She received her PhD in social psychology at the University of Illinois, Urbana-Champaign. Her research seeks to understand how people participate actively in dynamic cultural processes and the psychological implications for multicultural competence. She is also interested in the role of embodiment (bodily interactions with the environment) in the acquisition and endorsement of cultural values. Her edited book *Cultural Processes: A Social Psychological Perspective* (Cambridge University Press 2010) proposes an original process model of culture that extends contemporary theories of social cognition and social motivation to explain why culture matters in human psychology.

Lin Qiu is an assistant professor in the Division of Psychology at Nanyang Technological University. He received his PhD from Northwestern University. Lin's current research focuses on social–psychological aspects of human–computer interaction. He is broadly interested in cognitive science, learning technology, and engineering psychology. He has published papers in these areas for *Studies in Health Technology and Informatics*, *Journal of Interactive Learning Research*, *Journal of Educational Computing Research*, Annual CyberTherapy & CyberPsychology Conference, International Conference on Advances in Computer Entertainment Technology, and International Conference on Intelligent User Interfaces.

Laysee Ong is currently a Psychology PhD student at the Singapore Management University. She studies how bodily actions can influence cognitive processes among individuals in both within- and between-culture contexts. Specifically, her recent research seeks to examine how creative cognition can be enhanced in individuals through actions (embodiment) and unpriming (a process which reduces the influence of an activated concept). She is also interested in exploring the use of Second Life, an online virtual world, as a viable psychological research tool.

Kim-Pong Tam's research examines the dynamics of culture and psychology. In particular, his approach focuses on how people perceive their own culture and the psychological implications of such perceptions. His research interests also include happiness, human–nature relationship, and forensic judgments. Tam received his PhD from the University of Hong Kong and is currently an assistant professor at the Division of Social Science, Hong Kong University of Science and Technology.

Endnote

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References

Barsalou, L. W. (2008). Grounded cognition. *Annual Review of Psychology*, **59**, 617–645.

Black, J. B., Turner, T. J., & Bower, G. H. (1979). Point of view in narrative comprehension, memory, and production. *Journal of Verbal Learning and Verbal Behavior*, **18**, 187–198.

Boroditsky, L. (2001). Does language shape thought? English and Mandarin speakers' conceptions of time. *Cognitive Psychology*, **43**, 1–22.

Boroditsky, L., & Ramscar, M. (2002). The roles of body and mind in abstract thought. *Psychological Science*, **13**, 185–189.

Bourdieu, P. (1977). *Outline of a Theory of Practice*. Cambridge: Cambridge University Press.

Chandler, J., & Schwarz, N. (2009). How extending your middle finger affects your perception of others: Learned movements influence concept accessibility. *Journal of Experimental Social Psychology*, **45**, 123–128.

Cohen, D., Hoshino-Browne, E., & Leung, A. K.-y. (2007). Culture and the structure of personal experience: Insider and outsider phenomenologies of the self and social world. In M. P. Zanna (Ed.), *Advances in Experimental Social Psychology* (Vol. 39, pp. 1–67). San Diego, CA: Academic Press.

Cohen, D., & Leung, A. K.-y. (2009). The hard embodiment of culture. *European Journal of Social Psychology*, **39**, 1278–1289.

Cohen, D., Leung, A. K.-y., & IJzerman, H. (2009). Culture, psyche, *and body* make each other up. *European Journal of Social Psychology*, **39**, 1298–1299.

Ekman, P. (1992). Are there basic emotions? *Psychological Review*, **99**, 550–553.

Ekman, P., Friesen, W. V., & Ellsworth, P. (1972). *Emotion in the Human Face: Guidelines for Research and an Integration of Findings*. New York: Pergamon Press.

Fiske, A. (2004). Four modes of constituting relationships: Consubstantial assimilation; space, magnitude, time, and force; concrete procedures; abstract symbolism. In N. Haslam (Ed.), *Relational Models Theory: A Contemporary Overview* (pp. 61–146). Mahwah, NJ: Lawrence Erlbaum Associates.

Foroni, F., & Semin, G. (2009). Language that puts you in touch with your bodily feelings: The multimodal responsiveness of affective expressions. *Psychological Science*, **20**, 974–980.

Fridlund, A., Ekman, P., & Oster, H. (1987). Facial expressions of emotion. In A. Siegman & S. Feldstein (Eds.), *Nonverbal Behaviour and Communication* (pp. 143–224). Hillsdale, NJ: Erlbaum.

Gallese, V., Keysers, C., & Rizzolatti, G. (2004). A unifying view of the basis of social cognition. *Trends in Cognitive Sciences*, **8**, 396–403.

Gibbs, R. W. (1994). *The Poetics of Mind: Figurative Thought, Language and Understanding*. New York: Cambridge University Press.

Gibson, J. J. (1979). *The Ecological Approach to Visual Perception*. London: Erlbaum.

Haidt, J. (2010). Moral psychology must not be based on faith and hope: Commentary on Narvaez (2010). *Perspectives on Psychological Science*, **5**, 182–184.

Hong, Y.-y., Morris, M. W., Chiu, C.-y., & Benet-Martinez, V. (2000). Multicultural minds: A dynamic constructivist approach to culture and cognition. *American Psychologist*, **55**, 709–720.

IJzerman, H., & Cohen, D. (2011). Grounding cultural syndromes: Body comportment and values in Honor and Dignity cultures. *European Journal of Social Psychology*, **41**, 456–467.

IJzerman, H., & Koole, S. L. (2011). From perceptual rags to metaphoric riches: Bodily, social, and cultural constraints on socio-cognitive metaphors (Comment on Landau et al., 2010). *Psychological Bulletin*, **137**, 355–361.

IJzerman, H., & Semin, G. R. (2009). The thermometer of social relations. Mapping social proximity on temperature. *Psychological Science*, **20**, 1214–1220.

IJzerman, H., & Semin, G. R. (2010). Temperature perceptions as a ground for social proximity. *Journal of Experimental Social Psychology*, **46**, 867–873.

Kim, Y.-H., & Cohen, D. (2010). Information, perspective, and judgments about the self in face and dignity cultures. *Personality and Social Psychology Bulletin*, **36**, 537–550.

Kövecses, Z. (1995). Anger: Its language, conceptualization, and physiology. In J. R. Taylor & R. E. MacLaury (Eds.), *Language and the Cognitive Construal of the World* (pp. 181–196). Berlin: Mouton de Gruyter.

Kövecses, Z. (2000). *Metaphor and Emotion: Language, Culture, and Body in Human Feeling*. New York: Cambridge University Press.

Lakoff, G. (1987). *Women, Fire, and Dangerous Things: What Categories Reveal About the Mind*. Chicago, IL: University of Chicago.

Lakoff, G., & Johnson, M. (1999). *Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought*. New York: Basic Books.

Lakoff, G., & Kövecses, Z. (1987). The cognitive model of anger inherent in American English. In D. Holland & N. Quinn (Eds.), *Cultural Models in Language and Thought* (pp. 195–221). Cambridge: Cambridge University Press.

Landau, M. J., Meier, B. P., & Keefer, L. A. (2010). A metaphor-enriched social cognition. *Psychological Bulletin*, **136**, 1045–1067.

Lee, S. W. S., & Schwarz, N. (2010). Dirty hands and dirty mouths: Embodiment of the moral-purity metaphor is specific to the motor modality involved in moral transgression. *Psychological Science*, **21**, 1423–1425.
Lehrer, A. (1990). Polysemy, conventionality, and the structure of the lexicon. *Cognitive Linguistics*, **1**, 207–246.
Leung, A. K.-y., & Cohen, D. (2007). The soft embodiment of culture: Camera angles and motion through time and space. *Psychological Science*, **18**, 824–830.
Leung, A. K.-y., & Cohen, D. (2011a). *Embodied Morality: Hugging Embodies Particularist Obligations and Straight-Backed Rectitude Embodies Universalist Duties Among Bicultural Asian-Americans*. Unpublished manuscript, Singapore Management University.
Leung, A. K.-y., & Cohen, D. (2011b). Within and between culture variation: Individual differences and the cultural logics of honor, face, and dignity cultures. *Journal of Personality and Social Psychology*, **100**, 507–526.
Libby, L. K., & Eibach, R. P. (2002). Looking back in time: Self-concept change and visual perspective in autobiographical memory. *Journal of Personality and Social Psychology*, **82**, 167–179.
Maalej, Z. (2004). Figurative language in anger expressions in Tunisian Arabic: An extended view of embodiment. *Metaphor and Symbol*, **19**, 51–75.
McGlone, M., & Harding, J. (1998). Back (or forward?) to the future: The role of perspective in temporal language comprehension. *Journal of Experimental Psychology: Learning, Memory and Cognition*, **24**, 1211–1223.
Menon, T., Sim, J., Fu, J. H.-Y., Chiu, C.-y., & Hong, Y.-y. (2010). Blazing the trail versus trailing the group: Culture and perceptions of the leader's position. *Organizational Behavior and Human Decision Processes*, **113**, 51–61.
Miles, L. K., Nind, L. K., & Macrae, C. N. (2010). Moving through time. *Psychological Science*, **21**, 222–223.
Miracle, A., & Yapita, J. D. (1981). Time and space in Aymara. In M. J. Hardman (Ed.), *The Aymara Language in its Social and Cultural Context* (pp. 33–56). Gainesville, FL: University Presses of Florida.
Morling, B., Kitayama, S., & Miyamoto, Y. (2002). Cultural practices emphasize influence in the US and adjustment in Japan. *Personality and Social Psychology Bulletin*, **28**, 311–323.
Narvaez, D. (2010). The embodied dynamism of moral becoming: Reply to Haidt (2010). *Perspectives on Psychological Science*, **5**, 185–186.
Niedenthal, P. M., Barsalou, L., Winkielman, P., Krauth-Gruber, S., & Ric, F. (2005). Embodiment in attitudes, social perception, and emotion. *Personality and Social Psychology Review*, **9**, 184–211.
Nigro, G., & Neisser, U. (1983). Point of view in personal memories. *Cognitive Psychology*, **15**, 467–482.
Núñez, R. E., & Sweetser, E. (2006). With the future behind them: Convergent evidence from Aymara language and gesture in the crosslinguistic comparison of spatial construals of time. *Cognitive Science*, **30**, 401–450.
Rohrer, T. (2007). The body in space: Dimensions of embodiment. In T. Ziemke, J. Zlatev & R. M. Frank (Eds.), *Body, Language and Mind* (Vol. 1, pp. 339–378). Berlin: Mouton de Gruyter.
Schubert, T. W. (2004). The power in your hand: Gender differences in bodily feedback from making a fist. *Personality and Social Psychology Bulletin*, **30**, 757–769.
Schubert, T. W. (2005). Your highness: Vertical positions as perceptual symbols of power. *Journal of Personality and Social Psychology*, **89**, 1–21.
Schubert, T. W., & Koole, S. L. (2009). The embodied self: Making a fist enhances men's power-related self-conceptions. *Journal of Experimental Social Psychology*, **45**, 828–834.
Schubert, T. W., & Semin, G. R. (2009). Embodiment as a unifying perspective for psychology. *European Journal of Social Psychology*, **39**, 1135–1141.
Strack, F., Martin, L. L., & Stepper, S. (1988). Inhibiting and facilitating conditions of the human smile: A nonobstrusive test of the facial feedback hypothesis. *Journal of Personality and Social Psychology*, **54**, 768–777.
Susskind, J. M., Lee, D. H., Cusi, A., Feiman, R., Grabski, W., & Anderson, A. K. (2008). Expressing fear enhances sensory acquisition. *Nature Neuroscience*, **11**, 843–850.
Thelen, E., Schoner, G., Scheier, C., & Smith, L. B. (2001). The dynamics of embodiment: A field theory of infant preservative reaching. *Behavioral and Brain Sciences*, **24**, 1–86.
Traugott, E. C. (1978). On the expression of spatiotemporal relations in language. In. J. H. Greenberg (Ed.), *Universals of Human Language: Word Structure* (Vol. 3, pp. 369–400). Stanford, CA: Stanford University Press.
Trompenaars, F. (2003). *Did the Pedestrian Die?* Oxford: Capstone Publishing.
Trompenaars, F., & Hampden-Turner, C. (1997). *Riding the Waves of Culture: Understanding Cultural Diversity in Business*. London: Nicholas Brealey.
Varela, F. J., Thompson, E., & Rosch, E. (1991). *The Embodied Mind: Cognitive Science and Human Experience*. Boston, MA: MIT Press.
Vermeulen, N., Godefroid, J., & Mermillod, M. (2009). Emotional modulation of attention: Fear increases but disgust reduces the attentional blink. *PLoS ONE*, **4**, e7924.
Williams, L. E., & Bargh, J. A. (2008). Experiencing physical warmth promotes interpersonal warmth. *Science*, **332**, 606–607.
Williams, L. E., Huang, J. Y., & Bargh, J. A. (2009). The scaffolded mind: Higher mental processes are grounded in early experience of the physical world. *European Journal of Social Psychology*, **39**, 1257–1267.
Wu, S., & Keysar, B. (2007). The effect of culture on perspective taking. *Psychological Science*, **18**, 600–606.

Zajonc, R. B., & Markus, H. (1984). Affect and cognition: The hard interface. In C. Izard, J. Kagan & R. Zajonc (Eds.), *Emotions, Cognitions, and Behavior* (pp. 73–102). Cambridge: Cambridge University Press.

Zhong, C.-b., & Leonardelli, G. L. (2008). Cold and lonely: Does social exclusion literally feel cold? *Psychological Science*, **19**, 838–842.

Zhong, C.-b., & Liljenquist, K. (2006). Washing away your sins: Threatened morality and physical cleansing. *Nature*, **313**, 1451–1452.

Zurcher, L. A. (1968). Particularism and organizational position: A cross-cultural analysis. *Journal of Applied Psychology*, **52**, 139–144.