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Social Psychological and Personality Science published online 10 December 2010
DOI: 10.1177/1948550610391677

Social Psychological and Personality Science
000(00) 1-9

DOI: 10.1177/1948550610391677
http://spps.sagepub.com

Mind–Body Dissonance: Conflict Between the Senses Expands the Mind's Horizons

Li Huang[1] and Adam D. Galinsky[1]

Abstract

The ability of humans to display bodily expressions that contradict mental states is an important developmental adaptation. The authors propose that mind–body dissonance, which occurs when bodily displayed expressions contradict mentally experienced states, signals that the environment is unusual and that boundaries of cognitive categories should be expanded to embrace atypical exemplars. Four experiments found that mind–body dissonance increases a sense of incoherence and leads to category expansion. Recalling a happy memory while frowning or a sad event while smiling, listening to sad music while smiling or happy music while frowning, and assuming an expansive posture while being in a low-power role or a constricted posture while being in a high-power role all led to higher category inclusiveness compared to when the body and mind were coherent. The ability to display bodily expressions that contradict mental states may be an important foundation for the capacity of humans to embrace atypical ideas.

Keywords

mind–body dissonance, atypicality, incoherence, category inclusiveness, emotion, power

One of the most perplexing questions that has percolated throughout scientific history is the relationship between the mind and body (Descartes, 1596–1650). Scientists as early as Cabanis (1757–1808) believed that the mind and body work in tandem, reciprocally interacting with each other in shaping the experience of reality. Research in psychology, cognitive science, neuroscience, computer science, child development, and even anthropology has found strong evidence in support of this view (e.g., Damasio et al., 2000; Hamlin, Wynn, & Bloom, 2007; Searle, 1980; Thompson & Varela, 2001).

Research has explored the reciprocal relationship between the mind and body by tackling two related questions (e.g., Borod, 2000; Damasio, 1999; Niedenthal, 2007): Can bodily expressions be decoupled from the mental states? What are the cognitive and behavior consequences when mental states and bodily expressions contradict each other? This research has found that bodily expressions can contradict mental states (Ekman & Friesen, 1975). However, when they do, stress level goes up (Grandey, 2003) and memory encoding gets disrupted presumably because of a lack of processing fluency (Alter & Oppenheimer, 2009; Winkielman, Schwarz, Fazendeiro, & Reber, 2003).

In the current research, we argue that when the mind and body experience two seemingly contradictory states, a state we refer to as mind–body dissonance,[1] individuals experience a sense of incoherence (Centerbar, Schnall, Clore, & Garvin, 2008). We also contend that having the mind and body experience contradictory states has epistemic value for how individuals should approach their world—it signals that the environment is unusual, that a change in one's approach toward the environment is necessary, and that atypical alternatives ought to be considered. We conducted four experiments to examine whether mind–body dissonance leads people to expand their cognitive categories to include atypical exemplars.

Mind–Body Coherence as a Preadaptation State

Typically, the mind (i.e., the mental experience of a stimulus) corresponds tightly with the body (i.e., facial and bodily expression and motor behavior) in creating a coherent and unifying subjective experience (Niedenthal, 2007). This is especially true before the onset of enculturation and learning. Consistent with the notion of functional preadaptation, it is vital to young infants' survival to use bodily expressions to signal internal states (e.g., hunger, distress, pain, pleasure) because it allows them to secure crucial caregiver interventions. Some have also argued that infants and young children lack the cortical inhibitory control that is critical to the control of bodily expressions (Malatesta et al., 1989). As a result, mental states and bodily expressions are relatively congruent in

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early development and maintain an innate concordance before socialization (Izard, 1971; Malatesta et al., 1989).

Beyond infancy, humans learn to display bodily expressions that contradict their mental states (Ekman & Friesen, 1975), and a child's mastery of this ability has been considered a major developmental milestone—whereas preschoolers can enact happiness on request only if there is no underlying competing negative state (Cole, 1986), school-age children can smile despite intense displeasure or mimic distress that is not really felt (Ekman & Friesen, 1975; Saarni, 1979). Through neurological maturation (Malatesta et al., 1989) and socialization (Izard, 1990; Schmidt & Cohn, 2001), children learn to regulate bodily expressions in the service of developing interpersonal relationships and goal-directed behavior.

The Benefits of Mind–Body Coherence and the Detriments of Mind–Body Dissonance

Empirical research has found that the benefits of mind–body coherence are not limited to its vital role in infants' survival but extend to a number of cognitive domains. Bodily expressions that are consistent with a mental experience enhance the correct ''labeling'' of that mental experience and generate a sense of coherence, which enhances processing fluency and speeds up decision making (Alter & Oppenheimer, 2009). For instance, individuals are faster at judging positive stimuli when pulling and negative stimuli when pushing than when they experience a mismatch between motor movements and the valence of a stimuli (Neumann & Strack, 2000). Contracting the brow muscles while performing a difficult decision-making task or the cheek muscles while performing an easy decision-making task increases decisiveness compared to the mismatch between muscle movement and task difficulty (Tamir, Robinson, Clore, Martin, & Whitaker, 2004). Similarly, nodding one's head when listening to strong, persuasive arguments or shaking one's head when listening to weak arguments leads to more positive attitudes toward the argument than when a mismatch occurs (Briñol & Petty, 2003). These findings resonate with many Eastern religions: Buddhism, Hinduism, and Taoism all acknowledge the unity of the mind and body and seek it through ''personal cultivation'' such as meditation or yoga.

Research exploring the psychological consequences of mind–body dissonance has mostly pointed to its negative physiological or mental effects. For example, employees in services professions who display surface emotions that contradict their inner feelings report stress and exhaustion (Grandey, 2003). Similarly, being subliminally exposed to words related to sadness, while smiling leads to impaired short-term memory of information encountered during this emotional expression (Centerbar et al., 2008). In general, people are less likely to remember events that do not fit their general inclinations (Kelly, 1955). The value-from-fit model also suggests that people are less engaged when the means of goal pursuit do not fit their mental states (Higgins, 2000). Taken together, when the mind and body experience different states, stress levels go up and encoding ability and task engagement go down.

Mind–Body Dissonance: Embracing Atypicality

We propose, however, that mind–body dissonance may not always lead to negative outcomes. We argue that when individuals' bodily expressions contradict their mental states, they will be more likely to embrace atypicality.

First of all, because mind–body dissonance decreases processing fluency (Centerbar et al., 2008), it removes the usual preference for typical stimuli (Alter & Oppenheimer, 2009). For example, celebrity and stock names that are frequently repeated are processed with greater fluency and are therefore generally preferred to rare stimuli (Alter & Oppenheimer, 2006; Winkielman et al., 2003). This fluency tends to be driven by stimulus-specific sensorimotor simulation such as involuntary and covert pronouncing or typing of the words presented (Topolinski & Strack, 2009; Van den Bergh, Vrana, & Eelen, 1990). Thus, distracting the mouth by having participants eat popcorn, thereby preventing spontaneous oral motor simulation, eliminates this fluency and therefore the overwhelming preference toward typical stimuli (Topolinski & Strack, 2010). This latter finding suggests that the body can play a role in whether individuals embrace atypicality.

Second, we contend that mind–body dissonance creates a sense of incoherence, which signals that the environment is unusual and therefore leads individuals to embrace atypicality. The emotion literature suggests that specific emotional experiences inform humans about the current state of their world and their standing in it (Roseman, 1984) and alert people to the effectiveness of their current thinking and behavior (Schwarz & Clore, 1983). By doing so, emotions motivate people to think and behave in ways that help them adapt to and enhance their potential to survive and flourish in any given environment (Forgas, 2000; Izard & Tomkins, 1966; Mowrer, 1960; Schwarz & Clore, 1988; Smith & Lazarus, 1990).

There is some evidence that atypical emotional experiences lead people to embrace atypicality. For instance, emotional ambivalence (mentally experiencing positive and negative emotions at the same time) has been shown to increase sensitivity to atypicality in subsequent association tasks (Fong, 2006). Fong (2006) suggested that emotional ambivalence signals that people are in unusual environments and therefore they should embrace atypical associations.

We propose that a phenomenological experience created through the coherence or incoherence between the mind and the body can also provide information and provoke motivational states. Happy facial expressions ''normally'' happen in the context of happy thoughts, whereas sad expressions typically occur in the context of sad thoughts (Ekman, 1982). Similarly, high-power or dominant individuals normally display more expansive postures whereas low-power or nondominant individuals normally display more constricted postures

Table 1. Mean incoherence, mood and category inclusiveness ratings in Experiments 1 and 2. Standard deviations are in parentheses

	Experiment 1 Recall + Facial Expression		Experiment 2 Recall + Facial Expression		
			Category Inclusiveness		
	Incoherence	Mood	Weak Exemplars	Intermediate Exemplars	Strong Exemplars
Happy Mind/Happy Face	5.16 (1.53)	7.76 (1.37)	4.38 (1.48)	6.87 (1.56)	9.50 (1.22)
Sad Mind/Sad Face	5.67 (1.86)	4.32 (1.37)	4.04 (2.16)	7.00 (1.68)	10.17 (0.95)
Happy Mind/Sad Face	6.29 (1.28)	6.67 (1.52)	4.88 (1.26)	7.44 (1.27)	9.96 (1.01)
Sad Mind/Happy Face	6.22 (1.52)	5.58 (1.76)	5.22 (1.24)	8.36 (1.26)	10.22 (0.72)
Mind-Body Coherence	5.39 (1.68)	6.21 (2.20)	4.22 (1.80)	6.93 (1.59)	9.81 (1.14)
Mind-Body Dissonance	6.26 (1.37)	6.19 (1.69)	5.07 (1.24)	7.95 (1.32)	10.10 (0.86)

(Hall, Coats, & LeBeau, 2005; Huang, Galinsky, Gruenfeld, & Guillory, in press). These inherently congruent phenomenological experiences signal that one's present relationship with the environment is normal and typical. Mind–body dissonance, in contrast, is an atypical phenomenological experience, signaling that the environment might be unusual and individuals should expand their categories and embrace atypical exemplars and possibilities.

Overview

We hypothesize that mind–body dissonance is an atypical state, one that creates a sense of incoherence, which motivates individuals to expand their cognitive categories and embrace atypical exemplars. We conducted four experiments to test whether mind–body dissonance increases category inclusiveness—the inclusion of atypical exemplars or nonprototypes into a given category (Brewer, Dull, & Lui, 1981; Rosch, 1975). To test this hypothesis, we used multiple methods to induce mind–body dissonance. In three studies, we paired happy and sad memories or happy and sad music with happy and sad facial expressions. In another experiment, we paired high-power and low-power roles with high-power and low-power postures. Regardless of how mind–body dissonance was created, we predicted that it would lead individuals to see atypical exemplars as more prototypical of a category.

Experiment 1: The Subjective Experience of Mind–Body Dissonance

In our first experiment, we examined whether we could manipulate mental states and bodily states independently and whether mind–body dissonance creates a sense of incoherence.

Method

A total of 58 undergraduates (26 males, 32 females) were randomly assigned to a 2 (mentally experienced emotion: happy, sad) × 2 (facially expressed emotion: happy, sad) between-subjects design.

Participants sat in individual breakout rooms and performed a mental–physical coordination task. They were told that this task "explores individuals' ability to perform mental tasks while working on physical activities with parts of their body that they would not normally use for such tasks."

The physical part of the mental–physical coordination task engaged the muscles involved in smiling (i.e., the orbicularis and zygomaticus) or frowning (i.e., the frontalis and corrugators) and unobtrusively manipulated facial expressions of happiness or sadness (Niedenthal, 2007). In the *happy-face* conditions, the experimenter asked participants to hold a marker with only their front teeth; it was emphasized that their lips should not touch the marker. In the *sad-face* conditions, participants were asked to affix two golf tees on their foreheads right above the inside of their eyebrows and make the tips of the golf tees touch by raising and squeezing the inner corners of the eyebrows using only the muscles on their foreheads.

While holding the marker pen or bringing the golf tees together, for the mental part of the task, participants recalled an experience, in which they felt happy or sad and wrote a narrative account of this experience into the computer. They were given 5 min to relive this emotional experience and describe the experience with as much detail as possible.

Participants next reported (1 = *not at all*, 11 = *very much*) how coherent, imbalanced, adjusted, in harmony, and disoriented they felt and these items were averaged to create a measure of *incoherence* ($\alpha = .78$). Participants also reported how happy and sad they felt, which represented a measure of *mood* ($\alpha = .68$).

Results and Discussion

For mood, a 2 (mentally experienced emotion: happy, sad) × 2 (facially expressed emotion: happy, sad) ANOVA found only two main effects, $F(1, 54) = 32.73$, $p < .01$, $\eta_p^2 = .38$ for mind, and $F(1, 54) = 8.90$, $p < .01$, $\eta_p^2 = .14$ for body (see Table 1 for condition means in Experiments 1 and 2). A smile and a happy memory independently led participants to report being in a better mood. The interaction effect was not significant ($F < 1$).

On the incoherence measure, in contrast, we found an interaction between the mind and body, $F(1, 54) = 4.12$, $p = .05$, $\eta_p^2 = .07$. Mind–body dissonance led to significantly greater incoherence than mind–body coherence,

$t(56) = 2.13$, $p = .04$, $d = 0.57$. These results suggest that (a) we can successfully induce mind–body dissonance in individuals and (b) mind–body dissonance is subjectively experienced as an incoherent state.

Experiment 2: Dissonance Between Memories and Facial Expressions Increases Category Inclusiveness

Using the same manipulations as Experiment 1, we tested whether mind–body dissonance would lead individuals to expand their conceptual categories to include atypical exemplars. Specifically, we investigated its effect on category inclusiveness, the inclusion of atypical exemplars or nonprototypes into a given category (Isen & Daubman, 1984). We predicted that mind–body dissonance would produce higher category inclusiveness. We chose to use category inclusiveness rather than the Remote Associates Test that Fong (2006) used because it represents a more direct measure of atypicality.

Previous literature is mixed on the relationship between the valence of emotions and category inclusiveness. Much of the original research found no difference between positive and negative mood on category inclusiveness (e.g., Isen & Daubman, 1984). Other studies have found that the arousal or activation level of emotions matters more than the valence across a variety of emotions (e.g., De Dreu, Baas, & Nijstad, 2008). Because of these mixed findings, we had no clear a priori prediction on whether a main effect of the valence of emotional memories or whether a difference between the positive-coherent and negative-coherent states on category inclusiveness would occur.

Method

A total of 61 undergraduates (18 males, 43 females) received the same mind–body dissonance manipulations as in Experiment 1.

To assess category inclusiveness, participants were asked to rate how prototypical exemplars were of a particular category (1 = *not at all* to 11 = *very prototypical*). For each of the four categories we used, three exemplars were presented, one being strongly, one being moderately, and one being weakly prototypical (Isen & Daubman, 1984; Rosch, 1975). Specifically, the four categories (with strong, intermediate, and weak exemplars) were vehicle (bus, airplane, camel), vegetable (carrot, potato, garlic), clothes (skirt, shoes, handbag), and furniture (couch, lamp, telephone). Inclusiveness ratings were aggregated separately for strong, intermediate, and weak exemplars.

Results and Discussion

Following previous research (e.g., Isen & Daubman, 1984), we conducted separate two-way ANOVAs on weak, intermediate, and strong exemplars. We found significant interactions for weak, $F(1, 53) = 4.12$, $p = .05$, $\eta_p^2 = .07$, and intermediate exemplars, $F(1, 53) = 6.30$, $p = .02$, $\eta_p^2 = .11$. Compared to mind–body coherence, mind–body dissonance led to greater category inclusiveness ratings on weak, $t(55) = 2.08$, $p = .04$, $d = 0.55$, and intermediate exemplars, $t(55) = 2.63$, $p = .01$, $d = 0.70$. For strong exemplars, the interaction was not significant, $p = .34$.

As predicted, mind–body dissonance led participants to expand the boundaries of conceptual categories, seeing particularly atypical (i.e., weak and intermediate) exemplars as more representative members of cognitive categories.

Experiment 3: Dissonance Between Power Roles and Postures Increases Category Inclusiveness

Experiment 3 sought to replicate the findings from Experiment 2 by investigating whether the contradiction between one's power role and one's posture would lead people to embrace atypical exemplars. We manipulated power role by assigning participants to either a manager or a subordinate role in a two-person puzzle-building task. We manipulated bodily state through expansive or constricted body postures.

We chose to use power for two reasons. First, there is less agreement on whether specific combinations of bodily postures or motor behaviors align tightly with specific emotions. Any single bodily posture is normally associated with more than one emotion or other nonemotional processes. For instance, upright posture is associated with positive mood (Duclos et al., 1989), pride (Stepper & Strack, 1993), and persistence (Riskind & Gotay, 1982). In contrast, there is ample evidence suggesting that body posture has a unique one-to-one relationship with powerful roles and dominant psychological states (Carney, Cuddy, & Yap, in press; Hall et al., 2005; Huang et al., in press; Riskind & Gotay, 1982; Tiedens & Fragale, 2003). Second, we wanted to demonstrate that the phenomenological experience of mind–body dissonance is not limited to emotions and can be extended to other domains.

Method

Participants and design. A total of 86 undergraduates (40 males, 46 females) were randomly assigned to a 2 (power role: high, manager vs. low, subordinate) × 2 (bodily expressed power: high, expansive vs. low, constricted) between-subjects design.

Procedure. On arrival, participants filled out a leadership questionnaire that ostensibly assigned roles in a two-person puzzle-building task (Anderson & Berdahl, 2002). While participants waited for their role assignments, we introduced a "marketing test on ergonomic chairs" that required them to sit in a computer chair in a specific posture for about 3–5 min (Tiedens & Fragale, 2003). While sitting in their specified postures, participants read their role assignment and role-specific instruction for the coordination task.

In the *expansive posture* condition, participants placed one arm on the armrest and another on the back of a nearby empty chair while crossing one leg such that an ankle rested on the thigh of the other leg. In the *constricted posture* condition,

Table 2. Mean category inclusiveness ratings in Experiment 3. Standard deviations are in parentheses

	Role + Body Posture		
	Category Inclusiveness		
	Weak Exemplars	Intermediate Exemplars	Strong Exemplars
High-Power Role/Expansive Posture	4.76 (1.19)	7.55 (1.34)	9.82 (1.01)
Low-Power Role/Constricted Posture	4.49 (1.39)	7.44 (1.30)	10.10 (0.96)
High-Power Role/Constricted Posture	5.17 (1.52)	7.67 (1.34)	10.17 (0.84)
Low-Power Role/Expansive Posture	5.67 (2.09)	7.99 (1.73)	10.14 (1.06)
Mind-Body Coherence	4.63 (1.29)	7.49 (1.31)	9.96 (0.98)
Mind-Body Dissonance	5.43 (1.83)	7.84 (1.55)	10.16 (0.95)

participants placed their hands under their thighs, dropped their shoulders, and placed their legs together.

The questionnaire feedback randomly placed participants into one of two roles. Participants in the *high-power role* were assigned to be a manager and told that they were going to direct, evaluate, and reward the subordinates in the two-person puzzle-building task. Participants in the *low-power role* were assigned to be a subordinate and told that they were going to follow the managers' direction, build the puzzle, and be evaluated and rewarded by the managers. After reading the roles, participants released themselves from the postures.

Next, they took part in a "separate" category inclusion task while the puzzle-building task was being set up. We used the same measure from Experiment 2 to determine category inclusiveness.

Results and Discussion

Separate two-way ANOVAs were conducted on the category inclusiveness ratings for each of the three types of exemplars. For weak exemplars, only an interaction effect emerged, $F(1, 80) = 5.29$, $p = .02$, $\eta_p^2 = .06$. Conceptually replicating Experiment 2, mind–body dissonance led to greater category inclusiveness ratings on weak exemplars than mind–body coherence, $t(82) = 2.35$, $p = .02$, $d = 0.51$. For intermediate and strong exemplars, neither interaction reached significance ($ps > .29$) (see Table 2 for condition means in Experiment 3).

Even though we used a radically different manipulation of mind–body dissonance from the previous experiment, we replicated the same effect on category inclusiveness. When participants were in a high-power role but a constricted posture or a low-power role with an expansive posture, they were more likely to see the weak and therefore atypical exemplars as more prototypic of a category.

Experiment 4: Mind–Body Dissonance Increases Category Inclusiveness While Decreasing Short-Term Memory

So far we have shown that mind–body dissonance, manipulated through facial expressions and emotional memories or through body postures and structure roles, leads individuals to expand their cognitive boundaries and embrace atypical exemplars. The goal of the final experiment was twofold. First, we created a third manipulation of mind–body dissonance. We used the same facial expressions from Experiments 1 and 2 but had participants listen to happy or sad music to ensure that the effects we found in Experiment 2 were not caused by any idiosyncratic features of the recall manipulation.

More importantly Experiment 4 was designed to replicate the effect of mind–body dissonance on category inclusiveness while also replicating previous work showing that mind–body dissonance decreases encoding ability and therefore impairs recall (Centerbar et al., 2008). Thus, we hoped to demonstrate two parallel effects of mind–body dissonance—expanded categories and decreased encoding ability—in the same study.

Method

A total of 43 undergraduates (16 males, 27 females) completed the same physical tasks as in Experiments 1 and 2, which manipulated bodily expression of happiness or sadness through facial displays. While holding the marker pen or bringing the golf tees together, participants listened for 5 min to one of two pieces of classical music that have been previously used to manipulate mood (Ashton-James, Maddux, Galinsky, & Chartrand, 2009). In the *happy-mind* conditions, the music was Mozart's Serenade in G, K525 Eine Klein Nachtmusik 1, Allegro. In the *sad-mind* conditions, the music was Rachmaninov's vocalize in E minor, Opus 34, No. 14.

After the mind–body state manipulation, participants were presented with brief instructions, "Please concentrate on memorizing this information as it is important for the experiment," and 18 pieces of random information about a person named "Bob" (e.g., "Bob subscribes to sports magazines"). Each piece of information was presented for 5 s, followed by a blank screen of 0.5 s.

After receiving the information about Bob, participants worked on the category inclusion task. Next, participants were given 4 min to recall as many pieces of information about Bob as they could. We stressed that they should try to recall the exact information instead of forming a general impression. Two coders blind to the conditions coded the amount of

Table 3. Mean category inclusiveness ratings and amount of information recalled in Experiment 4. Standard deviations are in parentheses

	Music + Facial Expression			
	Category Inclusiveness			Amount of Information Recalled
	Weak Exemplars	Intermediate Exemplars	Strong Exemplars	
Happy Mind/Happy Face	3.95 (1.37)	6.82 (1.55)	9.55 (1.07)	9.55 (2.62)
Sad Mind/Sad Face	4.35 (0.97)	7.15 (1.72)	9.35 (0.86)	8.60 (2.76)
Happy Mind/Sad Face	4.67 (1.08)	7.65 (1.79)	10.06 (1.34)	7.50 (3.48)
Sad Mind/Happy Face	5.43 (1.80)	7.80 (1.64)	9.53 (1.27)	6.10 (3.18)
Mind-Body Coherence	4.14 (1.19)	6.98 (1.60)	9.45 (0.96)	9.10 (2.66)
Mind-Body Dissonance	5.01 (1.47)	7.72 (1.68)	9.82 (1.31)	6.86 (3.34)

information recalled ($\alpha = .97$). Performance on the recall task was our measure of encoding ability.

Results and Discussion

Category inclusiveness. Separate two-way ANOVAs were conducted on the category inclusiveness ratings for each of the three types of exemplars. For weak exemplars, only a significant interaction effect occurred, $F(1, 39) = 4.79$, $p = .04$, $\eta_p^2 = .11$. Replicating Experiments 2 and 3, mind–body dissonance led to greater category inclusiveness ratings on weak exemplars than mind–body coherence, $t(41) = 2.13$, $p = .04$, $d = 0.65$. For intermediate and strong exemplars, neither interaction reached significance ($ps > .16$) (see Table 3 for condition means in Experiment 4).

Encoding ability. We submitted the amount of information recalled to a two-way ANOVA. Only a significant interaction effect occurred, $F(1, 39) = 5.96$, $p = .02$, $\eta_p^2 = .13$. Conceptually replicating previous research (Centerbar et al., 2008), mind–body dissonance led to fewer pieces of information being recalled than mind–body coherence, $t(41) = 2.41$, $p = .02$, $d = 0.60$.

Mind–body dissonance had two separate effects. First, replicating past research (Centerbar et al., 2008), it decreased encoding ability and impaired short-term memory. At the same time, however, it led participants to flexibly expand the boundaries of their conceptual categories. This study demonstrates two parallel cognitive consequences of mind–body dissonance: the embracing of atypicality and the disruption of encoding. The latter has negative implication for short-term memory performance, but the former can be particularly conducive to creative problem solving.

General Discussion

The current research found that mind–body dissonance creates a sense of incoherence and leads people to expand their cognitive categories to embrace atypical exemplars. Consistent with our predictions about embracing atypicality, across three experiments, having the mind and body experience contradictory states predicted category expansion on weak and therefore atypical exemplars, but it never affected responses to strong exemplars, and in two of the three experiments there was no effect on intermediate exemplars. This consistent pattern suggests that experiencing mind–body dissonance is particularly likely to lead people to embrace atypical possibilities. Importantly, this effect was produced using three different manipulations of mind–body dissonance, demonstrating the robustness of its link to expanded categories.

Our findings support the idea that people use their current phenomenological experiences or somatic states as cues or markers to what type of environment they are in and what type of cognitive approach they should take (Damasio, Tranel, & Damasio, 1991; Forgas, 2000; Izard & Tomkins, 1966; Mowrer, 1960; Schwarz & Clore, 1983, 1996; Smith & Lazarus, 1990). Similar to emotional ambivalence, where two contradictory emotions are mentally experienced simultaneously (Fong, 2006), mind–body dissonance signals that one is in an unusual environment and therefore should embrace atypical exemplars. The current findings extend Fong's (2006) work by showing that ambivalence is not captured solely within the mind but also occurs across modalities, between the mind and face and the mind and body, and by demonstrating that mind–body dissonance is not limited to emotions but extends to other constructs such as power.

Future Directions

Given that mind–body dissonance and its link to category expansion is a novel phenomenon, there are many avenues for future research. First, research should examine the underlying mechanism for the relationship between mind–body dissonance and category expansion. In the introduction, we proposed that, consistent with mood-as-information theory (Clore, Schwarz, & Conway, 1994; Schwarz & Clore, 1983, 1996) and the somatic marker hypothesis (Damasio et al., 1991), the phenomenological experience of incoherence associated with mind–body dissonance may activate a need to think in an atypical way. In addition, mind–body dissonance may be a more arousing and activating state (De Dreu et al., 2008), which might have generated the category expansion effect we have observed.

Furthermore, as we mentioned in the introduction, mind–body dissonance appears only in older children and adults, driven by both biological maturation and the fact that the social situations become more complex over time. However,

the more individuals are experienced or practiced in enduring mind–body dissonance (e.g., actors, politicians, or customer service employees who display, on a daily basis, bodily expressions that do not necessarily reflect their mental states), the less likely they might be to benefit from its category-expanding effect because this state will no longer be atypical. Future research should explore whether individuals who constantly experience mind–body dissonance are indeed less likely to demonstrate the category-expanding effect we have demonstrated here.

When people express emotions that contradict their internal states, the expression may increase their attention toward emotional experiences and displays more generally. That is, mind–body dissonance may lead individuals to attend to others' emotional states. This is highly plausible given the role that facial simulation and mirror neurons play in the understanding of others' emotions (Dapretto et al., 2006; Zajonc, Murphy, & Inglehart, 1989). We suspect that maintaining two contradictory states not only inspires a particular motivational state but also may enhance individuals' perspective-taking tendency. They may be able to look at the world from the perspective of others, identify their emotional states more accurately, and empathize with a greater variety of emotional states. It may also lead people to appreciate mind–body dissonance in others and appreciate when someone is expressing happiness despite feeling sad on the inside. Future research is needed to explore this possibility.

Conclusions

The current experiments found that people expand their conceptual categories to embrace atypical possibilities when the mind and body experience opposing states. Our research suggests that the body is a key element in the advancement of the humankind, not only through physical labor but also through the embodiment of cognitions and emotions. Indeed, the ability of humans to display bodily expressions that are separate from and contradict mental experiences may be an important foundation in allowing humans to embrace and accept atypical ideas. Our evidence suggests that such an intrapsychic clash allows individuals to be less constrained by their typical mental framework, leading them to expand their cognitive boundaries to consider atypical possibilities.

The current findings also shed light on the mind–body conundrum. By finding that mind–body dissonance is an incoherent experience that leads individuals to embrace atypicality, the current data suggest that the mind and body reinforce each other in reciprocal ways. The inseparability of the mind and body is represented not only by their effect in reinforcing each other to shape a coherent experience of reality but also by the atypical associations generated by their disagreement.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interests with respect to the authorship and/or publication of this article.

Financial Disclosure/Funding

The author(s) disclosed receipt of the following financial support for the research and/or authorship of this article: The research described in this paper was supported in part by a grant to the first author from the American Psychological Association.

Note

1. The concept of mind–body dissonance is related to *affective coherence*, where "experienced affective reactions (such as feelings or other bodily experiences, including approach or avoidance behaviors, and affective expressions) validate coexisting activated affective concepts" (Centerbar, Schnall, Clore, & Garvin, 2008, p. 561). Affective incoherence corresponds to variance between different types of emotional experiences and activated emotional constructs. We use the term *mind–body dissonance* because it captures the true essence of the phenomenon that we investigate in the current research: (a) It locates the source of the conflict, (b) it specifies that the bodily expression directly opposes or conflicts with the mentally experienced state, and (c) it encompasses any situation in which the mind and body contradict each other, including emotions and power.

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