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Metaphor in Judgment and Decision Making

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“I say, block those metaphors. America’s economy isn’t a stalled car, nor is it an invalid who will soon return to health if he gets a bit more rest. Our problems are longer-term than either metaphor implies. And bad metaphors make for bad policy,” wrote Nobel-winning economist Paul Krugman in his New York Times column (2010, p. A25). Why would bad metaphors make for bad policy? Can metaphors shape how people think about the issues at hand and how they decide to fix them?

Neither traditional theories of metaphorical thought nor standard approaches to decision making would suggest so. However, key assumptions underlying both of these perspectives have been challenged by recent experimental findings. We begin by briefly outlining the traditional perspectives and the recent challenges. We propose why metaphors should affect decision making in predictable ways. We then review experimental findings that document profound effects of metaphors on decision making across a variety of economic, consumer, and social domains. We conclude by discussing their theoretical implications and identifying promising directions for future research.

Traditional and Current Perspectives on Metaphor in Thinking and Decision Making

Does Metaphor Matter For Thinking?

Traditional western philosophy, linguistics, and related cognitive sciences viewed metaphorical language as something of imaginative and extraordinary use. It may be employed by poets and playwrights (and perhaps some columnists) for decorative and artistic purposes but it bears little if any relation to ordinary thinking. From this perspective, metaphorical language is peripheral rather than central to thought (see Gibbs, this volume).

Lakoff and Johnson (1980) challenged this view by highlighting the systematic patterns underlying metaphorical expressions and their pervasive, mostly unconscious use in everyday language. Such systematicity and pervasiveness, they argued, would be unlikely if metaphorical language was nothing more than fancy talk invoked idiosyncratically on limited occasions. Their cognitive linguistics analysis assumed that “since communication is based on the same conceptual system that we use in thinking and acting, language is an important source of evidence for what that system is like” (p. 3). Through the window of linguistic patterns, their view of the conceptual system was strikingly different from tradition. They proposed that the conceptual system itself is metaphorical. Thought about abstract domains (e.g., morality, love) is guided by the schematic and inferential structures of relatively concrete domains (e.g., cleanliness, journey) that involve more direct bodily experience with the physical world. Although the linguistic evidence supporting this argument is sizeable and provocative, others warned

that linguistic patterns only indirectly bear on mental processes—language and thought are different things (e.g., Murphy, 1996, 1997).

Going beyond the limits of linguistic analyses, a rapidly growing body of experimental research provides persuasive evidence for the role of metaphors in human thought. It shows that even subtle, incidental bodily experiences can unconsciously affect thought about metaphorically related targets (for recent reviews see Barsalou, 2008; Landau, Meier, & Keefer, 2010; Williams, Huang, & Bargh, 2009). This work produced many surprising and memorable effects that would not have been predicted a few years ago. More important, the findings highlight the role of bodily experiences in a variety of psychological processes, from basic attention and memory to social perception, attitude, inference, and judgment. How a given bodily experience affects a psychological outcome can typically be predicted on the basis of metaphorical associations, though the specific mechanisms remain a matter of debate (cf. Anderson, 2008; Barsalou, 2008; Lakoff & Johnson, 1999).

Does Metaphor Matter For Decision Making?

That incidental bodily experiences affect how people *think* about metaphorically associated targets does not necessarily imply that they also affect how people *act* and *decide*. In classic rational choice approaches and their derivatives, actions and decisions are based on the expected utility of an outcome (e.g., Becker, 1976; Elster, 2006; Fishbein & Ajzen, 1975). Some bodily experiences are directly relevant to the expected utility of a choice alternative, as when hunger and thirst increase the utility of food and drink. Bodily experiences that are merely metaphorically relevant to the choice alternatives should exert no influence.

But as numerous studies have demonstrated, how people think and behave are strongly driven by their mental construal of the choice alternatives and the situation in which they are embedded (e.g., Lichtenstein & Slovic, 2006; Schwarz, 2007, 2009; Smith & Conrey, 2007; Smith & Semin, 2004). In many contexts of judgment and decision making, social and moral concerns like fairness and altruism (e.g., Fehr & Gächter, 2005; Fehr & Schmidt, 1999; Rabin, 1993) play a more influential role than has long been assumed, as do motivation, self-regulation, and actual or illusory control (e.g., Higgins, 2012). Importantly, these notions tend to be constructed and comprehended metaphorically in terms of bodily experiences, from morality (*dirty* behavior) and sociability (*warm* person) to fairness (*even-handed*) and self-control (see Schnall, Zhong, this volume). Furthermore, the language of evaluative judgment brims with metaphors, as shown by the impartiality of *balanced* judgments and the importance of *weighty matters*. Such observations suggest that metaphors may play an important role in how people mentally

construe the decision task, from their perception of the choice alternatives and the outcomes they afford to the social context in which the decision is situated.

From this perspective, incidental bodily experiences may activate metaphorically associated thoughts, goals, and feelings that pervade the construal of a decision: How attractive are the choice alternatives? Are the benefits worth the cost? Is my negotiation partner trustworthy? Is luck on my side? Do I have what it takes to pull this off? The underlying processes of mental construal are familiar from research on knowledge and goal accessibility (for reviews, see Bless & Schwarz, 2010; Förster & Liberman, 2007; Higgins, 1996; Schwarz, 2009). An embodied and metaphorical approach adds that mental representations are multi-modal instead of amodal (Barsalou, 1999, 2008) and hence can be activated through diverse sensory experiences; moreover, knowledge associations can be not only literal but also metaphorical. To date most demonstrations of metaphorical effects on judgment and decision making seem to occur through this process—bodily experiences activating metaphorically associated thoughts, goals, and feelings—but other processes are likely to exist as well. We will revisit this issue of multiple processes and elaborate its implications after reviewing some illustrative evidence.

Embodied Metaphors Affect Mental Construal

People are social (Fiske, 2004) and moral beings (Haidt & Kesebir, 2010), and both aspects figure prominently in how people make decisions. Human thought about sociality and morality is highly metaphorical, with many attributes conceptualized in terms of bodily interactions with the physical world (see Schnall, Zhong, this volume). As such, incidental bodily experiences that cue metaphorically associated meanings should be able to change how people make decisions. Empirically, it is true across economic, consumer, and social domains.

Metaphorical Cues with Social Meanings

Fishy and suspicious. Linguistic analyses (Soriano & Valenzuela, 2008) indicate that social suspicion is metaphorically associated with the sensory experience of smell in at least 18 languages, including Arabic, Chinese, English, French, German, and Spanish. However, the specific odor differs by language, suggesting a universal conceptual metaphor with culture-specific instantiations. In English, the relevant odor is *fishy*. Can smelling something fishy make people suspicious and unwilling to engage in trust-based investment in a joint venture or in a common cause?

To test this possibility, we (Lee & Schwarz, in press, Study 1) had an experimenter spray fish oil, fart spray, or odorless water at a corner area in a campus building. Another experimenter, blind to the

smell condition, approached students in a different area and invited them to participate in a one-shot trust game (Berg, Dickhaut, & McCabe, 1995) with another “participant,” who was actually a confederate. They walked over to the smell-manipulated corner area, where each received 20 quarters (\$5) and an investment form with instructions and response space. The true participant was always approached first and thus designated as decision-maker A (the sender), who could freely decide how much money to send to decision-maker B. Any amount sent would be quadrupled in value, and decision-maker B could then decide how much to send back to decision-maker A. Hence, if A trusts B to reciprocate the favor, A should send more money, thus quadrupling what is available for later distribution. If A suspects, however, that B may not be trustworthy, A is better off by sending less. As expected, participants exposed to incidental fishy smells sent significantly less money (\$2.53 of their \$5 endowment) than those exposed to fart spray (\$3.38) or odorless water (\$3.34). The amount sent did not differ significantly between the last two conditions, indicating that the metaphorical effect was not driven by generic valence. This “fishy effect” was replicated in a second study using a one-shot public goods game (Ledyard, 1995), where people should be less likely to invest in a pool of shared resources if they suspect their partners might not carry their share of responsibility. Again, smelling something fishy rather than farty or odorless led participants to contribute less money to the public good.

These studies highlight that incidental exposure to a subtle smell with metaphorical meaning is sufficient to elicit suspicion about the motives and trustworthiness of one’s partners, with adverse effects on cooperative behavior. The effect is not driven by the generic valence of the sensory experience but by its specific metaphorical associations, as the comparison between fishy and farty smells suggested. Participants’ debriefing reports revealed no conscious awareness of the smell and its influence.

We also tested for the reverse direction of influence: Would feeling suspicious influence participants’ perception of incidental fishy smells? As expected, inducing social suspicion improved participants’ ability to correctly identify fishy smells (Lee & Schwarz, in press, Study 3) and heightened their sensitivity to the presence of faint fishy smells in a signal detection paradigm (Study 7). Both of these effects were specific to the metaphorically related smell *fishy* and not observed for other smells, which lacked a metaphorical relationship with suspicion. Additional experiments indicated that social suspicion exerts its influence on the perception of fishy smells by activating metaphorically associated concepts related to *fishy* (Studies 4-6). Next, we consider embodied metaphors that can increase trust.

Warm and trustworthy. People who are “*warm and caring*” are those we can trust. Surprisingly, the impression that someone has a warm personality can be induced by incidental experiences of

physical warmth. Merely holding a warm rather than cold object (e.g., a cup of warm vs. iced coffee) can lead one to perceive another's personality as warmer (Williams & Bargh, 2008, Study 1) and to act in socially warm and caring ways (e.g., choosing a reward for a friend rather than for oneself; Study 2). Consistent with this metaphorical association between physical and social warmth, Kang, Williams, Clark, Gray, and Bargh (2010) found that incidental physical warmth can also increase trust in cooperation games. Their participants first held and evaluated either a warm or cold temperature pack, and then played 15 rounds of a trust game (Berg et al., 1995). Each round ostensibly involved a different partner, but in fact all "partner" responses were computer-generated. As predicted, participants who had held a warm rather than cold pack invested more money in the trust game (Kang et al., 2010, Study 1). The size of this effect depends on the constraints imposed by the choice alternatives (Study 2), highlighting the need to test for the robustness of metaphorical effects on decisions with varying degrees of constraint in natural contexts.

Hard and unyielding; rough and adversarial. Whereas *warm* people are trustworthy, people who are *rough* or *hard* seem less inviting, and interacting with them elicits corresponding behaviors on the perceiver's side. The incidental experience of tactile hardness or roughness turns out to be sufficient to elicit the same behaviors. Exploring the metaphorical meaning of hardness, Ackerman, Nocera, and Bargh (2010, Study 6) had participants imagine shopping for a new car, making an offer to the dealer, being rejected, and having to make a second offer. Depending on condition, participants were sitting in a hard wooden chair or a soft cushioned chair. As predicted, those sitting in a hard chair receded less from the first to the second offer. Apparently, they held a *harder* line in negotiation. Follow-up work (Cherkasskiy, Song, Malahy, & Bargh, 2012) also found that sitting in a hard rather than soft chair while reading criminal scenarios led people to recommend harsher sentences.

In a conceptually similar study, Ackerman et al. (Study 3) observed that touching rough materials increased the perception that a social interaction is rough and adversarial. Building on this finding, they asked participants in a decision experiment (Study 4) to complete a puzzle with pieces that were either smooth or covered in rough sandpaper. Next, participants played an ultimatum game (Güth, Schmittberger, & Schwarze, 1982). They received ten tickets for a \$50 lottery and decided how many to give to an anonymous (bogus) participant, who supposedly would decide whether to accept the offer (allowing both decision-makers to keep their respective allocations) or to reject it (in which case both decision-makers would get nothing). As predicted, participants who had played with a rough rather than smooth puzzle offered more tickets in the ultimatum game, presumably to ensure acceptance of their offer in the context of a potentially *rough* interaction.

Metaphorical Cues with Moral Meanings

Morality is a central domain of social thought, and a variety of different metaphors has been found to ground moral thought in embodied experience (Lakoff & Johnson, 1999; Schnall, this volume). For example, virtuous people have a *clean* conscience and walk in the *light*. Can these bodily experiences—feeling clean or seeing light—serve as metaphorical cues that promote honorable decision making against self-interest?

Moral and physical purity. People respond to moral transgressions with disgust, an emotion otherwise associated with exposure to physical contaminants from open wounds to spoiled food (e.g., Curtis, Aunger, & Rabie, 2004; Lee & Ellsworth, 2012). The parallels in response range from subjective feelings and facial expressions to overlapping neural network activities. They are also apparent in language use, from the Psalms' (24:4) notion of “clean hands and a pure heart” to everyday references to “dirty hands” or a “dirty mouth” (for a review, see Lee & Schwarz, 2011). Testing the behavioral consequences of these metaphorical associations, Zhong and Liljenquist (2006) found that immoral thoughts increased the appeal of cleaning products. Merely copying a story about someone else's unethical rather than ethical behavior was sufficient to make cleaning products more desirable (Study 2), and participants who had to recall their own immoral rather than moral acts were more likely to choose an antiseptic wipe as a gift (Study 3). As in the physical domain, the desire to cleanse is specific to the contaminated body part. Participants who were induced to sin with their mouth by conveying a lie on voicemail preferred mouthwash over hand sanitizer; conversely, those induced to sin with their hands by conveying the same lie on email preferred hand sanitizer over mouthwash (Lee & Schwarz, 2010a). Just as rinsing your mouth would not help after getting your hands dirty, rinsing your mouth also does not help after doing something unethical with your hands. These parallel responses to moral and physical contamination illustrate the extent to which moral thought draws on mechanisms of disgust that evolved to keep us away from sources of physical contamination (Lee & Schwarz, 2011; Schnall, this volume).

Applying these insights to the legal domain, Bilz (2012, Study 3) found that law students who did rather than did not have to use “dirty evidence” in a mock trial were more likely to choose a bottle of hand-sanitizer over a pen as a free gift. Going beyond the effect of disgust on preference and choice, Zhong and Liljenquist (2006, Study 4) further demonstrated that using a cleaning product can reduce feelings of guilt and the need to make amends. After recalling a moral transgression, 74% of their participants volunteered time to help another researcher, yet simply cleaning their hands with an antiseptic wipe reduced volunteerism to a mere 41%.

Whereas these studies illustrate that immoral acts are experienced as “dirty” and elicit a desire to cleanse, other studies show that cleanliness can facilitate adherence to moral standards. For example, Liljenquist, Zhong, and Galinsky (2010) hypothesized that clean scents might promote adherence to moral codes such as reciprocity and charity in the context of economic decisions. Each participant played a one-shot trust game (modeled after Berg et al., 1995) with a (bogus) partner in a room that either was or was not sprayed with citrus-scented Windex. The participant was told that she was randomly assigned to be the receiver and that her partner (the sender) had decided to send her the full amount of \$4, now tripled to \$12. As it turns out, participants in the clean-scented room returned more money to the partner, exhibiting greater reciprocity (Study 1). Participants in the clean-scented room were also more likely to volunteer for and donate money to a nonprofit organization, acting more charitably (Study 2).

Walking in the light. Zhong, Bohns, and Gino (2010, Study 2) explored the metaphorical association between having a dark view and making a morally questionable decision. Under the guise of a product test, participants received either a pair of sunglasses or clear glasses to test-wear while completing a supposedly unrelated task, namely, a one-shot dictator game (modeled after Kahneman, Knetsch, & Thaler, 1986). In the dictator game, the participant was given \$6 to freely allocate between himself and the recipient, and was told that he could keep any money he did not offer to the recipient for himself. All interactions were computer-mediated and, unbeknownst to the participant, the experimenter played the recipient. As predicted, participants wearing sunglasses rather than clear glasses offered less money and their offers fell below the point of fair division (\$3). Thus, the subjective experience of darkness, induced by wearing sunglasses, created an illusory sense of anonymity (Study 3) and set the stage for shady economic decisions.

Other Metaphors

The examples so far reveal how incidental bodily experiences can affect judgment and decision making in line with widely shared metaphors about sociality and morality. Of course, metaphors are not limited to these domains of human experience. The next few examples, on what feels important and how people exert control over their lives, illustrate how wide-ranging metaphorical effects can be.

Heavy and important. When describing a decision process, we may note that some considerations *carry more weight* than others, reflecting a metaphorical association between physical weight and conceptual importance or impact. A number of studies highlight the power of this metaphor by showing that things seem more important, and exert more influence, the heavier they weigh in our

hands (Jostmann, Lakens, & Schubert, 2009; Schneider, Rutjens, Jostmann, & Lakens, 2011; Zhang & Li, 2012). For example, Ackerman et al. (2010, Study 2) asked participants by how much the government should increase or decrease funding for various social issues. When the questionnaire was presented on a heavy clipboard, participants chose to allocate more money than when it was presented on a light clipboard. However, this effect was limited to issues that participants were likely to know about (e.g., air pollution) and not found for less familiar issues (e.g., regulation of the frequency bands for radio broadcast). This boundary condition seems surprising because one might expect incidental cues to exert *more* influence the less other information people have about the issue; if this was true, decisions about unfamiliar (rather than familiar) issues should have been *more* affected by incidental cues.

Subsequent research by Chandler, Reinhard, and Schwarz (2012) shed light on the underlying reason by revealing a possible process. In three studies, they observed that a book was evaluated as more important and influential when its heft was increased by a concealed weight. However, this metaphorical effect of weight was only observed for participants who knew something about the book, either because they had read it (Studies 1 & 2) or because they could peruse a short synopsis (Study 3). Apparently, the metaphorically relevant weight cue provided an initial hypothesis (“this seems important”), which participants subsequently tested against other information. Only when they could muster supporting evidence did they endorse the book’s importance. Hence, factual knowledge does not necessarily protect us against the effect of incidental cues; it may increase our susceptibility. From this perspective, in Ackerman et al.’s (2010) study the clipboard’s weight may have increased fund allocation when participants could muster some supporting information but not otherwise, giving an advantage to issues they knew something about. An important future direction is to test whether this logic applies to other metaphorical effects. For example, would fishy smells (Lee & Schwarz, in press) be more likely to undermine trust and cooperation when decision-makers can recruit some information about their partner or the situation to support their suspicion? Would physical warmth (Williams & Bargh, 2008) only render another person socially warmer when the perceiver can find some information that is compatible with this first impression?

Firming willpower (self-control). To many people, decisions about what kinds and amounts of food to consume pose an everyday self-control challenge: gustatory pleasure at the table and weight gain on the scale, or bland food now and better health later? Forgoing the immediate pleasure for the long-term health goal often requires firming one’s willpower.

Hung and Labroo (2011) tested whether, why, when, and for whom the bodily experience of firming muscles has the metaphorical benefit of firming willpower and promoting healthier food choices.

In a lab study (Study 3), participants first completed a sentence-unscrambling task that either did or did not prime health goals. Then they were given a nasty, sour-tasting health tonic to test-drink and were asked to report their online thoughts between sips. Meanwhile, under the pretense of motor skills assessment, they had to maintain a given posture that required either lifting the heels off the floor by contracting the calf muscles or simply keeping the feet on the ground. As expected, firming one's muscles increased tonic consumption (by a surprising 67%) relative to not firming one's muscles, and this effect was partially mediated by more willpower-related thoughts. Importantly, these effects were observable only if health goals had been primed, suggesting that firm muscles facilitate self-control in goal pursuit and exert no influence in the absence of a relevant goal.

Moving to a field setting (Study 4), they also found that simply holding a pen between stretched fingers (rather than holding it loosely between index and middle fingers) increased the purchase of healthy food and drinks at a snack bar. This effect was observable only for participants with chronic health goals, but not for participants with chronic indulgence goals, again indicating that firmed muscles facilitate the pursuit of active goals. In a final lab study (Study 5), participants who contracted their biceps showed more disapproval of a scenario character's unhealthy food choice (chocolate cake) and were more likely to make a healthy food choice for themselves, picking an apple rather than chocolate to consume. These effects on vicarious and own food choices were observable only if muscle-firming occurred during a self-control scenario related to food choice, not if muscle-firming occurred during a prior self-control scenario unrelated to food choice (the scenario was about resisting boredom). This set of studies shows that as long as health goals are temporarily or chronically accessible, firming muscles while making food choices can firm willpower and promote healthy eating.

Washing away past good or bad luck and other residue (illusory control). Good or bad luck is the target of many superstitious behaviors (Vyse, 1997). People believe that luck can "rub off" when they touch lucky individuals or objects (Radford & Radford, 1949). Athletes and gamblers on a winning streak keep wearing their "lucky" shirts and socks, but prefer changing their clothes when they are on a losing streak (Bleak & Frederick, 1998; Gmelch, 1974). Such superstitions suggest that people think about luck as a contagious substance (Rozin & Nemeroff, 1990) that can be transferred through physical contact and removed through physical cleansing.

To test this possibility, Xu, Schwarz, and Zwick (2012, Study 1) had participants recall either a lucky or unlucky financial decision and asked them to describe what happened and how they felt. Next, participants were handed an antiseptic wipe as part of an allegedly unrelated product evaluation task. Depending on condition, they either examined it only or tested it by wiping their hands prior to

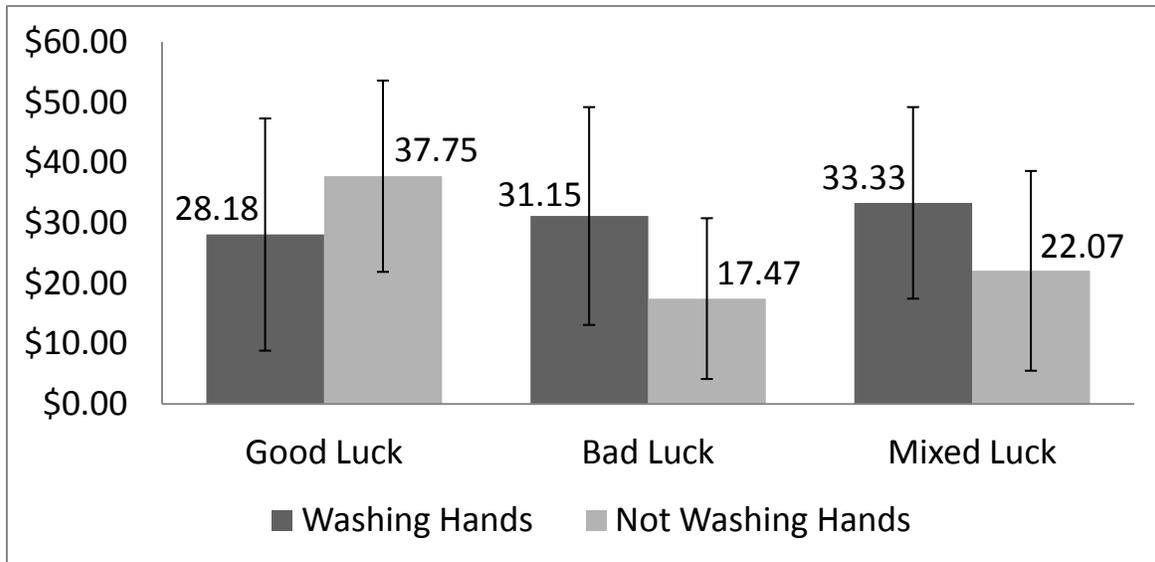
providing a product evaluation. Finally, participants assumed the role of a CEO as part of a third task and decided between a high-risk and a no-risk business option. As expected, those who had initially been assigned to recall a lucky financial decision took more risk in the business context than those who had to recall an unlucky financial decision. However, this effect was observed only for participants who merely examined the antiseptic wipe; the effect was fully eliminated for participants who actually used the wipe. Apparently, wiping hands removed the residues of previous luck, making the previously lucky participants more cautious and the previously unlucky ones more adventurous.

The same effect was observed when participants gambled with their own money (Study 2). Specifically, participants initially gambled for several rounds before they were asked to participate in a product test involving an organic soap. Some participants merely examined the soap prior to evaluating it; others tested it by washing their hands. Subsequently, participants played a final round of the gamble during which they could bet as much as they wanted. As expected, those who had been on a winning streak in the first few rounds of gambling bet the most in the final round, whereas those who had been on a losing streak bet the least. Participants who had experienced some wins and some losses fell in between these extremes, though their losses loomed larger than their gains (consistent with prospect theory; Kahneman & Tversky, 1979). More important, this influence of prior good or bad luck was observed only among participants who merely examined the soap, but was eliminated among those who washed their hands (see Figure 1). In both studies, physical cleansing metaphorically removed the residues of one's previous good or bad luck and its impact on subsequent risk-taking behavior.

Taking this reasoning to the domain of academic performance, Kaspar (2012) found that participants who washed their hands after failing a test became more optimistic about their future performance on a related task. Unfortunately, this optimism undermined their motivation to exert effort and thus impaired their subsequent actual performance—wiping off a bad past is not always a good thing.

In combination, these studies highlight that physical cleansing can remove more than one's sins. It can remove many other residues of the past, from good or bad luck to doubts and bad feelings, metaphorically *wiping the slate clean* (Lee & Schwarz, 2011). We will return to this issue in the next section. Moreover, the psychological impact of physical cleansing is not limited to things that people want to wash away. When given a choice, people want to remove the residues of negative experiences and avoid removing the residues of positive ones (Lee & Schwarz, 2010a)—but once they do cleanse, it also removes residues they would rather keep, including the glow of good luck (Xu et al., 2012) and positive life events (Lee, Schwarz, & Shaw, 2011).

Figure 1. Amount of bet as a function of previous luck and hand-washing (Xu, Zwick, & Schwarz, 2012, Study 2). Error bars represent standard errors.



Embodied Metaphors Affect Decision Processes

The metaphorical effects reviewed so far can be conceptualized by assuming that incidental bodily experiences activate metaphorically associated thoughts, goals, and feelings, which enter the mental construal of the situation at hand, from the nature of one's choice alternatives and the trustworthiness of one's interaction partner to the assessment of one's mental resources and concerns about one's luck. To date research has mostly focused on establishing the existence of such metaphorical effects and has paid limited attention to the underlying processes (Meier, Schnall, Schwarz, & Bargh, in press). The available evidence is even more limited for another category of metaphorical effects: Incidental bodily experiences may trigger metaphorically associated *procedures* that influence how people go about making a decision. Next, we review the preliminary evidence for this type of effect.

Washing Away Postdecisional Dissonance

As noted earlier, physical cleansing has powerful and surprising metaphorical effects, allowing people to wash away their sins (Zhong & Liljenquist, 2006) and remove other residues of past

experience such as good or bad luck (Xu et al., 2012) and failure on a test (Kaspar, 2012). Indeed, metaphorical expressions about cleansing are not limited to issues of moral purity. If songs and sayings are any guide to lay thinking, phrases such as *wiping the slate clean* and *wash away my trouble, wash away my pain* (in “Shambala”) suggest that the psychological effects physical cleansing may not be limited to the domain of moral purity. Instead, physical cleansing may *wipe the slate clean* in a more general sense, allowing people to metaphorically remove residues of past experience (Lee & Schwarz, 2011).

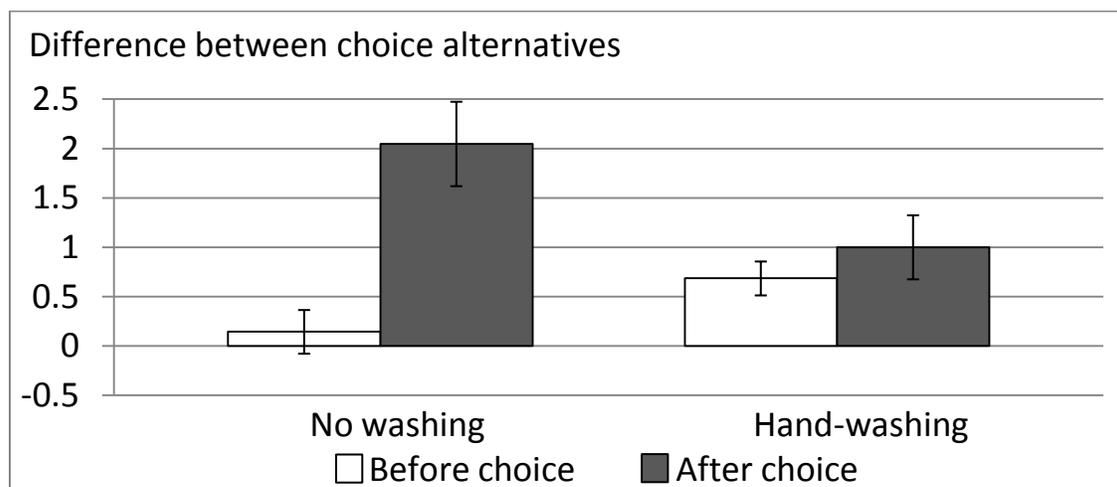
If so, decision-makers may be able to remove concerns about their previous choices with the help of a little soap. As seen in numerous cognitive dissonance studies (Festinger, 1957; for recent developments, see Cooper, 2007), the choices we make can profoundly affect later judgment and behavior. To test whether dissonance effects can be eliminated through physical cleansing, we (Lee & Schwarz, 2010b, Study 1) asked participants to rank 10 CDs in order of preference. Next, they were offered a free choice between two CDs that they had ranked as similarly and moderately attractive. Immediately after choosing which of the two CDs they wanted to take home, participants were asked to help with an unrelated product test; depending on condition, they evaluated a bottle of hand soap by merely examining or actually using it. Finally, participants provided another ranking of the 10 CDs based on their current feelings.

In this free choice paradigm (Brehm, 1956), people tend to justify their choice by changing their perception of the choice alternatives: After having made a choice, they perceive the chosen alternative as more attractive than they did before and the rejected alternative as less attractive than they did before. This increases the perceived difference between the alternatives, putting any doubt about one’s choice to rest. As expected, this classic postdecisional dissonance effect replicated when participants merely examined the soap without washing their hands, but it was eliminated when participants did wash their hands (Figure 2). Apparently, they had washed away their postdecisional dissonance and had no further need to justify their choice. In a conceptual replication (Study 2), participants who merely examined an antiseptic wipe after choosing between two fruit jams expected their chosen jam to taste better than the rejected one; actually using the wipe again eliminated this dissonance effect.

De Los Reyes and colleagues (2012) replicated the clean slate effect on postdecisional dissonance, using confidence in the quality of chosen and rejected pens as dependent measures. They also explored individual differences and found that wiping hands eliminated postdecisional dissonance only for participants who scored low on a composite measure of intolerance of uncertainty, rumination, and generalized anxiety, but not for participants who scored high on this measure. They noted that such

individual differences in clean slate effects might hold promise for identifying impulsive decision-makers and for differential diagnosis. We see a broader need for research on personal and situational variables such as rational vs. experiential thinking (Epstein, Pacini, Denes-Raj, & Heier, 1996) and abstract vs. concrete construal (Trope & Liberman, 2010) that may facilitate or impair people's ability to distance themselves from past decisions with the aid of physical cleansing. Identifying these variables may illuminate some of the potential complexity of metaphorical effects and the underlying mental processes.

Figure 2. Postdecisional dissonance after hand-washing or no hand-washing (Lee & Schwarz, 2010, Study 1). Higher values indicating higher preferences for the chosen alternative. Error bars represent standard errors.



Attaining Balance Through Compromise Choice

Another classic phenomenon in the decision making literature is compromise choice (e.g., Simonson, 1989). In a simple choice set involving three options that vary on two attributes, such as price and quality, the choice share of the compromise option (medium price and medium quality) should increase when people find both attributes important. Attributes are ideas, and ideas are metaphorically referred to as objects that one can give, take, or hold (e.g., *let me give you a better idea, don't steal my idea, I can't quite grasp it, catch this*; Lakoff & Johnson, 1980). Objects have weight, and weight is used metaphorically to conceptualize importance (e.g., *that's a heavy topic, his opinion carries weight*). Therefore, giving weight to an idea renders it important—not just as a metaphorical statement, but also with behavioral consequences, as reviewed earlier. If giving weight to one idea renders it important, giving weight to two ideas should render both important. Accordingly, a bodily state that involves

holding two ideas in hand and giving weight to both may have such a procedural effect as assigning similar weights to two attributes, thereby increasing compromise choice.

How may this bodily state look like? The balancing gesture is a prime candidate. It has two aspects: (1) with the palms facing up, objects or ideas can sit on the hands; (2) with the two hands moving alternately up and down, the two objects or ideas are given similar weights (“on the one hand, this attribute matters; on the other hand, that attribute matters too”). This analysis also suggests that deviations from either aspect would rob the gesture of its balancing meaning. If the palms are facing down, objects or ideas cannot sit on the hands. If the two hands are stationary, the two objects or ideas are not given similar weights. Does the balancing gesture really encourage compromise choice? If so, does either deviation eliminate its effect?

To answer these questions, we (Lee & Schwarz, 2012, Study 3) conducted a study allegedly about multi-tasking, where participants were asked to maintain a specific gesture for 20 seconds while reading two sets of product descriptions (adapted from Drolet, Luce, & Simonson, 2009). Depending on condition, the experimenter demonstrated one of three gestures: (1) moving both hands alternately up and down with palms facing up or (2) facing down, or (3) holding both hands palms-up and stationary. The first product set included three barbeque grills: one large size/heavy weight, one small size/light weight, and one medium size/medium weight (compromise option). The second set included three stereo speakers: one high power/high price, one low power/low price, and one medium power/medium price (compromise option). Right after the “multi-tasking” phase, participants marked which grill and speaker they would like to buy. As expected, participants who moved their hands palms-up made more compromise choices than those who moved their hands palms-down or those who held their hands palms-up and stationary, with no significant difference between the last two groups. Other studies using the same manipulations also found that the balancing gesture resulted in more balanced time allocations to work and leisure activities (Study 2) and heightened the perceived importance of having “balance in life” (Study 1).

In sum, a gesture that metaphorically weighs what is on one hand against what is on the other hand can increase compromise choice and balanced time budgeting, probably due to the activation of a balancing procedure. Both of the metaphorical bases of this gesture, palms up and hands moving, are necessary for the metaphorical effect to occur.

Implications and Future Directions

Just a few years ago, it would have been absurd to predict that smelling something fishy could

reduce monetary investment in trust-based exchanges, that sitting in a hard chair could lead one to hold a harder line in negotiations, or that firming one's muscles could firm one's willpower in making healthier food choices. But the past few years have seen a rapidly growing list of such metaphorical effects, cutting across economic, consumer, and social domains of judgment and decision making. These effects are often counterintuitive and surprising, ensuring considerable attention. They are also theoretically significant by shedding new light on the embodied and situated nature of human cognition and by adding to the multitude of ways in which human decision making deviates from normative models of rational choice.

Having established that incidental bodily experiences can reliably affect judgment and decision making in ways that are consistent with their metaphorical meanings, it is time to go beyond mere demonstration and begin unpacking the processes. In doing so, we will most likely learn that multiple processes contribute to the growing list of bodily influences.

1. Direct, non-metaphorical effects. Incidental bodily experiences can directly serve as information that people use like any other experiential information (Schwarz, 2012). Familiar examples are the informative functions of physiological arousal (Zillman, 1978), head movement (Wells & Petty, 1980), and proprioceptive feedback from facial expressions (Strack, Martin, & Stepper, 1988). These effects require no metaphorical meanings. They occur presumably because in daily life nodding tends to correlate with agreement and smiling with amusement, so over time the sensorimotor experiences pick up the ability to produce the same effects in their own right.

2. Metaphorical effects on mental construal of the decision situation. Incidental bodily experiences can activate metaphorically associated thoughts, goals, and feelings to affect how people construe the situation at hand. Most of the findings we reviewed can be conceptualized as reflecting differences in the mental construal of various aspects of the decision situation, such as the task's nature, the choice alternatives, one's resources, and the likely behavior of one's partner. This conceptualization integrates metaphors research with traditional themes of social cognition such as knowledge and goal activation (e.g., Förster & Liberman, 2007; Higgins, 1996) and mental correction (Bless & Schwarz, 2010; Wilson & Brekke, 1994). While we realize that many embodiment researchers prefer conceptualizations that break with these traditional models, much can be learned from exploring the links between metaphor effects and robust phenomena of social cognition research. For example, basic principles of knowledge activation and use (Higgins, 1996) predict that metaphorical effects are mediated by the accessibility of metaphorical knowledge and moderated by its applicability to the target; both predictions receive empirical support (Lee & Schwarz, in press). Furthermore, metaphorical cues seem

to affect judgment only if one can recruit some pertinent knowledge about the target (Chandler et al., 2012), again consistent with familiar phenomena of confirmatory hypothesis testing.

A theoretical cross-fertilization with social cognition theorizing does not diminish the novelty and significance of metaphorical effects. To illustrate, consider that actual cleansing (Zhong & Liljenquist, 2006) or visualizing oneself as cleansed (Zhong, Strejcek, & Sivanathan, 2011) has been shown to attenuate one's guilt and make one feel morally pure and righteous, whereas simply being primed with purity concepts without cleansing does not produce the same effects (Lee & Schwarz, 2011). Apparently, for some metaphorical effects, merely making the concepts accessible may be insufficient; the action requirements need to be fulfilled. In fact, merely making the concepts accessible may even backfire because thinking about purity without a chance to cleanse may increase one's sense of impurity, a possibility that awaits testing. Contrast this with the fishy findings (Lee & Schwarz, in press), where the presence of fishy smells is sufficient to produce metaphorical effects on social suspicion, much as the accessibility of trait concepts is sufficient to affect the encoding of person descriptions (e.g., Higgins, Rholes, & Jones, 1976; Srull & Wyer, 1979). The critical factor to explore may be what sensation or motor action is implied by the metaphor of interest. To be clean, one typically needs to cleanse. To smell something fishy, one simply needs to smell. An exploration of such bodily nuances may advance our understanding of metaphorical effects as well as knowledge accessibility.

3. Metaphorical effects on mental procedures in the decisional process. Incidental bodily experiences may activate metaphorically associated mental procedures that initiate, terminate, or change the decision process itself. For example, physical cleansing allows people to metaphorically wipe the slate clean and frees them from residual concerns about their recent decisions, thereby eliminating postdecisional dissonance (Lee & Schwarz, 2010b). Moving one's hands up and down with palms facing up elicits more "balanced" judgments and decisions, presumably by assigning more equal weights to the two attributes in the decision task (Lee & Schwarz, 2012). To date, experimental support for this type of effects is very limited, but we find it promising. It allows researchers to leverage numerous well-understood paradigms in behavioral decision making to explore the potentially broad impact of embodied metaphors.

4. Awareness eliminates these effects. We expect that both the direct and metaphorical effects of incidental bodily experiences will be eliminated when people become aware of their incidental nature, consistent with feelings-as-information theory (Schwarz, 2012) and models of mental correction (Strack & Hannover, 1996; Wilson & Brekke, 1994). Just as awareness undermines the influence of moods (e.g., Schwarz & Clore, 1983), arousal (e.g., Servay, Schwarz, & Kumpf, 1985), metacognitive experience (e.g.,

Schwarz et al., 1991) and semantic primes (e.g., Strack et al., 1993), awareness that a weight has been inserted in a book eliminates its metaphorical effect on judgments of the book's importance (Reinhard et al., 2012). This suggests that bodily experiences are most influential when they are subtle and escape direct attention, paralleling the influence of other experiential information.

In some decision situations, the above processes may be pitted against each other. For example, would physical cleansing eliminate postdecisional dissonance in a choice between guilty pleasure and virtuous restraint? If cleansing simply wipes the slate clean (process #3), it should matter little what the content is and postdecisional dissonance should be eliminated. But if cleansing activates moral meanings (process #2), it should affect how moral one feels about the choice alternatives or oneself, and the downstream consequences may be more complicated. Which of these processes occur may depend on whether people are aware or not (process #4) of the metaphorical effects of physical cleansing on thoughts, feelings, goals and procedures. Divergent outcomes of these processes are promising avenues for future research.

Finally, we emphasize that this chapter's focus on incidental bodily experiences with metaphorical meanings does not imply that metaphors *require* bodily experience in situ to exert an influence. As numerous studies illustrate, linguistic or graphical priming of different metaphorical frames can affect people's thinking and inferences (e.g., Boroditsky, 2000; Morris, Sheldon, Ames, & Young, 2007) without requiring a concurrent bodily input. Hence, simply presenting tasks in different metaphorical frames can have powerful effects on judgments and choices and such framing effects may themselves interact with whatever bodily experience the decision maker has at the time. The exploration of such possibilities promises to extend the long list of surprising insights provided by recent work on the role of embodied metaphors in judgment and decision making.

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