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From Perceptual Rags to Metaphoric Riches:

Bodily, Social, and Cultural Constraints on Socio-Cognitive Metaphors

(Comment on Landau, Meier, & Keefer, 2010)

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ABSTRACT

What leads people to describe some of their interpersonal relationships as "close" and "warm" and others as "distant" and "cold"? Landau, Meier, and Keefer (2010) proposed that conceptual metaphors facilitate social cognition by allowing people to use knowledge from a relatively concrete (source) domain (e.g., physical distance) in understanding a different, usually more abstract (target) concept (e.g., love). We concur that such a notion of metaphors can greatly enrich the field of social cognition. At the same time, we believe it is important to devote greater theoretical attention to the nature of metaphorical representations in social cognition. We believe that Landau et al. place too much emphasis on socio-cognitive metaphors as top-down knowledge structures and pay too little attention to the constraints that shape metaphors from the bottom up. In the present contribution, we highlight important bottom-up constraints, imposed through bodily constraints and social scaffolds. Socio-cognitive metaphors do not exist just for mental representation but for action as well. We discuss the relevance of grounding socio-cognitive metaphors for broader motivational purposes.

From Perceptual Rags to Metaphoric Riches:

Bodily, Social, and Cultural Constraints on Socio-Cognitive Metaphors (Comment on

Landau, Meier, & Keefe, 2010)

What leads people to describe some of their interpersonal relationships as "close" and "warm" and others as "distant" and "cold"? Why are people inclined to place more powerful others higher and less powerful others lower in hierarchical structures? What do people mean when they had a "heavy" discussion? Why do people refer to morally reprehensible behaviors as "dirty"? Are these merely figures of speech? Or is there a deeper psychological significance to the connection between abstract constructs and perceptual dimensions such as physical distance, temperature, verticality, weight, and cleanliness?

Questions about the grounding of social cognition in sensorimotor systems have become the focus of intense empirical and theoretical efforts in the last decade in psychology and other disciplines. Traditionally, theorists have assumed that social perceivers rely on abstract, disembodied categories or schemas that structure people's interpretation of social information (e.g., S. T. Fiske & Taylor, 1991; Macrae & Bodenhausen, 2000; Wyer & Srull, 1989). It has become increasingly apparent, however, that people regularly draw on their concrete bodily experiences in constructing social reality (Cohen, Leung, & IJzerman, 2009; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005; Smith & Semin, 2004). Building on and extending the aforementioned work, Landau, Meier, and Keefer (2010) proposed a metaphor-enriched approach to social cognition. Their new theoretical approach treats metaphors as an integral part of the conceptual system that people use to understand (not just express) abstract concepts like love, power, or morality through experience. Conceptual metaphors may thus allow people to make sense of life's complexities by allowing people to use knowledge from a relatively concrete (source) domain (e.g., physical distance) in understanding a different, usually more abstract (target) concept (e.g., love).

We concur with Landau, Meier, and Keefer (2010) that the notion of metaphors can greatly enrich the field of social cognition. At the same time, we believe that it is important to devote greater theoretical attention to the nature of metaphorical representations in social cognition. In Landau et al.'s theoretical analysis, socio-cognitive metaphors are "conceptual", exerting a top-down influence in structuring information and experience very much like the traditional notion of a social-cognitive schema (Smith, 1998). Although we agree that providing structure is an important function of socio-cognitive metaphors, recent work challenges the notion that these metaphors function like mere schemas.

Landau et al. (2010) further propose that people individually construct social-cognitive metaphors in unique and creative ways. In our view, this proposal underestimates the consensual nature of most important social-cognitive metaphors. Moreover, there is growing evidence that socio-cognitive metaphors arise from set bodily constraints and from specific social interactions, along with cultural affordances. In short, Landau et al. may place too much emphasis on socio-cognitive metaphors as top-down knowledge structures and pay too little attention to the constraints that shape metaphors from the bottom up.

Do Socio-Cognitive Metaphors Function Like Abstract Schemas?

The traditional schema literature has devoted a great deal of attention to the idea that schemas exert a top-down influence on social information processing, by allowing people to "go beyond the information given" in making sense of the world (Bruner, 1957; Stapel & Koomen, 2000). Although Landau et al.'s (2010) approach differs from classic schema models in important respects, their metaphor-enriched approach nevertheless retains an emphasis on top-down effects of knowledge structures. Specifically, conceptual metaphors are assumed to be "a structured framework for reasoning about, interpreting, and evaluating information related to the target concept" (p. 2). Moreover, metaphoric knowledge is derived from source concepts that "represent commonplace, schematic knowledge about the attributes

of familiar referents and the relations among those attributes" (p. 2). Conceptual metaphors are thus assumed to operate in the same manner and use the same representational format as traditional schemas, even if metaphors represent a case in which properties of the "schema" are borrowed from a semantically unrelated domain.

If socio-cognitive metaphors indeed operate like schemas, traditional social-cognitive theories about knowledge structures may possibly be applied to them (see Smith, 1998), leading to a host of testable hypotheses. For instance, conceptual metaphors may vary in temporary versus chronic accessibility and their applicability in a given social situation (Higgins, 1996). Like schemas, conceptual metaphors may then also act as energy-saving devices by allowing people to quickly get a grasp on abstract notions (see Macrae, Milne, & Bodenhausen, 1994). Conceptual metaphors may further influence social cognition spontaneously, that is, unintentionally, efficiently, non-consciously, and uncontrollably (Bargh & Chartrand, 2000). Indeed, just about every empirical finding that has been connected with schemas might, in principle, be applicable to socio-cognitive metaphors. A schema-like conception of socio-cognitive metaphors could thus be generative of new research.

Still, the theoretical implications of socio-cognitive metaphors might reach even further, if one considers these metaphors from a grounded cognition perspective. Grounded cognition "reflects the assumption that cognition is typically grounded in multiple ways, including simulations, situated action, and, on occasion, bodily states" (Barsalou, 1999; p. 619). Grounded cognition theories can readily accommodate top-down effects of "conceptual" metaphors on social cognition, without requiring that such metaphors rely on abstract information from the source domain. For instance, Barsalou's (1999) perceptual systems theory assumes that perceptual simulation involves the partial running of sensory-motor systems in a top-down manner. From this perspective, effects of socio-cognitive metaphors

related to "interpersonal warmth" and "heavy discussions" may be due to perceptual

simulation processes or situated action. If this is correct, the term "conceptual" metaphors

may be a misnomer for such socio-cognitive metaphors. After all, very pervasive and basic

socio-cognitive metaphors may have little to do with abstract concepts or schematic

knowledge.

One important implication of a grounded cognitive perspective is that the source

domain from which a socio-cognitive metaphor is derived does not need to be any more

"schematic" than the target domain to which the metaphor is applied. Lakoff and Johnson's

(1999) original idea of conceptual metaphors assumes a basic asymmetry between source and

target domains, such that "the greater inferential complexity of the sensory and motor

domains gives the metaphors an asymmetric character, with inferences flowing in one

direction only" (p. 57-58). The effects of some metaphors indeed appear to display such an

asymmetry. For instance, people more frequently express time in space, than space in time

(e.g., Friday is *far away*, or a *long* vacation). Likewise, research has found that influencing

participants' experience of space has a pervasive influence on one's experience of time, but

not vice versa (Casasanto & Boroditsky, 2008). Such asymmetries may arise because abstract

conceptualizations of time may be harder to simulate perceptually than space (but see also

Giddens, 1981; Hassard, 1989).

However, when supposed "target" and "source" domains can both be simulated with

relative ease, the influence of both domains may flow in either direction. Consider the

empirical findings that warm temperatures (e.g., induced by holding a warm coffee mug) can

lead people to perceive greater closeness towards and a more sociable judgment of an

experimenter or a third party (IJzerman & Semin, 2009; Williams & Bargh, 2008a). From the

latter research, one might infer that temperature is the "concrete" source concept and affection

is the "abstract" target concept. But is that really the case? Follow-up studies have shown that

inducing interpersonal closeness (through manipulations of physical proximity or

psychological similarity) leads to people to perceive higher ambient temperatures (IJzerman

& Semin, 2010). These and related findings in other domains (e.g., Zhong & Leonardelli,

2008; Schneider, Rutjens, Jostmann, & Lakens, 2010; see also Crawford, 2009) indicate that

socio-cognitive metaphors do not necessarily involve a set relation between a seemingly

unrelated concrete (source) domain and an abstract (target) concept.

Bi-directional influences between metaphorically related domains make little sense if

one assumes that conceptual metaphors function like schemas. After all, schemas are applied

to specific situations in a top-down, asymmetrical manner (Smith, 1998), and specific

situations influence schematic knowledge only in a very slow, incremental fashion (Smith &

DeCoster, 2000). By contrast, bi-directional influences between metaphorically related

domains can be easily handled by grounded cognition theories (e.g., Barsalou, 1999; 2008).

Perceptual simulations may activate elements of an underlying knowledge structure, and there

is no need to postulate asymmetrical influence between metaphorically related domains..

In short, there may be more to socio-cognitive metaphors than a schema-like

conceptual mapping between different domains. Indeed, recent findings indicate that

mappings between conceptual domains such as warmth and interpersonal closeness are bi-

directional. Such findings therefore suggest that socio-cognitive metaphors go beyond

conceptual metaphorical relations between source and target domains. To fully understand the

psychological meaning of socio-cognitive metaphors, it is essential to consider the bottom-up

constraints that are imposed through bodily constraints and social scaffolds, which are

subsequently provided with top-down organization through cultural scaffolds.

Bottom-Up Constraints on Conceptual Metaphors

How do pervasive socio-cognitive metaphors like "deep feelings," "high and mighty,",

or "dirty tricks" come about? Landau et al. (2010) briefly mention two ways in which people

may come up with conceptual metaphors. A first source of socio-cognitive metaphors is the ingenuity of the individual, who makes "creative leaps" (p. 18) in conveying the unique meanings of personal experience. Although we agree that the human mind is capable of impressive creative achievements, we doubt whether individual creativity is the mainspring of common socio-cognitive metaphors. If every individual would uniquely and creatively invent his or her own set of metaphors, we would expect people to develop highly idiosyncratic sets of metaphors. In fact, however, the research reviewed by Landau et al. reveals a great deal of consensus about the kinds of metaphors that people apply to certain phenomena. The creativity of individually operating minds thus seems implausible as an account for the majority of conceptual metaphors that influence social cognition.

A second potential source of socio-cognitive metaphors lies in the domain of "scaffolding" theories, which hold that non-metaphoric associations between social and bodily experiences form the basis of conceptual metaphors later in life (Mandler, 2004; Piaget & Inhelder, 1969; Williams, Huang, & Bargh, 2009). For instance, young children are likely to experience states of affection and physical warmth jointly, and this association may form the basis of metaphors of interpersonal warmth. The notion of scaffolding resonates with Lakoff and Johnson (1999), who suggested that people build immediate conceptual mappings via neural connections, inevitably and nonconsciously. Through such processes of "conflation" (C. Johnson, 1997), associations between different domains are subsequently mapped onto conceptual metaphors. Scaffolding processes are likely to be vital to the analysis of socio-cognitive metaphors, through the constraints that scaffolding imposes on the formation of these metaphors. Nevertheless, in their metaphor-enriched approach to social cognition, Landau et al. (2010) pay relatively little attention to scaffolding. To fill this important gap, we take a closer look at bodily constraints and scaffolding processes that may give rise to socio-cognitive metaphors.

Bodily Constraints

From the dawn of the human (and even other mammalian) species to the present day and age, social interactions have included physical experiences that have largely remained similar. For instance, individuals have experienced close, intimate contact when having empathic sex, when giving birth, sharing fluids (such as breast milk, semen, blood), and so forth (A. P. Fiske, 1992). Because of the adaptive significance of such experiences, selection pressures are likely to have shaped people's biological systems in a way that they have acquired very basic cognitive systems to engage in basic and essential social interactions (Caporael, 1997; Damasio, 1999; IJzerman & Semin, 2010).

In line with these notions, Bowlby (1969) suggested that people at birth already possess certain systems of "building bricks" that are "activated by stimuli falling within one or more broad ranges, (are) terminated by stimuli falling within other broad ranges, and (are) strengthened or weakened by stimuli of yet other kinds" (p. 265). Bowlby (1969) mentioned touch and clinging as examples of such stimuli – which include a basic association with physical warmth. Such building bricks are likely to have been formed out of people's bonding experiences (care-giving, intercourse, sharing of food), which have remained relatively constant throughout multiple generations. These physical experiences may include a variety of stimuli, such as light physical touch, communal eating, and proximity of others. Other examples may include dominance or submission displays, which are also homologous to animal behavioral systems (see e.g., Mignault & Chaudhuri, 2003). In the present article, we focus specifically on physical warmth, as one of the most well-researched embodiments of social relationships.

The repeated associations between physical warmth and affection might have caused a very basic connection that is innate or at least easily learned (Caporael, 1997; Cohen & Leung, 2009; Damasio, 1999; A. P. Fiske, 2004; IJzerman & Semin, 2010). Indeed,

converging lines of evidence support the basic biological significance of the link between

physical warmth and affection. For instance, Harlow (1958) showed that young monkeys

preferred a soft surrogate mother made of terrycloth to a surrogate that was made of wire.

Monkeys raised with a wire mother (as compared to the terrycloth mother) had more trouble

digesting milk and suffered from diarrhea more frequently. Harlow's (1958) work suggested

that close, physical contact (which often includes a basic association with warmth) throughout

infancy was necessary for healthy psychological functioning.

In a related vein, Fransson, Karlsson, and Nilsson's (2005) found provocative

evidence that when a baby was held by the mother, the mean difference between core and skin

temperature is much lower than when the baby was in its cot. Maternal touch may be thus

vital in preventing hypothermia, a major cause of death among neonates. Additional work

suggests that oxytocin, a hormone that regulates positive social exchanges plays a key role in

thermoregulation (Uvnäs-Moberg, 1998). For instance, Kasahara and colleagues (2007)

showed that oxytocin-deficient mice have impaired abilities to regulate temperature (and

specifically, resistance to colder temperatures). Finally, infants whose mother received

oxytocin during labor had a significantly higher scalp temperature during birth than those in

comparable control groups (Beck, Flowers, & Blair, 1979).

The link between physical warmth and social affection is thus deeply grounded in the

biological architecture of the human (and mammalian) body. Socio-cognitive metaphors about

warmth-as-affection are therefore far from arbitrary personal or cultural inventions. Instead,

such metaphors are likely to be built or "scaffolded" onto basic bodily experiences of the

intrinsic relation between physical warmth and social affection. From this perspective, there is

no need for schematic knowledge about the attributes of physical warmth to become

"transferred" to the "semantically unrelated" domain of affection. Rather, metaphors about

warmth-as-affection are more likely to be *reflective* of experiences during social interaction

and associated thermoregulatory processes, which are simulated or re-enacted when people are thinking or talking about social interactions.

Social Scaffolds as Extensions of the Body

Through its intrinsic relation with social affection, physical warmth becomes part of the fabric of people's social relationships. The type of relationship in which warmth is most relevant is what Alan Page Fiske (1991, 1992, 2004) has referred to as a *communal sharing* relationship, an altruistic relationship that is typically found among close kin. Communal sharing relationships are created and marked through physical actions that create a perception of a merged social body. Communal sharing relationships rely on a feeling of oneness between people and are formed through bonding experiences that connect the body, like touch, sharing fluids (i.e. breast milk, semen, blood), empathic sex, synchronous movement, and nursing. A. P. Fiske (1992) has argued that communal sharing relationships are grounded in innate and evolved mechanisms, or relational models, that allow people to coordinate social interaction.

In addition to communal sharing, A. P. Fiske (1992) identifies three relational models that can be universally found across cultures and are likely to be grounded in innate biological mechanisms. First, relationships based on *authority ranking* focus on ordered differences and allow people to know relative position in a linear hierarchy. Second, relationships based on *equality matching* lead people to monitor additive differences in order to maintain balance. These relationships are typified by interactions characterized by reciprocity, turn-taking, and so forth. Third, relationships based on *market pricing* lead people to use abstract ratios to compare otherwise non-comparable commodities (e.g. exchanging relatively arbitrary amounts of money for products). Of the four relational models, communal sharing, authority ranking, and equality matching relationships are based on very concrete interactions that involve bodily representations. Market pricing relationships, on the other hand, are constituted

primarily out of abstract, symbolic representations (primarily numbers, semantic language, and money), and seem to have primarily evolved with human mammals (A. P. Fiske, 2004).

Relational models are important for social cognition, because they allow people to achieve a consensus in constructing their conceptual experience. Such very basic relational structures allow for a rich, but coordinated, manner of dealing with one's social environment. For instance, communal sharing relationships are grounded not only in physical warmth (IJzerman & Semin, 2010), but also in experiences like physical distance (Williams & Bargh, 2008b) and synchrony (Hove & Risen, 2009; Lakens, 2010; Paladino, Mazzurega, Pavani, & Schubert, 2010). Relational structures like communal sharing relationships are mapped onto basic bodily systems, such as physical warmth, that are innately motivating and meaningful. Relational models may explain why some "social meanings are likely to be culturally wide-spread or universal" (Landau et al., 2010, p. 17).

Relational models may also explain individual differences in the meaning of socio-cognitive metaphors. Attachment theorists have shown that, from early interactions with caregivers, children develop generalized internal working models (which are critical in both infancy and adulthood; cf. Bowlby, 1969) on how to behave towards self and others. These working models are based on the reliability of the caregiver. Differences in the reliability of such meaningful relationships may give rise to substantial individual differences in internal working models of attachment, or attachment styles (cf. Ainsworth, Blehar, Waters, & Wall, 1978). Securely attached infants expect attachment figures to be available and are easily comforted when upset. By contrast, insecurely attached infants do not share these hopeful expectations. Among adults, secure attachment also provides a foundation for compassion and care-*giving* (Mikulincer & Shaver, 2005).

If the link between warmth and affection is grounded in innate relational models, then we would expect this link to be moderated by individual differences in attachment style.

Individuals who are securely attached may learn to associate feelings of warmth with the availability of loving relationships. By contrast, individuals who are insecurely attached may not have an association between warmth and affection, because for them, this association has not been enforced by their caregivers. In line with these ideas, IJzerman, Karremans, Thomsen, and Schubert (2010) found that attachment style moderates the effects of physical warmth on prosocial behavior. Specifically, securely attached children became more prosocial in warm (as compared to cold) conditions. However, this effect was absent amongst insecurely attached children. Importantly, both securely attached children and insecurely attached children were more generous toward their friends as compared to strangers, showing that at an abstract level, both groups of children were able to conceptualize the nature of the relationship. The innately motivating physical cues interacted with the children's internal models of attachment. These findings provide initial support for the idea that socio-cognitive metaphors like interpersonal warmth are grounded or "scaffolded" onto people's relational models.

Cultural Scaffolding: Conventional (Dis)Agreements

Bodily constraints and relational models may explain why some socio-cognitive metaphors have emerged universally across cultures. However, as Landau and colleagues (2010) point out, socio-cognitive metaphors can also be culturally specific. Such cultural variations in socio-cognitive metaphors may emerge in a variety of ways.

A first source of cultural variations in socio-cognitive metaphors is formed by differences in cultural norms on the basis of core cognitive structures. For example, consider Zhong and Liljenquist's (2006) findings that show how people alleviate negative feelings about moral transgressions by washing their hands. These findings attest to a link between physical (concrete) and moral (abstract) disgust, which has been suggested to be universal. On top of the seemingly universal link between physical and moral disgust, there appear to exist

clear cultural variations: Cohen and Leung (2009) discuss findings that making hand washing movements produces greater condemnation of blasphemy and belief violations among Muslims and Protestants, as compared to Hindus and Jews. For Muslims and Protestants, there is a greater emphasis on beliefs as compared to deeds. Violating one's beliefs is thus considered impure for Muslims and Protestants, and at odds with physical cleanliness (as implied by hand washing). By contrast, Hindus and Jews place greater emphasis on deeds than beliefs, and therefore react less strongly to the incongruence between physical cleanliness and belief violations. These findings suggest that conceptually separate abstract cultural schemas are mapped onto very concrete experiences of disgust.

A second source of cultural variations in socio-cognitive metaphors involves cultural differences in basic and subtle interactions (see also Bourdieu, 1977). People might develop certain bodily "techniques," which are built on similar types of basic bodily constraints and socially coordinated structures. Consider the findings that upright and dominant postures may universally be recognized as postures of pride (Tracy & Matsumoto, 2008). The content of pride and shame differs across cultures (Cohen, 2003). IJzerman and Cohen (2010) observed that differences in the understanding of shame and pride are literally embodied: Latino American males put in a straight up posture will put greater emphasis on values of male reputation, female purity, and familism (closely tied to expressions of shame and pride; Rodriguez, Mosquera, Fischer, & Manstead, 2002), as compared to a slouched, hangdog posture. Anglo-American males do not show similar embodiment effects. These effects, IJzerman and Cohen (2010) showed, are mapped on bodily postures bi-directionally. There are relatively few socio-cognitive metaphors available in language to describe such complex cultural norms (although one may think of "holding one's head high"). People presumably have learned basic cultural norms through relatively simple interactions (such as dominance contests, grounded in core systems of authority ranking relationships). Instead of creating

conceptual structure, the majority of the socio-cognitive metaphors that may be constructed

on the basis of such cultural norms seem to be reflective of the experience.

Finally, a third source of cultural variations in socio-cognitive metaphors is the

ingenuity of certain individuals, who make "creative leaps" (p. 18). This third source seems

most compatible with Landau et al.'s (2010) ideas about metaphoric transfer. Indeed, not all

cultural schemas are based on commonly coordinated structures. Specific types of socio-

cognitive metaphors arbitrarily relate concrete experiences to abstract target concepts. For

instance, Maass and Russo (2003) show that conventions such as writing direction profoundly

influence the way people perceive action. Europeans perceive an action that flows from left to

right as more agentic, whereas speakers of Arab (who use a reversed writing direction)

perceive an action that flows from right to left as more agentic. Such cultural embodiments

might have developed randomly (so-called *totem* embodiments; Cohen & Leung, 2009), and

might have been reaffirmed through subtle forms of cultural imitation throughout history,

causing major behavioral differences (Richerson & Boyd, 2005). These types of experiences

can give a top-down structure to experience, much as Landau et al. describe. Indeed, it seems

hard to imagine that the effects Maass and Russo (2003) describe would operate bi-

directionally: how could one change Europeans' writing direction by having them persistently

perceive an action from right-to-left?

Taken together, there may be at least three different sources of culturally specific

socio-cognitive metaphors. First, socio-cognitive metaphors may arise out of clearly

articulated sets of cultural norms that lead people to utilize their core cognitive systems in

extremely specific ways. Second, socio-cognitive metaphors may emerge from culturally

habituated embodied interactions. Third, socio-cognitive metaphors may be relatively

arbitrary sets of cultural conventions (so-called "totem embodiments"). Socio-cognitive

metaphors can thus be constructed from the bottom up (on the basis of very core cognitive

systems) in combination with top-down knowledge structures that are "given" by the context, either through semantic or non-semantic representations. Conversely, socio-cognitive metaphors may be constructed arbitrarily, through creative leaps by individuals, conceptually unrelated to the specific embodied representation. In order to fully understand the psychological meaning of socio-cognitive metaphors, it is essential to consider the interplay between such top-down influences with their bottom-up constraints.

Conclusions and Outlook: Conceptualizing Socio-Cognitive Metaphors

What leads people to describe their social reality in terms of physical qualities like temperature, verticality, weight, or cleanliness? Landau et al. (2010) have argued convincingly that these socio-cognitive metaphors are reflective of basic processes that allow people to make sense of the world. However, from a grounded cognition perspective, the psychological significance of socio-cognitive metaphors goes beyond mental representation and language. At least some socio-cognitive metaphors seem to have a universal meaning that is grounded in bodily constraints, and relational schemas that are rooted in ancient mammalian brain structures. Other socio-cognitive metaphors vary across cultures, but still seem to emerge from specific cultural differences in embodiment.

Grounding socio-cognitive metaphors may be particularly helpful in elucidating their motivational significance. Many of the most widely used socio-cognitive metaphors are about matters that people care about deeply and passionately, such as love, power, morality, and the self. From a grounded cognition perspective, this is no coincidence. Indeed, socio-cognitive metaphors are likely to build directly on the needs and motives that people seek to realize in their social worlds. Socio-cognitive metaphors thus do not exist just for the sake of mental representation but also for action. Indeed, what makes metaphors meaningful may be directly tied to what motivates people. For instance, being physically and psychologically close to others may be particularly important in times of existential threat (Wisman & Koole, 2003),

and thinking about the self as powerful may be particularly important as people are getting

ready to use physical force (Schubert & Koole, 2009). A grounded cognition perspective may

thus explain the enduring psychological appeal of socio-cognitive metaphors.

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