FlashReport

Imagined sensory experiences can shape person perception: It's a matter of visual perspective

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HIGHLIGHT

► Person evaluation is impacted by imaginary sensory experiences.
► Spatial visual perspective serves as a boundary condition of embodied cognition.
► Embodied simulation is primarily grounded in a first-person processing orientation.

ARTICLE INFO

ABSTRACT

Psychological warmth serves as a fundamental dimension of human social cognition. From impressions of strangers to appraisals of groups, assessments of warmth (vs. coldness) comprise an elemental building block of social perception. Using embodiment as a guiding framework, research has demonstrated that perceptions of others along the warm-cold dimension can be elicited by sensory experiences (e.g., physical warmth). Here we show that effects of this kind can also be triggered by mentally simulating physical temperature, but only under certain theoretically important imagery conditions. Specifically, impressions of a target were impacted by imagined warmth or coldness (i.e., thinking about holding a cup of hot/iced coffee) only when an event was simulated from an egocentric (i.e., first-person) perspective. No such effect emerged when an allocentric (i.e., third-person) orientation was adopted. This finding underscores the functional nature of mental simulation and identifies spatial visual perspective as a critical boundary condition of embodied cognition.

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Introduction

Psychological warmth serves as a fundamental dimension of human social cognition. From impressions of immediate strangers to appraisals of distant groups, assessments of warmth (vs. coldness) comprise an elemental building block of the person perception process (e.g., Asch, 1946; Fiske, Cuddy, & Glick, 2007). The benefits of this evaluative tactic are many. Having established that a person is warm or cold, one can quickly surmise whether they are also likely to be friendly or antagonistic, trustworthy or duplicitous and to be approached or avoided (Asch, 1946, 1958). Put simply, estimates of warmth underpin the behavioral products (e.g., impressions, feelings, actions) that shape the course and character of everyday social interaction. Moreover, this pivotal social-cognitive inference requires neither awareness nor consent, intuiting a person's psychological warmth is as straightforward as establishing they are female, middle aged and Asian (Fiske et al., 2007).

The application of warm and cold as universal person descriptors is believed to originate in the mind's propensity to ground abstract concepts (including psychological warmth) in concrete perceptual

experiences (i.e., embodiment, see Barsalou, 1999; Lakoff & Johnson, 1980; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005). Throughout early development, caregivers provide infants with repeated instances of bodily (e.g., cuddling, holding, caressing) and psychological intimacy (e.g., love, trust, support), prompting powerful associative links to be forged between physical and social warmth (Lakoff & Johnson, 1980; Williams, Huang, & Bargh, 2009). The consequences of this affective coupling are compelling. Physical and social warmth become functionally interchangeable (i.e., physical warmth = social warmth), such that experiences of physical warmth (or coldness) trigger the same subjective states (e.g., feelings) as those associated with psychological warmth (or coldness), and vice versa (e.g., Bargh & Shalev, 2012; Ijzerman & Semin, 2009, 2010; Williams & Bargh, 2008; Zhong & Leonardelli, 2008). Thus, just as a hot shower can attenuate feelings of loneliness, so too social isolation can amplify the degree to which one feels physically cold. Similarly, and of relevance to the current investigation, briefly holding a cup of hot rather than iced coffee can elevate the apparent warmth of a target's personality (Williams & Bargh, 2008).

Notwithstanding widespread endorsement of embodied accounts of psychological warmth (Williams et al., 2009), important theoretical questions remain. In particular, what are the critical boundary conditions for the emergence of "warm-cold" effects and embodied social

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cognition more generally (Landau, Meier, & Keefer, 2010; Meier, Schnall, Schwarz, & Bargh, 2012)? To date, work exploring the substitutability of physical and social warmth has focused exclusively on online embodiment (Niedenthal et al., 2005; Wilson, 2002), the extent to which perceptual experiences (e.g., holding a hot coffee cup) trigger concomitant subjective feelings (i.e., psychological warmth) when people interact with the environment (Bargh & Shalev, 2012; Ijzerman & Semin, 2009; Williams & Bargh, 2008). Of comparable theoretical significance, however, is the related question of what happens during offline embodiment when cognitive activity is decoupled from the external world (Wilson, 2002; Zhong, Strejcek, & Sivanathan, 2010), as is the case during mind wandering? For example, are internally generated experiences of physical temperature (e.g., imaginary events) sufficient to influence impressions of a target's personality (cf. Williams & Bargh, 2008)?

Our intuition is that imagined physical warmth (or coldness) can indeed impact person evaluation, but only under quite specific triggering conditions. A central tenet of embodiment is that when cognition is offline (e.g., during mental simulation), activity continues in modality-specific systems (Barsalou, 1999; Wilson, 2002). As Niedenthal et al. (2005) report, "just thinking about an object produces embodied states as if the object were actually there" (p. 187). But is this really the case for all mental simulations? Are embodied states (e.g., modality-specific re-enactments) an inevitable accompaniment to offline cognition? We suspect not. When imagining an event (e.g., holding a cup of coffee), it is possible to adopt one of two viewpoints: an egocentric (i.e., first-person) or allocentric (i.e., third-person) spatial visual perspective (Avraamides & Kelly, 2008). From an egocentric (i.e., actor) perspective, people experience events through their own eyes, as if they were looking outward on the world. In contrast, from an allocentric (i.e., observer) perspective they see themselves through the eyes of others, as actors embedded in an event (Libby & Eibach, 2011). Critically, these contrasting visual perspectives serve distinct roles in perception and action. While egocentric frames of reference are body-centered (i.e., self-to-object spatial relations) and guide action (e.g., reaching, grasping) in near space, allocentric representations code the spatial relations among objects (i.e., object-to-object spatial relations) and impact action planning at a distance (Kosslyn, 1994; Milner & Goodale, 1995).

These differences in spatial visual perspective may exert an important influence on the emergence of embodied behavior. Elsewhere, neuroimaging investigations have revealed greater activity in motor and sensorimotor regions when people imagine actions (and body parts) from an egocentric than allocentric viewpoint (e.g., Lorey et al., 2009; Ruby & Decety, 2001). In addition, the contents of mental simulations comprise more information about bodily sensations, affective reactions and psychological states when events are imagined from a first- than third-person perspective (Libby & Eibach, 2011; McIssac & Eich, 2002). Given therefore the contention that offline cognition (i.e., mental simulation) is body-centered and action oriented (Gallese, 2005; Jeannerod, 1994; Wilson, 2002), these imaging and self-report data suggest that the visual perspective from which an event is imagined may also impact the emergence of embodied behavior. Specifically, effects should be more pronounced when an egocentric than allocentric perspective has been adopted during mental simulation. As Lorey et al. (2009) contend, "...imagining oneself from a first-person perspective is more embodied than from a third-person perspective" (p. 233). We explored this prediction in an experiment in which participants furnished impressions of a target after imagining holding a cup of coffee (hot or iced) from either an egocentric (i.e., first-person) or allocentric (i.e., third-person) viewpoint.

Method

Participants and design

Forty-eight undergraduates (24 females) completed the experiment. The study had a 2 (Visual Perspective: egocentric or allocentric) × 2 (Coffee Cup: hot or cold) between-subjects design and was reviewed and approved by the School of Psychology, University of Aberdeen ethics committee.

Stimulus materials and procedure

Participants arrived at the laboratory individually and were greeted by a female experimenter who explained that the study comprised the performance of two unrelated tasks. The first task consisted of a guided mental imagery exercise whereby participants were instructed to imagine holding a cup of hot or iced coffee from either an egocentric or allocentric visual perspective. Prior to the imagery, participants were instructed about the visual perspective they were required to adopt. Those in the egocentric condition were told: "When you imagine the event, please picture it from a first-person perspective. Visualize the event from your own viewpoint—that is, you see the event through your own eyes." Alternatively, participants in the allocentric condition were instructed: "When you imagine the event, please picture it from a third-person visual perspective. Visualize the event from the viewpoint of an observer—that is, you see yourself and the surroundings." The experimenter then checked that the participant understood the instructions and clarified any misunderstandings. Next, participants were blindfolded to enhance the vividness of their imagery and asked to imagine (from the instructed perspective): "Standing outside a lecture theater with a friend who asks you to hold their cup of hot (iced) coffee while they go to the bathroom." Participants were given 30 seconds to visualize this event.

The second task comprised a personality questionnaire modeled on Asch (1946) and Williams and Bargh (2008). Participants were given a brief description of a hypothetical Person A (i.e., "Person A is intelligent, skillful and industrious. Person A is also determined, practical and cautious") and then rated this individual on ten traits using 7-point Likert scales. Five of the traits were related to the "warm-cold" dimension (i.e., generous/ungenerous; happy/unhappy, good-natured/irritable, sociable/anti-social and caring/selfish) while the others were unrelated to psychological warmth (i.e., attractive/unattractive, carefree/serious, talkative/quiet, strong/weak, honest/dishonest). Following Williams and Bargh (2008), scores for each trait set were averaged into a single index that was either relevant or irrelevant with respect to psychological warmth.

On completion of the tasks, participants were funnel debriefed to probe for any suspicions they had regarding the purpose of the research. Crucially, no participant indicated awareness of the experimental hypothesis or the possibility that the imagery task could influence ratings of the target. Finally, participants were fully debriefed and dismissed.

Results

Relevant traits

A 2 (Visual Perspective: actor or observer) × 2 (Coffee Cup: hot or cold) between-subjects analysis of variance (ANOVA) was performed on the data. This yielded a main effect of Coffee Cup, $F(1,44) = 5.96$, $p = .02$, $\eta_p^2 = .12$, that was qualified by a Visual Perspective × Coffee Cup interaction, $F(1,44) = 4.29$, $p = .04$; $\eta_p^2 = .09$, (see Fig. 1). Simple effects analysis revealed that only from an egocentric (i.e., first-person) perspective did the temperature of the coffee cup impact ratings, such that perceptions of the target were colder when participants previously imagined holding an iced rather than hot beverage, $F(1,44) = 10.18$, $p = .003$. No such effect emerged from an allocentric (i.e., third-person) perspective, $F<1$. To establish the directionality of the effect observed in the egocentric condition, twelve additional participants (6 females) were given the personality questionnaire absent the imaginary warm/cold experience. This baseline condition enabled us to ascertain if it was the hot or cold (or both) mental simulation that was driving the effect. Interestingly, only ratings in the cold condition differed
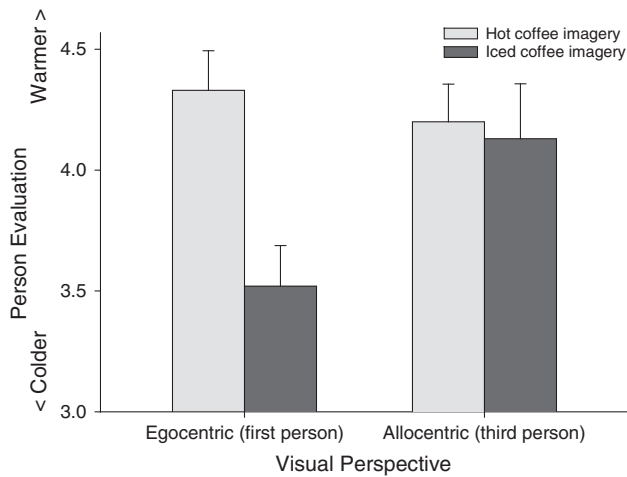
Fig. 1. Mean person evaluation ratings as a function of visual perspective (i.e., egocentric vs. allocentric) and imagery condition (i.e., hot vs. iced coffee). Error bars represent 1 SEM.

significantly from baseline (respective Ms: 3.52 vs. 4.35, $t(22) = 4.00$, $p < .001$, $d = 1.70$).

Irrelevant traits

A 2 (Visual Perspective: actor or observer) × 2 (Coffee Cup: hot or cold) between subjects ANOVA yielded no significant effects.

Discussion

Aside from furnishing yet another demonstration of embodied social cognition, the current investigation offers potentially valuable insights into both the elicitation and regulation of effects of this kind. Using Asch's (1946) "warm-cold" paradigm as a vehicle to explore offline embodiment, here we showed that imagined physical temperature (at least under certain conditions) was sufficient to impact subjective impressions of a target (cf. Williams & Bargh, 2008). Specifically, evaluations were colder when participants previously imagined holding a cup of iced rather than hot coffee, but only when an egocentric visual perspective was adopted. Elsewhere, the interchangeability of physical and psychological warmth has been documented in studies exploring online embodiment (Bargh & Shalev, 2012; Ijzerman & Semin, 2009). That equivalent effects arise during offline cognition provides further evidence for the role of the somatosensory components of mental imagery and the functional significance of this mode of thought (Gilbert & Wilson, 2009; Jeannerod, 1994; Suddendorf & Corballis, 2007). As demonstrated herein, holding an imaginary cup of hot or iced coffee generated a "warm-cold" effect comparable to that triggered by the actual physical experience of having the drinks in hand. It is worth noting, however, that the "warm-cold" effect reported here was in reality a cold effect. While an imagined iced coffee reduced estimates of warmth, ratings of the target did not differ reliably from baseline in the hot-coffee condition. This evaluative asymmetry mirrors previous findings (e.g., Bargh & Shalev, 2012) and corroborates the observation that positivity (i.e., warmth) is the default state in person appraisal (Cacioppo & Gardner, 1999).

Arguably the most noteworthy theoretical aspect of the current findings is the identification of an important boundary condition of (offline) embodied cognition. Elsewhere researchers have lamented the continued demonstration of embodied effects with little or no consideration given to the precise circumstances under which these phenomena arise (Landau et al., 2010; Meier et al., 2012; but see Foroni & Semin, 2009; Landau et al., 2011). Noting this intellectual lacuna, the current work hypothesized and demonstrated the influence that one's spatial visual perspective can exert on the elicitation of the embodied "warm-cold" effect in person evaluation. Only when visualized from an egocentric perspective did differences in imaginary temperature impact impressions of a target's character. What this reveals is that visual perspective serves as a critical determinant of off-line embodied cognition. Building on recent neuroscience research and models of social-cognitive functioning, the current findings substantiate the contention that embodied simulation is primarily grounded in a first-person processing orientation (Gallese, 2005; Jeannerod, 1994; Lorey et al., 2009). In so doing, these results challenge the assumption that sensory-motor reenactment is an obligatory consequence of mental simulation (Barsalou, 1999; Niedenthal et al., 2005). Instead, they support more nuanced accounts of embodiment suggesting that activity in modality-specific systems is moderated by a variety of endogenous and exogenous factors (Glenberg, 2010; Landau et al., 2010; Meier et al., 2012).

The demonstration that visual perspective impacts embodiment sits nicely with research exploring how the self-concept shapes core aspects of social cognition. According to this viewpoint (Conway, 2010; Wheeler, DeMarree, & Petty, 2007), priming effects (trait, exemplar, stereotype) depend on the extent to which triggering stimuli make contact with (and in turn modify) active representations in short-term memory, notably the working self. As described by Conway and Pleydell-Pearce (2000), the working self refers to a hierarchy of goal-states that drive behavior from one moment to the next. What the current results suggest is that, during mental simulation, the working self is shaped by the visual perspective through which imaginary events are construed. Thus, whether self plays the role of doer (i.e., egocentric perspective) or viewer (i.e., allocentric perspective) during imaginary events likely exerts a critical influence on course and products of social-cognitive functioning.

To extend the current inquiry, future research should investigate the effects of visual perspective in other judgmental/behavioral domains. Inspection of the available literature reveals a plethora of embodied effects exploring a wide range of metaphorical associations (see Meier et al., 2012). For example, reflecting the linkage between moral and physical purity, research has shown that cleaning one's hands with an antiseptic wipe can diminish the guilt of a moral transgression (Zhong & Liljenquist, 2006). Similarly, performing an unethical act can increase both the appeal of cleaning products and the amount of money that one is prepared to spend on them (Lee & Schwarz, 2010). Based on the current findings, at least two important observations can be made regarding so-called embodied phenomena. First, effects of this kind may extend beyond enacted behavior to encompass simulated events. Second, the spatial visual perspective adopted during mental simulation should moderate not only phenomenological experience and neural reactivity (Lorey et al., 2009; McIssac & Eich, 2002), but also subsequent behavior.

A core capacity of the human mind is the ability to imagine external realities (Gilbert & Wilson, 2009; Suddendorf & Corballis, 2007). Through the (re)activation of the sensory, motor and perceptual states associated with action (Decety & Grèzes, 2006), mental simulation prepares people for doing. As demonstrated herein, mental simulation also impacts a basic aspect of person perception, notably evaluative appraisal. Importantly, however, the precise manner in which an event (e.g., holding a cup of coffee) is simulated exerts a critical influence on the emergence of embodied behavioral effects. Whether imagined physical temperatures promote the perception of an icy or cozy demeanor is evidently a matter of (visual) perspective.

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