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Disembodiment: Abstract construal attenuates the influence of contextual bodily state in judgment

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Abstract

Can the mind be divorced from the body? As evidenced by a host of findings in the traditions of grounded cognition and embodiment, sensorimotor experience can exert a powerful influence on what and how people think. The current investigation explores the conditions that temper or enable this influence, proposing that level of mental construal may moderate the role of temporary physical state in judgment. Insofar as the sensorimotor information responsible for grounding cognition constitutes an incidental and thus low-level feature of a situation, it should exert less influence from an abstract or high-level (versus concrete) frame of mind. Two studies provide support for this prediction: Contextual bodily information affected visual length estimates (Study 1) and importance ratings (Study 2) for people led to think concretely but not for those thinking abstractly. These results suggest that high-level thought allows for consistency by buffering against the effects of transitory situational factors.

Keywords

construal level theory; physical body; distance; priming; judgment

Cognitive processing does not always operate independent of the rest of the body. Instead, from the perspective of theories on grounded cognition and embodiment, mental representations take root, at least partially, in sensorimotor states (Barsalou, 2008; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005). While research to date has documented numerous connections between bodily state and thought, moderating conditions that hinder or facilitate the making of these connections have gone unspecified. Here, we suggest that the effects arising from sensorimotor cues require that the individual be in a frame of mind that allows for consideration of such concrete, physical information.

Evidence in support of the influence of bodily state in judgment has taken many forms. For the present investigation, we consider only the role of temporary, contextual bodily states (as opposed to dispositional states, to which we return in the General Discussion). Research has shown, for example, that incidentally making an emotional face facilitates the identification of the same emotion (Niedenthal, 2007), and the physical experience of vertically moving one's head (i.e., nodding) enhances agreement with a concurrently-presented editorial message (Wells & Petty, 1980). Proffitt and colleagues have considered how contextual

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bodily factors can even alter visual perception of magnitude. As a result, hills look steeper to people experiencing fear of descending them (Stefanucci, Proffitt, Clore, & Parekh, 2008) and geographical space looks longer to those wearing a heavy backpack (Proffitt, Stefanucci, Banton, & Epstein, 2003) or standing on a hill (Stefanucci, Proffitt, Banton, & Epstein, 2005). Additionally, metaphor provides a straightforward link between the physical and the representational, enabling people to comprehend abstract concepts by grounding them in concrete sensorimotor experience (Clark, 1973; Lakoff & Johnson, 1980). This contention has received mounting empirical support in recent years: the experience of physical warmth activates the concept of interpersonal warmth (Williams & Bargh, 2008), and contact with a physically hard object elicits firmness or rigidity in negotiation (Ackerman, Nocera, & Bargh, 2010). Finally, in a test of the association between physical and conceptual weight, participants who held a heavy clipboard rated various issues as more important relative to those who made their ratings while holding a light clipboard (Ackerman et al., 2010; Jostmann, Lakens, & Schubert, 2009). The reasons underlying these various effects may diverge – a functionalist account for biases in visual perception guiding action (Gibson, 1979); metaphoric priming as a developmental artifact of using sensorimotor information to learn higher-order reasoning (Williams, Huang, & Bargh, 2009) – but the relevance of physical experience remains consistent.

Taken together, the extant findings suggest that contextual bodily state provides information that influences cognition and judgment. To propose a potential boundary condition, we consider whether different frames of mind might influence this process: If people do not readily incorporate concrete, contextual information into their general pattern of thought, might body-based effects disappear? Construal level theory (Lieberman & Trope, 2008; Trope & Liberman, 2010) provides a framework to address this question, differentiating between concrete and abstract modes of cognitive processing. Consider, for example, the act of painting a picture (see also Vallacher & Wegner, 1985). Mental construal of the same behavior can incorporate either its specific, contextualized details (concretely “making brushstrokes”) or its broader, generalized significance (abstractly “expressing creativity”). The latter is oriented toward why an action is undertaken, whereas the former considers how that same action is executed (Freitas, Gollwitzer, & Trope, 2004). Note that sensorimotor experience informs only concrete elements of representation. While concrete, low-level thought attunes people to the physicality of their immediate surroundings (e.g., the feeling of a brush in one’s hand), this information is absent from abstract, high-level thought (e.g., the creation of artwork). Thus, when thinking abstractly, people discount concrete, incidental features of the environment.

By definition, a target becomes psychologically distal as it is removed from immediate experience; targets characterized by such distance come to be represented abstractly, whereas closer targets are represented more concretely (Lieberman, Trope, & Stephan, 2007). The theory identifies four types of psychological distance: temporal, geographical, social, and probabilistic. Importantly, research from this tradition suggests that psychological distance diminishes the influence of one’s current environmental context in making judgments. For example, participants asked to give their opinion about a policy aligned their attitude with that of a one-time, incidental discussion partner to a greater extent for a policy framed as temporally close (to be implemented in the near versus distant future, Ledgerwood, Trope, & Chaiken, 2010). In another series of studies, Henderson and Wakslak (2010) provided evidence that the introduction of either spatial or probabilistic distance tempers semantic priming effects in social evaluations. Finally, the activation of social distance made people more likely to describe the spatial relationship between two objects in a manner consistent with the vantage point of another person (Tversky & Hard, 2009). Thus, each dimension of psychological distance enables people to transcend their immediate, contextual experience (see also Liviatan, Trope, & Liberman, 2008).

Because low-level construal prioritizes concrete, immediate experience, we hypothesize that people led to think concretely will prove particularly responsive to contextual bodily cues, whereas those thinking at a higher, more abstract level will not. Two experiments test this prediction. Study 1 first considers this question using a length estimation paradigm (e.g., Proffitt et al., 2003), as effects on basic visual perception would offer a particularly stringent test of our hypothesis. Study 2 adapts from the metaphoric priming literature a paradigm that has been shown to be robust across multiple empirical examinations: weight as embodied importance (Ackerman et al., 2010; Jostmann et al., 2009). In both studies, we expect a replication of the established findings for participants thinking at a concrete level but not at an abstract level.

Study 1: Visual Perception

In the first study, we manipulate level of mental construal with an initial task that orients participants toward the concrete or abstract aspects of an activity. As these patterns of thought transfer to new targets (Freitas et al., 2004), we thereafter assess the impact of bodily cues in a supposedly unrelated task. Study 1 utilizes a visual perception paradigm (adapted from Proffitt et al., 2003) to assess the degree to which a physical encumbrance affects the estimation of spatial length. We predict that the encumbrance will exacerbate length estimates among people in the concrete thought condition but for not those in the abstract thought condition.

Participants

One hundred and six New York University undergraduates participated in the study in exchange for course credit. They were met by the experimenter and taken to an empty hallway in the psychology department. Upon arrival, participants provided basic demographic information, including their age, sex, and weight.

Construal induction

In a first task, participants performed a manipulation verified by previous research to elicit either high- or low-level construal: those in the former condition considered *why* they would perform an activity, and those in the latter considered *how* they would perform an activity (see Freitas et al., 2004; Fujita, Trope, Liberman, & Levin-Sagi, 2006). In both conditions, the activity to be considered was “maintain good personal relationships,” and the task required them to complete four blank boxes on a page in sequential order. For those in the high-level condition, the bottom box on the page read, “maintain good personal relationships” with upward-pointed arrows connecting the remaining boxes. Participants were to respond to the question “Why?” with respect to each successive box, working their way from bottom to top. That is, participants indicated why they maintain good personal relationships in the second box from the bottom, then indicated why they performed that new activity in the third box from the bottom, and then again for the fourth and topmost box. Those in the low-level condition worked their way from top to bottom in the same manner, answering successive questions of “How?” with each box. Because consideration of why to perform an action generates abstract thought (versus an orientation toward concrete details after considering how to perform an action), this task activates a pattern of high- or low-level thought, respectively, that generalizes beyond the task itself.

Judgment task

Next, participants were randomly assigned to either wear or not wear a backpack while estimating the length of the hallway. For those in the backpack condition, the experimenter surreptitiously filled a backpack to a weight between one fifth and one sixth of the participant’s reported weight (Proffitt et al., 2003) while she/he completed the construal

level manipulation. Afterward, participants in the backpack condition put on the backpack that had been filled for them; those in the no backpack condition did not wear a backpack. All participants then directed their attention to the empty hallway and estimated its length in feet (the actual length was 58 feet). The experimenter provided a ruler as an example of one foot while participants made their estimates. Afterward, participants were debriefed, thanked, and dismissed.

Results and Discussion

The length estimates were submitted to a 2 (construal level: high versus low) \times 2 (backpack: yes versus no) between-subjects ANOVA. Level of construal had no effect on length estimates, $F < 1$. The main effect of backpack indicated that those wearing the backpack provided marginally longer estimates than their no-backpack counterparts, $F(1, 102) = 2.88$, $p = .09$. This was qualified by the expected interaction between construal and backpack, $F(1, 102) = 4.05$, $p < .05$, $\eta_p^2 = .04$ (see Figure 1). Simple main effects analyses revealed that, for those in the low-level construal condition, participants wearing a backpack saw the hallway as longer ($M = 58.3$, $SD = 33.7$) than those not wearing a backpack ($M = 38.0$, $SD = 18.5$), $F(1, 102) = 6.88$, $p = .01$. No such difference was evinced among those in the high-level condition, $F < 1$ (backpack: $M = 45.2$, $SD = 19.8$; no backpack: $M = 46.9$, $SD = 36.1$). These results suggest that abstract thought mitigates the role of bodily state, yielding visual length estimates that did not respond to a physical encumbrance. Next, we sought to replicate this effect using both a different construal manipulation and a different phenomenon related to current bodily context.

Study 2: Policy Judgment

Our first study directly manipulated level of construal, which influenced a subsequent, unrelated task. To provide convergent evidence for our hypothesis, Study 2 utilizes psychological distance to evoke abstract construal (Liberman et al., 2007). Here, participants evaluate a policy with a planned implementation in either the near or distant future (adapted from Ledgerwood et al., 2010). To extend our purview to the domain of metaphorical priming, we adapted the clipboard paradigm used in past research to examine the relationship between physical and conceptual weight (Ackerman et al., 2010; Jostmann et al., 2009). Accordingly, we expected the weight of a clipboard to exert a weaker influence on importance ratings for the policy with a psychologically distal date of implementation.

Participants

Eighty New York University undergraduates participated in the study in exchange for course credit. They were met by the experimenter at a lab room devoid of all chairs to ensure that participants would remain standing for the duration of the study (Jostmann et al., 2009).

Construal induction

The experimenter handed participants a clipboard to which the materials of the study were attached. Participants read a brief paragraph describing an upcoming meeting of the university financial committee in which they were expected to vote in support of a new policy limiting the amount of funding available to students for community service projects. All participants read that the meeting would occur in the same month as their experimental session and that the committee would not allow students to express their opinion regarding this policy. To manipulate temporal distance, participants were randomly assigned to condition in which the policy was to go into effect either immediately after the meeting (psychologically near) or at the beginning of the next academic year (psychologically far).

Judgment task

Participants were randomly assigned to complete the experiment while holding either a heavy (1015 g) or light (642 g) clipboard that included a storage compartment into which paper had been added to achieve the desired weight. After reading through the scenario, all participants indicated how important they thought it was for the budget committee to consider the opinion of students on a scale from 1 (*not at all important*) to 7 (*very important*). To control for the potential confound of heavier weight prompting the use of larger numbers in responding, they also indicated their enjoyment of and involvement in community service on a similar scale. Afterward, participants were debriefed, thanked, and dismissed.

Results and Discussion

We excluded data from seven participants who rested the clipboard against a table while completing the study. The importance judgments were submitted to a 2 (temporal distance: near versus far) \times 2 (weight: heavy versus light) between-subjects ANOVA. Temporal distance did not affect importance, $F < 1$. The main effect of clipboard weight indicated that the heavier clipboard tended to increase importance ratings across condition, $F(1, 69) = 2.90$, $p = .09$. This was qualified by a significant interaction between temporal distance and weight, $F(1, 69) = 3.83$, $p = .05$, $\eta_p^2 = .05$ (see Figure 2). When the policy was to be implemented soon, participants in the heavy clipboard condition indicated that consideration of student opinion was more important ($M = 6.39$, $SD = .61$) than did those holding a lighter clipboard ($M = 5.67$, $SD = 1.19$), $F(1, 69) = 6.61$, $p = .01$. This difference disappeared with a temporally distal implementation date, $F < 1$ (heavy clipboard: $M = 6.06$, $SD = .73$; light clipboard: $M = 6.11$, $SD = .74$). We observed no main or interaction effects for community service enjoyment or involvement, $p_s > .2$. These results suggest an effect unique to the targeted physical-conceptual link (i.e., weight) that is moderated by psychological distance: When the trigger to activate the concept of importance is itself a low-level feature of the judgment context, it exerts a weaker influence from an abstract (versus concrete) frame of mind.

General Discussion

Across two studies, people thinking at a higher level of mental construal were less influenced by contextual bodily state in mental representation and judgment than those thinking at a lower level. These results obtained for both direct (Study 1) and indirect (i.e., via temporal distance, Study 2) elicitations of high-level thought. While both studies manipulated physical weight to test our hypothesis, its operationalization vis-à-vis sensorimotor experience differed between the two: to exaggerate visual length perception (Study 1) and evaluations of importance (Study 2). Thus, abstract construal seems to have brought people to adopt a vantage point not anchored on their current bodily context but rather in a manner consistent with that of an unbiased third-party observer (e.g., Kross, Ayduk, & Mischel, 2005).

While the two studies presented here considered bodily state as an incidental environmental feature, this need not be the case. For example, similar exaggeration in length estimation obtains for older adults characterized by chronic (rather than temporary) fatigue (Bhalla & Proffitt, 1999). From the perspective of construal level theory, when bodily state has an enduring influence across a variety of circumstances, it becomes a high-level feature of the environment (Trope & Liberman, 2010). By a similar logic, other bodily states can vary along a continuum from incidental to essential and therefore in their responsiveness to level of construal. Study 2 was designed to utilize an incidental, low-level element of embodied metaphor (the physical cue of weight), and the data suggest that our participants did in fact

treat it as such. We base this conclusion on the fact that abstraction led to this feature being discounted: Abstract thought prevented contextual proprioceptive feedback from informing the higher-order concept and affecting judgments of importance. An alternative experimental design could provide participants with a high- rather than low-level aspect of embodied experience and assess its impact as a function of construal. For instance, by explicitly informing participants that heart rate offers consistent, reliable information about attitudinal certainty, this bodily feedback could be appraised as a high-level consideration. As a result, abstract construal should result in such factors receiving more – rather than less – consideration in judgment.

Given the ubiquity of embodiment effects recently documented in the psychological literature, this work makes the important contribution of identifying a boundary condition on when they occur (see also Lee & Schwarz, 2010). Though the current investigation sampled only two phenomena, we believe that a similar effect of abstract construal should generalize across a wide range of contextual bodily states, including smell (Liljenquist, Zhong, & Galinsky, 2010), sight (Zhong, Bohns, & Gino, 2010), and others. In addition, as the different dimensions of psychological distance produce similar effects on judgment (Henderson & Wakslak, 2010), our results should replicate beyond temporal distance as well as to other manipulations of construal (e.g., Kross et al., 2005; Maglio & Trope, 2011). Importantly, incidental proprioceptive feedback can at times prove advantageous, highlighting the value of concrete thinking. For example, research on the somatic marker hypothesis has documented the integral role of immediate physiological reactions in decision making (Damasio, 1994), and failure to incorporate such concrete feedback can compromise decision quality (Bechara, Damasio, Damasio, & Anderson, 1994). Furthermore, in the current Study 1, length estimates made by participants who thought concretely while wearing a heavy backpack came closest to objective accuracy. Nevertheless, this research may help identify prescriptive solutions to the malleability of attitudes and behaviors. If something as incidental as perceived deviation from the normal temperature can shift belief in global warming and donations to support its resolution (Li, Johnson, & Zaval, 2011), the policy implications of remedying such biases remain vast and valuable.

In sum, despite the well-documented tendency of seemingly irrelevant factors to sway human thoughts, judgments, and behaviors, certain conditions ensure that the incidental remains exactly that. The unique human capacity to construe the environment abstractly may endow us with a certain degree of consistency, whereby we manifest resilience to the ebb and flow of contextual variables that comprise everyday experience.

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References

- Ackerman J, Nocera C, Bargh J. Incidental haptic sensations influence social judgments and decisions. *Science*. 2010; 328:1712–1715. [PubMed: 20576894]
- Barsalou L. Grounded cognition. *Annual Review of Psychology*. 2008; 59:617–645.
- Bechara A, Damasio A, Damasio H, Anderson S. Insensitivity to future consequences following damage to human prefrontal cortex. *Cognition*. 1994; 50:7–15. [PubMed: 8039375]
- Bhalla M, Proffitt D. Visual-motor recalibration in geographical slant perception. *Journal of Experimental Psychology: Human Perception and Performance*. 1999; 25:1076–1096. [PubMed: 10464946]

- Clark, H. Space, time, semantics, and the child. In: Moore, T., editor. *Cognitive development and the acquisition of language*. New York: Academic Press; 1973. p. 27-63.
- Damasio, A. *Descartes' error: Emotion, reason, and the human brain*. New York: Grosset/Putnam; 1994.
- Freitas A, Gollwitzer PM, Trope Y. The influence of abstract and concrete mindsets on anticipating and guiding others' self-regulatory efforts. *Journal of Experimental Social Psychology*. 2004; 40:739–752.
- Fujita K, Trope Y, Liberman N, Levin-Sagi M. Construal levels and self-control. *Journal of Personality and Social Psychology*. 2006; 90:351–367. [PubMed: 16594824]
- Gibson, J. *The ecological approach to visual perception*. Boston: Houghton Mifflin; 1979.
- Henderson MD, Wakslak C. Psychological distance and priming: When do semantic primes impact social evaluations? *Personality and Social Psychology Bulletin*. 2010; 36:975–985. [PubMed: 20495093]
- Jostmann N, Lakens D, Schubert T. Weight as an embodiment of importance. *Psychological Science*. 2009; 20:1169–1174. [PubMed: 19686292]
- Kross E, Ayduk O, Mischel W. When asking “why” does not hurt: Distinguishing rumination from reflective processing of negative emotions. *Psychological Science*. 2005; 16:709–715. [PubMed: 16137257]
- Lakoff, G.; Johnson, M. *Metaphors we live by*. Chicago: University of Chicago Press; 1980.
- Ledgerwood A, Trope Y, Chaiken S. Flexibility now, consistency later: Psychological distance and construal shape evaluative responding. *Journal of Personality and Social Psychology*. 2010; 99:32–51. [PubMed: 20565184]
- Lee S, Schwarz N. Dirty hands and dirty mouths: Embodiment of the moral-purity metaphor is specific to the motor modality involved in moral transgression. *Psychological Science*. 2010; 21:1423–1425. [PubMed: 20817782]
- Li Y, Johnson EJ, Zaval L. Local warming: Daily temperature change influences belief in global warming. *Psychological Science*. 2011; 22:454–459. [PubMed: 21372325]
- Liberman N, Trope Y. The psychology of transcending the here and now. *Science*. 2008; 322:1201–1205. [PubMed: 19023074]
- Liberman, N.; Trope, Y.; Stephan, E. Psychological distance. In: Kruglanski, AW.; Higgins, ET., editors. *Social psychology: Handbook of basic principles*. 2. New York: Guilford Press; 2007. p. 353-381.
- Liljenquist K, Zhong C, Galinsky A. The smell of virtue: Clean scents promote reciprocity and charity. *Psychological Science*. 2010; 21:381–383. [PubMed: 20424074]
- Liviatan I, Trope Y, Liberman N. Interpersonal similarity as a social distance dimension: Implications for perception of others' actions. *Journal of Experimental Social Psychology*. 2008; 44:1256–1269. [PubMed: 19352440]
- Maglio SJ, Trope Y. Scale and construal: How larger measurement units shrink length estimates and expand mental horizons. *Psychonomic Bulletin & Review*. 2011; 18:165–170. [PubMed: 21327357]
- Niedenthal P. Embodying emotion. *Science*. 2007; 316:1002–1005. [PubMed: 17510358]
- Niedenthal P, Barsalou L, Winkielman P, Krauth-Gruber S, Ric F. Embodiment in attitudes, social perception, and emotion. *Personality and Social Psychology Review*. 2005; 9:184–211. [PubMed: 16083360]
- Proffitt D, Stefanucci J, Banton T, Epstein W. The role of effort in perceiving distance. *Psychological Science*. 2003; 14:106–112. [PubMed: 12661670]
- Stefanucci J, Proffitt D, Banton T, Epstein W. Distances appear different on hills. *Perception & Psychophysics*. 2005; 67:1052–1060. [PubMed: 16396013]
- Stefanucci J, Proffitt D, Clore G, Parekh N. Skating down a steeper slope: Fear influences the perception of geographical slant. *Perception*. 2008; 37:321–323. [PubMed: 18414594]
- Trope Y, Liberman N. Construal-level theory of psychological distance. *Psychological Review*. 2010; 117:440–463. [PubMed: 20438233]

- Tversky B, Hard B. Embodied and disembodied cognition: Spatial perspective-taking. *Cognition*. 2009; 110:124–129. [PubMed: 19056081]
- Vallacher, R.; Wegner, D. *A theory of action identification*. Hillsdale, NJ: Erlbaum; 1985.
- Wells GL, Petty RE. The effects of overt head movements on persuasion: Compatibility and incompatibility of responses. *Basic and Applied Social Psychology*. 1980; 1:219–230.
- Williams L, Bargh J. Experiencing physical warmth promotes interpersonal warmth. *Science*. 2008; 322:606–607. [PubMed: 18948544]
- Williams L, Huang J, Bargh J. The scaffolded mind: Higher mental processes are grounded in early experience of the physical world. *European Journal of Social Psychology*. 2009; 39:1257–1267. [PubMed: 20046813]
- Zhong C, Bohns V, Gino F. A good lamp is the best police: Darkness increases self-interested behavior and dishonesty. *Psychological Science*. 2010; 21:311–314. [PubMed: 20424061]

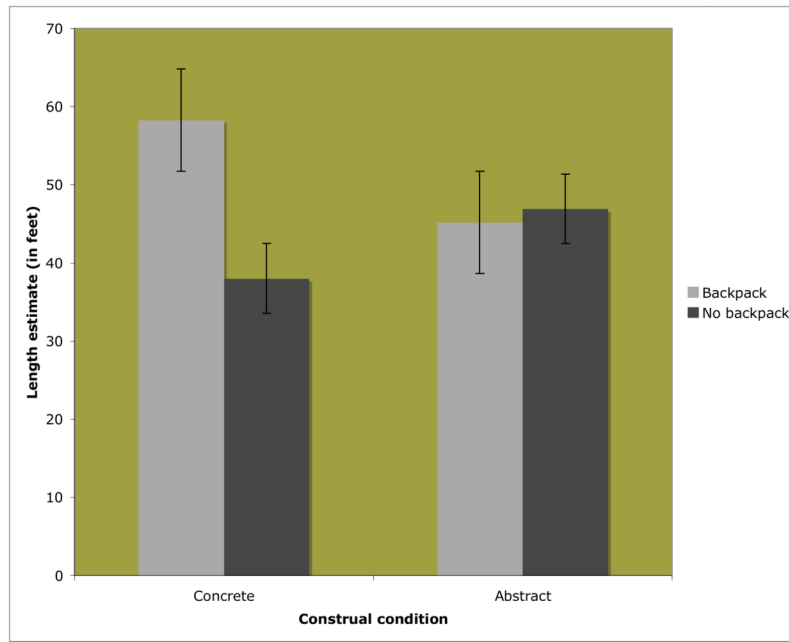


Figure 1. Length estimates by condition, Study 1. Bars indicate standard error.

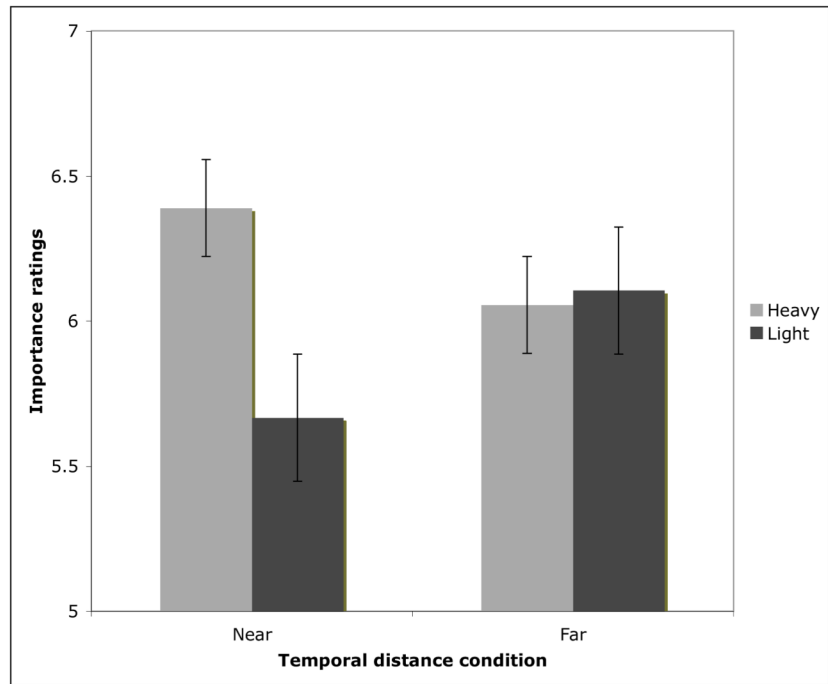


Figure 2. Importance ratings by condition, Study 2. Bars indicate standard error.