

## Research Article

# Weight as an Embodiment of Importance

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**ABSTRACT**—Four studies show that the abstract concept of importance is grounded in bodily experiences of weight. Participants provided judgments of importance while they held either a heavy or a light clipboard. Holding a heavy clipboard increased judgments of monetary value (Study 1) and made participants consider fair decision-making procedures to be more important (Study 2). It also caused more elaborate thinking, as indicated by higher consistency between related judgments (Study 3) and by greater polarization of agreement ratings for strong versus weak arguments (Study 4). In line with an embodied perspective on cognition, these findings suggest that, much as weight makes people invest more physical effort in dealing with concrete objects, it also makes people invest more cognitive effort in dealing with abstract issues.

Weight is a metaphor for importance in many languages, including English, Dutch, Spanish, and Chinese. For instance, people “weigh” the value of different options before making a decision, they “add weight” to place emphasis on important ideas, and their opinion “carries weight” if they fill an influential position. In this article, we report evidence that the link between weight and importance exists not only on a linguistic but also on a conceptual level. On the basis of recent theorizing on embodied cognition (for overviews, see Barsalou, 2008, and Semin & Smith, 2008), we suggest that the conceptualization of importance is grounded in bodily experiences of weight.

## THE EMBODIMENT OF IMPORTANCE

Gravity is a ubiquitous force in nature that shapes people’s bodies and behaviors in fundamental ways. For instance, children require a year of learning in order to move their bodies

without falling (Clark, 1973). In addition to shaping locomotion, gravity profoundly determines people’s relations to concrete objects. Depending on density and size, some objects are heavier than others, and interacting with heavy objects provides different affordances (i.e., opportunities and costs; Gibson, 1979) than interacting with light objects. Being hit by a heavy object generally has more profound consequences than being hit by a light object, and the energetic costs of moving a heavy object are higher than those of moving a light object. Thus, on average, heavy objects have a greater impact on people’s bodies than light objects do.

Through repeated experiences with heavy objects since early childhood, people learn that dealing with heavy objects generally requires more effort, in terms of physical strength or cognitive planning, than dealing with light objects. People may thus associate the experience of weight with the increased expenditure of bodily or mental effort. In line with this notion, research has found that people who carry heavy backpacks judge distances to be greater and hills to be steeper than those who do not carry this weight (Proffitt, 2006). The more consequential implications of dealing with heavy compared with light objects are also reflected in linguistic associations between weight and potency (Osgood, Suci, & Tannenbaum, 1967). Furthermore, many languages and cultures use weight as a metaphor for the importance of abstract issues (cf. Skutsch, 1936; Vankeerberghen, 2006). The metaphoric use of weight suggests that the association between weight and importance has developed from a concrete link to a conceptual relationship on an abstract level (cf. Lakoff & Johnson, 1980).

An intriguing possibility is that the abstract concept of importance is still grounded in sensory experiences of weight. This idea is supported by theories of embodied cognition (see Barsalou, 2008; Semin & Smith, 2008). In short, such theories posit that cognitive representations are grounded in the brain’s sensorimotor systems. Through schematization of experienced bodily states, people develop perceptual representations of abstract concepts. Because the concrete sensory experiences

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remain part of these representations, activation of these experiences can influence mental simulation and abstract thought (cf. Boroditsky & Ramscar, 2002). In line with an embodied-cognition perspective, recent research found that the abstract concepts of interpersonal warmth and moral purity are grounded in physical experiences of temperature (Williams & Bargh, 2008; Zhong & Leonardelli, 2008) and cleanliness (Schnall, Benton, & Harvey, 2008; Zhong & Liljenquist, 2006), respectively.

On the basis of the embodied-cognition perspective, we assume that the representation of importance includes sensory aspects of weight. Accordingly, the bodily experience of weight should influence the extent to which issues are judged to be important: Issues that are associated with a heavy weight should be judged to be more important than issues that are associated with a light weight. Moreover, the embodied perspective suggests that the experience of weight influences the amount of effort that people invest in dealing with an issue: Much as dealing with heavy objects is associated with greater physical or mental effort than dealing with light objects, dealing with important abstract issues is associated with more elaborate thinking than dealing with unimportant issues (see Petty & Wegener, 1999). Therefore, if an abstract issue is associated with heavy rather than light weight, it should trigger greater investment of cognitive effort and thus more elaborate thinking. Put differently, people do not tend to take weighty matters lightly.

To summarize, we assume that experiencing weight influences judgments of importance because the concept of importance is linked to experiences of weight. Therefore, we predicted that carrying a heavy weight, rather than a light weight, would make people judge issues to be more important. Moreover, we assume that experiencing more weight leads to greater investment of cognitive effort and therefore a higher level of message elaboration. Higher elaboration can be reflected in greater consistency between one's judgment and one's underlying beliefs, and also in greater polarization in evaluations of strong versus weak arguments (Petty & Wegener, 1999; cf. Briñol & Petty, 2008). Therefore, we predicted that carrying a heavy weight would lead to higher judgment consistency and greater polarization in judgments of arguments.

## THE PRESENT RESEARCH

In the present research, we conducted four studies to examine whether importance is embodied in weight. The procedure was similar across the studies. Participants completed a questionnaire (different in each study) while they were holding a clipboard that either was or was not weighed down. Specifically, the clipboard had a storage compartment (35 cm × 23 cm × 4 cm) that was empty for half of the participants and filled with paper for the other half. The clipboard weighed 657 g (1.45 lb) when the compartment was empty, but 1,039 g (2.29 lb) when it was filled. All participants completed the questionnaire in a stand-

ing position. We tested whether participants who held a heavy, rather than a light, clipboard would judge the value of foreign currencies to be higher (Study 1) and having a voice in decision-making procedures to be more important (Study 2). In addition, we examined whether holding the heavy clipboard would lead participants to elaborate more about issues of community policy. We assessed the effect of clipboard weight on judgment consistency (Study 3) and on polarization of participants' evaluations of strong versus weak arguments (Study 4).

## STUDY 1

In Study 1, we examined the impact of the clipboard's weight on judgments of monetary value. We reasoned that value is a crucial index of a currency's importance because it reflects the currency's purchasing power. Participants estimated the value of foreign currencies while holding a heavy or a light clipboard. We expected that holding a heavy clipboard would lead to higher value judgments than holding a light clipboard.

### Method

#### *Participants*

Forty volunteers from a Dutch university (27 women and 13 men; mean age = 20 years) participated in return for financial compensation or course credit. Participants were randomly assigned to the light-clipboard condition ( $n = 20$ ) or the heavy-clipboard condition ( $n = 20$ ). One participant was excluded from analysis because she expressed suspicions about the clipboard.

#### *Procedure*

Participants were tested individually in the laboratory. The experimenter explained that the purpose of the study was to investigate how different body positions influence information processing. All participants were instructed to stand while filling out a questionnaire that was attached to the clipboard. The experimenter told participants to clasp the clipboard with their nondominant arm and hold it in a comfortable position such that its lower part rested on the waist. After participants filled out the questionnaire, they indicated their current mood by marking a line (0 = *negative*, 100 = *positive*), provided some demographic information, and were debriefed.

On the questionnaire, participants estimated the value of six foreign currencies. For each currency, a number of monetary units (e.g., 100 Japanese yen, 1 Swiss franc) that could be purchased for the counter value of €2 or less (according to actual exchange rates) was listed. Participants were to guess how many euros were needed to purchase each stated quantity of foreign currency, indicating their guess on a line consisting of 20 dashes. The left end of the line was labeled €0, and the right end was labeled €2. Each dash thus represented a value of 10 cents, so scores could vary between 0 and 200 cents. Participants also indicated how satisfied they were with the euro, using

a scale from 1 (*not at all satisfied*) to 7 (*very much satisfied*; grand  $M = 4.56$ ).

## Results and Discussion

To assess the ratings of monetary value, we measured the positions of the dashes where participants had marked the lines. We then averaged the scores across currencies to obtain an overall index of monetary value in cents. A one-way analysis of variance (ANOVA) revealed that participants in the heavy-clipboard condition ( $M = 97.3$ ,  $SD = 29.4$ ) considered the currencies to be more valuable than participants in the light-clipboard condition ( $M = 77.8$ ,  $SD = 25.4$ ),  $F(1, 39) = 4.86$ ,  $p = .04$ ,  $p_{\text{rep}} = .93$ ,  $\eta_p^2 = .12$ .

The weight of the clipboard had no effect on satisfaction with the euro,  $F < 1$ , nor did satisfaction ratings influence the effects of clipboard weight on value ratings. We can therefore rule out the possibility that participants in the heavy-clipboard condition had devaluated the euro. We found no effects of clipboard weight on mood,  $F < 1$ , and the effect of clipboard weight on the currency evaluations remained significant when we controlled for mood in a covariance analysis.

As predicted, participants who held a heavy clipboard estimated the currencies to be more valuable than participants who held a light clipboard. The physical experience of weight influenced judgments of the purchasing power of foreign currencies. Study 1 thus provided a first indication that importance ratings are influenced by bodily experiences of weight.

## STUDY 2

Bodily experiences of weight might have influenced importance ratings in the domain of money because monetary value is sometimes determined by the actual weight of the material out of which the currency is made (e.g., precious metal). In Study 2, we wanted to replicate the effects of Study 1 in a completely abstract domain where importance has no counterpart in actual weight. Because justice is such a prototypically abstract concept, we chose the importance of having a voice in a decision-making procedure as the dependent variable. We expected that participants who held a heavy clipboard would consider having a voice to be more important than participants who held a light clipboard.

## Method

### Participants

Fifty-one volunteers from a Dutch university (31 women and 20 men; mean age = 22 years) participated in return for financial compensation or course credit. They were randomly assigned to the heavy-clipboard condition ( $n = 28$ ) or the light-clipboard condition ( $n = 23$ ). We excluded from analysis 1 participant who considered the issue to be decided absolutely irrelevant. We reasoned that people who lack concern about an

issue are unlikely to care about the procedures for making a decision about it.

### Procedure

The procedure was similar to that in Study 1 except as noted. Participants received no instructions regarding body position. They all remained in a standing position because the location provided no opportunity to sit down. The questionnaire in Study 2 presented a short scenario in which a university committee denied students the opportunity to express their opinion regarding the size of a grant to study abroad (Van den Bos, Wilke, & Lind, 1998). Participants indicated how important it was for them that the committee would listen to the opinion of the students (1 = *not at all*, 7 = *very much*).

## Results and Discussion

A one-way ANOVA revealed that participants in the heavy-clipboard condition ( $M = 5.27$ ,  $SD = 1.28$ ) found it more important that the committee listen to the students' opinions than did participants in the light-clipboard condition ( $M = 4.21$ ,  $SD = 2.10$ ),  $F(1, 49) = 4.33$ ,  $p < .05$ ,  $p_{\text{rep}} = .92$ ,  $\eta_p^2 = .08$ .

Clipboard weight had no effect on mood,  $F < 1$ . The effect of weight on importance ratings remained marginally significant when we controlled for mood in a covariance analysis ( $p = .095$ ,  $p_{\text{rep}} = .88$ ).<sup>1</sup>

As predicted, bodily experiences of weight influenced importance judgments in the abstract domain of having a voice in decision making. Because the justice domain is entirely free of concrete experiences of weight, this is strong support for an embodied conceptualization of importance.

## STUDY 3

The activation of relevant bodily cues may influence not only people's judgments, but also how these judgments are formed (Briñol & Petty, 2008). Taking the embodied perspective, we reasoned that heavier weight is associated with greater investment of cognitive effort. We therefore expected that dealing with an issue associated with heavy weight would trigger high elaboration.

Elaboration can lead to enhanced consistency between one's judgments and one's underlying beliefs (Chaiken, Pomerantz, & Giner-Sorolla, 1995; Petty & Wegener, 1999). In Study 3, we measured the consistency between two different but related judgments. Undergraduate participants provided direct and indirect judgments of their satisfaction with the city in which their university was located. One judgment was directly related to the quality of life in the city, whereas the other was an evaluation of the city's mayor, an indirect measure of satisfaction

<sup>1</sup>Participants also indicated the perceived task difficulty by marking a line (0 = *easy*, 100 = *difficult*). Clipboard weight did not affect perceived task difficulty,  $F < 1$ , and controlling for task difficulty did not reduce the effect of weight on importance judgments,  $p < .05$ ,  $p_{\text{rep}} > .91$ .

with the city. We expected that holding a heavy, rather than a light, clipboard would lead to higher consistency between evaluations of the city and evaluations of the mayor.

## Method

### Participants

Forty-nine volunteers from a Dutch university (31 women and 18 men; mean age = 21 years) participated in return for financial compensation or course credit. They were randomly assigned to the heavy-clipboard condition ( $n = 25$ ) or the light-clipboard condition ( $n = 24$ ). One participant was excluded from analyses because he expressed suspicions about the weight of the clipboard.

### Procedure

The procedure was similar to that of Study 1 except as noted. In this study, the questionnaire began with a short biographical sketch of the mayor of Amsterdam, The Netherlands, where the participants' university was located. Participants then indicated the extent to which they believed that the mayor could be characterized as competent, likeable, powerless (reverse-scored), trustworthy, intelligent, corrupt (reverse-scored), important, and charismatic (1 = *strongly disagree*, 7 = *strongly agree*). Evaluations were averaged ( $\alpha = .88$ ) to obtain an overall evaluation of the mayor (grand  $M = 5.38$ ). Next, participants indicated the extent to which they considered Amsterdam a great city and the extent to which they enjoyed being in Amsterdam (1 = *not at all*, 7 = *very much*). Responses to these two questions were averaged ( $\alpha = .89$ ) to obtain an index of general attitude toward the city (grand  $M = 6.03$ ).

## Results and Discussion

Initial analyses revealed no simple effects of clipboard weight on mayor evaluations or city attitudes, all  $F$ s < 1. We continued by regressing city attitudes on clipboard weight (heavy vs. light, contrast-coded), mayor evaluations (continuous and centered), and their interaction term. The interaction was significant,  $\beta = .34$ ,  $t(47) = 2.19$ ,  $p = .04$ ,  $p_{\text{rep}} = .93$ ,  $R^2 = .10$ . City attitudes correlated positively with mayor evaluations in the heavy-clipboard condition,  $r = .42$ ,  $p < .05$ ,  $p_{\text{rep}} = .92$ , but not in the light-clipboard condition,  $r = -.23$ , n.s.

We found no effects of weight on mood,  $F < 1$ , and the interaction effect remained significant when we controlled for mood ( $p = .04$ ,  $p_{\text{rep}} = .93$ ).<sup>2</sup>

<sup>2</sup>As in Study 2, participants rated the perceived task difficulty, and clipboard weight did not affect these ratings,  $F < 1$ . Participants also rated the perceived task pleasantness (0 = *unpleasant*, 100 = *pleasant*). They found the task somewhat more pleasant ( $M = 55$ ,  $SD = 19$ ) when the clipboard was heavy than when it was light ( $M = 48$ ,  $SD = 21$ ),  $F(1, 46) = 2.81$ ,  $p = .11$ ,  $p_{\text{rep}} = .88$ . Controlling for task pleasantness or task difficulty left the interaction effect in Study 3 significant,  $p$ s < .05,  $p_{\text{rep}}$ s > .91.

As predicted, evaluations of the mayor and attitudes toward the city were correlated when participants held a heavy clipboard, but not when they held a light clipboard. Even though the design of Study 3 makes it impossible to say with certainty whether city attitudes became more aligned with mayor evaluations or the other way around, we can conclude that holding a greater weight led to higher consistency between two related judgments. This finding is an indication that bodily experiences of weight can lead to more cognitive elaboration.

## STUDY 4

In Study 4, we sought to further test the hypothesis that the experience of weight leads to more cognitive elaboration. A straightforward way to measure the amount of elaboration is to measure participants' agreement with arguments of varying strength. High elaboration can be reflected by more polarization between agreement with strong arguments and disagreement with weak arguments (Petty & Wegener, 1999).

Participants held a heavy or a light clipboard while they evaluated weak and strong arguments. We expected that participants in the heavy-clipboard condition would display more polarization in their judgments of strong versus weak arguments than participants in the light-clipboard condition. We further expected that, as a consequence of this polarization, participants in the heavy-clipboard condition would be more confident about their own opinion regarding the issue in question than participants in the light-clipboard condition.

## Method

### Participants

Forty visitors to the campus of a Dutch university (23 women and 17 men; mean age = 23 years) voluntarily participated. They were randomly assigned to the heavy-clipboard condition ( $n = 20$ ) or the light-clipboard condition ( $n = 20$ ).

### Procedure

The procedure was similar to that in Study 2 except that participants were approached outside the laboratory on a part of the campus where there was no opportunity to sit down. The questionnaire asked participants to rate the extent to which they agreed with a number of arguments in favor of a controversial subway that was under construction in their city at the time of the study (1 = *strongly disagree*, 7 = *strongly agree*). The pilot-tested list included three arguments judged as weak (e.g., "the building of the subway is a sign of courage to handle large-scale projects") and three arguments judged as strong (e.g., "the subway will make the city center more accessible"). Subsequently, participants rated how confident they were in their opinion regarding the subway (1 = *not at all*, 7 = *very much*). They were then asked whether they were in favor of the subway

( $n = 20$ ), against it ( $n = 2$ ), undecided ( $n = 15$ ), or not interested in the issue ( $n = 3$ ).

## Results and Discussion

We averaged responses to the three weak arguments (grand  $M = 3.73$ ,  $SD = 0.96$ ) and responses to the three strong arguments (grand  $M = 4.83$ ,  $SD = 0.97$ ). We subsequently subjected the averaged responses to a 2 (clipboard weight: heavy vs. light)  $\times$  2 (argument strength: strong vs. weak) ANOVA with repeated measures on the last factor. Participants generally agreed more with strong arguments than with weak arguments,  $F(1, 38) = 39.19$ ,  $p < .001$ ,  $p_{\text{rep}} = .99$ ,  $\eta_p^2 = .51$ . More important, we found the predicted interaction of clipboard weight and argument strength,  $F(1, 38) = 8.10$ ,  $p = .008$ ,  $p_{\text{rep}} = .97$ ,  $\eta_p^2 = .18$ . In the light-clipboard condition, participants agreed more with the strong arguments ( $M = 4.65$ ,  $SD = 0.55$ ) than with the weak arguments ( $M = 4.05$ ,  $SD = 0.85$ ),  $F(1, 19) = 6.44$ ,  $p = .03$ ,  $p_{\text{rep}} = .94$ ,  $\eta_p^2 = .25$ . In the heavy-clipboard condition, this effect was even more pronounced,  $F(1, 19) = 37.87$ ,  $p < .001$ ,  $p_{\text{rep}} = .99$ ,  $\eta_p^2 = .67$  ( $M = 5.00$ ,  $SD = 1.25$ , vs.  $M = 3.40$ ,  $SD = 0.94$ ).

Analyses of simple comparisons revealed that there was less agreement with weak arguments in the heavy-clipboard condition than in the light-clipboard condition,  $F(1, 39) = 5.06$ ,  $p = .03$ ,  $p_{\text{rep}} = .94$ ,  $\eta_p^2 = .12$ . Agreement with strong arguments was similar in the two conditions,  $F(1, 39) = 1.32$ , n.s. A subsequent one-way ANOVA revealed that participants in the heavy-clipboard condition ( $M = 4.30$ ,  $SD = 1.49$ ) were more confident about their opinion regarding the subway than participants in the light-clipboard condition ( $M = 3.42$ ,  $SD = 1.07$ ),  $F(1, 39) = 4.43$ ,  $p < .05$ ,  $p_{\text{rep}} = .92$ ,  $\eta_p^2 = .11$ .

We also assessed whether participants had a clear opinion regarding the subway (i.e., were either in favor of it or against it) or were not sure what to think about it (i.e., were undecided or indifferent). In the heavy-clipboard condition, more participants had a clear opinion ( $n = 15$ ) than were unsure ( $n = 5$ ), whereas in the light-clipboard condition, more participants were unsure ( $n = 13$ ) than had a clear opinion ( $n = 7$ ),  $\chi^2(1, N = 40) = 6.47$ ,  $p < .02$ ,  $p_{\text{rep}} = .92$ .

As predicted, holding a heavy clipboard led to more cognitive elaboration than holding a light clipboard, as indicated by greater polarization between judgments of strong versus weak arguments, and by participants' greater confidence in their own opinion. In line with our hypothesis, Study 4 thus demonstrates that bodily experiences of weight can influence the amount of elaborated thought.

## GENERAL DISCUSSION

In four studies, we obtained evidence that the abstract concept of importance is linked to bodily experiences of weight. Experiencing heavy, rather than light, weight when holding a clipboard increased the perceived importance of issues. We

consistently demonstrated the embodied relationship between weight and importance across different domains, such as money, procedural justice, and community policy.

These findings are consistent with an embodied perspective on cognition (Barsalou, 2008), which holds that representations of abstract concepts are grounded in sensorimotor processes. In line with this perspective, recent research has identified several domains in which abstract concepts are influenced by physical experiences (e.g., judgments of moral purity and interpersonal warmth are influenced by experiences of cleanliness and temperature, respectively; see, e.g., Schnall et al., 2008; Williams & Bargh, 2008). The present studies add weight to this emerging body of research.

We demonstrated that weight influences how people process abstract information (e.g., procedural justice) that has absolutely no counterpart in concrete experiences of weight. Taking an embodied perspective, we predicted and found that weight influences how people deal with abstract issues much as it influences how people deal with concrete objects: It leads to greater investment of effort. In our studies, weight led to greater elaboration of thought, as indicated by greater consistency between related judgments, greater polarization between judgments of strong versus weak arguments, and greater confidence in one's opinion (cf. Briñol & Petty, 2008).

Notably, we found no evidence that participants perceived holding the heavy clipboard as more effortful than holding the light clipboard. Indeed, the weight of the heavy clipboard did not affect participants' mood, and it did not make participants perceive the task as more difficult or less pleasant (see footnotes 1 and 2). It thus seems unlikely that participants who held a heavy clipboard misattributed conscious feelings of effort when judging importance, or took such feelings as cues to engage in greater cognitive elaboration.

The absence of misattribution effects is in line with our idea that people have developed a conceptualization of importance that comprises a direct mental association between sensory experiences of weight and the investment of mental effort (cf. Barsalou, 2008). However, even though we assume that this association is not mediated by misattributions of effort, we cannot rule out the possibility that our participants used more implicit misattributions that we were unable to detect. One way for future research to address this issue would be to examine whether the association between weight and importance is bidirectional. If priming the concept of importance triggers feelings of weight, the possibility of misattribution becomes less likely.

To conclude, the present research demonstrates that the experience of weight is an integral part of the abstract conceptualization of importance. Our findings indicate that the impact of basic bodily experiences, such as weight, is more fundamental than previously suggested. Gravitational pull not only shapes people's bodies and behavior, but even influences their very thoughts.

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