APPEARANCES CAN BE DECEIVING. THE PORTAYAL OF WEIGHT AND EMBODIED MEANING PORTRAYAL IN PRODUCT DESIGN

Thomas van Rompuy, Francien Verdenius, Vanessa Okken and Ad Pruyn
University of Twente
✉ t.j.l.vanrompuy@utwente.nl, f.e.verdenius@alumnus.utwente.nl, v.s.okken@utwente.nl, a.t.h.pruyn@utwente.nl

ABSTRACT

First impressions often arise from visual perceptions of product appearance, later to be followed by multisensory impressions involving touch and haptic sensations. These subsequent sensations may sometimes reinforce impressions generated by product appearance, but lead to disappointment when expectations are not met. In this paper, the relationship between weight, product evaluation, and consumer personality is tested. Based on the embodied cognition framework, it is argued that a potential pitfall of downsizing consumer electronics consists in accompanied weight reductions, inspiring perceptions of products as cheap and flimsy. In order to substantiate this claim, in study 1, a vision-only study was conducted, clearly demonstrating that people prefer compact, slender product variants over more voluminous versions. In study 2, actual dummy phones were used and product weight was manipulated independently from product appearance. Results show that lightweight variants may reduce value perceptions and product appeal, but that this effect varies with consumer personality.

KEYWORDS: embodied cognition, product appearance, haptic sensations, value perceptions, personality

INTRODUCTION

Imagine seeing a mobile phone advertised online; it looks attractive, it just came out, and the brand happens to be the brand of your choice. Hence, you decide to visit your local retailer and eagerly wait to take it home. But as the phone is handed to you, you cannot help but feel disappointed; it sure looks nice, but it feels cheap. In fact, it feels so lightweight you almost get the impression that there is only a cover and nothing underneath. You go home and decide never again to make your purchase decision online, but always visit a local retailer first, as you did this time.

As opportunities for differentiation on traditional grounds such as practical functioning, quality, and price diminish, product developers and marketers increasingly appeal to experiential aspects of product experience in order to seduce and persuade consumers. In such endeavors, product design often takes center stage as it is the most direct source for communicating experiential benefits. Hence, in the above example, the phone’s robust and dark appearance may be stressed in order to convey an image of ruggedness or coolness so as to appeal to specific consumer segments. Usually, focus is on the visual aspects of product appearance since these are generally considered the most important with respect to purchase decisions (e.g., Bloch, 1995). In addition, it is, so far, the only product dimension that allows for presentation in the online context.

However, a considerable body of research testifies to the importance of multi-sensory input in the context of product experience (Spence & Gallance, 2011). Also, when looking at our own lives, we may find that memorable events may not only involve memory for visual aspects but also recollections of a specific smell (e.g., the smell of an advancing summer), sound (music playing in the background) or touch (the soft texture of a blouse resting on one’s shoulders). What these examples suggest is that consumers not only consider visual aspects when evaluating product episodes in terms of their experiential benefits but non-visual aspects as well. Additionally, consumers may use sensations from multiple cues in order to obtain a more complete picture of the product involved. For instance, Peck and Childers (2003) showed that shoppers more readily understand and form confident impressions about products with which they physically interact with, a finding in line with the examples painted above.

This research seeks to explore the role of product weight in product evaluations. Inspired by studies addressing the relationship between weight and evaluations of value, here it is proposed that although reductions in weight may to a certain
extent be desirable, especially so for portable products such as mobile phones, excessive weight reductions inspire perceptions of flimsiness or cheapness. In addition to exploring the interplay of weight and a product's visual appearance, the current research also takes into account consumer personality and questions whether weight is more important to some consumers than to others. Specifically, in figurative language use, optimism is often equated with lightness whereas negativism is usually equated with heaviness, inspiring the prediction that effects of product weight vary with participants' positive-mindedness.

To explore these issues, two studies are reported. In study 1, the influence of product downsizing was assessed in an online (vision-only) context. Hence, in this study, participants could only base their evaluations on visual information. In study 2, product appearance and product weight were independently manipulated using actual dummy phones in order to explore their interactions and relative importance with respect to consumer preference and value perceptions. In both studies, mobile phones were used as stimulus materials for the following reasons. Firstly, due to their portable and ‘hand-held’ characteristics, both dimensions are important in interactions with these products. Secondly, focus has nonetheless been on visual appearances in promotional efforts, amongst others resulting in downsizing of size parameters (further boosted by technological developments allowing for such downsizing). Thirdly, as discussed, mobile phones are frequently sold and bought in the online context where multisensory input is lacking. Before presenting the details of these studies, first we will present a brief overview of research addressing the relationship between weight and consumer evaluations.

WEIGHT AND IMPORTANCE: AN EMBODIED PERSPECTIVE

A key finding of research in embodied cognition holds that many affective or abstract concepts are rooted in people's embodied interactions with the environment and objects therein (Johnson, 1987; Lakoff & Johnson, 1999). For instance, affection and intimacy may be talked about in terms of warmth (e.g., a ‘cold’ person or a ‘warm’ embrace). Such couplings can be traced to early-life embodied interactions in which experiencing warmth and intimacy are part of the same interaction (e.g., a young child experiencing intimacy and affection in his mother’s warm embrace; Bargh & Shalev, 2012; Grady, 1997). In a similar manner, ease of social interactions and personality may be talked about in terms of material properties such as roughness or smoothness (e.g., a smooth interaction or rough person). Of particular importance for the current undertaking, importance, seriousness, and value are assessed. But what happens when such practices not only lead to more portable and compact designs but to excessively lightweight products as well? The studies described above suggest that this may reduce product value perceptions and consumer liking. However, to date, no research has addressed the relationship between weight and value perception in relation to product experience.

In order to explore the interplay between vision and touch and their relative importance in the design context, two stud-
ies were conducted. In study 1, we sought to verify the presumed importance of product size and thus expected that:

H1: A decrease in mobile phone size positively affects product appeal.

And as downsizing evidences technological innovation and state of the art techniques, we also expected that consumers would more readily associate a smaller product size with enhanced value and thus a higher price:

H2: A decrease in mobile phone size increases perceived value and boosts price expectations.

STUDY 1

Method

• Participants and procedure
58 respondents (26 male, 32 female; mean age: 30.1 years) participated in the study. They were recruited via social networking sites and were asked to fill out an online questionnaire assessing consumers’ first impressions of mobile phone prototypes. Upon consent, participants were redirected to a page where they were presented with either a slender, thin variant (Figure 1, left panel) or a more voluminous, thick variant (Figure 1, right panel). In addition to these stationary presentations, a 360-degree rotating animation of the phone was presented to ensure participants could form an accurate impression of the phone’s appearance. Next participants filled out an online questionnaire assessing the outcome measures under evaluation.

• Stimulus materials and experimental design
The prototypes (see Figure 1) for this study were modeled in Rhinoceros 4.0 and subsequently printed in 3D by Shapeways (a 3D-printing marketplace). The measurements (117.6/61.5/8.5 mm for the slender variant versus 117.6/61.5/16 mm for the voluminous variant) were based on “candybar” styled mobile phones (popular at the time of these studies), crystalizing in a one-factor (product appearance: slender versus voluminous) between-subjects design.

• Measures

Product appeal was measured with the items “This phone appeals to me”, “This phone is attractive”, “I would consider buying this phone”, and “This is not my type of phone” (alpha = .84). Using 7-point rating scales, participants indicated to what extent they agreed with these statements.

Assessments of product value were tapped with the items “This phone is casual”, “This phone is cheap”, and “This phone is worth paying a premium price for” (alpha = .61). Participants indicated (using 7-points rating scales) to what extent they agreed with these statements.

Participants filled out the expected price (in euro’s) prompted by the question ‘If this mobile phone were available in stores, how much would it cost?’.

Results and discussion

An analysis of variance (ANOVA) revealed a significant effect of product appearance on product appeal (F (1,56) = 30.04, p < .001), indicating that the slender, thin variant triggered a more positive attitude (M = 4.61, SD = 1.15) compared to the more voluminous, thick variant (M = 3.00, SD = 1.08).

Likewise, the effect of product appearance on value perceptions reached significance (F (1,56) = 11.98, p = .001), showing that the slender variant was perceived as more valuable (M = 3.61, SD = 1.15) compared to the more voluminous variant (M = 3.00, SD = 1.08).

In line with the results for value perception, an analysis of variance also revealed a significant effect of product appearance on price expectation (F (1,56) = 16.88, p < .001), indicating that the slender variant triggered a higher expected price (M = 354.12, SD = 179.13) compared to the more voluminous variant (M = 181.32, SD = 127.32).

In line with expectations, these results confirm a general preference for a slender, slim product appearance. In addition, they show that such designs are also perceived as more valuable and costly, as indicated by the fact that price expectations were almost twice as high for the slender variant.

STUDY 2

Having established this general preference for more compact, slender product variants, in a second study, the ‘weight’ factor was introduced. This allows us to assess whether reductions in product weight that often accompany scale reductions are also considered desirable. As outlined earlier, weight reductions may be appraised negatively because of embodied associations triggered by a literal lack of substance. Hence, in study two we independently manipulated visual appearance and weight and again assessed product appeal, value perceptions, and price expectations.

Additionally, we included a short ‘optimism’ personality in-
ventory. Language dealing with positive and negative affect is full of references to lightness and heaviness. Generally, optimism and spiritedness are linked to lightness (e.g., a light-hearted versus a heavy-hearted person), problems are often conceptualized as ‘a heavy load to carry’, and a severe depression may likewise be labeled ‘heavy’. Triggered by such language use, it was predicted that the importance of weight to consumer decision making might vary dependent on whether people tend to experience their world as ‘light’ and obstacles as easy to overcome (i.e., positive-minded participants), or conversely, as ‘heavy’ and obstacles as posing a serious challenge and requiring lots of effort to overcome (i.e., negative-minded participants).

Specifically, research indicates that people tend to prefer products and brands that are congruent with their self-image or personality (Govers & Schoormans, 2005; Hogg, Cox, & Keeling, 1998; Jamal & Goode, 2001; Malhotra, 1988; Sirgy, 1985). For instance, Govers and Schoormans (2005) showed that consumers prefer everyday products (e.g., coffeemakers, soap dispensers, and screwdrivers) with a product personality that matches their self-image (e.g., an extraverted person preferring an outspoken design over a modest design). The basis for such effects can be traced to the fact that products can be considered a material extension of the self (Belk, 1988), and therefore can help express people’s personality to the outside world. Hence:

H3: Lightweight product variants are perceived as less appealing and less valuable compared to heavyweight variants.

H4: These effects are more pronounced for negative-minded (as opposed to positive-minded) consumers.

**Method**

Participants and procedure. 96 respondents (50 male, 45 female, 1 participant did not reveal gender; mean age: 34.0 years) participated in the study. These participants were recruited at the town center and neighboring companies at a large Dutch city. Upon agreement to participate they were told that the purpose of the study was to assess people’s ‘look and feel’ impressions of early prototypes of mobile phones. Next, they were handed over one of the phone variants, and asked to fill out the questionnaire comprising the dependent measures.

**Stimulus materials and experimental design**

The phones were identical as in study 1, but this time for each variant, a lightweight and a heavyweight version was created (60 grams versus 180 grams) by inserting fishing sinkers in the phones’ bodies (see Figure 2), resulting in a 2 (product appearance: slender versus voluminous) X 2 (product weight: lightweight versus heavyweight) X 2 (consumer personality: low positivism versus high positivism) factor consideration between subjects design.

**Measures**

The product appeal (alpha = .91), value perception (alpha = .62), and price expectation measures were identical to study one. In order to measure positive-mindedness, participants were asked to indicate to what extent they considered themselves optimistic and spirited (r = .50, p < .001). Responses were recorded on 7-point rating scales. Based on a median split, participants were scored as either low or high on positive-mindedness.

**Results**

- **Product appeal**

As in study 1, an analysis of variance revealed a significant effect of product appearance on product appeal (F (1, 88) = 8.24, p < .01), indicating that the slender variant was considered more appealing (M = 4.62, SD = 1.43) compared to the more voluminous, thick variant (M = 3.81, SD = 1.30).

![Figure 2. Weight manipulation in study 2](image)

![Figure 3. Weight X Personality interactions on product appeal (left panel) and value perception (right panel)](image)
The effect of product weight was also significant (F(1, 88) = 4.47, p < .05), indicating that the weighty variant was liked better (M = 4.44, SD = 1.32) compared to the lightweight variant (M = 4.02, SD = 1.48). Importantly, the interaction between weight and personality also reached significance (F(1, 88) = 3.97, p < .05; see Figure 3, left panel).

Simple main effects show that whereas for participants scoring high on positive-mindedness the effect of product weight is not significant (F(1, 88) = 3.09, p = .08), for participants low on positive-mindedness, the effect of weight is significant, indicating that they have a clear preference for the more weighty variant (F(1, 88) = 6.67, p = .001).

- **Value perception**
  
  With respect to value perceptions, an analysis of variance revealed a significant effect of weight (F(1,88) = 8.65, p < .01), showing that the weighty variant is perceived as more valuable (M = 4.28, SD = 1.02) compared to the lightweight variant (M = 3.80, SD = 1.10). This time, the effect of product appearance was not significant (F(1,88) = 3.97, p < .05; see Figure 3, left panel).

  The interaction effect between weight and personality is again significant (F(1,88) = 7.40, p < .01; see Figure 3, right panel), showing (in line with the results for product appeal) that weight only has an influence for participants scoring low on positivism (F(1,88) = 12.78, p < .001). These participants perceive the heavyweight variant as more valuable compared to the lightweight variant. For positive-minded participants, weight does not influence value perceptions (F(1,88) = 1, ns).

  Finally, this interaction effect was further qualified by a significant three-way interaction, showing that the effect of weight on value perceptions of participants scoring low on positivism is particularly strong in the slender product appearance condition. Hence, if the phone suggests lightness through its visual appearance, weight is particularly important with respect to value perceptions.

- **Price expectation**
  
  Finally, an analysis of variance revealed a significant effect of product appearance on price expectation (F(1,88) = 8.52, p < .01), indicating that the slender, thin variant triggered a higher expected price (M = 302.98, SD = 137.30) compared to the more voluminous variant (M = 212.45, SD = 145.08).

  The effect of product weight was also significant (F(1,88) = 5.44, p < .05), showing that the weighty variant triggered a higher price expectation (M = 289.43, SD = 160.98) compared to the lightweight variant (M = 221.02, SD = 123.25). The analysis revealed no further interaction effects.

### GENERAL DISCUSSION

The theorizing and findings presented in this paper shed light on a largely neglected consequence of downsizing and selection of lightweight materials in design and production of consumer electronics; a literal loss of substance and resulting consumer skepticism. Inspired by the embodied cognition framework and previous research in cognitive linguistics and the social sciences, we set out to explain why reductions in weight may trigger associations related to value or the lack thereof. Taking into account that ever more products are purchased online, where visual appearances are often the only source of product information, study one demonstrated a general preference for a thin, slender product appearance. Clearly, this is not a surprising finding. After all, mobile phones should be portable, easy to carry in trousers and bags, and unobtrusive. However, decisions based on visual appearances may only be regretted later when products arrive at home and haptic and kinesthetic sensations issuing forth from product interactions enter the picture.

Hence, in study 2 appearance and weight were manipulated independently. As in study 1, product appearance remained the most influential factor with respect to product appeal. However, across the dependent measures, effects of product weight were also significant, and (in line with predictions) particularly strong on value perceptions, indicating that an all too lightweight product may backfire on consumer preference and value perceptions in particular.

Although manipulations of product weight and appearance influenced consumer ratings independently of each other, effects of weight were qualified by consumer personality. Specifically, effects of weight on product appeal and value perceptions only surfaced for participants with a more serious, less optimistic outlook on life. These participants in particular valued the more weighty variants. This finding is remarkable insofar as it suggests that couplings between positivism on the one hand and weight-related constructs on the other are not just a linguistic oddity. The finding that ‘heavy-minded’ participants expressed a preference for more weighty product variants is in line with research and theorizing suggesting that people prefer products that match their own personality or self-image (e.g., Govers & Schoormans, 2005). Obviously, a concern for ‘weighty substance’ may not just follow from personality, but also from situational factors and context of use. For instance, attending an important business meeting or preparing for a job interview may also trigger such concerns. Hence, also depending on context of use (is a mobile phone mainly used for private, business-related, or social ends?), effects of product weight are likely to vary.

Of course, the weighty variants used in current research were still rather lightweight when considering that the iPhone4 (the current model at the time of these studies) weighs in at 137 grams, just 43 grams lighter than the heavyweight version used in the current research. Hence, the heavyweight variants were (in terms of weight) representative of participants’ phones at the time of study, with the lightweight versions arguably experienced as extremely ‘light’. Thus although our findings do not warrant conclusions on absolute or ideal weight in terms of consumer liking and value perceptions, they do reveal a structural relationship between weight and symbolic meaning portrayal that not only structures...
language use, but also multi-sensory product experience. Another shortcoming of current research relates to the fact that no actual interactions (e.g., calling, texting, etc.) took place over a prolonged period of time. Arguably, benefits of weight reductions come to the fore with greater clarity after extended use and (for instance) travel.

Thus although no firm conclusions are warranted on the precise implications of the embodied weight-value relationship with respect to product experience and interaction, our findings do strongly suggest to take this easily overlooked factor into account, especially so when considering that weight reductions in the current research did not transpire in heightened product appeal (regardless of consumer personality).

REFERENCES


