Is Your Product on the Right Side?

The "Location Effect" on Perceived Product Heaviness and Package Evaluation

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ABSTRACT

Location of the product image on a package façade is shown to influence consumers' perceptions of the visual heaviness of the product and evaluations of the package. The "heavier" ("lighter") locations are on the bottom (top), right (left), and bottom-right (top-left) of the package. For products for which heaviness is considered as a positive attribute, packages with the product image placed at heavy locations are preferred; whereas for products for which heaviness is considered negative, packages using light locations are preferred. Further, in the former category (e.g., snacks) a salient health goal, as opposed to a neutral goal, weakens the preference for packages using heavy locations, although this moderating effect of goal is weaker for healthy snacks compared to regular snacks. Store shelf context is found to be a boundary condition such that the location effects on perceived product heaviness and package evaluation appear in a contrasting context but disappear in an assimilating context. Moreover, perceived product heaviness mediates (1) the location effect on package evaluation and (2) the moderating role of store shelf context (i.e., mediated moderation).

Keywords: visual packaging design, product image location, visual perceived heaviness, top-bottom, left-right

Packaging is integral to the marketing and distribution of products. At the point-of-sale, the product package can play a pivotal role in a consumer's purchase decision. Even after the purchase, the packaging can continue to influence the consumption experience. Thus, understanding how packaging variables such as shape, color, and graphics affect consumer perception, evaluation, and behavior is of theoretical and managerial importance. Recently, marketing researchers have focused on the effects of package shape on volume perception, package preference, choice and consumption (e.g., Folkes and Matta 2004; Krishna 2006; Raghubir and Greenleaf 2006; Raghubir and Krishna 1999; Wansink and Van Ittersum 2003; Yang and Raghubir 2005).

In this research, we focus on the relative location of product images on different package façades. Based on the art and visual perception literature we will hypothesize and demonstrate a "location effect," in which product images placed at certain locations on a package façade appear to be heavier than the same images placed at other locations. Specifically we will first show that the "heavier" locations are on the bottom, right, and bottom-right of the package façade, and the "lighter" locations are on the top, left, and top-left. We will then show that different locations of the product image can influence the shopper's perception of the visual heaviness of the product and these differing perceptions can affect package evaluation. We will further hypothesize and demonstrate that product attribute valence, consumer goal, and store shelf context can moderate this effect.

Before we discuss the theoretical justification for our hypotheses, we will report the findings of a field study where we observed some systematic patterns regarding how managers are currently using the location of the product image on a package façade in the actual market place.

FIELD STUDY: THE LOCATION EFFECT OBSERVED IN THE SNACK CATEGORY

We conducted a field study in a metropolitan supermarket in the snack category. We were interested in observing (1) how frequently packaging in this category featured an image of the product, (2) if there was an image, whether the location of the image varied, and (3) whether the pattern of this variation differed in any systematic way.

We investigated two types of snacks: cookies and crackers. Summary statistics are reported in Table 1A. As shown, 100% of the snack packages displayed a product image (photography or illustration) on the façade (see Web Appendix for examples). Second, 61% of the cracker packages featured a health claim (e.g., no trans fat, no or low saturated fat, fat free, no hydrogenated oils, sugar free, no or low cholesterol) whereas only 28% of the cookie packages did ($t(277) = 6.0$, $p < .0001$), suggesting that the cracker category is being marketed as a healthier category. Consistent with this categorization, 41% of the cracker packages placed the product image at light locations, whereas for cookies (the less healthy options) only 30% of the packages did ($t(277) = 2.0$, $p < .05$). We further examined the interaction between the presence of a health claim on the package and the presence of a product image placed at light locations separately for each category. Results are reported in Table 1B. As shown, for cookies this interaction was significant ($\chi^2(1) = 31.0$, $p < .0001$), and the presence of a product image placed at light locations was 66% for those packages with a health claim and only 17% for those without ($t(136) = 6.3$, $p < .0001$). For crackers this interaction was of the opposite pattern, although not significant: 38% of the packages with a health claim placed the product image at light locations whereas 47% of those without a health claim did.

Insert Table 1 about here

The field study suggests that there are some systematic patterns in the location of the product image on package facades. It appears that the location of the product image is related to product categories and consumers' shopping goals. This is intriguing because our conversations with brand managers and packages designers suggested that the location effect was *not* an effect of which they were conscious. Also our literature search in packaging trade journals and related articles found no discussion of this effect. However, we know that pictures are more easily recognized and recalled than text (Childers and Houston 1984) and further that pictorial information has a profound impact on consumer perception and judgment (Holbrook and Moore 1981). So, we are not surprised to see via our field study that product image was so prevalently used in package design. Given the attention drawn to images it would also make sense that at least at an intuitive level managers might be using product images and their locations to provide product information. Our experiments are designed to provide a roadmap that will help a manager predict how the location of the product image on a package façade may be used in a deliberate way to communicate perceptions about the product.

In Study 1, we demonstrate that pictorial objects placed at heavy locations of a visual field appear to be heavier than the same objects placed at light locations. Treating a package façade as the visual field and the product image as a pictorial object within that field, in Studies 2-4 we then apply this finding to product packaging and examine the effect of location on package evaluation. In Study 2, we show that there is no universal preference for heavy or light locations. For products for which heaviness is considered as a positive attribute, packages with the product image placed at heavy locations are preferred; whereas for products for which heaviness is considered negative, packages using light locations are preferred. In Studies 3-4 we then focus on the snack category where heaviness is good and test moderating conditions for the preference for packages using heavy locations. In Study 3 we identify consumer goal as a moderator where a salient health goal, as opposed to a neutral goal, weakens the preference for packages using heavy locations. We also provide evidence that this moderating effect of goal is weaker for healthy snacks as compared to regular snacks, echoing results from our field study. In Study 4, we identify store shelf context as another moderator. Specifically, the location effects on perceived product heaviness and package evaluation appear in a contrasting context but disappear in an assimilating context. Moreover, we establish that perceived product heaviness mediates (1) the location effect on package evaluation and (2) the moderating role of store shelf context (i.e., mediated moderation).

STUDY 1: THE LOCATION EFFECT ON VISUAL HEAVINESS PERCEPTION

Perceptions about the lifted weight of *physical objects* as a function of seeing and feeling the objects have been extensively studied in experimental psychology. For example, one heavily researched effect is size-weight illusion in which bigger objects of the same weight feel lighter (Charpentier 1891). Perceived visual weight of *pictorial objects*, on the other hand, has been examined in the art and design literature from a Gestalt psychology perspective (e.g., Arnheim 1974). Here it is shown that artists can skillfully distribute perceived visual weight by assigning pictorial objects to different locations of a visual field to achieve a perceptual balance in the art work and to convey certain meanings to the viewer.

Based on the Gestalt's whole-part relation, Arnheim (1974) argues that no object is perceived as isolated, that is, seeing an object involves assigning it a place in the whole, for example, a location in space. A visual field's "structural skeleton" (i.e., the boundaries, center, and axes of symmetry, p.13) serves as a frame of reference for assigning location to an object within the field. This location further determines the object's visual weight. The relation between location and visual weight can be described as "bottom-heavy" (i.e., as a pictorial object moves from the top to the bottom along the vertical axis of a visual field it looks heavier, p.30) and "right-heavy" (i.e., as a pictorial object moves from the left to the right along the horizontal axis of a visual field it also looks heavier, p.33). According to Arnheim, both bottom-heavy and right-heavy are "perceptual forces" (p.16). That is, they are the counterpart of physical forces in our visual perception. He argues that bottom-heaviness occurs because of gravitational pull and right-heaviness occurs because of the lever effect.

Living in a world dominated by gravitational pull, we observe heavy things anchored on the ground while things of little weight (e.g., balloons) float upward. Our visual weight judgments are in line with these bottom-heavy or top-light observations. This visual perception is so powerful that designers tend to make the bottom part of a visual object appear heavier. Greenough (1947, p.24) observed: "That buildings, in rising from the earth, be broad and simple at their bases, that they grow lighter not only in fact but in expression as they ascend, is a principle established. The laws of gravitation are the root of this axiom. The spire obeys it. The obelisk is its simplest expression." This visual tradition is even observed in situations where the force of gravity is not directly relevant. Typographers design the lower part of a letter or number to be slightly bigger than the upper part. For example, 3, 8, S, and B look comfortably poised in their upright position but "macrocephalic" (the condition of having a head that is excessively large) when turned upside-down (Kanizsa and Tampieri 1968).

One explanation for right-heaviness is based on one of the principles of the lever. This principle states that the greater the distance on the lever from the fulcrum position that an object is placed, the heavier the weight that is needed on the other side to balance the object. Based on this mechanism, Arnheim proposes a two-step explanation for the right-heavy perception. First, pictures are “read” from left to right, and this is why the diagonal that runs from bottom-left to top-right is seen as ascending, the other diagonal (i.e. top-right to bottom-left) as descending (i.e., if “read” from right to left, these two diagonals will then be seen as descending and ascending, respectively, Wolfflin 1950). Second, because our eyes enter a visual field from the left, the left naturally becomes the anchor point or “visual fulcrum.” Thus, the further an object is placed away from the left side (or the fulcrum), the heavier the perceived weight. Although this “visual level effect” was Arnheim’s theory he had no direct empirical evidence for it.

Subsequent research in the field of ocular dominance (i.e., eye dominance or eyedness) however has provided support for Arnheim’s theory of right-heaviness, albeit not necessarily directly through his lever princple. Ocular dominance is “the visual phenomenon where a functional ocular unilaterality exists in binocular vision—some sort of physiological preferential activity of one eye over that of the other when both are used together” (Ogle 1962).[1] Porac and Coren (1976) reported that approximately 65% of the population is right-eye dominant, 32% left-eye dominant, and 3% ambiocular (Bourassa, McManus, and Bryden 1996 reported similar statistics based on a meta-analysis covering research from 1925 to 1992). They also described the influence of ocular dominance on perceptual processing. For example, relative to the non-dominant eye, the dominant eye has greater voluntary muscle movement strength (Schoen and Schofield 1935), is more likely to provide the primary information for the computation of visual direction (Walls 1951), and has a higher input intensity (Francis and Harwood 1959). These observations point to a “visual ego” (the center point for egocentric localization) that resides in the dominant eye (Porac and Coren 1976).

Visual input from the dominant eye is accentuated during binocular viewing suggesting that objects on the same side as the dominant eye are often overestimated. First, Coren and Porac (1976) found that objects presented to the dominant eye were seen as bigger than the same objects presented to the non-dominant eye. Scott and Sumner (1949) found that objects placed in front of the dominant eye were seen as being closer to the observer. Mefferd and Wieland (1969) had subjects bisect a horizontal line and found that the locus of the midpoint shifted toward the side of the dominant eye. That is, for right-eyed subjects, the right segment of the line seemed to “count” more. Finally, as a direct test for Arnheim’s right-heavy principle, Hirata (1968) had right-eyed subjects assign a visual balance point anywhere along the straight line anchored by two identical objects or two objects of different sizes. It was found that, during binocular viewing, there was a clear tendency to set the balance point to the right of the physically expected balance point, proving that for right-eyed subjects, objects in the right visual field had greater visual weight. However, Hirata’s (1968) study did not include left-eyed subjects who might exhibit the same, reduced, or reversed right-heavy perceptual tendency.

In light of Arnheim’s bottom-heavy and right-heavy visual weight principles, and the subsequent support for right-left visual weight asymmetry among right-eyed individuals (who make up 65% of the population) we predict general bottom-heavy and right-heavy effects across individuals, although due to individual differences in eyedness the latter effect might be weaker than the former one.

H1: A pictorial object placed at the bottom, right, and bottom-right of a visual field will be perceived as heavier than the same object placed at the top, left, and top-left, respectively.

Method

All experiments reported in this paper were computer-based and conducted in the same behavioral laboratory. Participants were primarily students at a northeastern U.S. university who participated in experimental sessions containing several studies (of which our study was one) and were compensated $10/hour. Study 1 (N = 139) was conducted to test H1 using a one-factor (product image location: top, bottom, left, right, top-left, bottom-right; see the labels used in Figure 1) within-subject design. We prepared seven stimuli: one practice-stimulus and six study-stimuli. The six study-stimuli were the labels used in Figure 1. In the practice stimulus, the disk was placed at the center of the square. A 6 x 6 Latin square was used to counterbalance the order of the six study-stimuli such that, within a sequence, each stimulus appeared only once in each of the six positions and, across the six sequences, each stimulus followed each of the others only once (see Reviewer Appendix for detail). This design also allowed us to test H1 both as a between-subjects study (using only the first stimulus each participant rated) as well as a within-subject study (using all stimuli). Participants rated the practice-stimulus and then the six study-stimuli, one at a time, on three nine-point scales (-4 = unsubstantial, weightless, feathery; 4 = substantial, weighty, hefty).

Results

"Location" as a within-subject factor. The three scales were averaged to form a perceived heaviness index ($\alpha = .87$). A repeated-measures ANOVA with location as a within-subject factor conducted on this index revealed a significant main effect of location ($F(5, 665) = 48.5$, $p < .0001$, see Figure 1A).[2] Planned contrasts indicated that the object located at the bottom

was perceived as visually heavier than was the object located at the top (M_{top} = -.72, M_{bottom} = .81; t(133) = 6.9, $p < .0001$), the object at the right heavier than the object at the left (M_{left} = -.30, M_{right} = .65; t(133) = 6.5, $p < .0001$), and the object at the bottom-right heavier than the object at the top-left ($M_{top\text{-}left}$ = -1.12, $M_{bottom\text{-}right}$ = .93; t(133) = 10.1, $p < .0001$).[3] Thus, H1 was supported. We also calculated a difference score based on the first two contrasts (i.e., "difference $_{bottom\ vs.\ top}$ – difference $_{right\ vs.\ left}$") for each participant. We found that this difference was significantly greater than zero (t(133) = 2.3, $p < .05$), suggesting that the bottom-heavy result is a stronger phenomenon than the right-heavy result.

Insert Figure 1 about here

"Location" as a between-subjects factor. A one-way ANOVA with location as a between-subjects factor conducted on the rating on the first stimulus revealed that the main effect of location was also significant (F(5, 133) = 7.0, $p < .0001$, see Figure 1B). Planned contrasts again indicated that the object located at the bottom was perceived as visually heavier than was the object located at the top (M_{top} = -1.16, M_{bottom} = 1.00; t(133) = 4.3, $p < .0001$), the object at the right heavier than the object at the left (M_{left} = -.31, M_{right} = .54; t(133) = 1.7, $p < .05$), and the object at the bottom-right heavier than the object at the top-left ($M_{top\text{-}left}$ = -1.41, $M_{bottom\text{-}right}$ = .14; t(133) = 3.0, $p < .005$). The planned contrast between bottom-heavy and right-heavy also indicated that the former was a stronger effect than was the latter (t(133) = 1.9, $p < .05$).

The underlying mechanism for the right-heavy effect. Hirata's (1968) study revealed a right-heavy effect among right-eyed individuals. In Study 1, including both right-eyed and left-eyed individuals, we found a right-heavy effect but discovered it to be weaker than the bottom-heavy effect. Based on the findings that ocular dominance influences visual processing such that objects on the same side as the dominant eye are often overestimated in size (Coren and Porac

1976) and length (Mefferd and Wieland 1969), one might conjecture that the reason that the right-heavy effect was smaller than the bottom-heavy effect could be related to heterogeneity in eyedness among our participants. To test this conjecture, we conducted Study 1a (N = 117).

Participants were shown (1) an object in the left visual field (see the 3rd label used in Figure 1), (2) an object in the right visual field (see the 4th label), (3) side-by-side presentation of (1) and (2) with (1) on the left side, and (4) side-by-side presentation of (1) and (2) with (1) on the right side, one at a time. Four between-subjects conditions were used to counterbalance the order. The paired-presentation in (3) and (4) was consistent with the experimental paradigm used in the ocular dominance studies.[4] We then assessed participants' eyedness using an unconscious sighting test, the Alignment Test (Crovitz and Zener 1962; Hirata 1968) described earlier in footnote 1.[5] Participants were instructed to perform the Alignment Test eight times with alternating hands and to report each time which eye led to an alignment failure. Those who reported stronger alignment for the right eye four times or more were categorized as right-eyed people, otherwise as left-eyed people. Our results showed that 77% and 23% of the participants were right-eyed and left-eyed individuals, respectively.

A 2x2 repeated-measures ANOVA with location as a within-subject factor and eyedness as a between-subjects factor conducted on the perceived heaviness index ($\alpha = .82$) revealed a significant main effect of location ($F(1, 115) = 23.6$, $p < .0001$), a significant main effect of eyedness ($F(1, 115) = 5.2$, $p < .05$), and a significant interaction between the two ($F(1, 115) = 7.8$, $p < .01$). Planned contrasts indicated that the object located at the right side was perceived as visually heavier than was the object located at the left side for right-eyed participants ($M_{left} = -.58$, $M_{right} = .55$; $t(115) = 8.0$, $p < .0001$) but not for left-eyed participants ($M_{left} = .29$, $M_{right} = .59$; $t(115) = 1.2$, $p > .1$). In other words, left-eyed participants perceived the object in the left visual field to be significantly heavier than did right-eyed participants (t(115) = 3.5, $p < .001$), although they perceived the object in the right visual field to be equally heavy. Therefore, our conjecture that eyedness moderates the right-heavy perception was confirmed.

Discussion

In Study 1, using a square visual field we established that a pictorial object's location within a visual field determines its visual weight. In our subsequent studies we aim to add more external validity to our experimental stimuli. So we will use six different shaped package façades, including those we identified in the field study and a circle shaped package façade that has been observed in gourmet shops (e.g., Danish cookie tins), that display real product images as our stimuli (illustrated in an abstract form in Figure 2).

Insert Figure 2 about here

Although we gain generalizability using these more realistic package shapes, we also introduce a confound because the different shapes are conducive to different (heavy vs. light) locations. For example, the bottom-heavy principle is not as relevant to the two horizontal rectangle shapes as in these shapes there is no enough space for a pictorial object to vary significantly along the height dimension; similarly, the right-heavy principle is not as relevant to the two vertical rectangle shapes. Thus we will apply the bottom-heavy (right-heavy) principle only to the two vertical (horizontal) rectangle shapes. However we can apply both principles to square and circle shapes. Therefore, we redefine "heavy" ("light") as the bottom (top) of vertical rectangle shapes, the right (left) of horizontal rectangle shapes, and the bottom-right (top-left) of square and circle shapes. In our subsequent studies the location effect on perceived product heaviness will refer to the mean difference in perceived heaviness between products placed at heavy locations (Figure 2, bottom row) and products placed at light locations (top row).

Similarly, the location effect on package evaluation will refer to the mean difference in evaluation between packages using heavy locations (Figure 2, bottom row) and packages using light locations (top row). Finally, because in Study 1 we have established the location effect in both a within-subject and a between-subjects experimental design, in the following studies we will manipulate location as a within-subject factor so that we will have the power to test the location effect using a large number of different shapes.

Raghubir and Krishna (1999) demonstrated that consumers' volume perceptions determine their package preferences such that the more voluminous the packages are perceived to be, the more they are preferred. Analogously, we argue that consumers' heaviness perceptions will translate to their package preferences as well such that, the heavier the product appears to be from the package illustration, the more that package will be preferred. Based on this argument, in Studies 2 and 3 we will test the location effect on package evaluation directly without measuring perceived product heaviness to control for any potential carryover or demand effect that measuring the mediator might evoke. In Study 4, however, we will explicitly test the hypothesized mediating role of perceived product heaviness.

STUDY 2: OVERALL VALENCE OF PRODUCT HEAVINESS MODERATES THE LOCATION EFFECT ON PACKAGE EVALUATION

Heaviness, as an attribute of a product, is not universally preferred. For some products, heaviness is considered positive (e.g., where weight is positively correlated with durability or richness in taste), however for others heaviness is considered negative (e.g., where weight is negatively correlated with portability). Thus higher levels of perceived heaviness may increase or decrease consumer utility as a function of the valence (positive or negative) that is assigned to that attribute. We note that the valence assigned to a product attribute may further be influenced by the consumer's current affect (Adaval 2001) or whether that attribute is aligned with a salient goal (Huffman and Houston 1993; Markman and Brendl 2000), which we will address later. If heaviness is considered positive (negative), then product image locations that increase the perception of heaviness will be more (less) preferred. This is an important hypothesis because it suggests that there is no universally preferred product image location (e.g., the bottom or right side of the package façade), but preferred location is a function of the valence assigned to heaviness (as a product attribute) with respect to a specific product category.

Specifically we investigate two groups of products where the valence of heaviness differs. For snack products (e.g., ChocoStix wafer stick, Chips Ahoy chocolate chip cookie, and Oreo sandwich cookie), heaviness is good because it suggests (1) "getting more" or (2) a richness in taste. In contrast, for nonfood items (e.g., Logitech quickcam, Panasonic fluorescent bulb, and Ty Beanie babies), heaviness is not good, because it suggests disadvantages regarding (1) safety (e.g., it is not safe when a heavy light bulb or computer-mounted video cameras falls out of place, or when kids throw a heavy toy around, or at each other) or (2) portability.

H2: For products for which heaviness is considered positive, packages with the product image placed at heavy locations will be preferred. In contrast, for products for which heaviness is considered negative, packages with the product image placed at light locations will be preferred.

Method

Study 2 (N = 140) was conducted to test H2 using a 2 (product image location: heavy vs. light) x 2 (attribute valence: heaviness is positive vs. heaviness is negative) within-subject design. Manipulation checks (conducted among a separate group of 124 participants) confirmed that heaviness was considered as a positive attribute for the three snack products, relative to the three nonfood products ($M_{difference}$ = 1.0 on a nine-point scale; $t(122) = 5.2$, $p < .0001$); whereas lightness was considered positive for the three nonfood products, relative to the three snack products ($M_{difference}$ = 2.1; $t(122) = 11.3$, $p < .0001$).

For each of the six products, we prepared 12 schematic package façades similar to those shown in Figure 2 except that the axes were removed and the disk was replaced by the real product image. The 72 stimuli were organized into six groups of 12 stimuli, such that within each group (1) heavy and light locations each occurred six times, (2) the six products each occurred twice and (3) the six shapes each occurred twice. Six sequences were used to counterbalance the stimulus order within each group. Participants were randomly assigned to one of the 36 between-subjects conditions (i.e., six groups x six sequences).[6]

In the introduction to the study, participants were shown a sample schematic package façade along with the corresponding realistic package. This side-by-side comparison facilitated their understanding of how the schematic drawing translated to an actual package. They then viewed the 12 schematic packages assigned to them in pairs, and evaluated each package on three nine-point scales (-4 = dislike, bad, unsatisfactory; 4 = like, good, satisfactory). Presenting stimuli in pairs allowed us to reduce the number of webpages that participants needed to go through from 12 to six, and thus reduce participant fatigue. The results from Study 1a also indicated that stimulus presentation format (i.e., single vs. pair) had no effect on visual weight.

Results

The three scales were averaged to form a package evaluation index ($\alpha = .96$). A 2x2 repeated-measures ANOVA conducted on this index revealed a significant location x valence interaction ($F(1, 139) = 136.0$, $p < .0001$, see Figure 3). Planned contrasts showed that for products where heaviness is good, packages with the product image placed at heavy locations were evaluated more favorably than were packages with the product image placed at light locations ($M_{heavy} = 1.21$, $M_{light} = .19$; $t(139) = 9.0$, $p < .0001$). For products where lightness is good, packages using heavy locations were evaluated less favorably than were packages using light locations ($M_{heavy} = .23$, $M_{light} = 1.08$; $t(139) = -7.5$, $p < .0001$). Thus, H2 was supported.

Insert Figure 3 about here

Discussion

In Study 2 we confirmed that there is no universally preferred product image location for package design, and preferred location is a function of the valence of heaviness in a specific product category. However, since we could not control for other attributes that might differ between the two groups of products, we cannot determine conclusively that the preferences for different product image locations was strictly a function of the differing valences assigned to heaviness across the two groups. We will remove this confound in the next study by keeping product category constant (i.e., focusing on the snack category where heaviness is considered a positive attribute) and manipulate goal to induce differences in the valence assigned to heaviness. This study will also help us understand the results of the field study by examining package evaluations for regular and healthy snacks and for snacks with and without a health claim.

STUDY 3: CONSUMER GOAL MODERATES THE LOCATION EFFECT ON PACKAGE EVALUATION

Goals affect how consumers evaluate attribute levels (Huffman and Houston 1993; Markman and Brendl 2000) and assign valence (positive or negative) to a product attribute. In Study 2 we showed that when no goal was primed, consumers considered heaviness as a positive attribute for regular snacks, which led to a preference for perceptual heaviness on the package. However, there are consumer goals such as eating healthy or being on a diet that could mitigate the positive valence of heaviness in the snack category. That is, a less positive valence might be assigned to heaviness because of its incompatibility with the consumer's health-related goal, and as a result the preference for heavy product image locations on the package should become weaker. Based on this argument, we predict a two-way interaction between consumer goal and product image location such that goal will moderate the preference for packages using heavy locations (see H3a).

In addition to consumer goal, we can also compare healthy snacks (e.g., crackers) to regular snacks (e.g., cookies). For consumers with a health goal, healthy snacks allow them to indulge themselves in snacking without compromising their heath goal. So, they should prefer "getting more" of healthy snacks and thus perceptual heaviness on the package, resembling the tendencies that consumers in the no-goal state exhibited for regular snacks in Study 2. As a result, although a health goal will weaken the preference for packages using heavy locations (H3a), this weakening effect will diminish for healthy snacks, compared to regular snacks. In other words, we hypothesize a three-way interaction among snack type, consumer goal, and product image location such that the two-way interaction described above will be further moderated by snack type (see H3b).

H3: **(a)** While there is a preference for packages with the product image placed at heavy locations under a neutral goal, this effect will be weakened under a salient health goal.

(b) While a salient health goal weakens the preference for packages with the product image placed at heavy locations for regular snacks, this weakening effect will diminish for healthy snacks.

Methods

Study 3 (N = 69) was conducted to test H3 using a 2 (product image location: heavy vs. light) x 2 (consumer goal: neutral vs. health) x 2 (snack type: regular vs. healthy) mixed design. Consumer goal was the only between-subjects factor and was manipulated using a Scrambled Sentence Task (Srull and Wyer 1979). Regular snacks were represented by the three snack products used in Study 2. Healthy snacks were represented by Nilla wafer reduced fat, Triscuit crackers reduced fat, and Wheat Thins crackers reduced fat.

As in Study 2, we prepared 72 package stimuli, 12 for each of the six snack products.[7] The stimulus construction and organization also followed Study 2. At the beginning of the study, participants were asked to complete 20 scrambled sentences, ten of which contained a goal-priming word either for health goal (e.g., low-fat, salad, and workout) or neutral goal. Other aspects of this study were similar to Study 2 except that a single-scale measure of package evaluation was used (-4: dislike; 4: like).

Results

A 2x2x2 repeated-measures ANOVA conducted on package evaluation revealed a significant main effect of location ($F(1, 67) = 216.8$, $p < .0001$), a significant two-way interaction effect of location x goal ($F(1, 67) = 37.1$, $p < .0001$), and a marginally significant three-way interaction effect of location x goal x snack type ($F(1, 67) = 2.8$, $p < .1$). Means and planned contrasts results are reported in Table 2. First, planned simple effect contrasts indicated a significant preference for heavy locations over light locations, which we referred to as

"Positive Location Effect" (PLE = $M_{heavy\ location} - M_{light\ location}$), in all conditions: 2.69 (t(67) = 11.7, $p < .0001$) under neutral goal and .87 (t(67) = 3.6, $p < .0005$) under health goal for regular snacks; 2.19 (t(67) = 9.5, $p < .0001$) under neutral goal and 1.15 (t(67) = 4.8, $p < .0001$) under health goal for healthy snacks. However, consistent with H3a, we found evidence that this preference for heavy locations was weakened by a health goal, as planned two-way interaction contrasts indicated a significantly positive "Moderating Effect of Goal" (MEG = $PLE_{neutral\ goal} - PLE_{health\ goal}$) across both types of snacks: 1.82 (t(67) = 5.5, $p < .0001$) for regular snacks and 1.03 (t(67) = 3.1, $p < .005$) for healthy snacks. Finally, consistent with H3b, we also found evidence that this weakening effect of a health goal further diminished for healthy snacks, as the planned three-way interaction contrast indicated a significantly positive "Moderating Effect of (snack) Type" (MET = $MEG_{regular\ snack} - MEG_{healthy\ snack}$): .78 (t(67) = 1.7, $p < .05$).

Insert Table 2 about here

Discussion

In Study 3 we held product category constant and focused on the snack category where we had demonstrated in Study 2 that heaviness was considered positive and thus perceptual heaviness was preferred over perceptual lightness on the package. We showed that, relative to neutral goal, a health goal weakened this preference (i.e., a goal x location two-way interaction). We also showed that, this weakening effect of a health goal further diminished for healthy snacks, relative to regular snacks (i.e., a snack type x goal x location three-way interaction).

In Study 3 we also provided some systematic evidence to support our field study findings. If we assume that a health claim on a package is promoting a health goal for consumers then the results in the field study parallel the results in Study 3. Specifically, the field study indicated that for regular snacks (i.e., cookie), packages with a health claim used light locations significantly more frequently than did packages without a health claim (i.e., 66% vs. 17%). This is consistent with the finding in Study 3 that a health goal significantly weakened the preference for heavy locations for regular snacks (i.e., $MEG_{Regular}$ = 1.82). Also, the field study indicated that for healthy snacks (i.e., cracker), packages with a health claim used light locations less frequently than did packages without a health claim (i.e., 38% vs. 47%). This is consistent with the finding in Study 3 that the weakening effect of health goal significantly diminished for healthy snacks (i.e., MET = .78). Overall we observe considerable convergence between findings from the field study and lab Studies 1-3.

The location effect manifested in consumer designs. Studies 1-3 demonstrate that consumers respond in a predictive way to different product image locations constructed to test our theory. However, it would be interesting to test whether consumers actually have a mental model that is consistent with our theory. To explore this, we conducted Study 3a (N = 81).

Participants' task was to design two snack packages by placing several design elements in a package façade (design element and package façade were explained to them in simple terms). On the design webpage, four design elements (digital images of the snack, logo, snack name, and weight label) were scattered outside of a rectangle. Participants were instructed to drag all four elements into the frame to form a package design. They could move elements around or click a "reset" button to try different compositions. When they were satisfied with the design, they could click a "finished" button to leave the page, at which point the location of each design element (x and y coordinates with the top-left corner of the frame as the point of origin) was recorded. After a practice design, all participants designed one cookie and one cracker package. Across the two snacks, the logo and the weight label were that same, whereas the snack image and product name were different. Four between-subjects experimental conditions were used such that participants in conditions 1 and 2 designed on a horizontal rectangle package façade (h/w ratio = ½) whereas participants in conditions 3 and 4 drew on a vertical rectangle frame (h/w ratio = 2). Orthogonal to the package façade shape, participants in conditions 1 and 3 designed for the cookie first and then for the cracker and in conditions 2 and 4 this order was reversed.[8]

If consumers' lay theory agreed with our previous findings, we should observe that they would use heavy locations more frequently than light locations for cookie images and do the opposite for cracker images. This predication was confirmed. The relationship between snack image location and snack type was statistically significant ($\chi^2(2) = 10.8$, $p < .005$). Further, 38% of the participants placed the cookie image at heavy locations and 20% placed it at light locations of the package façade ($t(80) = 2.2$, $p < .05$); in contrast, 17% and 37% placed the cracker image at heavy and light locations, respectively, ($t(80) = -2.5$, $p < .05$).

STUDY 4: PERCEIVED PRODUCT HEAVINESS MEDIATES THE LOCATION EFFECT ON PACKAGE EVALUATION AND THE MODERATING ROLE OF STORE SHELF CONTEXT

Although consumers may encounter a product package in isolation when they shop online, in brick-and-mortar stores a product package is almost always viewed in the context of other packages on a store shelf. Thus in an actual retail store display, the perceived heaviness a consumer may experience from the graphics of a single package is likely to be moderated by the graphics of other nearby packages. If other packages on the shelf are similarly using product graphics the effects of a single package are likely to be mitigated. On the other hand, if other packages on the shelf are using product image locations in light positions, then a single package with the product image in a heavy location is likely to have a more dramatic effect. Thus the retailer's placement of other manufacturer's packages on the shelf can nullify or reinforce a single manufacturer's strategy for his/her own brand.

Research on attention allocation proposes that consumers attend to store shelf display via a two-process model. First, they allocate attentional resources evenly across the entire display with parallel processing of multiple stimuli. Second, they concentrate attentional resources on one display element, with serial processing of different stimuli (Jonides 1983). Behavioral decision research using eye-tracking data indicates that these two processes underlie a three-stage choice model of in-store purchase: the parallel processing underlies the first stage of choice called "orientation," where shoppers overview the entire product display; the serial processing underlies the second and the third stages of choice called "evaluation" and "verification," respectively, where shoppers compare between two or three alternatives and verify the tentatively chosen brand-size (Russo and LeClerc 1994).

This literature suggests that store shelf context plays an important role in consumer perception and evaluation at the point of purchase. It also suggests that the effect of context on evaluation is mediated by perception. In this study we will test for this mediation mechanism.

Context effect literature distinguishes between two types of effect: contrast and assimilation. Contrast refers to the displacement of judgments away from the values of contextual stimuli, and assimilation refers to the displacement of judgments toward the contextual standard (Wedell 1994). We accordingly simulate two types of store shelf context. A contrasting context is formed when the target package is different from the contextual packages in terms of product image location (i.e., a heavy (light) target package is surrounded by light (heavy) packages). An assimilating context is formed when the target package is the same as the contextual packages in terms of product image location (i.e., a heavy (light) target package is surrounded by heavy (light) packages).

We propose that, for packages with the product image placed at heavy (light) locations, a contrasting store shelf context will strengthen the perceptual heaviness (lightness) of the product whereas an assimilating context will weaken this perception. That is, store shelf context is hypothesized to moderate the location effect on perceived product heaviness such that contrasting contexts will accentuate and assimilating contexts will attenuate this effect. This moderation mechanism is illustrated in Figure 4 and outlined in H4a.

Insert Figure 4 about here

We then propose that consumers' perceptions of product heaviness will translate to their package evaluations. Based on this mediation hypothesis, we further propose that store shelf context will also moderate the location effect on package evaluation such that contrasting contexts will accentuate and assimilating contexts will attenuate this effect. This is a "mediated moderation" because the hypothesized mediation process is responsible for this moderating effect (c.f., Muller, Judd, and Yzerbyt 2005).[9] In other words, if the perceived product heaviness did not mediate package evaluation, the moderating effect of store shelf context would stop at the perception stage without extending to the evaluation stage. This mediated moderation mechanism is also illustrated in Figure 4 and outlined in H4b.

H4: **(a)** Store shelf context moderates the location effect on perceived product heaviness.

(b) Perceived product heaviness mediates (1) the location effect on package evaluation and (2) the moderating role of store shelf context in the location effect on package evaluation.

Method

Study 4 (N = 42) was conducted to test H4 using a 2 (product image location: heavy vs. light) x 2 (store shelf context: contrasting vs. assimilating) within-subject design. Two regular snack products used in Studies 2 and 3, Chips Ahoy chocolate chip cookie and Oreo sandwich cookie, were used again here to construct the package stimuli.

To prepare the stimuli, for each of the two cookies, we designed eight target packages using four different shapes. For each of the eight target packages, we created a store shelf simulation by surrounding it by 31 contextual packages that were of the same four different shapes and various snack products. The target package was colored while all contextual packages were black-and-white. In total we created 16 store shelf simulations (see Web Appendix). They were organized into four groups of four stimuli, such that within each group (1) target packages using heavy and light locations each occurred twice, (2) contrasting and assimilating contexts each occurred twice, (3) the two cookies each occurred twice, (4) the four shapes of target package each occurred once, and (5) the four locations of the target package on the shelf each occurred once. Moreover, four sequences were used to counterbalance the stimulus order within each group.[10] Participants were randomly assigned to one of the 16 between-subjects conditions (i.e., four stimulus groups x four sequences).

In the introduction to the study, participants were shown a sample store shelf simulation composed of schematic package designs and the corresponding store shelf snap shot composed of realistic packages (see Web Appendix). They then viewed the four stimuli assigned to them one by one, and for each stimulus rated the cookie in the target package on the three scales used to measure perceived heaviness in Study 1. Finally, they viewed the four stimuli again, one at a time, and rated the target package on the three scales used to measure package evaluation in Study 2.

Results

Perceived product heaviness. The three scales used to measure perceived product heaviness were averaged to form a perceived heaviness index ($\alpha = .83$). A 2x2 repeated-measures ANOVA conducted on this index revealed a significant main effect of location ($F(1, 41) = 10.6$, $p < .005$) and a significant interaction effect of location x context ($F(1, 41) = 8.7$, $p < .01$, see Figure 5A). Planned contrasts showed that, in the contrasting context, cookies placed at heavy locations were perceived as visually heavier than were cookies placed at light locations ($M_{heavy} = .43$, $M_{light} = -.72$; $t(41) = 4.4$, $p < .0001$), however this effect disappeared in the assimilating context. Thus, H4a was supported.

Insert Figure 5 about here

Package evaluation. The three scales used to measure package evaluation were averaged to form a package evaluation index ($\alpha = .96$). The same ANOVA conducted on this index revealed a significant main effect of location ($F(1, 41) = 7.5$, $p < .01$) and a significant interaction effect of location x context ($F(1, 41) = 7.9$, $p < .01$, see Figure 5B). Planned contrasts showed that, in the contrasting context, packages with the product image placed at heavy locations were evaluated more favorably than were packages with the product image placed at light locations ($M_{heavy} = .88$, $M_{light} = -.54$; $t(41) = 3.9$, $p < .0005$), however this effect again disappeared in the assimilating context. Thus we provided evidence that the moderation of store shelf context in the location effect on perceived heaviness carried over to package evaluation.

Mediation and Mediated moderation analyses. To test H4b we estimated the six regression models suggested by Muller, Judd, and Yzerbyt (2005, equations 1-6). Models 1 through 3 tested the mediation hypothesis (H4b-1):

(1) Package evaluation $= \beta_{10} + \beta_{11}\text{location} + \varepsilon_1$

(2) Perceived heaviness = $\beta_{20} + \beta_{21}$location + ε_2

(3) Package evaluation = $\beta_{30} + \beta_{31}$location + β_{32}perceived heaviness + ε_3

Results are reported in Table 3. As shown (1) the overall effect of location on package evaluation, b_{11}, was significant, (2) the effect of location on the mediator, b_{21}, was also significant, and (3) the effect of the mediator on package evaluation, b_{32}, was significant, but the residual direct effect of location on package evaluation (controlling for the mediator), b_{31}, was not, indicating that perceived heaviness fully mediated the effect of location on package evaluation. The Sobel test (Sobel 1982) confirmed that the indirect effect of location on package evaluation via the mediator was significant ($z = 2.4$, $p < .05$). Moreover, an equality relationship existed among the estimated parameters of these models such that the difference between the overall effect and the residual direct effect of location on package evaluation ($b_{11} - b_{31}$) was equal to its indirect effect via the mediator ($b_{21} \times b_{32}$), demonstrating excellent model fit.

Insert Table 3 about here

Models 4 through 6 tested the mediated moderation hypothesis (H4b-2).

(4) Package evaluation = $\beta_{40} + \beta_{41}$location + β_{42}context + β_{43}location*context + ε_4

(5) Perceived heaviness = $\beta_{50} + \beta_{51}$location + β_{52}context + β_{53}location*context + ε_5

(6) Package evaluation = $\beta_{60} + \beta_{61}$location + β_{62}context + β_{63}location*context + β_{64}perceived heaviness + β_{65}perceived heaviness*context + ε_6

To establish mediated moderation, we should first observe an overall moderation of the location effect (i.e., β_{43} should be nonzero). The question then is whether the above mediating process partially or fully accounts for this moderation. If it does, then the moderation of the residual direct effect of the location should be reduced or eliminated compared to the moderation of the overall location effect, that is, β_{63} should be smaller in magnitude than β_{43}, or close to zero in the case of full mediation. Results supported this mechanism (see Table 3). As shown (4) the overall effect of location on package evaluation (X→Y) depended on the level of the moderator (i.e., b_{43} was significant), (5) the effect of location on the mediator (X→ME) also depended on the level of the moderator (i.e., b_{53} was significant), and (6) the effect of the mediator on package evaluation (ME→Y) was significant (i.e., b_{64} was significant) but constant (i.e., b_{65} was not significant), and the residual direct effect of location on package evaluation (controlling for the mediator) did not depend on the moderator (i.e., b_{63} was not significant). This pattern indicated that perceived heaviness fully mediated the moderating role of context in the location effect on package evaluation (cf. Muller, Judd, and Yzerbyt 2005, p. 856). The Sobel test confirmed that the (moderated) indirect effect of location on package evaluation via the mediator was significant ($z = 2.1$, $p < .05$). Moreover, an equality relationship existed among the estimated parameters of these models such that the difference between the overall (moderated) effect and the residual (moderated) direct effect of location on package evaluation ($b_{43} – b_{63}$) was equal to its (moderated) indirect effect via the mediator ($b_{64} \times b_{53} + b_{65} \times b_{51}$), demonstrating excellent fit.

Discussion

In Study 4, we provided evidence that store shelf context moderated the location effect on perceived product heaviness such that this effect appeared in a contrasting context but disappeared in an assimilating context. Second, store shelf context also moderated the location effect on package evaluation such that this effect appeared in a contrasting context but disappeared in an assimilating context. Third, the latter moderation was due to the fact that perceived product heaviness fully mediated the location effect on package evaluation.

GENERAL DISCUSSION

Summary of the Paper

In this research, we examine the effects of a package design element, the location of the product image within a package façade, on consumers' perceived product heaviness and package evaluation. A field study and a series of laboratory studies provide convergent evidence that this design element can be used strategically to create favorable perceptions about the product and evaluations toward the package.

Specifically, in a field study conducted in a metropolitan supermarket in the snack category, we find that the location of the snack image on a package façade varies systematically as a function of snack type (e.g., cookie vs. cracker) and feature (e.g., containing healthy ingredients or not), suggesting that the location of the product image is used to communicate product information. In the art and visual perception literature, location is among those factors that determine a pictorial object's visual weight (e.g., Arnheim 1974). Based on this literature and the research on ocular dominance (e.g., Porac and Coren 1976), in Study 1 we experimentally establish that "heavy" ("light") locations are the bottom (top), right (left), and bottom-right (top-left) of a visual field because pictorial objects placed at these heavy (light) locations are perceived to be heavier (lighter). We then apply this "location effect" to package graphic design. In Study 2 we demonstrate that for products for which heaviness is considered as a positive attribute, packages with the product image placed at heavy locations are preferred, whereas for products for which heaviness is considered negative, packages using light locations are preferred. This suggests that there is no universal preference for heavy or light locations, but that the placement of the product image should depend on the valence assigned to heaviness. Focusing on a product category where heaviness is considered positive (i.e., the snack category), in Study 3 we show that consumers' salient health goal weakens the preference for packages using heavy locations. However, the influence of goal becomes weaker if the snack category is considered healthy. This suggests that, in the snack category, the preferred product image location should be a function of snack type (e.g., regular vs. healthy snacks) and consumer goal (e.g., dieters vs. non-dieters). These results are consistent with the field study findings. In Study 4, we explore another moderating condition for the location effect on package evaluation as well as the underlying mechanism. We discover that store shelf context first moderates the location effect on perceived product heaviness such that this effect appears in a contrasting context but disappear in an assimilating context. Second, because perceived product heaviness mediates the location effect on package evaluation, the moderating effect of store shelf context further translates to package evaluation (i.e., mediated moderation) such that packages using heavy locations are evaluated favorably in a contrasting context but not in a assimilating context. Our analyses confirm both the mediation and the mediated moderation processes.

Contributions to the Literatures and Future Research

Visual perception. Bottom-heavy and right-heavy are two principles of visual weight in the literature of art and visual perception (e.g., Arnheim 1974). However, bottom-heavy has never been experimentally tested before and right-heavy was tested only among right-eyed people (Hirata 1968). We experimentally test these two principles and confirmed that eyedness moderates the right-heavy perception. We also apply these perceptual effects to the context of packaging and identify moderating conditions. In so doing we contribute back to the art and visual perception literature.

Research on consumer perceptual processing of visual cues has shown that consumers frequently make perceptual judgments (e.g., how big, how long, how many) based on visual cues (e.g., Folkes and Matta 2004; Krider, Raghubir and Krishna 2001; Krishna 2006; Raghubir and

Krishna 1999), and these judgments are often biased (see Krishna 2007 for a review). We also contribute to this line of more applied research by examining another perceptual judgment, how heavy a product is perceived to be, and similarly illustrating systematic biases in this visual perception.

Packaging. Researchers in this area have been interested in how package shape affects evaluation via perceived volume (e.g., Krishna 2006, Raghubir and Krishna 1999; Wansink and Van Ittersum 2003; Yang and Raghubir 2005). We contribute by examining how the location of the product image on a package façade affects evaluation via perceived product heaviness. Perceived heaviness is an especially interesting construct and future research is needed to further explore its antecedents and consequences. According to Arnheim (1974), factors such as color, shape, size, direction, depth, isolation, and intrinsic interest can also determine visual weight. Among these factors, color and shape are particularly relevant to package graphic design. We have conducted a preliminary study to test whether different colors do induce differential visual heaviness perceptions and found support for this idea. We pre-tested the visual weight of ten colors (the three primaries, two secondaries, and five tertiaries colors) commonly used in graphic design. We found that, when saturation was held constant, these ten hues differed considerably from each other in visual weight. Further for each hue, high saturated color chip was perceived as significantly heavier than was the low saturated color chip. These preliminary findings suggest that color has strong potential for influencing package evaluation via perceived heaviness and we believe this is a fruitful area for future research. Container shape has been found to affect volume perception such that the greater the height/weight ratio of a container, the greater the estimated volume (i.e., the elongation effect, e.g., Raghubir and Krishna 1999). We believe that shape can also affect visual weight perception and leave this topic for future research.

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FOOTNOTES

[1] Ocular dominance was first documented by Porta (1593), who noticed a striking phenomenon that can be demonstrated easily: First, hold a pencil directly in front of yourself. Then, keeping both eyes open, align its tip with a point on a distant wall. Now cover one of your eyes and see if the pencil will remain in good alignment with the target. Now cover the other eye and see if the alignment maintains. If the pencil shifts out of the alignment when you cover the left (right) eye, you can be categorized as a left (right)-eyed person.

[2] For the sake of brevity, in this paper we do not report results that are not statistically significant.

[3] We use one-tailed test for all planned contrasts.

[4] Our analyses found no effect of stimulus presentation format (single vs. pair), stimulus (left-right) position within a pair, and stimulus order. So in the subsequent analyses, data were collapsed over these factors.

[5] See Porac and Coren 1976 for different tests for eyedness and the advantages of unconscious tests**.**

[6] Our analyses found no effect of the replicate factors (2) and (3), and of stimulus order. We also found no effect of stimulus group and sequence. So in the subsequent analyses, data were collapsed over these factors.

[7] As in study 2, our analyses found no effect of the replicate factors, product instance and shape, and of stimulus order. We also found no effect of stimulus group and sequence. So in the subsequent analyses, data were collapsed over these factors.

[8] Our analyses found no effect of package façade shape and snack order. So in the subsequent analyses, data were collapsed over these factors.

[9] Based on the mediation literature, in a mediated moderation, the path from the independent variable to the mediator (i.e., X→ME) depends on the level of the moderator, whereas the effect of the mediator on the dependent variable (i.e., ME→Y) is constant. In contrast, in a moderated mediation, the path from the independent variable to the mediator (i.e., X→ME) is constant, whereas the effect of the mediator on the dependent variable (i.e., ME→Y) depends on the level of the moderator. Here we propose a mediated moderation rather than a moderated mediation because, in our case, the moderator is hypothesized to act on the X→ME path rather than the ME→Y path.

[10] Our analyses found no effect of the replicate factors (3), (4), and (5) on both perceived heaviness and package evaluation. We also found no effect of stimulus group and sequence. So in the subsequent analyses, data were collapsed over these factors. However, we found the effect of stimulus order to be significant on perceived heaviness ($p < .01$, the stimuli in the 2nd and 3rd positions were rated higher than was the stimulus in the 1st position) but not on package preference. This is the only significant order effect we observed across all studies. Because we always controlled for order via counterbalancing, this result does not compromise our conclusions.

TABLE 1

PRODUCT IMAGE LOCATION OBSERVED IN THE SNACK CATEGORY

A. Summary Statistics

	Snack type	Cookie	Cracker
	Number of package [1]	138	141
	Product image(s) on the package façade	100%	100%
	A single image (cluster)	88%	84%
Package façade shape 1:	Vertical rectangle	41%	67%
Package façade shape 2:	Horizontal rectangle	47%	26%
Package façade shape 3:	Square	12%	8%
	Health claim(s) on the package façade	28%	61%
	Product image placed at the light locations	30%	41%

[1] If a package façade contained a transparent window, we excluded that package from our analysis to focus on product graphics only. We excluded 24 cookie and cracker packages.

B. Product Image Location as a Function of Snack Type and Health Claim

	Cookie (n = 138)		Cracker (n = 141)	
	Health claim: No (n = 100)	Health claim: Yes (n = 38)	Health claim: No (n = 55)	Health claim: Yes (n = 86)
Product image location placed at light locations	17 (17%)	25 (66%)	26 (47%)	33 (38%)

TABLE 2

CONSUMER GOAL AND SNACK TYPE MODERATE THE EFFECT OF PRODUCT IMAGE LOCATION ON PACKAGE EVALUATION

	Regular snack				Healthy snack				
	Neutral goal		Health goal		Neutral goal		Health goal		
Product image location (H: heavy; L: light)	H	L	H	L	H	L	H	L	
Package evaluation	1.98	-.70	1.12	.25	1.66	-.53	1.19	.04	Mean
Positive Location Effect (PLE: M_{heavy}- M_{light})	2.69***		.87**		2.19***		1.15***		Contrast [1] Simple-effect
Moderating Effect of Goal (MEG: $PLE_{\text{neutral}} - PLE_{\text{health}}$)	1.82***				1.03**				Contrast [2] 2-way interaction
Moderating Effect of (snack) Type (MET: $MEG_{\text{regular}} - MEG_{\text{healthy}}$)	.78*								Contrast [3] 3-way interaction

* $p < .05$
** $p < .005$
*** $p < .0001$

TABLE 3

REGRESSION COEFFICENTS (STANDARD ERRORS) FOR THE MEDIATION AND MEDIATED MODERATION ANALYSES IN STUDY 4

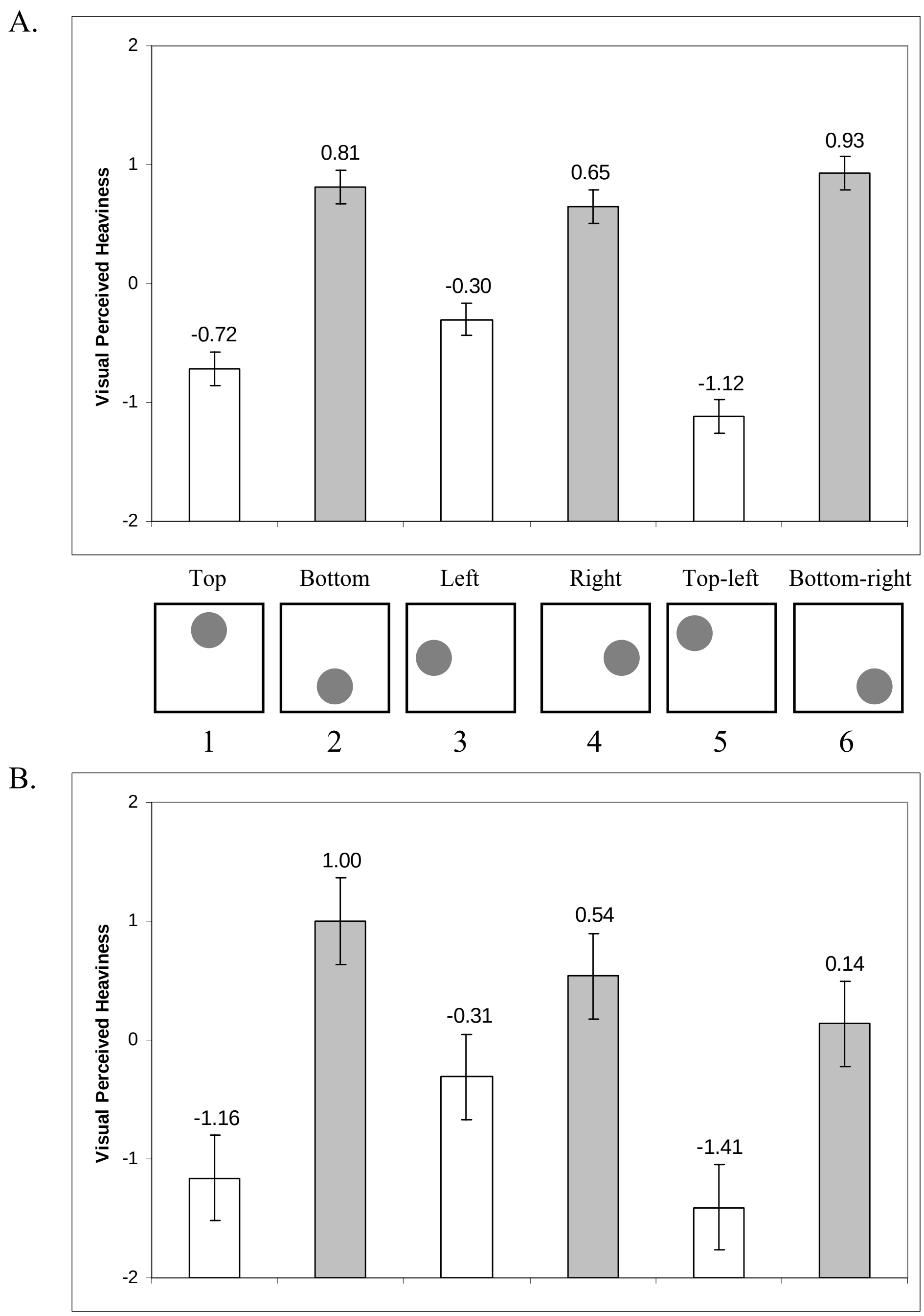
Mediation Model		Intercept	Product Image Location (X)	Perceived Heaviness (ME)
(1)	Package Evaluation (Y)	.27 (.15)	.35* (.15)	
(2)	Perceived Heaviness (ME)	-.16 (.12)	.30* (.12)	
(3)	Package Evaluation (Y)	.38** (.13)	.15 (.13)	.67*** (.08)

Mediated Moderation Model		Intercept	Product Image Location (X)	Store Shelf Context (MO)	Location * Context (X*MO)	Perceived Heaviness (ME)	Heaviness * Context (ME*MO)
(4)	Package Evaluation (Y)	.27 (.15)	.35* (.15)	-.10 (.15)	.36* (.15)		
(5)	Perceived Heaviness (ME)	-.16 (.12)	.30* (.12)	.02 (.12)	.27* (.12)		
(6)	Package Evaluation (Y)	.37** (.13)	.15 (.14)	-.10 (.13)	.17 (.14)	.65*** (.09)	.02 (.09)

* $p < .05$
** $p < .005$
*** $p < .0001$

FIGURE 1

A PICTORIAL OBJECT'S LOCATION WITHIN A VISUAL FIELD DETERMINES ITS VISUAL WEIGHT

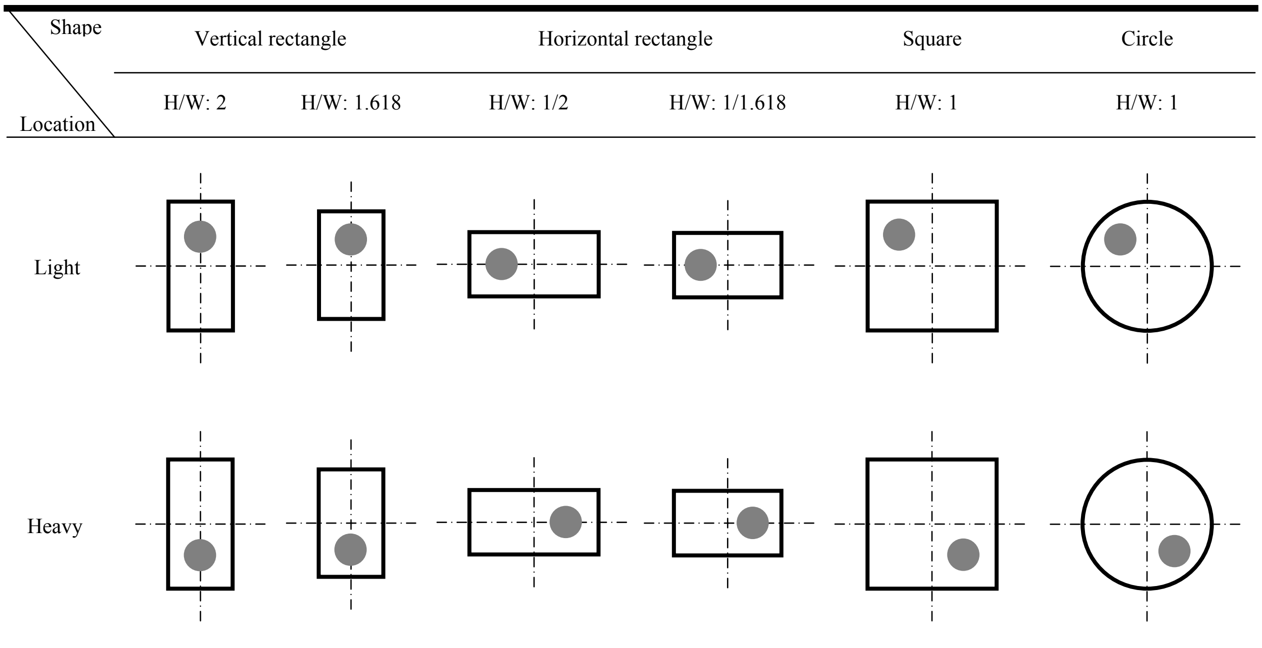


NOTES.—Part A shows the within-subject effect and Part B shows the between-subjects effect of location on visual perceived heaviness.

FIGURE 2

MANIPULATIONS OF PRODUCT IMAGE LOCATION AND PACKAGE FAÇADE SHAPE

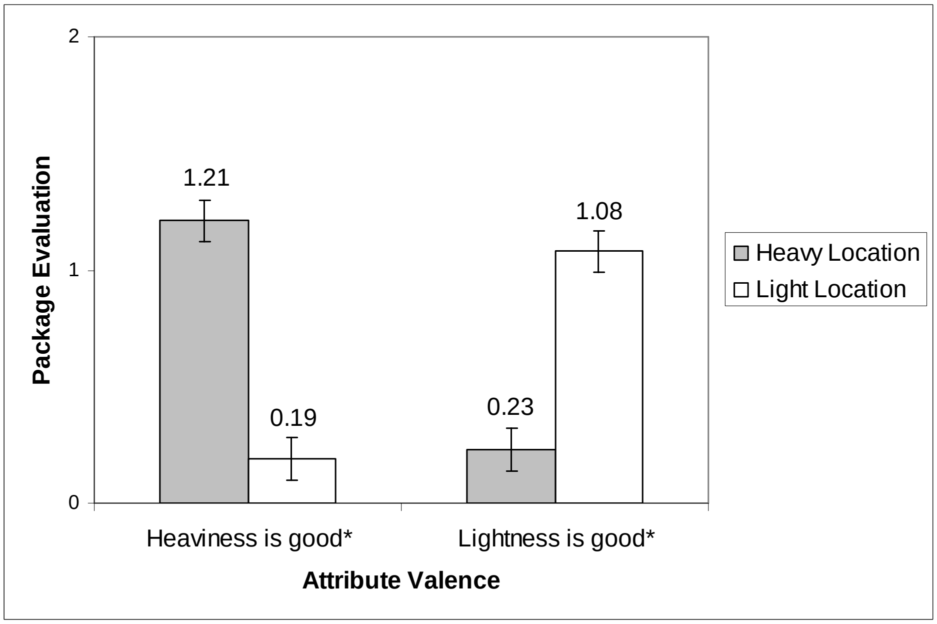
IN STUDIES 2-4



NOTES.—H/W: height/width ratio. H/W of 1.618 is the golden ratio or golden section that has been widely used in product design and package design (Bloch 1995; Raghubir and Greenleaf 2006).
Studies 2 and 3 used all six shapes. Study 4 used the first four shapes.

FIGURE 3

PRODUCT ATTRIBUTE VALENCE MODERATES THE EFFECT OF PRODUCT IMAGE LOCATION ON PACKAGE EVALUATION

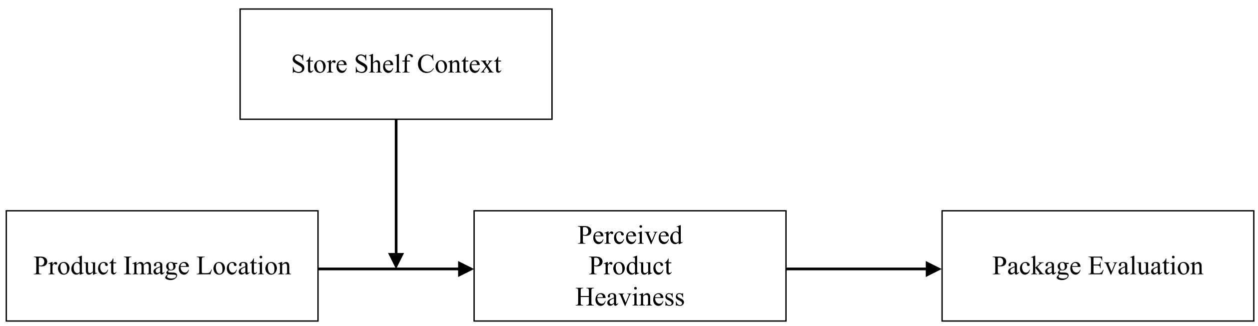


*$p < .0001$

FIGURE 4

THE MODERATING ROLE OF STORE SHELF CONTEXT AND THE MEDIATING ROLE OF PERCEIVED PRODUCT HEAVINESS

A. The Mediated Moderation Model



B. Specific Effects of Contrasting and Assimilating Store Shelf Contexts

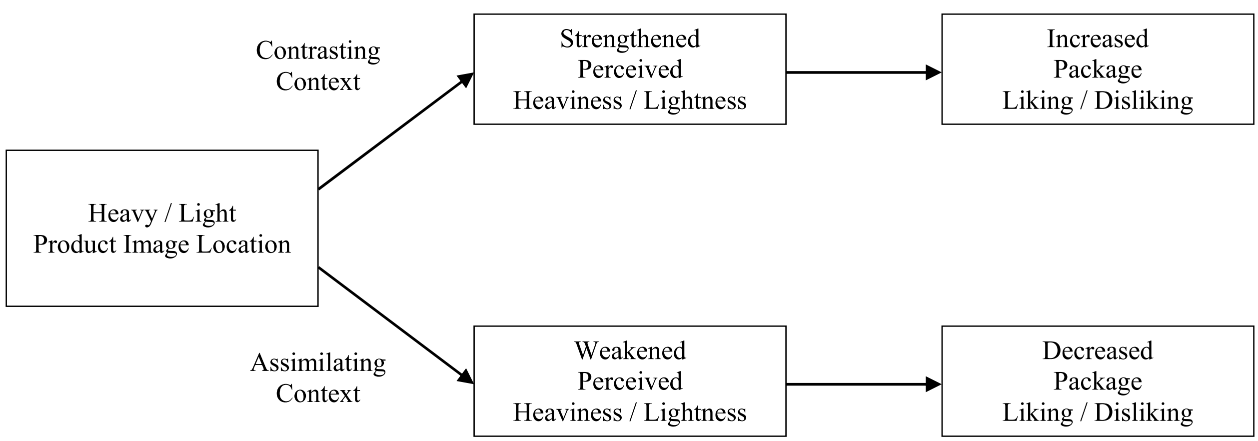
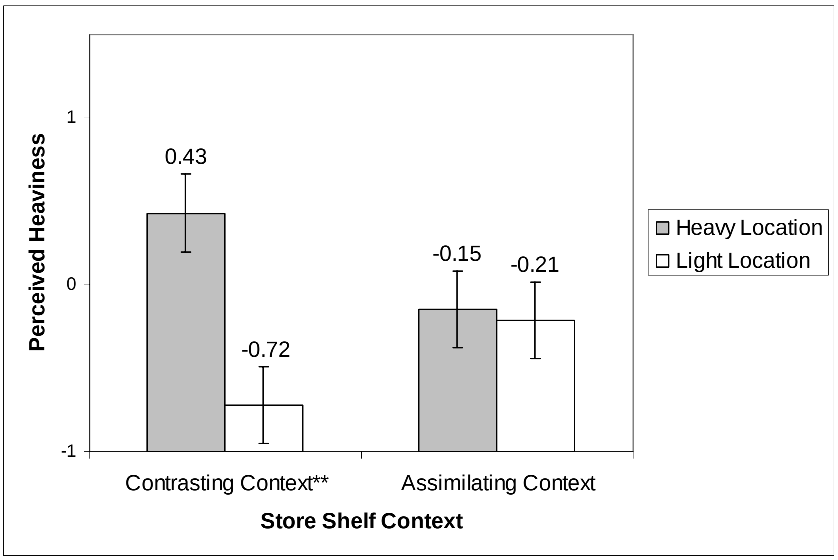


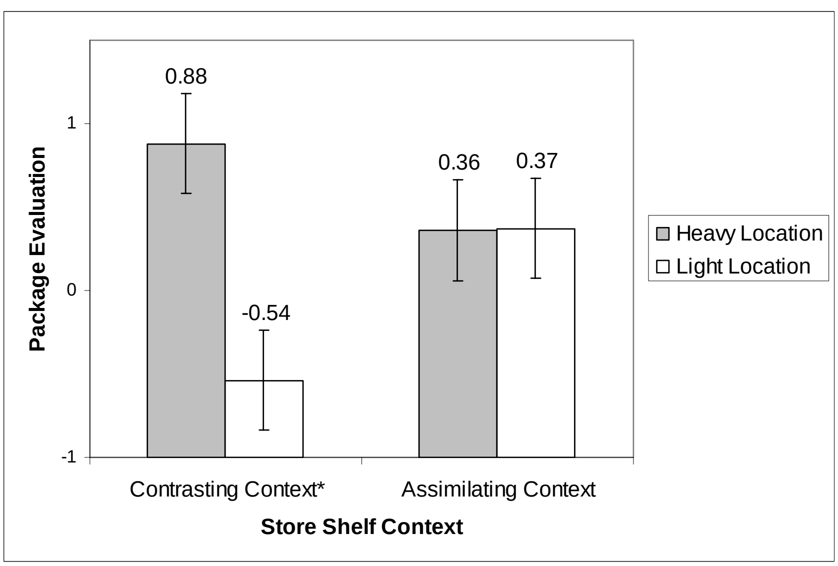
FIGURE 5

STORE SHELF CONTEXT MODERATES THE EFFECS OF PRODUCT IMAGE LOCATION ON PERCEIVED PRODUCT HEAVINESS AND PACKAGE EVALUATION

A. Perceived Product Heaviness



B. Package Evaluation



**p* < .0005
***p* < .0001

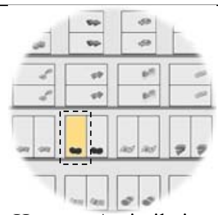
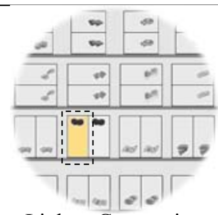
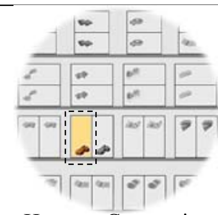
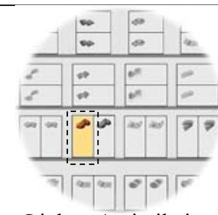
WEB APPENDIX

SAMPLE PACKAGES EXAMINED IN THE FIELD STUDY

STIMULI USED IN STUDY 4

SAMPLE STIMULUS SHOWN IN THE STUDY INSTRUCTION

FORMAL STIMULI SHOWN IN THE STUDY

Shape \ Group		1	2	3	4
Vertical Rectangle	H/W: 2	 Heavy—Assimilating	 Light—Contrasting	 Heavy—Contrasting	 Light—Assimilating
	H/W: 1.618	 Light—Contrasting	 Heavy—Assimilating	 Light—Assimilating	 Heavy—Contrasting
Horizontal Rectangle	H/W: 1/2	 Heavy—Assimilating	 Light—Contrasting	 Heavy—Contrasting	 Light—Assimilating
	H/W: 1/1.618	 Light—Contrasting	 Heavy—Assimilating	 Light—Assimilating	 Heavy—Contrasting

NOTES.—Each participant rated one group of four stimuli. "Heavy" ("Light") indicates target packages using heavy (light) locations. "Assimilating" ("Contrasting") indicates the type of store shelf context. All target packages were colored (here they are outlined for clarification purpose) while all contextual packages were back-and-white.