“This package looks heavier”: Effects of visual heaviness of package on consumers’ product expectation and evaluation

Master thesis

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Abstract

The weight of an object can transmit different meanings for consumers. This study aims to see if, and to what extent, visual heaviness (instead of physical weight) on packaging design transfers to consumers' product expectation and evaluation.

This study investigated the relative impact of perceived color heaviness and the design of health claims on consumers' product expectation and evaluation. To this end, a 2 (product conditions: *yogurt* vs. *nuts*) by 2 (packaging color: *bright* vs. *dark*) by 2 (health claim: *top-left, thin font* vs. *bottom-right, bold font*) experimental design was carried out.

The results demonstrated that package's color brightness and the design of health claims influenced consumers' perceived product heaviness. This effect also transmitted to their price expectation of the product. Specifically, a visually heavier product was expected to be more expensive. Moreover, color darkness was found to increase consumers' expected taste intensity and product attitude of yogurt. Furthermore, a lighter location-font of health claim was preferred in both food types. These findings highlighted that visual heaviness can be communicated through food packaging with the help of color and health claim design to positively influence consumer evaluations. The results could have important implications for food packaging designers and marketers in the healthy food sector.

Keywords

Packaging appearance; Color; Health claim; Location effect; Typeface; Visual heaviness; Taste expectation; Perceived satiety; Perceived healthiness; Product evaluation

Table of Contents

Introduction

Food choice can be influenced by both intrinsic (sensory properties) and extrinsic (packaging and label) product properties (Gutjar et al., 2014). Speaking of the shopping environment, extrinsic factors (e.g. package, brand, context) of food products can be seen as more salient than intrinsic (sensory, nutritional) factors since intrinsic factors have not yet been evaluated at this stage. According to Underwood & Ozane (1998), the packaging of food is an effective communicator for in-store contexts, where the majority of the consumers form their purchase decisions. When shopping in the supermarket, customers might not have time or motivation to compare all the products or information deliberately, hence, the visual aspects of packaging design (e.g., color, form, or image mold) are critical to the success or failure of many of the products on the supermarket shelf (Spence, 2016). And of all the visual packaging cues that are available to the customer, color is perhaps the most prominent (Lynn, 1981). For instance, the color of packaging can not only attract consumers (Tijssen et al., 2017), but also influence their product experience such as tasting (Spence et al., 2015) and perceived healthiness (Tijssen et al., 2017; Mead & Richerson, 2018). While most of the research have focused on the use of color hues on packaging design, there seems to be no specific research into the influence of color darkness on consumers' product experience.

In addition to the color of food package, the evaluation of a product can also be influenced directly through verbal elements, such as nutrition labels (van Herpen et al., 2013, Vyth et al., 2010) or health labels (Vidal et al., 2013). Previous reviews have reported that health claims can induce cognitive biases in which products are evaluated more favorably than similar products without health claims (Leathwood et al., 2007; Wills et al., 2012). Instead of the present of health claim, the design might also affect consumers' product evaluation. For instance, green nutrition labels (comparing with red) can increase perceived healthfulness, especially among consumers who place high importance on healthy eating (Schuldt, 2013). However, research systematically assessing the influence of health claim's design on food package evaluation is limited.

In addition to visual packaging design, weight can also be seen as a factor which can qualify the impact of product packaging on food expectations and experiences. Previous research has shown that the weight of the object can transmit different meanings such as quality, and expense (Lindstrom, 2005; van Rompay & Ludden, 2015). Moreover, the food of a heavier container was found out to be expected more satiating than that in a lighter

container, indicating that consumers' product experience can be influenced by the heaviness of the container or package (Piqueras-Fiszman & Spence, 2012).

Interestingly, research suggests that visual heaviness of packaging can also influence consumers' product experience. Deng and Kahn (2009) document that a product whose image placed at the bottom (vs. top) of a package is perceived to be visually heavier. The location effect can also be seen in various studies regarding consumers' product experience (e.g., van Rompay et al., 2014; Fenko et al., 2018; Kahn & Deng, 2010; Machiels & Orth, 2017). In addition to imagery design, typefaces can also convey meanings over the textual information, which may influence both brand and product perception (Childers & Jass, 2002; Doyle & Bottomley, 2006). However, there has been no specific research into how the location and typeface of health label can be mapped onto consumers' perceived heaviness on food products. Besides, research of the relationship between color darkness and heaviness on consumers' study is scarce. That is, the influence of visual weight, especially color and health claims, on consumers' product expectation has not been studied yet.

Hence, this study aims to investigate whether color darkness and the location of health claims can influence consumers' choices. To this end, the following research question is formulated: *"Can visual heaviness cues related to color brightness and positioning of health claim influence consumer responses?"* and *"To what extent is this effect moderated by product type?"*

Theoretical Framework

Cross-modal correspondence

Various studies have shown that people intuitively make connections between different sensory domains. According to Schifferstein and Spence (2008), 'cross-modal correspondence' refers to the connections that most people make between various sensory attributes in different modalities. For example, a round shape is more likely to be called "Baluma," which is a soft word, and an angular shape "Takete," which sounds less soft and sharper (Köhler, 1929). In striving for multisensory coherence, it becomes obvious that a product's package should be regarded as an integral part of the overall product design (Schifferstein & Spence, 2008). According to Becker, van Rompay, Schifferstein and Galetzka (2011), when consumers confront with products, they face the task of integrating meanings connoted across product elements into an overall impression. Previous studies have shown the cross-modal correspondence in the context of consumer behavior. For instance, consumers' judgment of the taste of a food or drink can be affected by their touch experiences, such as the firmness of the container (Krishna & Morrin, 2008) and their body posture (Biswas, Szocs & Abell, 2019). Specifically, the results in Biswas, Szocs and Abell's (2019) study indicate that consumers evaluated hot coffee as being less hot when they sampled in a standing (versus sitting) posture.

Embodied cognition and weight

Study has shown that the weight of the object can transmit different meanings such as quality and expense (Lindstrom, 2005). This effect can be traced to the embodied cognition framework in which abstract meanings are accounted for in terms of concrete bodily interactions (Lakoff and Johnson, 1980,1999; Van Rompay & Ludden, 2015). For example, Jostmann et al. (2009) have demonstrated that people tend to equate heaviness with importance, which also apparent in language use, for example, "a weighty issue" or "an issue not to be taken light-heartedly." They had participants provide judgments of importance and found out that participants who held a heavy clipboard judged monetary value of a product higher that those who held a light clipboard. According to Van Rompay and Ludden (2015), such relationships are embodied because they are grounded in correlations between object weight and value judgments in our physical interactions with the environment and objects.

For instance, perfume bottles, as considered a luxury item, are mostly made of glass because the weight provides the consumer with a sense of luxury that other materials, such as plastic, cannot provide (Caldwell & Flammia, 1991). Similarly, the study of Van Rompay, Verdenius, Okken, & Pruyn (2014) also shows that excessively lightweight mobile phones might harm value perceptions and, consequently, lower price expectations.

Moreover, the weight of a container might not only affect people's expectation but also their behavior. In Piqueras-Fiszman and Spence's (2012) study, they tried to investigate the influence of the weight of the container on expected satiety prior to tasting the food within and on the perceived density of the food and any feelings of fullness expected to follow consumption (expected satiation). They found out that the contents of a heavier container are expected to be more satiating than when exactly the same contents are presented in a visually-identical, but physically lighter, container (even before the food has been tasted).

Hence, it is undoubted that consumer's perception of the sensory and hedonic properties of products can be altered significantly simply by changing the weight of the packaging. Instead of adding any physical weight to the packaging, some packaging designers are currently considering whether there are any psychological ways that can be used to increase the perceived weight (Spence, 2016). To this end, the visual design of packaging plays an important role.

Packaging color and perceived heaviness

According to Swientek (2001), color, relative to other packaging cues, triggers the fastest response, explaining why it is so often used in packaging strategy to capture the attention of consumers in store (Orquin & Loose, 2013). In addition to visual attractiveness of colors, people tend to consistently associate particular colors with the five basic tastes (Spence et al., 2015). To be more specific, Spence et al. (2015) found out that sweetness is associated with red or pink, sourness with green or yellow, saltiness with white or blue, and bitterness with black or brown. Also, the colors on packaging can influence consumers' product expectation. In the studies of Temple et al. (2011), consumers have been found to associate green labels with healthful foods and red labels with unhealthful foods (Levy et al., 2012). Recently, more attention has been addressed on the vividness or saturation of the same color hue on packaging design. Researches have shown that vivid color on packaging tend to be more attractive but less healthfulness to customers. (Mai et al., 2016; Tijssen et al., 2017; Mead & Richerson, 2018)

Speaking of the relation between color and weight, the first attempt to determine experimentally the effect of color upon apparent weight was made by Bullough (1905). In the study, he presented to the observers a series of triangles with different color brightness in each half of it. The result showed that people preferred the triangle with the lower half of a darker color than the upper half. Bullough (1905) concluded that people feel more comfortable with the darker color on the bottom because it seems "heavier" to them. A more recent study on color darkness and heaviness also showed that darker colored balls are expected to be heavier than identical but brighter colored balls (Walker et al., 2010). However, the research of color-heaviness and product experience was relatively few. One can be found in the study of Gatti et al (2014); the result showed that liquid soap presented in the red bottles was averagely perceived as heavier and had a fragrance significantly more intense than that in the other (i.e., pink and white) bottles.

To sum up, the relation of color darkness and heaviness in the field of packaging design has not yet been investigated. Based on previous studies, it is expected that:

- **H1a:** A dark colored, as opposed to bright colored, packaging will increase consumers' perceived product heaviness.
- **H1b:** A dark colored, as opposed to bright colored, packaging will increase consumers' perceived taste intensity.
- **H1c:** A dark colored, as opposed to bright colored, packaging will increase consumers' expected product price.

Location effects and typeface

Speaking of visual heaviness in the field of food packaging design, studies have shown that the image on package can not only influence consumers' perceived product heaviness but also flavor heaviness and actual consumption. For example, Kahn and Deng (2009) document that a product whose image placed at the bottom (vs. top) of a package is perceived to be visually heavier. The results of Fenko et al.'s (2018) study also demonstrated that the image (i.e., lion head) presented on the bottom of the coffee package positively influenced the perceived strength of coffee and the product's purchase intention compared to the image presented on top of the package. This result could be interpreted from the perspective of the embodied cognition theory, which activates the "strong is heavy" metaphor. As heavy objects are associated with a position on the ground, this would explain

why perceiving a visually heavy package (i.e., with the lion positioned in the bottom part) would lead to the experience of a strong coffee.

Moreover, in the study of Togawa et al. (2019), they found out that lower product image placement on the food package can increase flavor perception but decrease consumption quantity. These effects can be considered a win-win situation for consumers, because enhanced flavor perception satisfies consumers' need for instant satisfaction, while reduced food consumption is beneficial to their health in the long run. However, instead of imagery design, the location of verbal claims seems to be missing in previous study.

In addition to location effect, different typefaces on a product's packaging may also be capable of conveying meaning over and above the actual semantic content of the particular words. (Childers & Jass, 2002; Doyle & Bottomley, 2006). According to Karnal et al. (2016), when communicating with consumers, typefaces can operate on two levels: On one hand, they convey the literal meaning of the written word; on the other hand, they convey an implicit meaning as individuals extract symbolism from the visual characteristics of the written material. For instance, based on Henderson et al.'s (2004) typeface study, the selection of typeface can be simplified with the use of six underlying design dimensions: elaborate, harmony, natural, flourish, weight, and compressed. The weight of typeface is consisting of properties including heavy and light, short and fat, tall and thin (Henderson et al., 2004). Hence, typefaces should be able to influence heaviness perception. That is, a delicate typeface should symbolically convey the concept of light and thin (Childers & Jass, 2002), whereas a bold typeface should convey the concept of heavy and fat. However, little research has yet been conducted on the question of how typefaces can be mapped onto consumers' perceived heaviness of products.

Hence, based on previous research, it is expected that the joint influence of typeface and location of health label on packaging can influence consumers' perceived heaviness, satiety and taste intense of the product. It is therefore expected that:

- **H2a:** The health label with a bold (vs. thin) typeface located on bottom-right (vs. top-left) will increase consumers' perceived product heaviness.
- **H2b:** The health label with a bold (vs. thin) typeface located on bottom-right (vs. top-left) will increase consumers' perceived taste intensity.
- **H2c:** The health label with a bold (vs. thin) typeface located on bottom-right (vs. top-left) will increase consumers' expected product price.

Packaging design and perceived healthiness

The lighter the healthier

Food products feature in “low-fat” or “sugar-free” are often perceived healthier than other similar products (Kozup et al. ,2003). In Lee et al.’s (2013) study, the results indicated that the presence of an organic label can exert an influence on one’s caloric estimation, wiliness to pay, and nutritional evaluations. To be more specific, foods labeled organic were estimated to be significantly lower in calories than foods without the organic label. While the presence of healthy claims and labels can influence consumers’ product expectation, little research has looked into the design of these claims. That is, in this study, it is expected that the visual heaviness of healthy claims can also affect consumers perceive healthiness of food products.

Besides the verbal information, color cues also play an important role on consumers’ perceived healthiness of products. In the study of Mead and Richerson (2018), they demonstrate that consumers appear to perceive foods in vivid, highly color-saturated food packaging as less healthful than foods in muted, less color-saturated packaging. Moreover, according to Tijssen et al. (2017), increasing packaging color intensity can enhance sensory expectations and perceptions, potentially making them more appealing to consumers. In their study, they manipulated the color saturation (low, high) on the packaging and found out that the expected sweetness and attractiveness were significantly increased when the package was printed with high color saturation. The study also shows that a low-sugar dairy drink is perceived as less healthful but more attractive when presented in a package with high color saturation. However, no research has focused on the heaviness of color and consumers’ perceived product healthiness. Hence, this study aimed to find out to what extent does the visual heaviness transmit to consumers’ perceived healthiness of the product. The hypothesis has therefore been drawn up:

- **H3:** A visually lighter design of package will lead consumers to expect the product healthier.

Product evaluation on heaviness and healthiness

The product packaging is consisted of various elements. Studies have found out that the congruence between different elements can positively affect various kinds of consumer responses such as brand impressions, brand choice, and perceived product value (Bottomley & Doyle, 2006; Erdem & Swait, 2004). For instance, in the study of Fenko, Heiltjes, and van den Berg-Weitzel (2016), they demonstrated that beer brands were evaluated more positively

when tactile characteristics of bottles (such as heavy vs. light, smooth vs. rough) were congruent with brand values (such as premium vs. dynamic). Fenko, Lotterman, and Galetzka (2016) also found that the congruent combination of product shape and brand name were expected to taste better and were more likely to be purchased compared to incongruent combinations. Moreover, according to Van Rompay and Pruyn (2011), the shape-typeface congruence of product packaging can positively effect consumers' perception of brand credibility and price expectations, indicating that consumers were willing to pay more for congruent variants because they are more attractive. Therefore, it can be seen that in the case of product packaging, congruence can generate general positive affect. In this study, the congruence of color and location-font was then taken into account. It is expected that:

- **H4:** Congruent (i.e., heavy color & heavy location-font; light color & light location-font), as opposed to incongruent (i.e., heavy color & light location-font; light color & heavy location-font), combinations of packaging design will enhance product liking.

Speaking of food type, based on previous study of multisensory congruency, a heavier packaging might be seen as congruent with a heavier food condition and therefore increase consumers' product liking. However, this effect might also occur in a lighter food condition. The result of Tijssen et al.'s (2017) study shows that a low-sugar dairy drink was perceived as less healthy but more attractive when presented in a visually heavier package (high color saturation). That is, although a "healthier" or "lighter" packaging is congruent with a lighter food condition, it might be seen as less attractive to consumers because healthy foods often lead to lower hedonic evaluation and decreased satiating properties compared to their regular counterparts (Tijssen et al., 2017). Hence, when it comes to food choice, there is no universally preferred heaviness (e.g., the lighter the better), but perceived weight of the product can be a function of the valence assigned to a specific product category.

In this study, it is expected that a "lighter" or "healthier" food condition with a heavier packaging can increase consumers' product attitude and purchase intention while the results for a food condition features in "high nutrition" or "high energy" could be contrary. That is, if consumers already expected the product to be heavy, a lighter packaging might play a positive role on their product attitude and increase their purchase intention. The following hypothesis has therefore been drawn up:

- **H5a:** In a lighter healthy food condition, a package with heavier design (i.e., dark, bottom-right, bold font) will increase consumers' product attitude and purchase intention compared to a package with lighter design (i.e., bright, top-left, thin font).
- **H5b:** In a heavier healthy food condition, a package with lighter design (i.e., bright, top-left, thin font) will increase consumers' product attitude and purchase intention compared to a package with heavier design (i.e., dark, bottom-right, bold font).

Method

Pre-test

Product type

To choose the food product for the main study, an online survey was conducted. The participants were 20 students at University of Twente. Seven healthy food products (i.e., nuts, crackers, yogurt, cereal, muesli, oat and protein bar) were presented in the survey. Participants had to rate to what extent do they agree with the statements regarding food heaviness (i.e., *energy*, *nutrition*, *weight* and *heaviness*). Overall, nuts reached the highest score among the food products while yogurt reached the lowest ($M_n = 3.74$, $SD = 0.42$ versus $M_y = 3.08$, $SD = 0.48$, $p<.001$).

Color

A pretest was conducted in order to ensure the effectiveness of the packaging color manipulations. To this end, thirty-five participants (17 males, 18 females; mean age 24.29 years) rated the design of color stimuli (i.e., bright and dark) on the item "this image looks heavy." The participants evaluated two pairs of product variants for each product condition (see Fig. 1). The color of each product was chosen based on the most used color of in-market product. (yogurt: hue 206, *saturation* 29, *brightness* 90 versus hue 206, *saturation* 29, *brightness* 32; nuts: hue 29, *saturation* 49, *brightness* 88 versus hue 29, *saturation* 49, *brightness* 27). For each design pair, only the brightness of color block was manipulated. Participants indicated (using 7-point rating scales ranging from "not at all" to "very much so") to what extent they considered these images heavy via an online survey. Each pair of design was presented in random order.

Fig. 1. Color variants (pretest).

For the yogurt condition, comparisons of means showed that the first pair (see Fig. 1a) yielded greater variation on the perceived heaviness than the second pair (see Fig 1b) (1a: M_{bright} = 2.40, SD = 1.52 versus: M_{dark} = 5.17, SD = 1.50, $p < .001$; 1b: M_{bright} = 2.23, SD = 1.03 versus M_{dark} = 4.37, SD = 1.40, $p < .001$). As the nuts condition, the second pair (see Fig. 1d) differentiated more clearly on the perceived heaviness than the first pair (see Fig. 1c) (1c: M_{bright} = 3.43, SD = 1.38 versus: M_{dark} = 4.80, SD = 1.32, $p < .001$; 1d: M_{bright} = 2.94, SD = 1.43 versus M_{dark} = 4.91, SD = 1.52, $p < .001$).

Location-font

As for the location-font manipulation, twenty-one participants (8 males, 13 females; mean age 23.19 years) rated the design of healthy claims (i.e., top-left, light font and bottom-right, bold font) on the item "this product is heavy." In order to see the effect of location-font design, the analysis of variance with location-font as a within-subject factor was conducted. The participants evaluated two designs of product variants, using seven-point rating scales ranging from "not at all" to "very much so," for each product condition (see Fig. 2).

Fig. 2. Location-font of healthy claims variants (pretest).

Analysis of means showed that in both product conditions, the bottom-right location with bold font of healthy claim was rated as more heavy than the top-left location with light font of claim. (yogurt: $M_{top\text{-}left}$ = 2.57, SD = 1.25 versus $M_{bottom\text{-}right}$ = 4.05, SD = 1.63, $p < .001$; nuts: $M_{top\text{-}left}$ = 4.05, SD = 1.69 versus $M_{bottom\text{-}right}$ = 5.29, SD = 1.52, $p = .001$)

Main study

Based on the findings from pretests, four product variants, varying in packaging color and health claim, were created in each product condition (see Table 1 and Fig. 3), crystallizing in a 2 (product conditions: yogurt versus nuts) × 2 (packaging color: bright versus dark) × 2 (healthy claims: top-left, light font versus bottom-right, bold font) design.

Table 1. Stimuli Conditions in 2x2x2 Between Subjects-Design

Condition	Food type	Color	Location&font
1	Light (Yogurt)	Light (Bright)	Light (Top-left, thin)
2	Light (Yogurt)	Light (Bright)	Heavy (Bottom-right, bold)
3	Light (Yogurt)	Heavy (Dark)	Light (Top-left, thin)
4	Light (Yogurt)	Heavy (Dark)	Heavy (Bottom-right, bold)
5	Heavy (Nuts)	Light (Bright)	Light (Top-left, thin)
6	Heavy (Nuts)	Light (Bright)	Heavy (Bottom-right, bold)
7	Heavy (Nuts)	Heavy (Dark)	Light (Top-left, thin)
8	Heavy (Nuts)	Heavy (Dark)	Heavy (Bottom-right, bold)

Fig. 3. Stimulus materials (main study)

Participants and procedure

An online survey tool *Qualtrics* was used in this study. Participants were approached via social media and were informed that only people who have bought yogurt or nuts in the Netherlands would be qualified in this survey. All participants were informed about the anonymity of their answers and agreed with the voluntary participation. Each participant was randomly assigned to one of the stimulus conditions. In total, 329 people participated in the online survey. Table 2 presents age and gender distribution across the experimental conditions.

Table 2. Demographics of participants for each experimental condition.

Condition	N	Gender		Age					
		Male	Female	18-24	25-34	35-44	45-54	55-64	65-74
Yogurt, bright, top-thin	40	30.0%	70.0%	40.0%	50.0%	7.5%	2.5%	0%	0%
Yogurt, bright, bottom-bold	40	30.0%	70.0%	45.0%	45.0%	7.5%	0%	2.5%	0%
Yogurt, dark, top-thin	43	39.5%	60.5%	27.9%	53.5%	14.0%	2.3%	0%	2.3%
Yogurt, dark, bottom-bold	41	26.8%	73.2%	39.0%	43.9%	14.6%	2.4%	0%	0%
Nuts, bright, top-thin	40	32.5%	67.5%	27.5%	45.0%	12.5%	10.0%	5.0%	0%
Nuts, bright, bottom-bold	41	26.8%	73.2%	41.5%	46.3%	9.8%	0%	0%	2.4%
Nuts, dark, top-thin	41	19.5%	80.5%	31.7%	61.0%	4.9%	2.4%	0%	0%
Nuts, dark, bottom-bold	43	34.9%	65.1%	39.5%	46.5%	7.0%	4.7%	2.3%	0%

Measures

Perceived heaviness and satiety

The perceived heaviness was measured with the single item “How heavy do you think this yogurt/nut is? (in grams.)” Two items (i.e., “I think this yogurt/nut is high in calories.” “I expect this yogurt/nut to be high in fat.”) Responses were recorded on a 7-point rating scale ranging from “strongly disagree” to “strongly agree”.

Perceived healthiness

The perceived healthiness was measured with 5 items adapted from Binninger (2015) “I think this yogurt/nut is good for health”, “I think this yogurt/nut is organic”, “I think this yogurt/nut

is fresh", "I think this yogurt/nut is natural" and "I think this is an eco-friendly yogurt/nut" (alpha = 0.733). Using 7-point rating scale, participants had to indicate to what extent they agreed with each of these statements.

Taste expectation

The expected taste intensity measure comprised the four items *heavy, strong, intense* and *rich* (alpha = 0.793) from the studies of Fenko, de Vries, & van Rompay. (2018) and van Rompay, van Hoof, Rorink, & Folsche (2019). The responses were recorded on a 7-point Likert scale ranging from "strongly disagree" to "strongly agree".

Also, taste healthiness was measured with 3 items *healthy*, *fresh* and *natural* (alpha = 0.763) adapted from Van Rompay, Deterink & Fenko (2016). Responses were recorded on a 7-point rating scale ranging from "strongly disagree" to "strongly agree".

Furthermore, hedonic taste expectation was measured with two single-item "I think I will like the taste of this yogurt/nut" and "I think the taste of this yogurt/nut will be good.". Using 7-point rating scale, participants had to indicate to what extent they agreed with each of the statements.

Product attitude

The product attitude was measured with 7 items from Bruner, Hensel & James (2005), including "This product looks good", "This product looks beautiful", "This product looks attractive", "I think the quality of this product is good", "I am positive about this yogurt/nut", "I like the packaging design of this yogurt/nut" and "This yogurt/nut is appealing" (alpha = 0.907). All items were scored on 7-point rating scales (from "strongly disagree" to "strongly agree").

Purchase intention and price expectation

The purchase intention was measured with four items "I would like to try out this yogurt/nut", "I would consider buying this yogurt/nut", "I would be interested in a free sample package of this yogurt/nut" and "There is a strong likelihood that I will buy this yogurt/nut" (alpha = 0.910). Responses were recorded on a 7-point rating scale ranging from "strongly disagree" to "strongly agree".

Furthermore, the price expectation was measured with the item "How much would you expect to pay for this product in an average supermarket? (in Euro and Euro-cents)"

Results

To investigate the effects of the independent variables, analyses of variance were conducted with color (bright versus dark), location-font (top-left, thin versus bottom-right, bold), and food type (yogurt versus nuts) as independent variables, and perceived heaviness, satiety, healthiness, taste expectation, product attitude, purchase intention and price expectation as dependent variables. The data was analyzed using ANOVA test in SPSS Follow-up analyses (i.e., pairwise comparisons) of significant interaction effects were conducted using tests of simple main effects.

Perceived heaviness and satiety

The perceived heaviness as dependent variable reveled a main effect of color ($F(1,327) = 6.38$, $p < .05$, $\eta^2 = .19$), showing that the dark color of packaging (regardless of food type or location-font) was expected to be heavier than the bright color ($M_d = 362.1$, $SD = 218.3$ versus $M_b = 307.6$, $SD = 168.8$). Also, the main effect of location-font ($F(1,327) = 4.47$, $p < .05$, $\eta^2 = .13$) was significant, indicating that the claims located on bottom-right with a bold typeface (regardless of food type or color) was expected to be heavier than the claims located on top-left with a thin typeface ($M_b = 358.19$, $SD = 223.20$ versus $M_t = 312.47$, $SD = 164.58$). Furthermore, the main effect of food type reached significance as expected ($F(1,327) = 126.85$, $p < .001$, $\eta^2 = .28$). Surprisingly the results showed that yogurt was rated much heavier than nuts ($M_y = 439.82$, $SD = 213.02$ versus $M_n = 231.6$, $SD = 104.62$).

However, the interactive effects of perceived heaviness were not significant (type*color, type*location, color*location: F's < 1, ns; type*color*location: $F(1,327) = 1.26$, $p = .262$, $\eta^2 = .04$).

For the perceived satiety, the main effect of food type was reveled significantly ($F(1,327) = 32.83$, $p < .001$, $\eta^2 = .09$), showing that nut was expected to bring more satiety than yogurt ($M_n = 5.58$, $SD = 1.43$ versus $M_y = 3.66$, $SD = 1.16$). Whereas, the main effects of color and location were not significant (F's < 1, ns), neither were the interaction effects (all F's < 1, ns).

Perceived healthiness

The perceived healthiness as dependent variable reveled a main effect of food type ($F(1,327) = 7.83$, $p < .01$, $\eta^2 = .024$), showing that yogurt was expected to be more healthy than nuts ($M_y = 5.05$, $SD = .87$ versus $M_n = 4.77$, $SD = .92$). However, the main effects of both color

and location were not significant (F's < 1, ns), neither were the interaction effects (all F's < 1, ns).

Taste expectation

Taste intensity

For the taste intensity as dependent variable, all main effects of color, location and food type were not significant (color: $F(1,327) = 1.32$, $p = .25$, $\eta^2 = .004$; location: $F < 1$, ns; food type: $F < 1$, ns).

Importantly, a significant interaction effect between food type and location-font emerged ($F(1,327) = 5.32$, $p < .05$, $\eta^2 = .016$). As shown in Fig. 4, within the yogurt condition, the expected taste intensity was rated higher when the claims were bold fonts and located on bottom-right ($p < .05$), indicating that the yogurt package with bold-typeface-claims located on bottom-right was expected to taste stronger than the package with thin-typeface-claims located on top-left. Whereas within the nuts condition, the difference was not significant ($p = .26$), Also, when the claims are located on top-left with a thin typeface, the difference between yogurt and nuts was significant ($p < .05$), showing that participants expected nuts to have stronger taste than yogurt. Yet, the difference in bottom-right and bold font condition was not significant ($p = .24$).

As for other interaction effects, none of them leaded to significantly different taste intensity rating (color*location: $F(1,327) = 1.01$, $p = .32$, $\eta^2 = .003$; type*color, type*color*location: F's < 1).

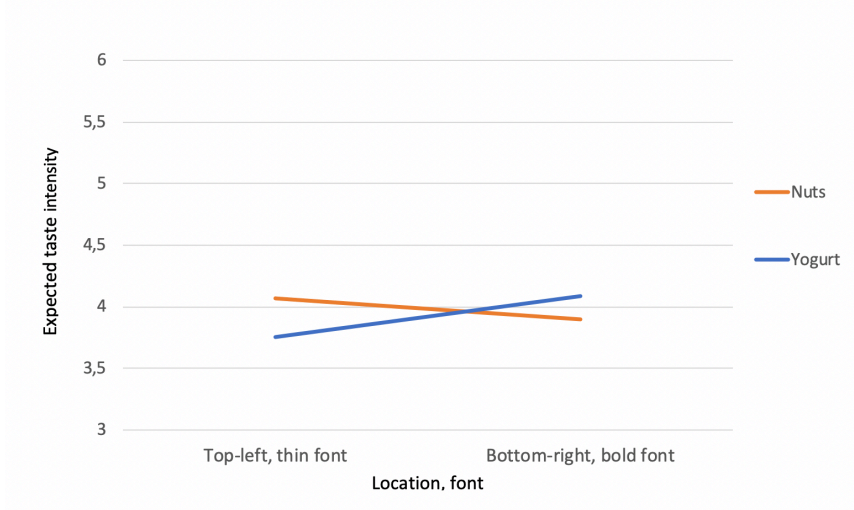

Fig. 4. Mean taste heaviness as a function of location-font and product type.

Taste healthiness

The main effect of taste healthiness reveled a significant difference on product type ($F(1,327) = 5.60$, $p < .05$, $\eta^2 = .018$), showing that yogurt was expected to taste more healthy than nuts ($M_y = 4.98$, $SD = .94$ versus $M_n = 4.72$, $SD = 1.00$). Also, a marginally significant main effect was found on color ($F(1,327) = 3.58$, $p = .05$, $\eta^2 = .011$), indicating that packages with bright colors were expected to taste more healthy than dark colors ($M_b = 4.95$, $SD = .94$ versus $M_d = 4.74$, $SD = 1.00$). Whereas, the main effects on location were not significant ($F < 1$, ns); neither were the interaction effects (type*color: $F(1,327) = 1.84$, $p = .18$, $\eta^2 = .006$; type*location: $F(1,327) = 1.50$, $p = .22$, $\eta^2 = .005$; color*location: $F < 1$, ns; type*color*location: $F(1,327) = 1.078$, $p = .30$, $\eta^2 = .003$)

Taste liking

For the taste liking as dependent variable, only main effect on product type were significant ($F(1,327) = 5.70$, $p < .05$, $\eta^2 = .017$), showing that nuts were expected to taste better than yogurt ($M_n = 5.16$, $SD = .93$ versus $M_y = 4.89$, $SD = 1.14$). No other main effects or interaction effects reached significance for taste liking as dependent variable (all F's < 1, ns).

Product attitude

The product attitude as dependent variable reveled a significant main effect of location-font ($F(1,327) = 6.96$, $p < .01$, $\eta^2 = .021$), showing that participants liked the claims located on top-left with a thin typeface (regardless of food type or color) more than the claims located on bottom-right with a bold typeface ($M_t = 4.85$, $SD = 1.18$ versus $M_n = 4.51$, $SD = 1.15$). The main effects of color and type were not significant (color: $F < 1$, ns; type: $F(1,327) = 2.08$, $p = .15$, $\eta^2 = .006$).

Importantly, the interaction between product type and color was significant ($F(1,327)=8.09$, $p<.01$, $\eta^2 = .025$). Pairwise comparisons (see Fig. 5) show that for the yogurt condition, dark color induced higher scores ($p < .05$), indicating that participants liked the dark color packaging more than bright color. Whereas for the nuts condition, bright color packaging was preferred but the effect was not significant ($p = .08$). Also, within the bright color condition, the difference between yogurt and nuts was significant ($p < .01$), showing that nuts had better product liking than yogurt. However, the difference within the dark color condition was not significant ($p = .30$). Likewise, no significant differences were found in other interaction effects (type*location: $F(1,327) = 1.55$, $p = .21$, $\eta2 = .005$; color*location: $F < 1$, ns; type*color*location: $F(1,327) = 1.24$, $p = .27$, $\eta2 = .004$).

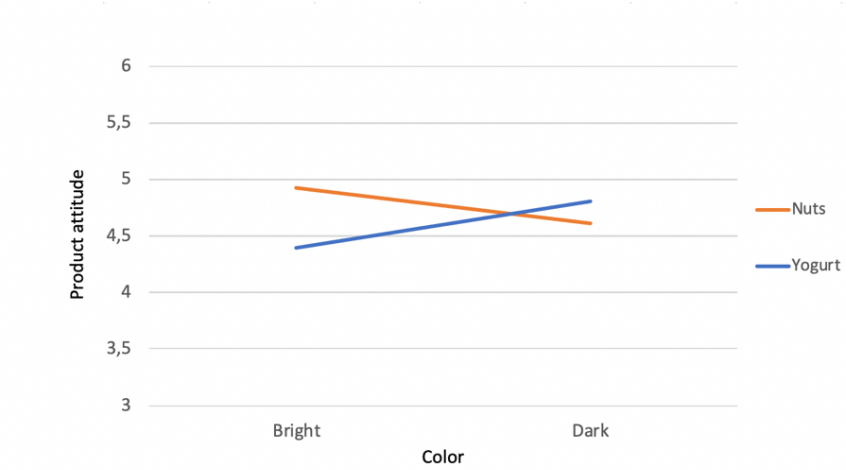

Fig.5 . Mean product attitude as a function of color and product type.

Purchase intention and price

Purchase intention

For the purchase intention as dependent variable, the main effect of location-font was significant ($F(1,327) = 5.06$, $p < .05$, $\eta^2 = .015$), showing that participants were more willing to buy the products with thin-typeface-claims located on top-left of the package ,compared to bold-typeface-claims located on bottom-right ($M_t = 5.00$, $SD = 1.32$ versus $M_b = 4.68$, $SD = 1.27$). Whereas no significant difference was found in main effects of color and type color: ($F(1,327) = 1.48$, $p = .23$, $\eta^2 = .005$; type: $F<1$, ns).

Also, all interaction effects were not significant (type*color: $F(1,327) = 1.13$, $p = .29$, $\eta^2 = 0.004$; type*location: $F < 1$, ns; color*location: $F < 1$, ns; type*color*location: $F(1,327) = 1.239$, $p = 0.27$, $\eta^2 = .004$)

Price expectation

The price expectation as dependent variable reveled a main effect of color ($F(1,327) = 3.84$, $p < .05$, $\eta^2 = 0.014$), showing that the dark color of packaging was expected to be more expensive than the bright color ($M_d = 3.00$, $SD = 1.74$ versus $M_b = 2.63$, $SD = 1.55$). Also, the main effect of location-font ($F(1,327) = 5.87$, $p < .05$, $\eta^2 = 0.018$) was significant, indicating that the claims located on bottom-right with a bold typeface was expected to be more expensive than the claims located on top-left with a thin typeface ($M_b = 3.03$, $SD=1.94$ versus $M_t = 2.59$, $SD=1.29$). Furthermore, the main effect of price expectation on food type also revealed a significant difference ($F(1,327) = 50.681$, $p < .001$, $\eta^2 = .13$). Not surprisingly, the results showed that nuts were rated more expensive than yogurt ($M_n = 3.41$, $SD = 1.80$ versus $M_y = 2.20$, $SD = 1.25$).

For the interaction effects, no significant difference was found (type*color: $F < 1$, ns; type*location: $F(1,327) = 1.68$, $p = .20$, $\eta^2 = .005$; color*location: $F < 1$, ns; type*color*location: $F(1,327) = 1.81$, $p = .18$, $\eta^2 = .006$).

Table 3. overview of the hypotheses.

	Hypotheses	Supported
H1a	A dark colored, as opposed to bright colored, packaging will increase consumers' perceived product heaviness.	Yes
H1b	A dark colored, as opposed to bright colored, packaging will increase consumers' perceived taste intensity.	No
H1c	A dark colored, as opposed to bright colored, packaging will increase consumers' expected product price.	Yes
H2a	The health label with a bold (vs. thin) typeface located on bottom-right (vs. top-left) will increase consumers' perceived product heaviness.	Yes
H2b	The health label with a bold (vs. thin) typeface located on bottom-right (vs. top-left) will increase consumers' perceived taste intensity.	Partly
H2c	The health label with a bold (vs. thin) typeface located on bottom-right (vs. top-left) will increase consumers' expected product price.	Yes
H3	A dark colored, as opposed to bright colored, packaging will decrease consumers' perceived product healthiness.	No
H4	Congruent, as opposed to incongruent, combinations of packaging design will enhance product liking.	No
H5a	In a lighter healthy food condition, a package with heavier design will increase consumers' product attitude and purchase intention compared to a package with lighter design.	Partly
H5b	In a heavier healthy food condition, a package with lighter design will increase consumers' product attitude and purchase intention compared to a package with heavier design.	Partly

General Discussion

The findings presented clearly show that visual heaviness of packaging design may have a strong influence on product expectation. As for color brightness, strong main effects were found on perceived heaviness and price expectation. Specifically, and in line with previously reported findings on effects of color darkness on an object's heaviness (Walker et al., 2010), a dark, as opposed to a bright, color packaging was expected to be heavier**.** Additionally, as darker color was perceived heavier, the effect also showed on consumers' price expectation. In line with previous studies (Van Rompay & Ludden, 2015), heavier packages are expected to be more expensive. On a theoretical level, the findings suggest that color heaviness, rather than physical weight, might indeed have the same influence on consumers' price expectation.

For the location-font of health claims, significant main effects were found on perceived heaviness, product attitude, purchase intention and price expectation. The results on perceived heaviness and price expectation were in line with that of color darkness, showing that visual packaging design can affect consumers' perceived product heaviness and price. On a theoretical level, not only does the location of imagery (Deng & Kahn, 2009) on package can influence consumers' perceived product heaviness, but also the location of health claim occurs the same effect. Additionally, for the price expectation, consumers expected to pay more for a 'heavier' location-font (i.e., bottom-right, bold font) packaging design than a 'lighter' location-font. This result was as same as previous research about embodied cognition and packaging design, showing that people tend to expect heavier products more expensive (Van Rompay & Ludden, 2015).

Moreover, the location-font of health claims revealed significant differences on product attitude and purchase intention. Specifically, a 'lighter' design of health claims (i.e., top-left, thin typeface) increased both consumers' product attitude and purchase intention. That is, regardless of the healthy food type, consumers seemed to prefer the lighter location-font on packaging design. This is however not in line with the previous hypothesis (H5). It was initially expected that a visually heavier package of a lighter food would be preferred wile a visually lighter package of a heavier food would be preferred. Whereas, this study found out that in both healthy food conditions (i.e., yogurt and nuts), consumers liked the packages with "lighter" location-font more than the packages with "heavier" location-font. A possible explanation could be the similarity of these food products. Because yogurt and nuts are both seen as healthy food, a lighter design might therefore be preferred. However, different effects on perceived heaviness and healthiness might occur for other types of food

products and categories (e.g., unhealthy food). Hence, for follow-up research, it is interesting to test whether the results would show similar pattern for a broad range of food products.

Importantly, an interaction effect of location*food type was found on consumers' expected taste intensity. Yogurt with a heavier location design (i.e., bold font, bottom-right) was expected to taste stronger than yogurt with a lighter design (i.e., thin font, top-left). This result was in line with the embodied cognition theory and previous studies of location on heaviness and taste evaluation (Fenko et al., 2018). When product package has a heavier design, it might be expected to taste stronger and more intense.

Also, in the interactive effect of color*food type on product attitude, people tended to prefer a darker package of yogurt rather than a brighter packaging. This was in line with the previous hypothesis (H5a), indicating that a heavier package can increase consumers' product liking of a lighter food condition. According to Tijssen et al.'s (2017), certain package color cues (i.e. high brightness, low saturation) signal implicit associations regarding health, whereas other color cues (i.e. low brightness, high saturation) signal implicit associations regarding attractiveness. Hence, the finding of this study showed that when making a healthy food choice, consumers still prefer a more attractive (i.e., dark color) packaging. However, for the nuts condition, this effect did not transpire.

Admittedly, the packaging design used in this research was only presented in pictures rather than 3D video or even a physical product. The perceived weight of the product could be more accurate if participants could feel it physically. Further research could therefore make the package more realistic for the participants. Besides, only people who live in the Netherlands were recruited for this study, therefore the findings of this study cannot be generalized to other cultures and countries. Previous research has also found the influence of consumers' diet and nutrition knowledge on product attitude. For example, restrained eaters tend to devote considerable attention to external food cues, like packaging (Schachter et al., 1968, Tom & Rucker, 1975); and consumers with higher levels of subjective knowledge rely less on marketer-supplied evaluations of products than do other consumers (Brucks, 1985). These factors should also be taken into account for further research on package's perceived heaviness and healthiness. Additionally, brand familiarity can also influence the results because consumers tend to buy familiar brands out of habit or because of loyalty (Solomon, 2007). Follow-up studies should therefore extend this research to a brand familiarity perspective in order to see whether the effects obtained also uphold for brands in relation to which consumers already have clear expectations.

Furthermore, taste experience for new products is hard to evaluated in this study without tasting the product. Where expectations are only based on visual stimuli and associations, perceptual data are also influenced by actual tasting of the product. Study has shown the difference of consumers evaluation before and after tasting the food product. In Tijssen et al.'s (2017) study, the effects of package color properties on sensory data may have been overruled by actual flavor perceptions, which explained the overall decreased effects of color when it comes to actual perception. However, according to Schifferstein et al. (2013), since product choice in supermarkets is mainly based on visual cues, as tasting is often not possible at this stage, effects of expectations are initially important. Future research should therefore look into the influence of visual heaviness on both taste expectation and perception.

In conclusion, recently marketers have been able to capitalize on the consumer trend towards healthier foods. It is therefore crucial for them to understand what value perceived heaviness can bring to their products and how to effectively translate it into a valuable product offering. The result of the present study demonstrate that color brightness and location-font of health claims can influence consumers' perceived heaviness of the food product. Moreover, this effect can transmit to their price expectation, product attitude and purchase intention. This provides a better understanding of the visual heaviness of packaging design and offer guidelines for the positioning of healthy food products. More research is therefore needed into the effects of packages' visual heaviness on consumers' product evaluation.

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Appendix

Appendix 1: The questionnaire

Thank you for participating in this research. The survey will take about 3-5 minutes.

I am a student of Master Communication Studies with a specialisation in marketing communication and design in University of Twente. The purpose of this survey is to gather data for my master thesis. Your response will be confidential and the information gathered will only be used for the research.
For any further questions or comments, please contact: t.yang@student.utwente.nl

Your participation is completely voluntary. You may refuse to participate in the survey and you have the possibilty to end the test at all time. In addition, this study is completely anonymous and your answers will be strictly confidential, and not shared with other parties. If you have any remarks or complaints about ethical issues you can contact the Ethics Commission of Utwente via ethicscommittee-bms@utwente.nl. By completing this survey you also confirm that you are 18 years of age or older.

○ Yes, I agree (1)

To what extent do you agree with the following statements?

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
This product looks good. (1)	○	○	○	○	○	○	○
This product looks beautiful. (2)	○	○	○	○	○	○	○
This product looks attractive. (3)	○	○	○	○	○	○	○
I think the quality of this product is good. (4)	○	○	○	○	○	○	○

To what extent do you agree with the following statements?

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
I think this yogurt is good for my health. (1)	○	○	○	○	○	○	○
I think this yogurt is organic. (2)	○	○	○	○	○	○	○
I think this yogurt is fresh. (3)	○	○	○	○	○	○	○
I think this yogurt is natural. (4)	○	○	○	○	○	○	○
I think this is an eco-friendly yogurt. (5)	○	○	○	○	○	○	○
I think this yogurt contains artificial ingredients. (6)	○	○	○	○	○	○	○

How heavy do you think this yogurt is? (in grams)

_____

To what extent do you agree with the following statements?

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
This package looks heavy to me. (1)	○	○	○	○	○	○	○
I think this package is larger than a similar product. (2)	○	○	○	○	○	○	○
I think this yogurt is high in calories. (3)	○	○	○	○	○	○	○
I expect this yogurt to be high in fat. (4)	○	○	○	○	○	○	○
I think this yogurt contains more calories than other similar yogurts. (5)	○	○	○	○	○	○	○
I think this yogurt can offer me more energy than other similar yogurts. (6)	○	○	○	○	○	○	○

After eating this whole product, how full will you expect to feel?

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	
Not full at all	○	○	○	○	○	○	○	Very full

To what extent do you agree with the following statements?

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
I think the taste of this yogurt will be strong. (1)	○	○	○	○	○	○	○
I think the taste of this yogurt will be intense. (2)	○	○	○	○	○	○	○
I think the taste of this yogurt will be heavy. (3)	○	○	○	○	○	○	○
I think the taste of this yogurt will be rich. (4)	○	○	○	○	○	○	○
I think this yogurt will taste healthy. (5)	○	○	○	○	○	○	○
I think this yogurt will taste fresh. (6)	○	○	○	○	○	○	○
I think this yogurt will taste natural. (7)	○	○	○	○	○	○	○
I think the taste of this yogurt will be good. (8)	○	○	○	○	○	○	○
I think I will like the taste of this yogurt. (9)	○	○	○	○	○	○	○

To what extent do you agree with the following statements?

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
I am positive about this yogurt. (1)	○	○	○	○	○	○	○
I like the packaging design of this yogurt. (2)	○	○	○	○	○	○	○
This yogurt is appealing. (3)	○	○	○	○	○	○	○
I would like to try out this yogurt. (4)	○	○	○	○	○	○	○
I would consider buying this yogurt. (5)	○	○	○	○	○	○	○
I would be interested in a free sample package of this yogurt. (6)	○	○	○	○	○	○	○
There is a strong likelihood that I will buy this yogurt. (7)	○	○	○	○	○	○	○

How much would you expect to pay for this product in an average supermarket?
(in Euro and Euro-cents)

_____

What is your age?

▼ 18 - 24 (1) ... 85 or older (8)

What is your gender?

- ○ Male (1)
- ○ Female (2)
- ○ Other (3)
- ○ Prefer not to say (4)

Do you have any other comments for the survey?

_____

Appendix 2 : Questionnaire items

Scale	Items	α
Product attitude	1. This product looks good 2. This product looks beautiful 3. This product looks attractive 4. I think the quality of this product is good 5. I am positive about this yogurt/nut. 6. I like the packaging design of this yogurt/nut. 7. This yogurt/nut is appealing.	.907
Perceived healthiness	1. I think this yogurt/nut is good for my health. 2. I think this yogurt/nut is organic. 3. I think this yogurt/nut is fresh. 4. I think this yogurt/nut is natural. 5. I think this is an eco-friendly yogurt/nut.	.733
Perceived product heaviness and satiety	- How heavy do you think this yogurt/nut is? (___g)	
	1. I think this yogurt/nut is high in calories. 2. I expect this yogurt/nut to be high in fat.	.759
Taste expectation	1. I think the taste of this yogurt/nut will be strong. 2. I think the taste of this yogurt/nut will intense. 3. I think the taste of this yogurt/nut will be heavy. 4. I think the taste of this yogurt/nut will be rich.	.793
	1. I think this yogurt/nut will taste healthy. 2. I think this yogurt/nut will taste fresh. 3. I think this yogurt/nut will taste natural.	.763
	1. I think I will like the taste of this yogurt/nut. 2. I think the taste of this yogurt/nut will be good.	.857
Purchase intention and price	1. I would like to try out this yogurt/nut. 2. I would consider buying this yogurt/nut. 3. I would be interested in a free sample package of this yogurt/nut. 4. There is a strong likelihood that I will buy this yogurt/nut.	.910
	- How much would you expect to pay for this product in an average supermarket? (€____)	

Appendix 3 : Results of all effects

	Color darkness	Location-font	Food type	Type* color	Type* location	Color* location	Type* location* color
Heaviness	√	√	√				
Satiety			√				
Healthiness			√				
Taste heaviness					√		
Taste healthiness			√				
Taste liking			√				
Product attitude		√		√			
Purchase intention		√					
Price	√	√	√				