Title

How should I tell you this? The effects of the image used to convey that a natural yogurt is sweetened on consumer expectations and willingness to buy

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Abstract

This study aimed to assess how packaging imagery used to convey that a natural yogurt is sweetened influences consumer expectations and willingness to buy. Four packages of sweetened natural yogurt were designed, in which the message that they were sweetened was conveyed through three different images (sugar cubes, a sack of sugar and a spoon of sugar) and through only text. The results of a pretest consisting of a word association task and a main experiment consisting of an online survey show that packages in which the message that the yogurt is sweetened is conveyed by using an image together with a textual claim instead of just a textual claim are expected to be sweeter. However, some differences can be appreciated depending on the specific image that is depicted (with the package showing an image of sugar cubes raising the higher sweetness expectations). Moreover, results show that Willingness to buy is positively associated with the attributes Natural Ingredients, Healthy and Quality, and in a slightly negative way with the attribute Sweet. Overall, these results suggest that although using packaging imagery to convey a message may enhance consumer expectations and willingness to buy, its effect on consumers' attitude towards the product may ultimately depend on the subject of the image that is depicted and in the valence of the message to be conveyed. These findings are discussed in the context of packaging design and consumer research, and directions for further research are provided. This study may help

packaging designers and dairy companies to better communicate the desired message to consumers and to improve the marketing performance of their products.

Keywords

packaging imagery; visual cue; verbal cue; expectations; perception; consumer research

Highlights

- The effect of packaging imagery on expectations and response is studied.
- The image used to convey sweetness affects sensory and non-sensory expectations.
- An image depicting sugar cubes raises the highest sweetness expectations.
- Depicting a sugar sack enhances naturalness expectations and willingness to buy.
- Making the concept sweet too salient may enhance unhealthfulness expectations.

1. Introduction

Spanish households spend 8.59% of their food budget on dairy products. The fermented milk category is the one that has the greatest presence in households, accounting for 38.7% of the sales and 15.34 liters per person per year consumption. Within this category, yogurt plays a key role and accounts for 65.2% of sales in the category of fermented milk (MAPAMA, 2017). Consumption of yogurt and fermented milk is associated with numerous health benefits and both products are among the most common fresh dairy products consumed around the world (Donovan & Shamir, 2014).

In Spain, different types of yogurts are classified as follows: natural yogurts, natural sugar-sweetened yogurts, sweetened yogurts, fruit yogurts, juices and/or other foods, flavored yogurts and yogurts pasteurized after fermentation (BOE, 2014). Natural sweetened yogurts are those natural yogurts in which edible sugar or sugars were added. As far as the energy level is concerned, it means that the average of 64 kcal in natural yogurts can reach up to 100 kcal in natural sweetened yogurts (data per 100 grams, BEDCA, 2018). The advantage of natural sweetened yogurts is that consumers do not need any additional products (sugar or other natural or artificial sweeteners) to eat it with. Roughly 50% of people add sugar to natural yogurts before eating them and some studies have shown that the average amount of sugar (or other sweeteners, such as honey or jam) added to natural yogurts is above the average amount of sugar that natural sweetened yogurts contain (measured in sucrose, Saint-Eve et al., 2016).

Due to its intrinsic characteristics, such as its creamy texture and its rapid degradation, sweetened yogurt is always marketed packed. Yet, research has shown that the functions of food packaging go well beyond the protection and handling of the product given that packaging has the ability to grab consumer attention and to influence consumer expectations and response (Rundh, 2005, 2009, 2013). Indeed, literature shows that consumer perception and attitude may be affected by physical packaging cues such as its shape (Becker, van Rompay, Schifferstein, & Galetzka, 2011; Rebollar, Lidón, Serrano, Martín, & Fernández, 2012; Velasco, Woods, Petit, Cheok, & Spence, 2016) or its weight (Piqueras-Fiszman & Spence, 2012), and by visual cues such as its material (Magnier & Schoormans, 2017; Rebollar et al., 2017), its color (Piqueras-Fiszman & Spence, 2015; Spence, 2018) or even the typography used in the label texts (Celhay, Boysselle, & Cohen, 2015; Velasco, Salgado-Montejo, Marmolejo-Ramos, & Spence, 2014).

Nevertheless, despite being one of the most common food packaging design elements and a prominent visual cue (Underwood & Klein, 2002), the effect of packaging imagery on consumer expectations and response has attracted modest scientific attention thus far (for a historical account on the topic see Hine, 1995; for more recent reviews, see Piqueras-Fiszman & Spence, 2015, pp. 173-174; and Simmonds & Spence, 2017, pp. 343-344). Given that packaging is a key communication tool between producers and consumers (Celhay & Remaud, 2018; Festila & Chrysochou, 2018), one of the main objectives of the images shown on food packaging is to convey information (Ares et al., 2011; Underwood & Klein, 2002). Consumers infer meaning from the images that appear on packages and consequently use them to identify and categorize products, as well as to generate expectations regarding their attributes (Loken, 2006): for example, Rebollar et al. (2016) showed that the product that is depicted together with the fresh cheese in the image on the package

influences the expectations that consumers have about the characteristics of that same fresh cheese. Thus, images are commonly used by packaging designers to convey information, and they are, together with verbal cues, the most frequently used cues for this purpose (Kauppinen-Räisänen, Owusu, & Abeeku Bamfo, 2012; Machiels & Karnal, 2016; Piqueras-Fiszman, Ares, & Varela, 2011).

However, it should be noted that this communication process may rely on different layers of information as designers often have to convey several messages to consumers, for which designers can use different packaging cues (Ares et al., 2011; Laing & Masoodian, 2016; see also Matthews, Simmonds, & Spence, 2019). Among all the possible cues, the most appropriate ones will be those that correctly convey the desired message and at the same time have a more positive impact on consumers' response. For example, in the case of a sweetened natural yogurt, the designer must clearly communicate the product category (i.e. natural yogurt) and the product subcategory (i.e. sweetened): in this case, it is reasonable to wonder what kind of cue will be the most adequate for each message. Previous studies analyzed the consequences of using one or another kind of cue in order to convey the product category (Bone & France, 2001; Rebollar et al., 2017; Underwood & Klein, 2002) and even suggested that the packaging shape can be used for that purpose (Arboleda & Arce-Lopera, 2015; Velasco et al., 2016). However, it is not clear which kind of cue (i.e. whether visual or verbal) is the most adequate to communicate specific product attributes (e.g. that a natural yogurt is sweetened) and how this decision may influence consumer expectations and willingness to buy. In contrast to verbal cues, images more easily attract consumer attention at the point of sale (Honea & Horsky, 2012; Venter, van der Merwe, de Beer, Kempen, & Bosman, 2011) and require a lower level of cognitive effort, as they are processed in a more unintentional and unconscious way (Mueller, Lockshin, & Louviere, 2009; Underwood & Klein, 2002). As a consequence, consumers generate expectations more quickly by looking at an image than by reading a text (Underwood & Klein, 2002). Indeed, some authors suggest that conveying a given concept through imagery helps to make it more accessible in consumers' mind (Gil-Pérez, Rebollar, Lidón, Martín, et al., 2019; Gil-Pérez, Rebollar, Lidón, Piqueras-Fiszman, & van Trijp, 2019), thus making it more salient and thereby affecting perception (Adams, Hart, Gilmer, Lloyd-Richardson, & Burton, 2014; Rebollar et al., 2017). Given that salience is considered to play a key role in the process of shaping expectations (Piqueras-Fiszman & Spence, 2015), we hypothesize:

> H1. Packages conveying that a yogurt has been sweetened by depicting an image together with a textual claim (rather than just by a textual claim) will increase (decrease) sweetness expectations.

Moreover, the question arises of what the differences would be depending on the specific image selected as visual cue. Findings of previous investigations on the manipulation of the main image that is shown on the package show that what is depicted may make an impact on consumer expectations and response (Machiels & Karnal, 2016; Mizutani et al., 2010). Therefore, it seems reasonable to wonder not only about the effect of using an image to convey a message like that a natural yogurt is sweetened, but also about the effect of the specific image used for that purpose. Manipulating packaging imagery may elicit different meanings (e.g. enhancing a particular concept, Gil-Pérez, Rebollar, Lidón, Martín, et al., 2019; Gil-Pérez, Rebollar, Lidón, Piqueras-Fiszman, & van Trijp, 2019) and anchor consumer judgement (e.g. making consumers think that the number of

product units depicted in the package correlates to the amount of product contained within it, Madzharov & Block, 2010), thus influencing consumer expectations and behavior (Neyens et al., 2015). Based on the above, we propose:

H2a. Packages displaying images depicting a high (low) amount of sugar will increase (decrease) sweetness expectations.

H2b. Packages displaying images depicting a high (low) level of naturalness will increase (decrease) the expectation of natural ingredients having been used in the production of the yogurt.

In addition, it should be noted that consumers are gradually becoming more health conscious (Anesbury, Nguyen, & Bogomolova, 2018; Grunert & Wills, 2007) and, thus, sugar consumption and sweet products are being increasingly associated with poor dietary choices (Lustig, Schmidt, & Brindis, 2012; Sütterlin & Siegrist, 2015). In contrast, a growing market trend shows that consumers tend to prefer natural and unprocessed foods (Fernqvist & Ekelund, 2014; Román, Sánchez-Siles, & Siegrist, 2017; Smith, Barratt, & Selsøe Sørensen, 2015), which tend to be considered healthier and of better quality (Machiels & Karnal, 2016; Román et al., 2017). Accordingly, we propose:

H3a. Expected sweetness will be negatively associated to healthfulness expectations and to willingness to buy.

H3b. Expected naturalness will be positively associated to healthfulness and quality expectations, and to willingness to buy.

2. Materials and methods

In order to test the proposed hypotheses, a pretest and a main experiment were conducted. The pretest aimed to assess whether the image used to convey that the yogurt is sweetened affects the attributes that the consumers associate with the product, with a particular interest in the mental associations regarding the product sweetness. To that end, a word association task was conducted using four different packages of natural sweetened yogurt designed *ad hoc* for this study. The main experiment aimed to analyze whether the image used to convey that the yogurt is sweetened affects consumer expectations and willingness to buy, and consisted of an online survey. In it, participants were asked to evaluate their expectations and their willingness to buy in relation to the same stimuli used in the first experiment. Taken together, the pretest and the main experiment aimed to offer different and complementary insights into how using imagery to convey a message affects consumer perception and response.

2.1. Stimuli

A market study was carried out prior to the design of the stimuli to become familiar with the most frequent characteristics of the packages of sweetened natural yogurt sold in the Spanish market. It entailed a series of supermarket visits in which 29 sweetened natural yogurts from a total of 12 brands were analyzed. The results showed that the most frequently depicted subjects used to convey sweetness were sugar cubes (N=7, 24.1%), a sugar sack (N=6, 20.7%), and a spoon with sugar

(N=3, 10.3%), while the remaining packages relied on textual cues and did not use images to convey sweetness (N=13, 44.8%). According to these findings, four kinds of stimuli were designed in a way they would resemble the appearance any of these products might have on the market. Each package included the same elements: the words ‘‘Yogur Natural Azucarado” (sweetened natural yoghurt, in English), an image of a cow, the brand (Yulé – created specifically for this investigation so that the participants could not deduce certain attributes of the products based on their prior experiences with other brands), the nutrition information and other symbols (e.g., barcode, recycled package). The only difference between packages was the image shown to indicate that the yogurt was sweetened.

The images used were the ones more commonly seen in these kinds of yogurt packages: sugar cubes, a spoon of sugar, a sack of sugar and no image. These stimuli will be hereafter referred to, respectively, as *Sugar cubes*, *Sugar sack*, *Sugar spoon* and *Only text*. According to our hypotheses, two stimuli were intended to depict a large amount of sugar (*Sugar cubes* and *Sugar sack*) and one stimulus was intended to depict a high level of naturalness (*Sugar sack*). In order to verify the adequacy of the images that were chosen to represent each case, a manipulation check was conducted. Fifty-one people (28 female, 23 male; mean age of 24.9 years; standard deviation of 7.9 years) were asked to rate, according to a Likert scale of 1 (strongly disagree) to 7 (strongly agree), how much sugar did they consider was depicted in each image, and how related to the concept ‘natural’ each image was. The results of a one-way repeated measures analysis of variance (within-subjects ANOVA; Table 1) showed that, as it was intended, the *Sugar sack* and the *Sugar cubes* images were considered to depict a larger amount of sugar than the *Sugar spoon* image, and that the *Sugar sack* image was judged as being more related to the concept ‘natural’ than the *Sugar cubes* and the *Sugar spoon* images.

[Insert Table 1 around here]

Once the adequacy of the chosen imagery had been checked, the final stimuli were designed. The visual stimuli used in the experiments (Fig. 1) were photorealistic renderings created using Photoshop CS5 (Adobe Systems Inc., San Jose, CA, U.S.A.) and Keyshot 4 (Luxion Inc., Tustin, CA, U.S.A.).

[Insert Figure 1 around here]

2.2. Pretest (word association)

The pretest aimed to explore whether the image used to convey that the yogurt has been sweetened affects the accessibility of the concept ‘Sweet’. To that end, a word association task was conducted. Word association is a qualitative research technique usually used in sociology and psychology (Schmitt, 1998). This technique is based on free answers given by the participant as a response to a stimulus; these answers provide a better understanding of the mental representation that consumers have of the stimulus in question. When this technique is applied to food, the answers given make it possible to identify the most relevant concepts for consumer’s buying decisions (Roininen, Arvola, & Lähteenmäki, 2006).

A convenience sample of 112 people (62 female, 50 male) participated in this pretest, all residing in Spain. Their mean age was 33.5 years with a standard deviation of 13.5 years. Participants were recruited both from mailing lists and by approaching them at the university campus, were not compensated for participating, and carried out the task on a voluntary and anonymous basis. The experiment was conducted in a quiet room with stable and homogeneous conditions of light and temperature in the School of Engineering and Architecture of Zaragoza University. The participants were randomly divided into four groups of 28 people. No statistically relevant difference was found in the composition of groups regarding age and gender.

Each group of participants performed a task with one of the four stimuli shown in the Figure 1. Participants were asked to evaluate the stimuli and to write down the first three words, associations, thoughts or feelings that came to their minds. The stimuli were shown on a 23" LED monitor with a resolution of 1920 x 1080px and a refresh rate of 60Hz and were of a similar size to the real-life package. There was no time limitation to perform the task and participants could write one, two or three ideas.

2.3. Main experiment (online survey)

The main experiment aimed to assess whether the image used to convey sweetness affects consumer expectations and willingness to buy, thus addressing H1, H2 and H3. Participants were recruited from mailing lists and social media, and by posting a link to the survey on University webpages. They were not compensated for participating, and carried out the survey on a voluntary and anonymous basis, using an online survey data collection tool: SurveyMonkey™. Participants were not given a time limit to complete the survey or any particular section thereof. They were shown photorealistic renderings (Fig. 1) and given a questionnaire to evaluate them. A within-subject experimental design was used, so all survey participants saw the same packages. The packages were shown one at a time and in a randomized order.

One hundred and fifty-seven people (95 female, 63 male) other than those who took part in the pretest participated in this investigation, all residing in Spain. Their mean age was 29.1 years with a standard deviation of 10.1 years.

The survey was divided into two sections: demographic information of the participants (age and gender) and the presentation of the packages to analyze—the visual stimuli in Figure 1. For each package, the survey evaluated a total of four product attributes which were selected for being seen as particularly relevant in case of natural sweetened yogurts: one sensory attribute (Sweet) and three non-sensory attributes (Healthy, Natural Ingredients, and Quality).

Participants were asked to evaluate the four product attributes for each of the four packages according to a Likert scale of 1 (strongly disagree) to 7 (strongly agree). Willingness to buy was evaluated using the same Likert scale of 1 (would not buy under any circumstances) to 7 (would be definitely willing to buy). It was specified that all the packages contained the same type of product (i.e., sweetened natural yogurt), the same quantity of yogurt and had the same cost (though the price was not specified).

2.4. Statistical Analyses

2.4.1. Pretest (word association)

All word associations made by the participants were analyzed qualitatively. The terms with similar meaning were grouped using inter-rater consensus technique (Armstrong, Gosling, Weinman, & Martaeu, 1997; Glaser & Strauss, 1967). Each researcher individually evaluated the results and, consequently, the classification of the final categories was agreed on by three raters. This triangulation technique has been used by other authors dealing with qualitative techniques (Guerrero et al., 2010). Only those categories that were mentioned by at least five participants were taken into consideration (Piqueras-Fiszman, Velasco, Salgado-Montejo, & Spence, 2013).

HJ-Biplot (Galindo, 1986) was used to analyze the word association task. This exploratory technique is a variant of the biplot methods proposed by Gabriel (1971). The biplot methods make it possible to plot the rows (stimuli) and columns (words) of the data matrix as points on a low dimension vector space. The interpretation of this method is similar to other multivariate techniques. The distances between row markers are interpreted as an inverse function of similarities, so closer markers (stimuli) are more similar. The cosines of the angles between the column vectors (words) approximate the correlation between variables in such a way that small acute angles are associated with high positive correlations, obtuse angles are associated with negative correlations and right angles are associated with uncorrelated variables. In the same way, the cosines of angles between the column markers (words) and the axes approximate the correlations between them. Besides, the order of the orthogonal projections of the row markers (stimuli) onto column markers (words) approximates the order of the row values in that column of the data matrix. Thus, this technique allows to analyze the similarity (or dissimilarity) between stimuli in relation to the latent variables defined by the word categories. The data was processed and analyzed using MULTBIPLOT (Vicente-Villardón, 2015).

2.4.2. Main experiment (online survey)

A one-way repeated measures analysis of variance (within-subjects ANOVA) was used to analyze the statistical differences between stimuli for each individual attribute, in order to assess the effect of the image manipulation on consumer expectations and willingness to buy. For the comparisons of pairs following the analysis of variance, the Bonferroni correction was used.

In addition, the Individual Differences Model (Carroll & Chang, 1970; Horan, 1969) was used to analyze the perception structure of the individuals in the ordering of the stimuli based on a small set of dimensions defined by the attributes. This technique is included within multidimensional scaling techniques and has been used primarily to characterize variation in judged stimulus structure across individuals. It allows both to study how each stimulus relates to each dependent variable (i.e. each of the measured expectations and the willingness to buy), and to assess how each dependent variable relates to each other (thus showing the perception structure of the individuals).

This method is also known as INDSCAL. In this study, a matrix (4X4) of similarities between packages was calculated for each individual. These similarities were obtained from each individual score given to the different packages of yogurts in relation to their attributes. This technique allows

the creation of a space of consensus for the individuals showing the similarities between the packages of yogurts. In addition, it is possible to find out the weights that each individual gave to the dimensions obtained in the consensus space. The weights reflect the importance that the individuals associate to the dimensions in the stimuli space. Although one person can perceive one of the dimensions to be more important than the other, another person can have the opposite perception. This technique was used to evaluate the attributes, as well as willingness to buy. The analysis was conducted using the PROXCAL algorithm (Leeuw & Heiser, 1980), and Euclidian distance was used as a measure of similarity. The criterion to choose the number of dimensions in the consensus space was based on goodness of fit and the number of stimuli included in the analysis. S-Stress was used to determine goodness of fit. If this measurement is low, it indicates that the configuration obtained in the map (or space) is good. Kruskal and Wish (1984) deemed the solution to be acceptable when the S-Stress values are less than 0.1.

Moreover, the vector model (Schiffman, Reynolds, & Young, 1981) was used to interpret the dimensions of preference in accordance with the observable attributes. This procedure uses the multiple-regression technique to determine the direction of the attributes. The means of the individual scores of attributes are used to calculate the multiple regression, and the standardized regression coefficients (^β1; ^β2; ^β3) are computed and drawn as coordinates in the three-dimensional stimulus space. Finally, a line is drawn through the origin of the stimulus consensus space and through coordinates defined by the regression coefficients. This model helps to interpret the dimensions of the space of similarities using the attributes forming the similarities between the stimuli. Moreover, the attribute-vector is shown as a line in the space representing packages of yogurts in which the projection of each stimulus corresponds to the level of attributes possessed by that stimulus. If the attribute in question is strongly related with the stimuli space, then the projections of the stimuli will coincide very closely with the value of the attribute and the correlation between the projection and the attribute will be quite high. When two attributes are facing in the same direction, this also indicates a high correlation. When the points that represent the vector are close to a dimension and far from the center, it means they are relevant for explaining that dimension. If an attribute is in a position halfway between two dimensions, it indicates that the attribute is explained in both dimensions. If a vector-attribute is close to the center of the stimuli space, it means that it is insignificant in the explanation of the dimensions of that space.

This model allowed the packages to be ordered according to each of the attributes evaluated by the subjects, also making it possible to determine which attributes had a high correlation in the stimuli evaluation. Subjects' willingness to buy was included as an external value to explore the dimension with the highest correlation. SPSS Statistics 23 (Armonk, NY, U.S.A.) was used for data analysis and processing.

3. Results

3.1. Pretest (word association)

The elicited words were clustered into eight categories, corresponding to those mentioned by more than five participants (Piqueras-Fiszman et al., 2013). The most mentioned associations were concepts related to 'Sweet', 'Natural yogurt', and 'Nature' (Table 2). In addition, the data was also

processed in the form of a biplot graph (Fig. 2). The first two axes of the HJ-Biplot analysis explained 89.22% of the data variability. Axis 1 was mainly defined by the term 'Healthy' against 'Sweet'. This axis separated *Sugar cubes* and *Sugar sack* stimuli (more frequently associated with 'Sweet') from *Sugar spoon* and *Only text* stimuli (more frequently associated with 'Healthy'). Axis 2 was defined by the terms 'Yogurt' and 'Nature' against the term 'Fresh'. This axis separated *Sugar sack* stimulus against *Sugar cubes* and *Only text*, whereas *Sugar spoon* stimulus occupied the intermediate position.

[Insert Table 2 around here]

[Insert Figure 2 around here]

Overall, these results seem to support the notion that conveying sweetness by using an image together with a textual claim (instead of just a textual claim) may influence sweetness expectations. Specifically, the results suggest that imagery helps to enhance the salience of the depicted concepts, since the stimuli depicting images designed to convey sweetness (namely, *Sugar cubes*, *Sugar spoon* and *Sugar sack*) appear to have favored the elicitation of concepts related to 'Sweet' (compared to the *Only text* stimulus). In addition, the pretest results also suggest that this effect may depend on the specific image used to convey sweetness, since apparently relevant differences may be seen in the frequency of elicitation of concepts related to 'Sweet' that were mentioned by the participants for each stimulus (with the *Sugar cubes* and the *Sugar sack* images seeming to have favored the accessibility of the concept 'Sweet' compared to that of the *Sugar spoon* image). Finally, the biplot graph also seem to show a tendency by which the stronger the association that a stimulus raises to concepts related to sweetness, the weaker the association that the same stimulus raises to concepts related to healthfulness.

3.2. Main experiment (online survey)

All the results obtained using the variance technique analysis gave statistically significant values regarding both the four attributes tested and the willingness to buy the product (Table 3, Fig. 3).

The results seem to be aligned with the findings of the pretest, since the greatest difference in the results can be seen in relation to the Sweet attribute. In fact, the packages conveying sweetness through an image and a textual claim (*Sugar sack*, *Sugar cubes* and *Sugar spoon*) raised higher sweetness expectations than the package conveying sweetness only through a textual claim (*Only text*), supporting H1. In addition, regarding the Sweet attribute, there was a significant difference between the *Sugar cubes* package in relation to the others, with the *Sugar cubes* package obtaining the highest mean value ($\bar{X}$=5.47, SD=1.47) and the *Only text* package obtaining the lowest mean value ($\bar{X}$=4.48, SD=1.56). This partially supports H2a, since although the *Sugar cubes* package depicts a high amount of sugar, it is also the case of the *Sugar sack* package and yet it raised similar sweetness expectations than the *Sugar spoon* package ($\bar{X}$=5.09, SD=1.46 and $\bar{X}$=5.03, SD=1.34, respectively). Regarding the Natural Ingredients attribute, the *Sugar sack* package raised the highest naturalness expectations ($\bar{X}$=4.22, SD=1.59), supporting H2b. In addition, the results relating to the other non-sensory attributes (namely, Healthy and Quality) also had a significant difference between their extreme values. Indeed, all the attributes (except Sweet) obtained structurally similar results,

with the *Sugar sack* stimulus obtaining the highest results and the *Sugar cubes* package obtaining the lowest results. The results for Willingness to buy also followed a similar pattern, showing that the package obtaining the highest value was the one depicting a sugar sack ($\bar{X}$=4.48, SD=1.64), and the one with the lowest value was the one depicting the sugar cubes ($\bar{X}$=3.97, SD=1.69).

[Insert Table 3 around here]

[Insert Figure 3 around here]

Regarding the multidimensional analysis results, the consensus space showed similarities between the stimuli (Fig. 4). The dimensionality chosen for the multidimensional scaling solution was that of three dimensions (S-Stress = 0.00233). The reason by which three and not two dimensions were chosen was that the S-Stress obtained by using two dimensions was close to 0.1 and the *Sugar sack* stimulus was not represented accurately in a two-dimensional space. Thus, the first dimension differentiated the *Sugar cubes* package from the *Only text* package, the second dimension differentiated the *Sugar sack* package from the rest of the packages, and the third dimension differentiated the *Sugar spoon* package from the *Sugar cubes* package. Analysis of the layout of the packages regarding the attributes showed that the attributes Sweet and Healthy were closely associated with Dimension I. The attributes Natural Ingredients and Willingness to buy were closely associated with the Dimension II and the attribute Quality was equally associated with Dimensions II and III. In the analysis of individuals' weights, 72% gave similar importance to dimensions I, II and III, compared to 15% who gave most importance to dimension I and to 12% who gave more importance to dimension II. Just 1% of individuals rated only dimension III.

The multidimensional analysis results support H3 since it can be seen how Willingness to Buy had a strong positive connection with the attributes Natural Ingredients, Healthy, and Quality; and how, on the other hand, the attribute Sweet displayed a strong negative connection with the attribute Healthy and a weak negative connection with Willingness to buy.

[Insert Figure 4 around here]

4. Discussion

This study aimed to analyze whether the images used on packaging to convey that a yogurt is sweetened make an impact on consumer expectations and on willingness to buy. The results of the current research enrich the literature on how the product extrinsic cues influence consumer expectations and response by showing that the image chosen to convey the message that the yogurt is sweetened influences both consumer sensory and non-sensory expectations and that it also affects willingness to buy. These findings enhance our understanding of the effects of conveying a message on food packaging (in this case, indicating that yogurt is sweetened) through different cues, thus helping both designers and producers to design clearer and more effective packages for their products.

4.1. Contributions

The results of this study show that the package that has only text and no images raises the lowest sweetness expectations. This finding contributes to the literature by supporting previous research which suggest that visual information is more powerful than verbal information (McQuarrie & Mick, 2003; McQuarrie & Phillips, 2005), and is in accordance with the findings by Rebollar et al. (2017) that suggested that using a visual cue to convey a secondary message in a food package enhances consumer expectations. Overall, literature suggests that salience plays a key role in the process of shaping expectations (Piqueras-Fiszman & Spence, 2015), since increasing the salience of a given concept leads to an increased activation of the parts of the brain devoted to processing it (González et al., 2006). Compared to texts, images are considered to increase the salience of the conveyed message because they more easily attract attention and are processed more quickly (Honea & Horsky, 2012; Sehrawet & Kundu, 2007; Smith et al., 2015; Venter et al., 2011). Thus, the results of this study support the notion that conveying a message through imagery helps to enhance the salience of the depicted concepts, since consumers expected a yogurt contained in a package showing sugar-related images to be sweeter than a yogurt displaying only textual claims. In addition, the results of the word association conducted in this study also seem to be aligned with this notion, since the package that used only text to convey sweetness (i.e., the package without an image related to sweetness) elicited the lowest number of terms related to the concept 'Sweet'.

Moreover, these results contribute to the literature by demonstrating that the specific image chosen to be depicted in packaging imagery does make an impact on consumer's sensory expectations, thus supporting previous research in the field (e.g. Machiels & Karnal, 2016; Mizutani et al., 2010; Rebollar et al., 2016). Specifically, in this study, packages with an image of sugar cubes raised higher sweetness expectations than packages depicting an image of a sugar spoon or that of a sugar sack. Literature devoted to the effect of packaging imagery on consumer expectations and response offers a possible explanation to this effect, as it shows that pictures activate information related to the immediate visual properties of the product that is depicted, thereby making it and its attributes more accessible in consumers' mind (Gil-Pérez, Rebollar, Lidón, Martín, et al., 2019; Madzharov & Block, 2010; Smith et al., 2015). In this vein, as we hypothesized, on the one hand it can be argued that the *Sugar cubes* and the *Sugar sack* images depict a larger sugar amount than the *Sugar spoon* image. Thus, a heuristic judgement may be triggered by which consumers infer that the larger the amount of sugar depicted in the image, the higher the quantity of sugar present in the product. That would support the results of Madzharov and Block (2010), who showed that the number of product units (e.g., number of cookies) displayed on the package influences consumers' perceptions of the quantity of product (the more cookies are depicted in the package, the more cookies consumers think there are contained within). However, on the other hand, these results suggest that other mechanisms may be at play, since the *Sugar sack* image also depicts a high amount of sugar and yet it raises lower sweetness expectations than the *Sugar cubes* image. In this regard, it should be noted that processing fluency literature suggest that when consumers' mental representation of a target matches the way the target is presented, this fit increases processing fluency (Chae & Hoegg, 2013) and increases the accessibility of the depicted concept (González et al., 2006). Thus, both the *Sugar cubes* and the *Sugar spoon* images may fit better with consumers' mental representation of

adding sugar to a product than the *Sugar sack* image, since they accurately represent the way in which consumers are used to do that task. From a semiotic point of view, the sign would be congruent with the product in which it is applied and it thus would allow to easily access the concept of sweet in the consumer's mind (Ares et al., 2011; Lynott & Connell, 2010; Smith et al., 2015). In contrast, a sack of sugar would be an element that consumers would not associate with the action of adding sugar to products since it would not fit into their everyday experience. Thus, according to our results, we propose that the package with an image depicting sugar cubes is the one raising the higher sweetness expectations for two reasons. First, because it both depicts a large amount of sugar; and second, because it fits into consumers' mental representation of adding sugar to a yogurt. In contrast, the other two stimuli (i.e., that of a sugar sack and that of a sugar spoon) only meet one of these two criteria each. This is in line with Sperber and Wilson's relevance theory (1995), since consumers seem to interpret each image by assuming that each of its features (e.g., the depicted quantity of sugar) is situationally relevant (Smith et al., 2015). However, these mechanisms should be further tested in order to yield a comprehensive process model and thus empirically test their validity.

As for the effects of the images on naturalness expectations, the results show that the image of a sack of sugar raises more naturalness expectations than the rest of the images. According to previous research, that could be explained due to the sack serving as a sign that triggers associations with concepts related to a natural environment (Chae & Hoegg, 2013; Smith et al., 2015). This assumption lines up with earlier studies which suggest that stereotypical information associated with food shapes perception (Brierley & Elliott, 2015), and may be explained within a semiotic approach (Celhay & Remaud, 2018). In contrast, consumers would not associate nor the image of the sugar cubes nor the image of the sugar spoon with the concept of natural ingredients because neither of the two images would be easily associated with concepts related to nature, as in both cases the sugar is depicted processed and ready for consumption. Thus, this study adds to previous research by suggesting that consumers tend to project the attributes of the products depicted in the packaging imagery (in this case, naturalness) into the main product, thus modulating consumer expectations (Machiels & Karnal, 2016; Rebollar et al., 2016).

In addition, these results suggest that sweetness expectations are somewhat negatively related to healthfulness expectations and to willingness to buy: although the results of the multidimensional scaling show that willingness to buy does not have a strong association with the expectations of sweetness, a certain negative trend can be seen. Moreover, the biplot pretest results show a strong negative association between the number of times that participants elicited words related to the concepts 'Sweet' and 'Healthy'. Both findings are in line with our hypotheses and are aligned with a growing body of literature that links sugar consumption with an increased risk of a variety of chronic diseases (Billich et al., 2018; Lustig et al., 2012). Additionally, the results show that the attribute Natural Ingredients has a positive correlation with the attributes Quality and Healthy, which supports previous research that suggest that consumers judge products as healthier and of a higher quality when they have a high proportion of natural ingredients (Machiels & Karnal, 2016; Román et al., 2017; Sütterlin & Siegrist, 2015). In turn, the results show that high naturalness expectations are positively related to quality expectations and to willingness to buy, which supports previous literature

that suggests that there is a strong positive association link between willingness to buy and such attributes as Natural Ingredients, Healthy, and Quality (Fernqvist & Ekelund, 2014; Román et al., 2017). This might imply that the higher consumer expectations are of whether the product is natural, and/or is made with natural ingredients, the higher their willingness to buy is (Machiels & Karnal, 2016; Román et al., 2017).

Overall, these results support previous work that suggests that packaging imagery has the ability to improve consumer attitude towards the product (Underwood & Klein, 2002), since showing the image of a sugar sack in the yogurt package enhanced the participants' willingness to buy the product. However, it may be noted that this may not always be the case as this effect did not occur for the other images. Our results even suggest that the willingness to buy the package displaying an image of sugar cubes appear to be even lower than that of the package displaying only a textual claim (i.e. with no sugar-related image; see also Rebollar et al., 2016). Literature shows that conveying a message by means of an image makes it more salient than doing so through a text because it captures attention more quickly and is processed sooner (Honea & Horsky, 2012; Underwood & Klein, 2002; Venter et al., 2011), so it seems reasonable to think that consumers' attitude towards a product may not only be influenced by the implicit valence of the image depicted in its package (as it was shown by Mizutani et al., 2010), but also by the valence of the message to be conveyed. Such a 'halo effect' occurs when consumers correlate the assessments of different product attributes, generalizing positive (or negative) perceptions elicited by a given attribute (Lähteenmäki et al., 2010). For example, Rebollar et al. (2017) reported a positive 'halo effect' by which conveying a positive message through an image rather than by a textual claim (in their case, that the chips contained in a bag of chips had been fried in olive oil) enhanced willingness to buy and consumer expectations for all the assessed attributes. In contrast, if the message to be conveyed is not clearly rendered as positive by consumers (like it could be the case of this study, where the salience of the 'sweet' concept raised by the *Sugar cubes* image may trigger negative mental associations in the mind of some consumers; Billich et al., 2018; Lustig et al., 2012), providing too much relevance to it by means of a visual cue may end up being counterproductive and detrimental to consumer expectations and willingness to buy (resulting in a negative 'halo effect'). However, further research is needed in order to assess the validity of these hypotheses and to better understanding the effect of packaging imagery in consumer attitude and product acceptance.

4.2. Limitations and future research

Regarding the limitations of this research, it should be noted that the results obtained may have been influenced by visual factors that have not been taken into account, such as the size of the image or the aesthetics of the composition. As for the visual design, the use of graphic elements such as images of the cow or a natural environment may have biased the results increasing the accessibility to some concepts over others, but since they were shown in all the stimuli, their possible effects were thus cancelled. Moreover, part of this study was conducted using an online survey on social media meaning that the participants therein came only from that environment. Additionally, the number of participants who carried out the word association task was modest. Consequently, there are limitations regarding the participants' diversity and characteristics. It would be interesting to carry out

further testing to see if the obtained results can be extrapolated to other countries, since all the participants were Spanish.

Although we propose that the differences between the sweetness expectations raised by the images can be partly explained by how well the images fit with consumers' mental representation of the action of adding sugar to a yogurt, this would need to further be tested and other alternative explanations should not be ruled out. In addition, one should be cautious when drawing conclusions regarding the causal relation of some of the effects reported in this study. While it may be tempting to think that the higher accessibility to the 'Sweet' concept given by the images depicting a large amount of sugar explains the higher sweetness expectations elicited by those images, this kind of causal link has not been explicitly assessed in this study. Thus, further research is advised in order to understand how the results of the word association task conducted in the pretest may relate to the images' effect on consumer expectations.

Furthermore, it is worth noting that consumers' willingness to buy has been measured by means of a hypothetical context set in an online survey. This may raise some concern about these results truly reflecting consumers' demand and not only consumers' product acceptability, since the behavior of consumers in the field might be different from the one expected based on the presented results (Elbakidze & Nayga, 2012; Martínez-Carrasco, Brugarolas, Martínez-Poveda, & Ruiz-Martínez, 2015). Indeed, nonhypothetical experimental methods are becoming increasingly popular when it comes to measuring constructs like consumer behavior (see Lim et al., 2013; & Verbeke et al., 2013; for examples regarding the effect of package labelling on willingness to pay). Hence, further research should aim to study whether the results of this experiment regarding consumer willingness to buy are robust and also can be found by conducting nonhypothetical experimental methods (such as experimental auctions, Corrigan et al., 2009, or choice experiments, Alfnes et al., 2006).

These results open the door to further research, in which it would be interesting to explicitly assess the effect of the valence of the message to be conveyed (i.e. whether it is rendered as being positive or negative) through different package cues on consumer expectations and response. It also might be interesting to conduct a tasting in order to investigate what minimum amount of added sugar shall be considered by the participants to be excessively sweet and to assess if these effects also influence taste perception and willingness to buy. It would also be relevant to analyze in depth the possible existence of mediation (indirect effect) of the attribute Sweet with willingness to buy through the attribute Healthy, as the findings of this study may suggest. We believe that another interesting line of investigation should be directed at studying how the results obtained might be affected by the individual differences of the participants regarding health consciousness, since earlier studies suggest that the knowledge and beliefs of the consumer influence food acceptance (Karnal, Machiels, Orth, & Mai, 2016; Verbeke, 2005).

5. Conclusions

The results of this research suggest that the specific image chosen to be depicted in packaging imagery influences consumer sensory and non-sensory expectations and willingness to buy. In addition, these findings challenge the notion that packaging imagery improves the attitude of the consumer towards the product, since the results of this study show that a poor image selection may

have a detrimental effect on consumer expectations and response than not showing any image at all. The practical implications of these findings are of interest for both designers and producers, since they seem to suggest that if a product attribute that is not regarded as clearly positive by consumers has to be conveyed in the package, it may not be a good idea to do so by depicting an image since it may make that attribute too salient and thus negatively affect consumer expectations and willingness to buy. Overall, these results highlight the relevance of packaging imagery when it comes to shape consumer expectations and willingness to buy and imply that designers should be cautious when deciding when to use visual cues and what to depict on them.

References

Adams, J. M., Hart, W., Gilmer, L., Lloyd-Richardson, E. E., & Burton, K. A. (2014). Concrete images of the sugar content in sugar-sweetened beverages reduces attraction to and selection of these beverages. *Appetite*, *83*, 10–18. https://doi.org/10.1016/j.appet.2014.07.027

Alfnes, F., Guttormsen, A. G., Steine, G., & Kolstad, K. (2006). Consumers' Willingness to Pay for the Color of Salmon: A Choice Experiment with Real Economic Incentives. *American Journal of Agricultural Economics*, *88*(4), 1050–1061. https://doi.org/10.1111/j.1467-8276.2006.00915.x

Anesbury, Z., Nguyen, Y., & Bogomolova, S. (2018). Getting a "sweet" deal: does healthfulness of a sub-brand influence consumer loyalty? *European Journal of Marketing*. https://doi.org/10.1108/EJM-04-2017-0285

Arboleda, A. M., & Arce-Lopera, C. (2015). Quantitative analysis of product categorization in soft drinks using bottle silhouettes. *Food Quality and Preference*, *45*, 1–10. https://doi.org/10.1016/j.foodqual.2015.04.006

Ares, G., Piqueras-Fiszman, B., Varela, P., Marco, R. M., López, A. M., & Fiszman, S. (2011). Food labels: Do consumers perceive what semiotics want to convey? *Food Quality and Preference*, *22*(7), 689–698. https://doi.org/10.1016/j.foodqual.2011.05.006

Armstrong, D., Gosling, A., Weinman, J., & Martaeu, T. (1997). The place of inter-rater reliability in qualitative research: An empirical study. *Sociology*, *31*(August), 1–6.

Becker, L., van Rompay, T. J. L., Schifferstein, H. N. J., & Galetzka, M. (2011). Tough package, strong taste: The influence of packaging design on taste impressions and product evaluations. *Food Quality and Preference*, *22*(1), 17–23. https://doi.org/10.1016/j.foodqual.2010.06.007

BEDCA. (2018). Base de Datos Española de Composición de Alimentos. Retrieved from http://www.bedca.net/

Billich, N., Blake, M. R., Backholer, K., Cobcroft, M., Li, V., & Peeters, A. (2018). The effect of sugar-sweetened beverage front-of-pack labels on drink selection, health knowledge and awareness: An online randomised controlled trial. *Appetite*. https://doi.org/10.1016/j.appet.2018.05.149

BOE. (2014). Real Decreto 271/2014, de 11 de abril, por el que se aprueba la Norma de Calidad para el yogur o yoghourt. Madrid. Retrieved from https://www.boe.es/diario_boe/txt.php?id=BOE-A-2014-4515

Bone, P. F., & France, K. R. (2001). Package graphics and consumer product beliefs. *Journal of*

Business and Psychology, *15*(3), 467–489. https://doi.org/10.1023/A:1007826818206

Brierley, M., & Elliott, C. (2015). Nutritional components and children's interpretations of packaged food. *International Journal of Health Promotion and Education*, *53*(5), 230–243. https://doi.org/10.1080/14635240.2015.1010654

Carroll, J. D., & Chang, J.-J. (1970). Analysis of individual differences in multidimensional scaling via an n-way generalization of "Eckart-Young" decomposition. *Psychometrika*, *35*(3), 283–319. https://doi.org/10.1007/BF02310791

Celhay, F., Boysselle, J., & Cohen, J. (2015). Food packages and communication through typeface design: The exoticism of exotypes. *Food Quality and Preference*, *39*, 167–175. https://doi.org/10.1016/j.foodqual.2014.07.009

Celhay, F., & Remaud, H. (2018). What does your wine label mean to consumers? A semiotic investigation of Bordeaux wine visual codes. *Food Quality and Preference*, *65*(November 2017), 129–145. https://doi.org/10.1016/j.foodqual.2017.10.020

Chae, B., & Hoegg, J. (2013). The Future Looks "Right": Effects of the Horizontal Location of Advertising Images on Product Attitude. *Journal of Consumer Research*, *40*(2).

Corrigan, J. R., Depositario, D. P. T., Nayga, R. M., Wu, X., & Laude, T. P. (2009). Comparing open-ended choice experiments and experimental auctions: An application to golden rice. *American Journal of Agricultural Economics*, *91*(3), 837–853. https://doi.org/10.1111/j.1467-8276.2009.01267.x

Donovan, S. M., & Shamir, R. (2014). Introduction to the yogurt in nutrition initiative and the first global summit on the health effects of yogurt. *American Journal of Clinical Nutrition*, *99*(5), 1209–1211. https://doi.org/10.3945/ajcn.113.073429

Elbakidze, L., & Nayga, R. M. (2012). The effects of information on willingness to pay for animal welfare in dairy production: Application of nonhypothetical valuation mechanisms. *Journal of Dairy Science*, *95*(3), 1099–1107. https://doi.org/10.3168/jds.2011-4730

Fernqvist, F., & Ekelund, L. (2014). Credence and the effect on consumer liking of food - A review. *Food Quality and Preference*, *32*(PC), 340–353. https://doi.org/10.1016/j.foodqual.2013.10.005

Festila, A., & Chrysochou, P. (2018). Implicit communication of food product healthfulness through package design: A content analysis. *Journal of Consumer Behaviour*, (February 2017), 1–16. https://doi.org/10.1002/cb.1732

Gabriel, R. K. (1971). The biplot graphic display of matrices with application to principal component analysis. *Biometrika*, *58*(3), 453–467. https://doi.org/10.1093/biomet/58.3.453

Galindo, P. (1986). An alternative for simultaneous representation: HJ-Biplot. *Questiió: Quaderns d'Estadística, Sistemes, Informatica i Investigació Operativa*. Retrieved from http://dialnet.unirioja.es/servlet/articulo?codigo=2360880&info=resumen&idioma=SPA

Gil-Pérez, I., Rebollar, R., Lidón, I., Martín, J., van Trijp, H. C. M. H. C. M., & Piqueras-Fiszman, B. (2019). Hot or not? Conveying sensory information on food packaging through the spiciness-shape correspondence. *Food Quality and Preference*, *71*, 197–208. https://doi.org/10.1016/j.foodqual.2018.07.009

Gil-Pérez, I., Rebollar, R., Lidón, I., Piqueras-Fiszman, B., & van Trijp, H. C. M. (2019). What do you mean by hot? Assessing the associations raised by the visual depiction of an image of fire on food packaging. *Food Quality and Preference*, *71*, 384–394. https://doi.org/10.1016/j.foodqual.2018.08.015

Glaser, B. G., & Strauss, A. L. (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Chicago: Aldine. https://doi.org/10.2307/2094063

González, J., Barros-Loscertales, A., Pulvermüller, F., Meseguer, V., Sanjuán, A., Belloch, V., & Ávila, C. (2006). Reading cinnamon activates olfactory brain regions. *NeuroImage*, *32*(2), 906–912. https://doi.org/10.1016/j.neuroimage.2006.03.037

Grunert, K. G., & Wills, J. M. (2007). A review of European research on consumer response to nutrition information on food labels. *Journal of Public Health*, *15*(5), 385–399. https://doi.org/10.1007/s10389-007-0101-9

Guerrero, L., Claret, A., Verbeke, W., Enderli, G., Zakowska-Biemans, S., Vanhonacker, F., … Hersleth, M. (2010). Perception of traditional food products in six European regions using free word association. *Food Quality and Preference*, *21*(2), 225–233. https://doi.org/10.1016/j.foodqual.2009.06.003

Hine, T. (1995). *The total package: The secret history and hidden meanings of boxes, bottles, cans, and other persuasive containers*. New York, NY: Little Brown.

Honea, H., & Horsky, S. (2012). The power of plain: Intensifying product experience with neutral aesthetic context. *Marketing Letters*, *23*(1), 223–235. https://doi.org/10.1007/s11002-011-9149-y

Horan, C. B. (1969). Multidimensional scaling: Combining observations when individuals have different perceptual structures. *Psychometrika*, *34*(2), 139–165. https://doi.org/10.1007/BF02289341

Karnal, N., Machiels, C. J. A., Orth, U. R., & Mai, R. (2016). Healthy by design, but only when in focus: Communicating non-verbal health cues through symbolic meaning in packaging. *Food Quality and Preference*, *52*, 106–119. https://doi.org/10.1016/j.foodqual.2016.04.004

Kauppinen-Räisänen, H., Owusu, R. A., & Abeeku Bamfo, B. (2012). Brand salience of OTC pharmaceuticals through package appearance. *International Journal of Pharmaceutical and Healthcare Marketing*, *6*(3), 230–249. https://doi.org/10.1108/17506121211259403

Kruskal, J. B., & Wish, M. (1984). *Multidimensional scaling*. Beverly Hills and London: Sage Publications.

Lähteenmäki, L., Lampila, P., Grunert, K., Boztug, Y., Ueland, Ø., Åström, A., & Martinsdóttir, E. (2010). Impact of health-related claims on the perception of other product attributes. *Food Policy*, *35*(3), 230–239. https://doi.org/10.1016/j.foodpol.2009.12.007

Laing, S., & Masoodian, M. (2016). A study of the influence of visual imagery on graphic design ideation. *Design Studies*, *45*, 187–209. https://doi.org/10.1016/j.destud.2016.04.002

Leeuw, J., & Heiser, W. J. (1980). Multidimensional scaling with restrictions on the configuration. In P. R. Krishnaiah (Ed.), *Multivariate analysis* (pp. 501–522). Amsterdam, the Netherlands: North-Holland.

Lim, K. H., Hu, W., Maynard, L. J., & Goddard, E. (2013). U.S. Consumers' Preference and Willingness to Pay for Country-of-Origin-Labeled Beef Steak and Food Safety Enhancements. *Canadian Journal of Agricultural Economics*, *61*(1), 93–118. https://doi.org/10.1111/j.1744-7976.2012.01260.x

Loken, B. (2006). Consumer Psychology: Categorization, Inferences, Affect, and Persuasion. *Annual Review of Psychology*, *57*(1), 453–485. https://doi.org/10.1146/annurev.psych.57.102904.190136

Lustig, R. H., Schmidt, L. A., & Brindis, C. D. (2012). Public health: The toxic truth about sugar. *Nature*, *482*(7383), 27–29. https://doi.org/10.1038/482027a

Lynott, D., & Connell, L. (2010). Embodied conceptual combination. *Frontiers in Psychology*, *1*(NOV), 1–14. https://doi.org/10.3389/fpsyg.2010.00212

Machiels, C. J. A., & Karnal, N. (2016). See How Tasty it is? Effects of Symbolic Cues on Product Evaluation and Taste. *Food Quality and Preference*, *52*, 195–202. https://doi.org/10.1016/j.foodqual.2016.04.014

Madzharov, A. V, & Block, L. G. (2010). Effects of product unit image on consumption of snack foods. *Journal of Consumer Psychology*, *20*(4), 398–409. https://doi.org/10.1016/j.jcps.2010.06.007

Magnier, L., & Schoormans, J. (2017). How Do Packaging Material, Colour and Environmental Claim Influence Package, Brand and Product Evaluations? *Packaging Technology and Science*. https://doi.org/10.1002/pts.2318

MAPAMA. (2017). *Informe del consumo de alimentación en España 2016*. Madrid. https://doi.org/http://www.magrama.gob.es/es/alimentacion/temas/consumo-y-comercializacion-y-distribucion-alimentaria/informeconsumoalimentacion2014_tcm7-382148.pdf

Martínez-Carrasco, L., Brugarolas, M., Martínez-Poveda, A., & Ruiz-Martínez, J. J. (2015). Comparing hypothetical versus non-hypothetical methods for measuring willingness to pay in a food context. *Spanish Journal of Agricultural Research*, *13*(4). https://doi.org/10.5424/sjar/2015134-8233

Matthews, P., Simmonds, G., & Spence, C. (2019). Establishing boundary conditions for multiple design elements congruent with taste expectations. *Food Quality and Preference*, 103742. https://doi.org/10.1016/j.foodqual.2019.103742

McQuarrie, E. F., & Mick, D. G. (2003). Visual and Verbal Rhetorical Figures under Directed Processing versus Incidental Exposure to Advertising. *Journal of Consumer Research*, *29*(4), 579–587. https://doi.org/10.1086/346252

McQuarrie, E. F., & Phillips, B. J. (2005). Indirect persuasion in advertising: How consumers process metaphors presented in pictures and words. *Journal of Advertising*, *34*(2), 7–20. https://doi.org/10.1080/00913367.2005.10639188

Mizutani, N., Okamoto, M., Yamaguchi, Y., Kusakabe, Y., Dan, I., & Yamanaka, T. (2010). Package images modulate flavor perception for orange juice. *Food Quality and Preference*, *21*(7), 867–872. https://doi.org/10.1016/j.foodqual.2010.05.010

Mueller, S., Lockshin, L., & Louviere, J. J. (2009). What you see may not be what you get: Asking consumers what matters may not reflect what they choose. *Marketing Letters*, *21*(4), 335–350. https://doi.org/10.1007/s11002-009-9098-x

Neyens, E., Aerts, G., & Smits, T. (2015). The impact of image-size manipulation and sugar content on children's cereal consumption. *Appetite*, *95*, 152–157. https://doi.org/10.1016/j.appet.2015.07.003

Piqueras-Fiszman, B., Ares, G., & Varela, P. (2011). Semiotics and Perception : Do Labels Convey the Same Messages To Older and Younger Consumers? *Journal of Sensory Studies*, *26*(3), 197–208. https://doi.org/10.1111/j.1745-459X.2011.00336.x

Piqueras-Fiszman, B., & Spence, C. (2012). The weight of the bottle as a possible extrinsic cue with which to estimate the price (and quality) of the wine? Observed correlations. *Food Quality and Preference*, *25*(1), 41–45. https://doi.org/10.1016/j.foodqual.2012.01.001

Piqueras-Fiszman, B., & Spence, C. (2015). Sensory expectations based on product-extrinsic food cues: An interdisciplinary review of the empirical evidence and theoretical accounts. *Food Quality and Preference*, *40*, 165–179. https://doi.org/10.1016/j.foodqual.2014.09.013

Piqueras-Fiszman, B., Velasco, C., Salgado-Montejo, A., & Spence, C. (2013). Using combined eye tracking and word association in order to assess novel packaging solutions: A case study involving jam jars. *Food Quality and Preference*, *28*(1), 328–338. https://doi.org/10.1016/j.foodqual.2012.10.006

Rebollar, R., Gil, I., Lidón, I., Martín, J., Fernández, M. J. M. J., & Rivera, S. (2017). How material, visual and verbal cues on packaging influence consumer expectations and willingness to buy: The case of crisps (potato chips) in Spain. *Food Research International*, *99*, 239–246. https://doi.org/10.1016/j.foodres.2017.05.024

Rebollar, R., Lidón, I., Gil, I., Martín, J., Fernández, M. J., & Riveres, C. E. (2016). The influence the serving suggestion displayed on soft cheese packaging has on consumer expectations and willingness to buy. *Food Quality and Preference*, *52*, 188–194. https://doi.org/10.1016/j.foodqual.2016.04.015

Rebollar, R., Lidón, I., Serrano, A., Martín, J., & Fernández, M. J. (2012). Influence of chewing gum packaging design on consumer expectation and willingness to buy. An analysis of functional, sensory and experience attributes. *Food Quality and Preference*, *24*, 162–170. https://doi.org/10.1016/j.foodqual.2011.10.011

Roininen, K., Arvola, A., & Lähteenmäki, L. (2006). Exploring consumers' perceptions of local food with two different qualitative techniques: Laddering and word association. *Food Quality and Preference*, *17*(1–2), 20–30. https://doi.org/10.1016/j.foodqual.2005.04.012

Román, S., Sánchez-Siles, L. M., & Siegrist, M. (2017). The importance of food naturalness for consumers: Results of a systematic review. *Trends in Food Science and Technology*, *67*, 44–57. https://doi.org/10.1016/j.tifs.2017.06.010

Rundh, B. (2005). The multi-faceted dimension of packaging: Marketing logistic or marketing tool? *British Food Journal*, *107*(9), 670–684. https://doi.org/10.1108/00070700510615053

Rundh, B. (2009). Packaging design: creating competitive advantage with product packaging. *British Food Journal*. https://doi.org/10.1108/00070700910992880

Rundh, B. (2013). Linking packaging to marketing: how packaging is influencing the marketing strategy. *British Food Journal*, *115*(11), 1547–1563. https://doi.org/10.1108/BFJ-12-2011-0297

Saint-Eve, A., Leclercq, H., Berthelo, S., Saulnier, B., Oettgen, W., & Delarue, J. (2016). How much sugar do consumers add to plain yogurts? Insights from a study examining French consumer behavior and self-reported habits. *Appetite*, *99*, 277–284. https://doi.org/10.1016/j.appet.2016.01.032

Schiffman, S. S., Reynolds, M. L., & Young, F. W. (1981). Introduction to Multidimensional Scaling. In *Theory, Methods and Applications*. New York: Academic Press.

Schmitt, N. (1998). Quantifying word association responses: what is native-like? *System*, *26*(3), 389–401. https://doi.org/10.1016/S0346-251X(98)00019-0

Sehrawet, M., & Kundu, S. C. (2007). Buying behaviour of rural and urban consumers in India: the impact of packaging. *International Journal of Consumer Studies*, *31*(6), 630–638. https://doi.org/10.1111/j.1470-6431.2007.00629.x

Simmonds, G., & Spence, C. (2017). Thinking inside the box: How seeing products on, or through, the packaging influences consumer perceptions and purchase behaviour. *Food Quality and Preference*, *62*, 340–351. https://doi.org/10.1016/j.foodqual.2016.11.010

Smith, V., Barratt, D., & Selsøe Sørensen, H. (2015). Do natural pictures mean natural tastes? Assessing visual semantics experimentally. *Cognitive Semiotics*, *8*(1), 53–86. https://doi.org/10.1515/cogsem-2015-0001

Spence, C. (2018). Background colour & its impact on food perception & behaviour. *Food Quality and Preference*, *68*(December 2017), 156–166. https://doi.org/10.1016/j.foodqual.2018.02.012

Sperber, D., & Wilson, D. (1995). *Relevance: Communication and cognition*. Malden: Blackwell Publishing.

Sütterlin, B., & Siegrist, M. (2015). Simply adding the word “fruit” makes sugar healthier: The misleading effect of symbolic information on the perceived healthiness of food. *Appetite*, *95*, 252–261. https://doi.org/10.1016/j.appet.2015.07.011

Underwood, R. L., & Klein, N. M. (2002). Packaging as brand communication: Effects of product pictures on consumer responses to the package and brand. *Journal of Marketing Theory and Practice*, *10*(4), 58–68. https://doi.org/10.1080/10696679.2002.11501926

Velasco, C., Salgado-Montejo, A., Marmolejo-Ramos, F., & Spence, C. (2014). Predictive packaging design: Tasting shapes, typefaces, names, and sounds. *Food Quality and Preference*, *34*, 88–95. https://doi.org/10.1016/j.foodqual.2013.12.005

Velasco, C., Woods, A. T., Petit, O., Cheok, A. D., & Spence, C. (2016). Crossmodal correspondences between taste and shape, and their implications for product packaging: A review. *Food Quality and Preference*, *52*(4), 17–26. https://doi.org/10.1016/j.foodqual.2016.03.005

Venter, K., van der Merwe, D., de Beer, H., Kempen, E., & Bosman, M. (2011). Consumers’ perceptions of food packaging: an exploratory investigation in Potchefstroom, South Africa. *International Journal of Consumer Studies*, *35*(3), 273–281. https://doi.org/10.1111/j.1470-6431.2010.00936.x

Verbeke, W. (2005). Consumer acceptance of functional foods: Socio-demographic, cognitive

and attitudinal determinants. *Food Quality and Preference*, *16*(1), 45–57. https://doi.org/10.1016/j.foodqual.2004.01.001

Verbeke, W., Rutsaert, P., Bonne, K., & Vermeir, I. (2013). Credence quality coordination and consumers' willingness-to-pay for certified halal labelled meat. *Meat Science*, *95*(4), 790–797. https://doi.org/10.1016/j.meatsci.2013.04.042

Vicente-Villardón, J. L. (2015). MULTBIPLOT: A package for Multivariate Analysis using Biplots. *Departamento de Estadística. Universidad de Salamanca.* Retrieved from http://biplot.usal.es/ClassicalBiplot/index.html

Figures and tables

Fig. 1. Four yogurt packages were designed for this investigation, only differing in the image used to convey sweetness.

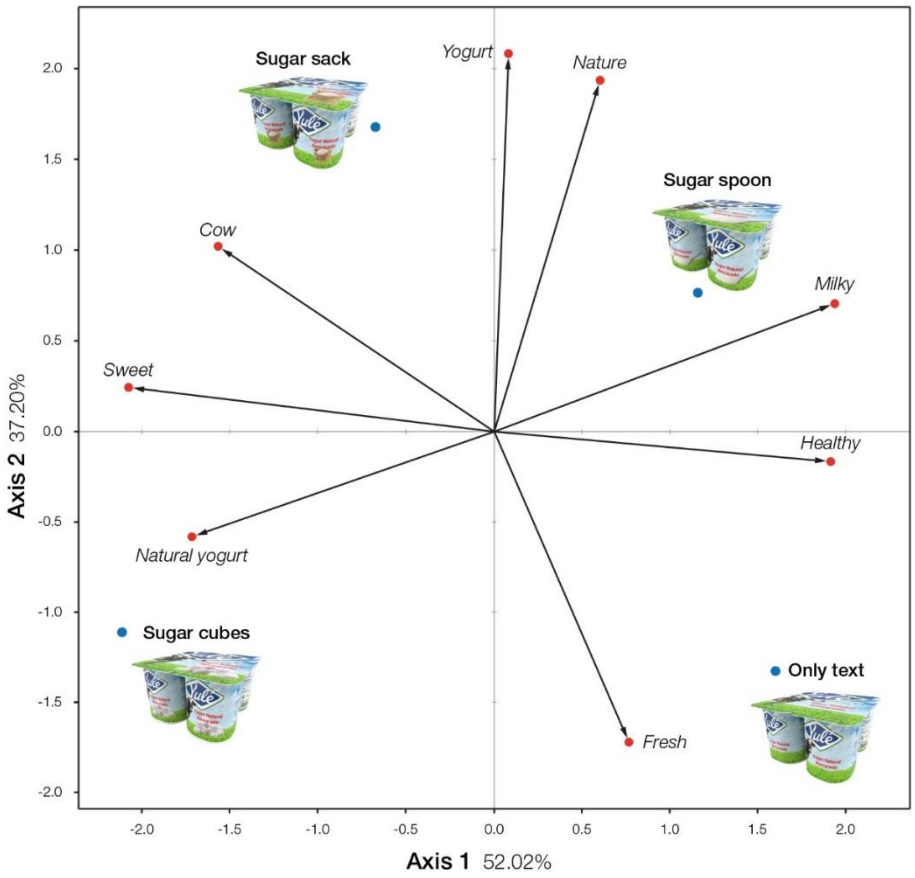


Fig. 2. Biplot graph of the word association task. The angle between two attributes indicates their correlation, where angles close to 0º indicate a high positive correlation, angles close to 180º indicate a high negative correlation, and angles close to 90º indicate no correlation. The orthogonal projections of the stimuli on an attribute allows to order the stimuli according to how strongly are they related to it.

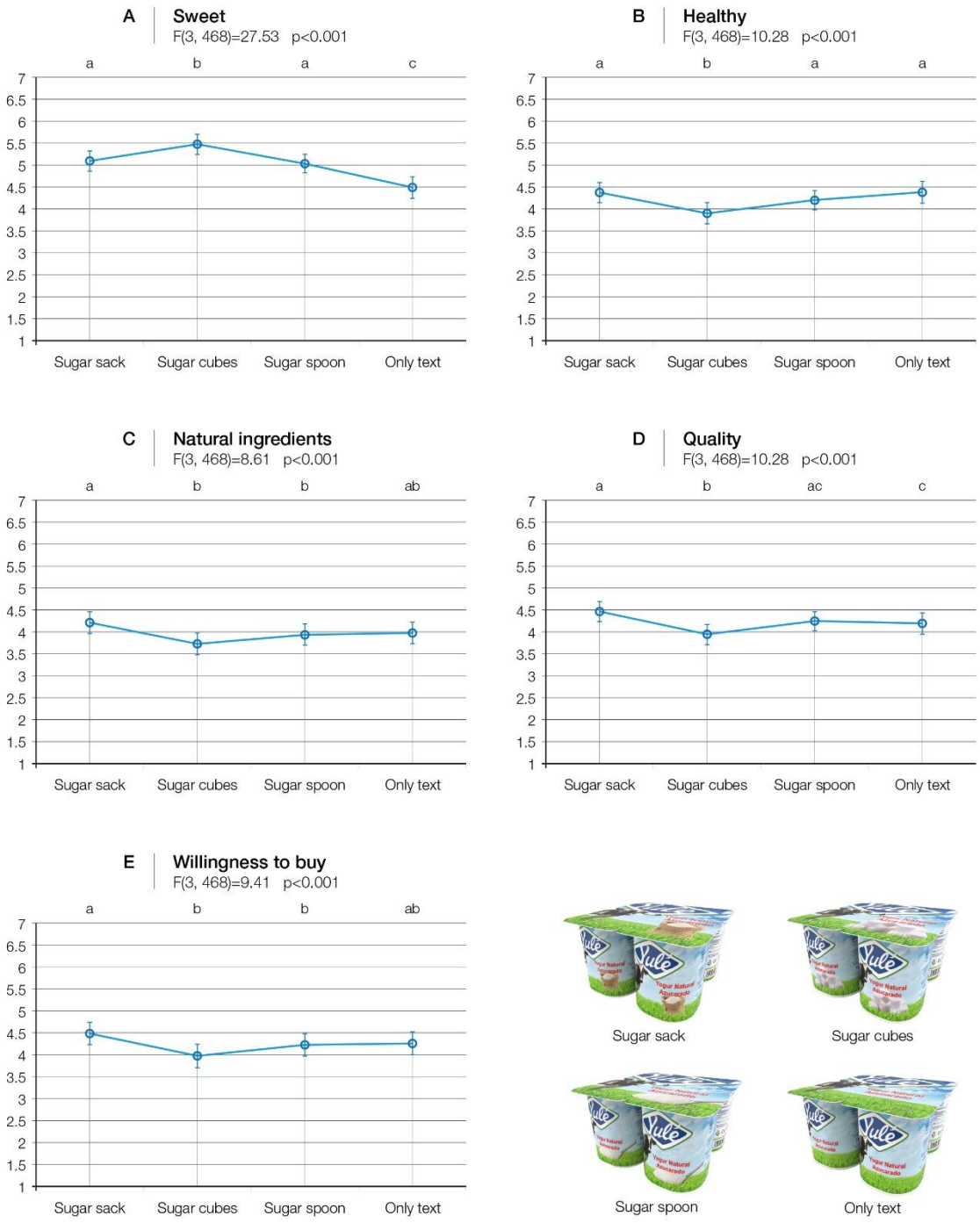


Fig. 3. Results of the one-way repeated measures analysis of variance. Means with differing letters within attributes are significantly different at the p<0.05 based on Bonferroni paired comparisons.

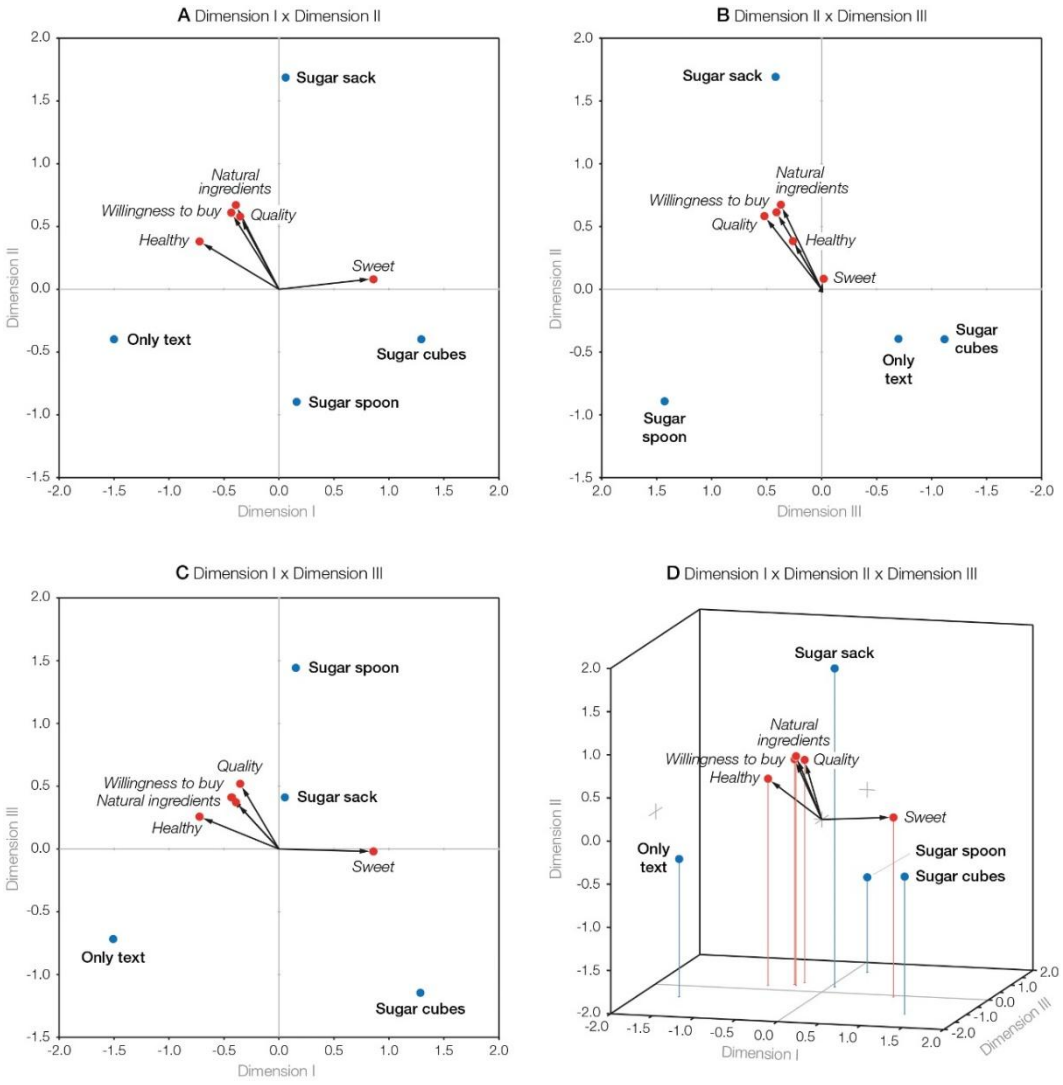


Fig. 4. Results of the multidimensional scaling. The angle between two attributes indicates their correlation, where angles close to 0º indicate a high positive correlation, angles close to 180º indicate a high negative correlation, and angles close to 90º indicate no correlation. The orthogonal projections of the stimuli on an attribute allows to order the stimuli according to how strongly are they related to it.

Table 1

Means, standard deviations, and ANOVA results of the manipulation check conduced to assess the adequacy of the images chosen for this study

	Images					
	Sugar sack	Sugar cubes	Sugar spoon			
Attributes	M (SD)	M (SD)	M (SD)	F (2, 100)	p	η^2
Depicted sugar quantity	5.51 (1.43) a	4.98 (1.62) a	4.00 (1.71) b	20.29	<0.001	0.29
Perceived naturalness	4.04 (1.67) a	2.92 (1.76) b	3.16 (1.59) b	13.63	<0.001	0.21

Note: Sample size N=51. Means with differing letters within rows are significantly different at the p<0.05 based on Bonferroni paired comparisons.

827

Table 2

Frequency of elicitations of terms for the four stimuli considered in the word association task

	Stimuli			
Category	Sugar cubes	Sugar spoon	Sugar sack	Only text
Sweet	37	17	29	11
Natural Yogurt	22	18	21	20
Nature	14	16	17	15
Cow	14	10	17	10
Milky	5	9	8	9
Healthy	2	8	7	13
Yogurt	6	8	9	6
Fresh	6	5	5	8

828

Table 3

Means, standard deviations, and ANOVA results on the effect of the images depicted on the yogurt packages on consumer expectations

	Stimuli						
	Sugar sack	Sugar cubes	Sugar spoon	Only text			
Attributes	M (SD)	M (SD)	M (SD)	M (SD)	F (3, 468)	p	η^2
Sweet	5.09 (1.46) a	5.47 (1.47) b	5.03 (1.34) a	4.48 (1.56) c	27.53	<0.001	0.15
Healthy	4.38 (1.46) a	3.91 (1.54) b	4.20 (1.39) a	4.39 (1.59) a	10.28	<0.001	0.06
Natural Ingredients	4.22 (1.59) a	3.73 (1.56) b	3.94 (1.54) b	3.98 (1.56) ab	8.61	<0.001	0.05
Quality	4.46 (1.44) a	3.95 (1.44) b	4.25 (1.38) ac	4.20 (1.50) c	10.28	<0.001	0.06
Willingness to buy	4.48 (1.64) a	3.97 (1.69) b	4.23 (1.59) b	4.26 (1.69) ab	9.41	<0.001	0.06

Note: Sample size N=157. Means with differing letters within rows are significantly different at the p<0.05 based on Bonferroni paired comparisons.

829

Figure 1

Sugar sack

Sugar cubes

Sugar spoon

Only text

Figure 2

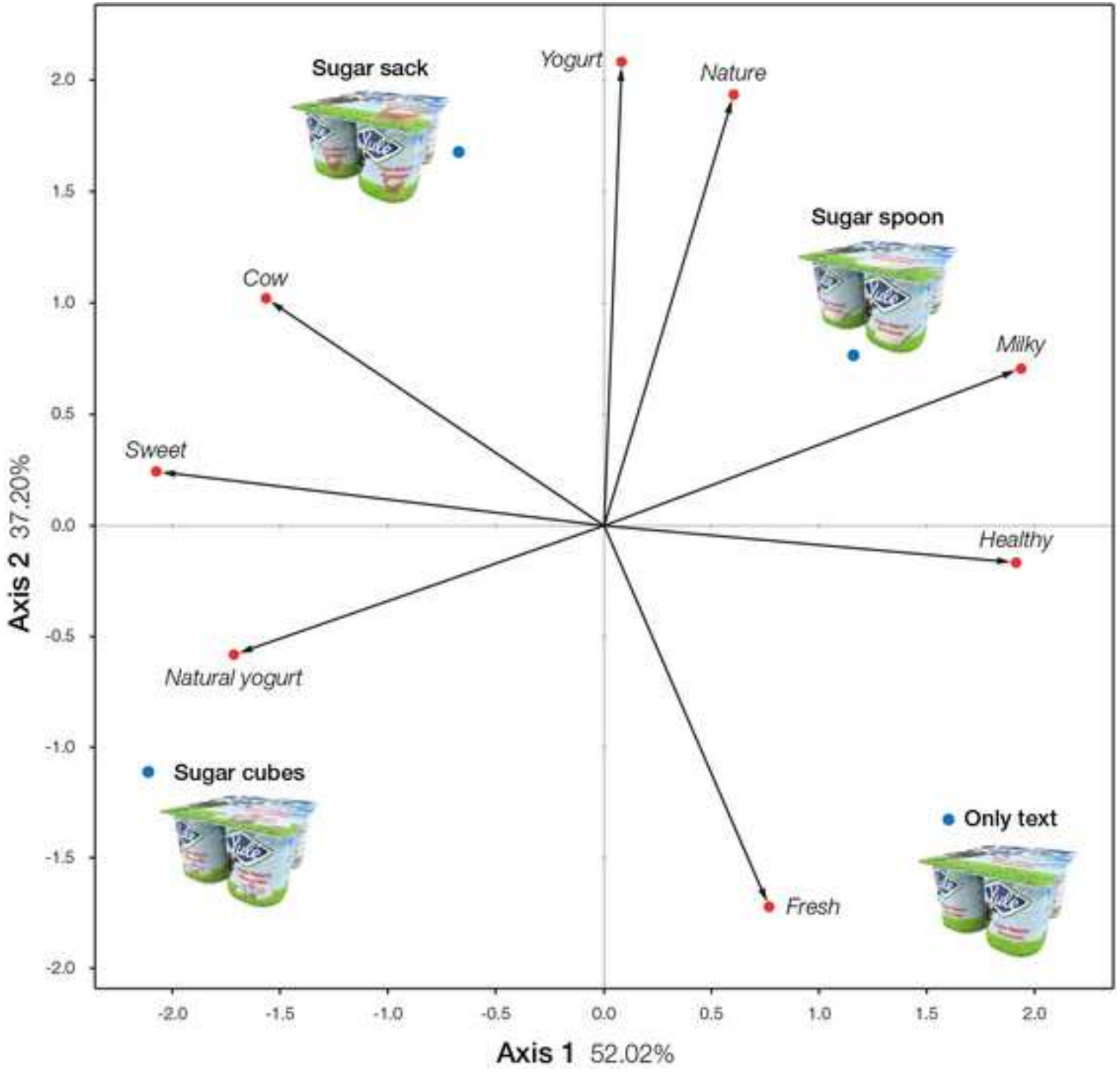

Sugar sack
Yogurt
Nature
Sugar spoon
Cow
Milky
Sweet
Healthy
Natural yogurt
Sugar cubes
Only text
Fresh
Axis 2 37.20%
Axis 1 52.02%
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0

Figure 3

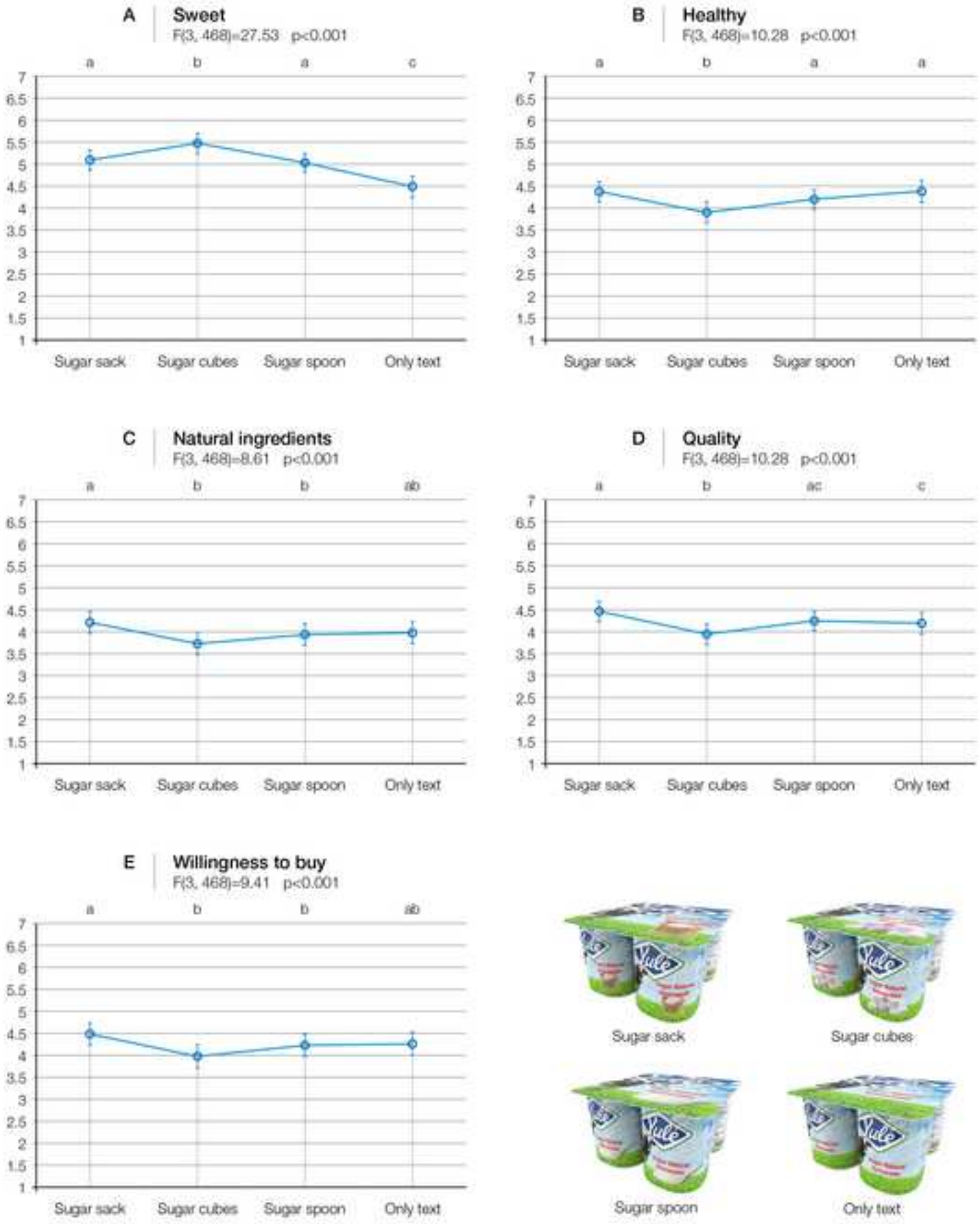
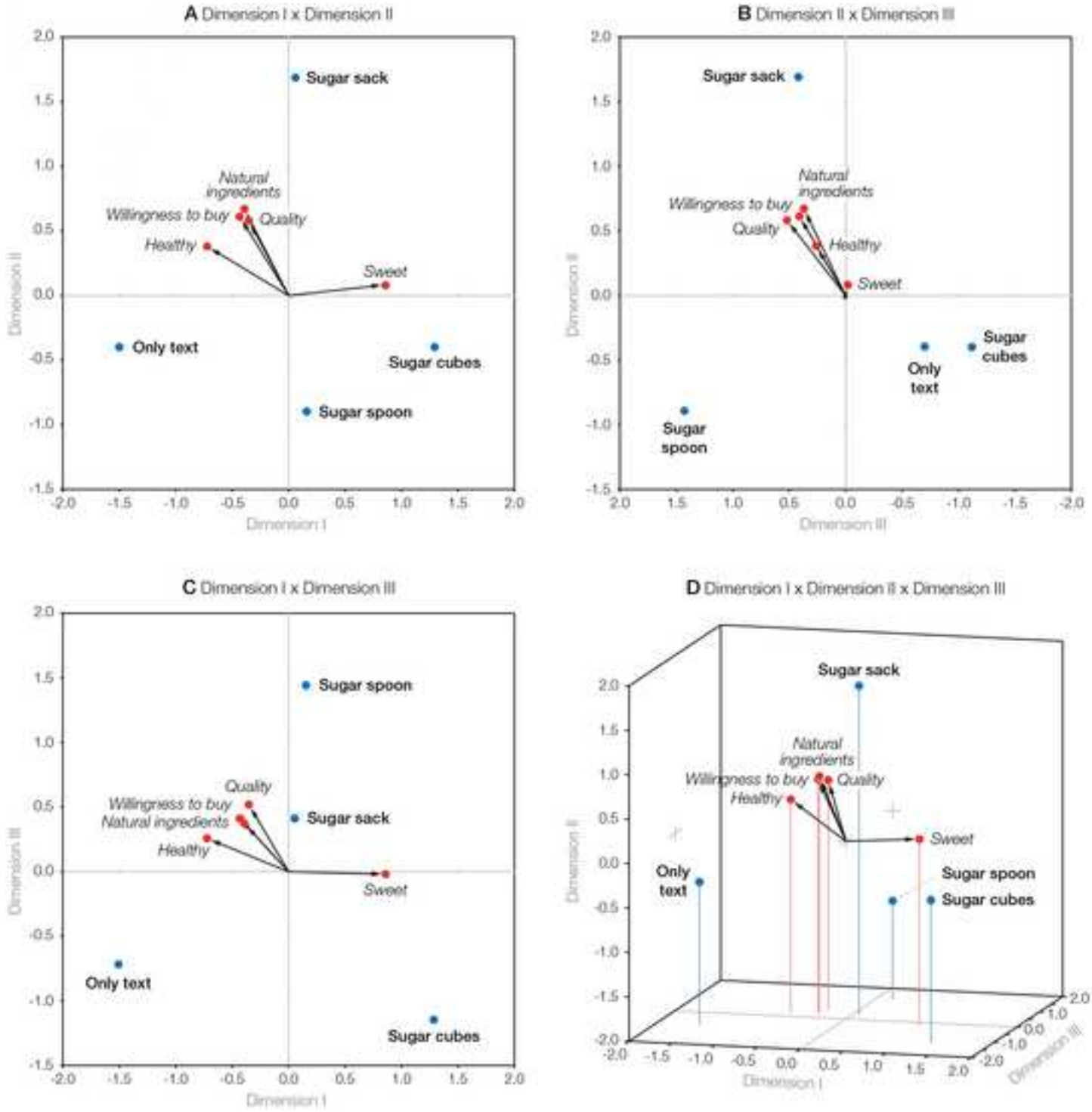

A
Sweet
F(3, 468)=27.53 p<0.001
a b a c
B
Healthy
F(3, 468)=10.28 p<0.001
a b a a
C
Natural ingredients
F(3, 468)=8.61 p<0.001
a b b ab
D
Quality
F(3, 468)=10.28 p<0.001
a b ac c
E
Willingness to buy
F(3, 468)=9.41 p<0.001
a b b ab
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
Sugar sack
Sugar cubes
Sugar spoon
Only text
Sugar sack
Sugar cubes
Sugar spoon
Only text

Figure 4


A Dimension I x Dimension II
Sugar sack
Natural ingredients
Willingness to buy
Quality
Healthy
Sweet
Only text
Sugar cubes
Sugar spoon
Dimension I
Dimension II
B Dimension II x Dimension III
Sugar sack
Natural ingredients
Willingness to buy
Quality
Healthy
Sweet
Sugar cubes
Only text
Sugar spoon
Dimension II
Dimension III
C Dimension I x Dimension III
Sugar spoon
Quality
Willingness to buy
Natural ingredients
Sugar sack
Healthy
Sweet
Only text
Sugar cubes
Dimension I
Dimension III
D Dimension I x Dimension II x Dimension III
Sugar sack
Natural ingredients
Willingness to buy
Quality
Healthy
Sweet
Only text
Sugar spoon
Sugar cubes
Dimension II
Dimension I
Dimension III

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*Graphical Abstract

STIMULI

Sugar cubes

Sugar sack

Sugar spoon

Only text

RESULTS

- **Sugar cubes:** higher sweetness expectations and lower willingness to buy
- **Sugar sack:** higher naturalness expectations and higher willingness to buy
- Strong possitive connection between **willingness to buy**, **naturalness**, **healthfulness** and **quality expectations**
- Strong negative connection between **healthfulness** and **sweetness expectations**