Assessing the influence of packaging design symmetry, curvature, and mark on the perception of brand premiumness

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ABSTRACT

Packaging and label design are crucial in facilitating the perception of brand premiumness. However, we know relatively little about how common design characteristics used in a product' packaging affect consumers' perception of premiumness. Related research suggests that consumers may associate some features, such as symmetry, with premiumness, given their quality connotations. In this article, we report an online study (n = 741) designed to evaluate the influence of curvature (round vs. angular), symmetry (symmetrical vs. asymmetrical), and mark (black vs. no fill) on consumers' premiumness perceptions, across four different food product categories (chocolate, coffee, jam, and ice-cream), and two price conditions. Overall, we find a significant positive effect of symmetry, and a significant effect of mark on all except one product category. The effect of mark and curvature on consumers' premiumness perception appeared to be affected more by context and product-category. Consistent with evolutionary theory, the results provide evidence for the hypothesis that symmetry is a key indicator of brand premiumness. This contributes to our understanding of the aesthetics of premium brands and suggests specific implications for practitioners.

1. Introduction

It is important for both marketing professionals and academics to understand how different sensory cues (colour, shapes, textures, sounds) of brand elements, such as a product's packaging, influence consumers' perceptions and behaviours (Estes et al., 2018; Schifferstein et al., 2022; Velasco and Spence, 2019b). However, research is still limited when it comes to how such characteristics may guide consumers' perceptions of premiumness. Recently, though, there has been some interest in understanding how to differentiate premium and luxury brands through different sensory properties (e.g., Lyons and Wein, 2018; Pombo and Velasco, 2021; Velasco and Spence, 2019b; Wiedmann et al., 2013).

In the present study, we assessed the influence of the design characteristics symmetry, curvature, and mark, as embodied in a product's packaging, on premiumness perception. These are key sensory properties that are present across objects, and more specifically brand touchpoints, which may signal certain evolutionarily value, something which makes them likely candidates to influence premiumness perceptions. With this in mind, this paper contributes to the literature by studying specifically the role that each of these properties has on premiumness perception. It also contributes by exploring both their individual and interactive effects on premiumness perception. Finally, we provide managerial implications as how to capitalize on specific visual cues to differentiate a brand in terms of premiumness.

The paper is organized as follows: First, we present the theoretical background where we cover the concepts of luxury and premiumness and their role in the food market, and then move on to discuss the role of sensory cues in premiumness perception. Here, we also present a framework, based on evolutionary theory, for why certain sensory cues may or may not convey premiumness. After that, we present our empirical study which evaluates the role of symmetry, curvature, and mark on premiumness perception, across food product categories and price conditions, and discuss the results considering the theory.

2. Theoretical background

2.1. Luxury and premium market

Despite the growing body of literature on premium and luxury branding (see Miller and Mills, 2012; Wiedmann et al., 2007; see also Ko et al., 2019, for a review), there is still some variation in terms of what authors and practitioners mean by the terms "premium" and "luxury".

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Terms such as "luxury", "premium brand", "premium quality", "premium price", "price premium" are often used indiscriminately in the context of premium and luxury goods to denote similar meanings. But these are not necessarily the same. For example, while "price premium" refers to whether the price exceeds a benchmark price of the category, "premium brand" refers to whether the brand exceeds the benchmark price but also the benchmark quality, relative to other members of the category (Lyons and Wein, 2018).

What exactly is the difference between premium and luxury? Early research by Nueno and Quelch (1998, p. 62) suggests that "… Luxury brands are those whose ratio of functional utility to price is low while the ratio of intangible and situational utility to price is high. A luxury brand is not merely a premium-priced product …". What is more, over 30 years ago, Quelch (1987) asserted that standard and premium brands differ in terms of quality as well as price. A relatively high price, given an excellent quality that justifies it, is an inherent part of the premium brand, and thus, premiumness. With these ideas in mind, some authors have suggested that the difference between luxury and premiumness is a matter of degree, being luxury above premiumness (Okonkwo, 2007; Vigneron and Johnson, 2004).

From the literature, it is clear that premium products or brands are different from other products in a given product category in terms of price and quality (Lyons and Wein, 2018). These two attributes are highly correlated and endogenously determined, which makes them difficult to study (Quelch, 1987). Following this debate, we decided to focus on premiumness perception, which we define, following Oxford Dictionary and previous research (Quelch, 1987; Lyons and Wein, 2018), as "relating to or denoting a commodity of superior quality and therefore a higher price".

The extent to which a brand is perceived as premium may be context- and consumer-dependent. Even for the same consumer, depending on the product category (e.g., luxury fashion vs. luxury automobiles), their attitudes may be different (Allsopp, 2005; Brun and Castelli, 2013). However, premiumness can be shaped by the sensory information of products and brands (Lyons and Wein, 2018). Indeed, research from evolutionary biology, has suggested that certain sensory cues such as visual symmetry can convey, for instance, organism fitness/quality across contexts, individuals, and even species (e.g., Bertamini et al., 2019; Møller and Thornhill, 1998; Waitt and Little, 2006). In the present research, we focus on three specific sensory elements, namely symmetry, curvature, and colour (operationalized through marks). The reason for this is that, among visual characteristics of brands, these are both ever present in brand touchpoints and likely candidates to shape the perception of premiumness as suggested by existing research linking them to quality, being it either for strong evolutionary reasons, culture, or both (see Velasco and Spence, 2019b, for a review; see also Wiedmann et al., 2013).

2.1.1. Symmetry and perceived quality

From evolutionary biology (Beck et al., 2005; Culbert and Forrest, 2016; Little et al., 2007; Sheperd and Bar, 2011) to consumer psychology (Bajaj and Bond, 2018; Bettels and Wiedmann, 2019; Orth and Malkewitz, 2008), research shows that symmetry is a highly prevalent feature in everything from faces, through animals and plants, to objects, which is typically preferred relative to asymmetry (though this preference may have exceptions, see Bertamini et al., 2019; Leder et al., 2019; Swaddle and Cuthill, 1995). For example, perfectly symmetric flowers signal a high quality/quantity of pollen or nectar to pollinators, which puts high selection pressure on symmetric features (Giurfa et al., 1999).

From an evolutionary perspective, it has been suggested that the degree of symmetry of different organisms (animals, flowers) is a cue of phenotypic and genotypic quality (Bertamini et al., 2019; Enquist and Arak, 1994; Møller and Thornhill, 1998). Symmetrical bodies and faces tend to be related to attractiveness, and more importantly, to health and fitness (e.g., Hughes and Aung, 2018; Jones et al., 2001; Little, 2014; Little et al., 2007; Scheib et al., 1999). Importantly, such results have

been replicated in a consumer behaviour setting, suggesting that symmetry and balance may affect the perception of and preference for specific packages and food dishes (e.g., Velasco et al., 2020; Velasco and Veflen, 2021). In addition, it is important to mention that processing fluency has been suggested to explain the effects of symmetry on perception and preference. Processing fluency research suggests that symmetrical features are more easily perceived and processed, boosting the aesthetic experience of the object (e.g., Huang et al., 2018; Palmer et al., 2013; Reber et al., 2004; Shimamura and Palmer, 2014).

Based on the aforementioned studies, symmetry as a sign of quality,[1] a key dimension of premium brands, and also as an aesthetically pleasing characteristic of objects, could fit under the premium framework as an important feature that has a strong biological root, therefore, we hypothesize that:

H1. Symmetrical designs are perceived as more premium than those with asymmetrical designs.

2.1.2. Curvature and visual preference

Research from multiple fields suggests that people, and other animals, prefer round objects relative to more angular ones (e.g., Chuquichambi et al., in press; Gómez-Puerto et al., 2016; Gómez-Puerto et al., 2018; Munar et al., 2015; Palmer et al., 2013; Palumbo et al., 2015). It has been proposed that people's preference for curvature may be an evolutionary response of avoiding angular/sharp shapes, as they may be associated with threat signals (Bar and Neta, 2006; recently, though, the source of this preference has been challenged, see Bertamini et al., 2016). As noted by Zhang et al. (2006, p. 796), though, "when individuality and toughness is sought, angular features are more attractive". Hence, angularity may be a differentiating element when pursuing uniqueness. Previous studies, including early studies on the topic, have also found correlations between adjectives such as powerful, hard, and serious and angular lines and shapes, and more recently an association between angular shapes and emotions such as surprise and excitement was found (Blazhenkova & Kumar, 2018; Collier, 1996; Poffenberger and Barrows, 1924).

Whilst curvature is preferred, angularity seems to evoke more power, at a semantic level. On the one hand, premium products need to evoke positive evaluations, however, on the other, consumers are seeking products that are unique rather than typical (Anselmsson et al., 2014; Mugge et al., 2015). In that sense, angular patterns as opposed to round ones could signal a certain rarity, as well as power. As such, they may signal that a product might be more expensive and/or of higher quality, given that these atypical features can still look aesthetically pleasing (van Ooijen et al., 2016). Accordingly, we hypothesize that:

H2. Angular patterns are perceived as more premium relative to rounded ones.

2.1.3. Colour meaning

There is strong evidence that among visual features, colour is perhaps one of the most important attributes in marketing as far as product packaging is concerned (Spence and Velasco, 2018). Colour can draw consumers' attention and convey meaning, something which is especially important for fast-moving consumer goods due to the strong

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[1] Note that, slightly different definitions of quality may be found across fields. From an evolutionary perspective, quality is associated with absence of 'defects', both genotypic and phenotypic, which ultimately is reflected on the overall health and appearance of individuals (Little et al., 2007). For products and services, quality can be defined as "the cognitive evaluation of a product's intrinsic core benefit" (Orth et al., 2009). In the context of luxury marketing, the concept of quality usually refers to superior long-term performance, exceptional characteristics, above the standard (Dubois et al., 2001). All in all, though, quality appears to refer to an intrinsic core element of fitness that a given object or organism has, relative to others, in their corresponding context.

competition (Labrecque and Milne, 2012; Singh, 2006). Moreover, colour is a powerful tool that provides access to stored information from the memory of learned associations and evolutionary responses towards certain colours (Elliot and Maier, 2007).

Labrecque and Milne (2012) addressed the importance of colour as a marketing tool, with the potential to increase purchase intention when used correctly. Relevant to the food and beverages context, colour has been shown to set expectations about taste, texture, and can even influence consumers' choices for healthier options (Ares and Deliza, 2010; Becker et al., 2011; Spence, 2015; Spence et al., 2014). For instance, in fruits and vegetables, colour and appearance serve as a sign of quality, among other attributes (Barret et al., 2010). Indeed, when it comes to fruits, vegetables, and other perishable products, colour is a key sign that people use to judge their process development process, and thus, their quality (Maga, 1974).

More specifically. in relation to premiumness, there are studies that demonstrate that darker colours such as black, but also other tones like purple and blue, can lead to higher price estimations and refined aesthetics perception, relative to other colours (Ampuero and Vila, 2006; Ares et al., 2010; Rebollar et al., 2012; Velasco and Spence, 2019b). From a physics point of view, black is not technically a colour but the absence of chroma. For practical purposes, though, we present the literature capitalizing on colour, which typically includes black and white. What is more, given that we focus on black marks vs. the absence of said marks, in our study, we call our variable of interest "mark".

Ampuero and Vila (2006) found some associations between elegant and high-priced products and design features such as cold and dark colours, mainly black, and vertical straight lines, squares, and symmetrical compositions. Importantly, from an evolutionary perspective, black (along with red, yellow and white) serves as a warning cue in nature, especially the animal kingdom to advertise potentially dangerous creatures (Forbes, 2009).

Even though the meaning of colours in general can be context-dependent (Spence and Velasco, 2018), black appears to also have certain similar connotations across countries (Madden et al., 2000). Black has several associations that range from darkness, sadness, sorrow, and mystery to power, luxury, sophistication, and elegance (Amsteus et al., 2013; Singh and Srivastava, 2011). Historically, the use of black in clothing was associated with the spiritual and political authorities in some cultures and established during the 18th and 19th centuries as a symbol of power, social status and wealth, used by the royalty and court men (Colomer, 2014). In a cross-cultural study, Jacobs et al. (1990) consistently found black to be associated to powerful and expensive in China, Korea, Japan and US (see also Aslam, 2006). Thus, our hypothesis is that:

H3. Packages with black marks are perceived as more premium relative to packages without black marks.

2.1.4. Combining cues and conveying meaning to consumers

To the best of our knowledge, there is little research showing the interactive role of symmetry, curvature, and marks in food packaging perception, nor in relationship to the perception of brand premiumness (de Sousa et al., 2020; Velasco and Spence, 2019b). Still, given that some visual aesthetic properties (e.g., symmetry) may be key to signal premiumness, but premium products need to differentiate, perhaps certain combinations (e.g., symmetry as quality signal and angularity as differentiation element) may better hint the concept. As previously mentioned, one of the characteristics of luxury and premiumness is uniqueness or exclusivity, and that can be enhanced by adding a differentiating element relative to the product category (Mugge et al., 2015).

Based on the aforesaid points, the present research aims to explore the relationship between specific attributes and premiumness (e.g., symmetry and premiumness) and to inquire about whether there was an interaction between different visual cues. Following research on

multisensory perception, we wonder whether there would be additive, superadditive or subadditive effects (Spence, 2016; Velasco and Obrist, 2020). This means that, potentially, certain combinations of sensory attributes could boost or reduce (e.g., sensory overload) the perception of premiumness, or that perhaps one of them could dominate the communication of the concept.

3. Methods and materials

3.1. Participants

813 people from the United Kingdom took part in the study in exchange for £1.66.3% of participants were females, 33.33% males, and 0.37% preferred not to say. Participants' age ranged from 18 to 74 years old ($M = 36.81, SD = 11.83$). The study survey was programmed in Qualtrics software (https://www.qualtrics.com/) and distributed via Prolific Academic (http://prolific.ac/). Prolific academic was chosen for the high-fidelity participant pool that they have (Peer et al., 2017).

3.2. Apparatus and materials

Four products were selected for the present study: Chocolate, coffee, ice-cream, and jam. These products were selected because they are widely purchased by several groups of consumers and have a wide price range in UK supermarkets, including premium options. In order to determine a realistic price range for products, six UK supermarket chains (Asda, Marks and Spencer, Sainsbury's, Selfridges and Co Foodhall, Tesco, Waitrose) were selected and the product prices of the products were analysed. Based on the information available on their websites, a list of prices was created (*see osf.io/djw3v for a list of products in different supermarkets in the UK and their different prices*) and low and high price ranges were established for each of the products.

Free mock-up images found online were used as templates to design the packages (*see osf.io/djw3v for the links to the templates*). The images were cleared from any labels or stimuli and turned into grayscale using Adobe Photoshop CS5. The design element of the packages was created with Microsoft PowerPoint. The design element was manipulated as a function of three design properties: curvature (round and angular), symmetry (symmetrical, asymmetrical left and right), and mark (black and no fill colour). Each set of packages for each product were evaluated in two conditions in relation to price: low-price range and high-price range. The designs were slightly different for each product. The curvature manipulation was achieved using geometric shapes. A black or without fill mark element was added in each case. The black colour code used in the different products was the same, but the no fill colour option was adapted to each case to match the background and to keep the design relatively neat and realistic (Table 1). The overall symmetry of the packages was altered via the design elements in relation to the packaging's frame. Symmetrical products were those in which the main designed element was aligned with the frame's centre, whereas asymmetrical products were those where the design element was 7.55% off the centre (to the left and to the right, respectively).

Considering the above-mentioned variables, twelve packaging concepts were created for each product category. The grayscale images were

Table 1
Design elements for each product. Note that, whilst we acknowledge that the shade of the mark can vary as a function of product, and thus create boundary effects, the focus of the present research is on the relative difference between the variables, instead of their absolute variables.

Attribute	Chocolate	Coffee	Ice-cream	Jam
Curvature				
Angular shape	Rectangle	Triangle	Star	Hexagon
Round shape	Ellipse	Circle	Ellipse	Circle
Mark (hex code)				
Positive mark	#000000	#000000	#000000	#000000
Background fill	#e7e7e7	#efefef	#d3d3d3	#7e7e7e

Fig. 1. Example of the twelve variations for one of the products, coffee pouches, shown in the experiment *(For full set, please see* osf.io/djw3v*)*.

fitted to 600 × 600 pixels and a resolution of 72 dpi. The images contained no references to real trademarks or brand names (see Fig. 1 for an example).

3.3. Design and procedure

A 2 × 2 x 3 within-subjects design with factors: Curvature (round vs. angular), mark (no fill colour vs. black), symmetry (symmetrical vs. asymmetrical left vs. asymmetrical right) experimental design was followed for each product and price condition. Participants were randomly assigned to one of the eight conditions (4 products x 2 price ranges).

Participants performed a two-alternative forced choice task in a full set of 66 pairs, which represented all the possible combinations of the variables of interest (symmetry, curvature, and mark). Participants were presented with each image pair in random order and required to indicate which one they considered as more premium. The position (which option was presented to the left or to the right) of the options on the computer screen was randomized. Participants evaluated one stimuli pair at a time until all choice sets had been presented *(see* osf.io/djw3v, *for the full questionnaire participants completed)*. With this task, we aimed to capture revealed preferences, which are preferences obtained from actions and not words.

Subsequently, several control questions were answered by participants regarding their consumption attitudes towards premium products, willingness to pay, and importance of price in the decision *(see* osf.io /djw3v, *for the full questionnaire)*.

At the end of the survey, participants were presented with the following question in order to check their overall attention to the study: "It's important that you pay attention to this study. Please tick "Strongly disagree"". This question was added to evaluate if participants were following through and paying attention to the task or not. Total response time was also registered (M = 5.34 min).

3.4. Data analysis

We performed a series of repeated measures analysis of variance

(ANOVA)[2] for each product with frequency of choice as the dependent variable and symmetry, curvature, and colour as within-subject factors. The analysis was executed using the 'ez' package (Lawrence, 2016) and ezANOVA function in R. The statistics are presented in Tables 2−5 and the results represented in Fig. 2−5. For each product, we report the F-value (F), p-value (*p*) and generalized eta square (η_G^2) as a measure of effect size (Bakeman, 2005; Lakens, 2013). In the cases where sphericity was violated *(Mauchly's test was significant)*, the Huynh-Feldt correction was applied (Girden, 1992). Based on Cohen's recommendations (Cohen, 1988), $\eta_G^2 = 0.02$ would be a small effect size, $\eta_G^2 = 0.13$ medium effect size and $\eta_G^2 = 0.26$ large effect size. In order to measure the differences in our dependent variable between the levels of the attributes, a pairwise-t-test was performed with the "Holm-Bonferroni" correction *(means and standard deviations of all conditions are presented in* osf.io /djw3v*)*.

4. Results

4.1. Sample characteristics

Data from participants who failed at the attention check (did not select the option "Strongly disagree") were removed from the analysis (66 trials). Also, trials with latencies 3 standard deviations above the mean response time (M = 546.7 s, M + SD*3 = 1429.6 s) were removed (7 trials). At the end, answers of 741 participants were considered for the analysis. In *Appendix A,* we present a full description of the demographic and behavioural profiles of the participants.

4.2. Role of symmetry, curvature, and mark on premium choice

Chocolate. Results showed significant main effects of symmetry and mark for both price conditions (see Table 2, for the results of the ANOVAs). The effect was more notable for mark in both cases (bigger effect sizes), with black being more frequently matched to premium than no fill (Fig. 2). For symmetry, those packages that were symmetrical were matched more often with premium than their asymmetrical

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[2] Whilst ANOVA might not necessarily be the most suitable approach to frequency data, we decided to keep these analyses considering that we also replicated them using mixed effects logit (see Appendix B).

Table 2

ANOVA results of the effects of the variables on the choice for chocolate. Rows shown in bold represent variables with significant results ($p < .05$).

Chocolate						
	Low price			High price		
	F	*p*	η_G^2	*F*	*p*	η_G^2
Symmetry	**13.32**	**<.001***	**.052**	**13.96**	**<.001***	**.048**
Curvature	3.52	.064	.012	**5.21**	**.025**	**.016**
Mark	**415.11**	**<.001**	**.482**	**330.16**	**<.001**	**.422**
Symmetry:Curvature	**3.56**	**.030**	**.001**	1.75	.176	<.001
Symmetry:Mark	1.22	.296	<.001	2.88	.058	<.001
Curvature:Mark	.267	.607	<.001	1.44	.233	<.001
Symmetry:Curvature:Mark	.420	.658*	<.001	.016	.980*	<.001

*p-values corrected with the Huynh-Feldt correction.
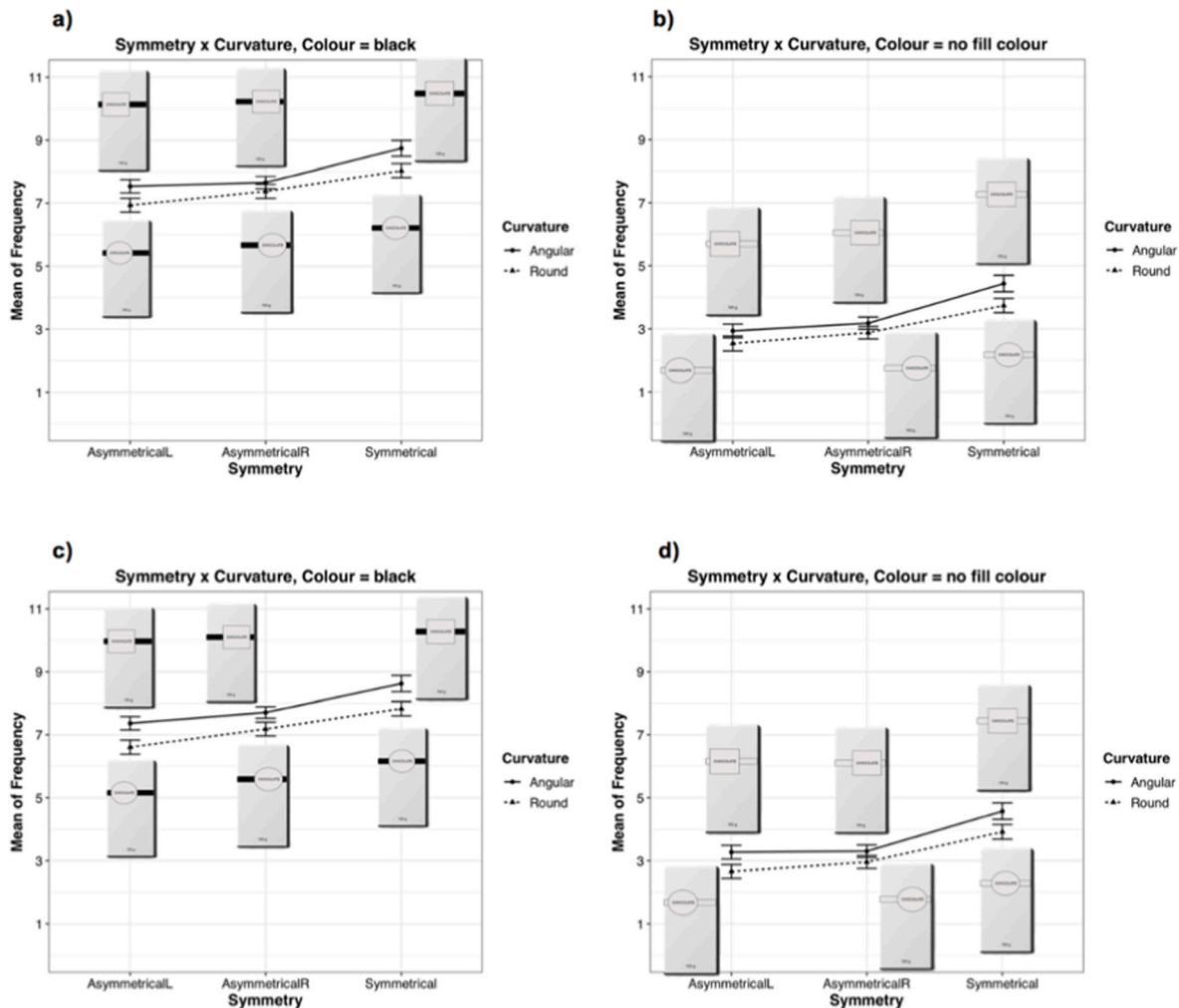
Fig. 2. Interaction plots showing the effect of symmetry and curvature on the premium choice frequency for Chocolate. a) Mark = Black, Price = Low, b) Mark = No fill, Price = Low, c) Mark = Black, Price = High, d) Colour = No fill, Price = High. The *error bars* represent the standard error of the means.

counterparts; that is, both asymmetrical left *(ps = <.001, Cohen's Ds= >0.44)* and asymmetrical right *(ps=<.001, Cohen's Ds= >0.52)*. Main effect of curvature was significant for the high price condition, being angular labels associated with premium more frequently than round ones. The interaction between symmetry and curvature was also significant, but η^2 was relatively small to consider it an important effect.

Coffee. The analysis for coffee revealed significant main effects of symmetry and mark in both price conditions (see Table 3). The packages

with symmetrical designs were more frequently associated with premium than the asymmetrical ones, that is, both asymmetrical left *(ps = <.001, Cohen's D=>0.52)* and asymmetrical right *(ps=<.001, Cohen's D= >0.70)*. Besides, packages with black marks were matched more frequently to premium than packages with no fill (Fig. 3). The interaction between symmetry and curvature was significant, though the effect size was relatively small. There was an association between packages with round labels and symmetrical layout and premium compared to

Table 3

ANOVA results of the effects of the variables on the choice for coffee. Rows shown in bold represent variables with significant results (p < .05).

Coffee						
	Low price			High price		
	F	p	η^2_G	F	p	η^2_G
Symmetry	**30.24**	**<.001***	**.115**	**38.07**	**<.001***	**.139**
Curvature	.904	.344	.002	2.12	.149	.006
Mark	**80.35**	**<.001**	**.169**	**132**	**<.001**	**.260**
Symmetry:Curvature	**21.82**	**<.001***	**.011**	**5.13**	**.015***	**.005**
Symmetry:Mark	.717	.490	<.001	.672	.505*	<.001
Curvature:Mark	.673	.414	<.001	.650	.422	<.001
Symmetry:Curvature: Mark	.636	.520*	<.001	**4.33**	**.002**	**.001**

*p-values corrected with the Huynh-Feldt correction.

those with angular labels and asymmetrical layout. This association shifts for symmetrical layouts, though, where packages with angular and symmetrical layouts were matched to premiumness more often than those with round labels and a symmetrical layout (Fig. 3a).

Ice-cream. Significant main effects of symmetry and colour were observed (see Table 4), with symmetrical and packages with black marks being more likely to be matched to premium products than their asymmetrical (ps = <.001, Cohen's Ds = >0.84) and no fill counterparts (Fig. 4). The interaction between curvature and mark was significant for the low-price condition, but the effect size was relatively small.

Jam. The main effect of symmetry was significant for the low and high price conditions (see Table 5). There were no significant effects of the other variables nor of the interactions on participants' premium choices. Participants chose packages with symmetrical designs as premium more often than their asymmetrical counterparts (ps = <.001, Cohen's Ds = >1.71) (Fig. 5).

In addition to the analyses reported, which tested our main hypothesis, additional post-hoc analyses were conducted and the results are presented in *Appendix B*. In these, we took advantage of the within-subject design of the study and modelled individual appraisals for the different brand premiumness attributes. This served both as an indicator of the importance the estimated average treatment effect and allowed us to begin exploring brand premiumness attribute evaluations across different customer segments. These post-hoc results can be used to identify customer segments that respond differently to brand premiumness features, and, when such differences exist, suggest that product customization at the segment level should take place.
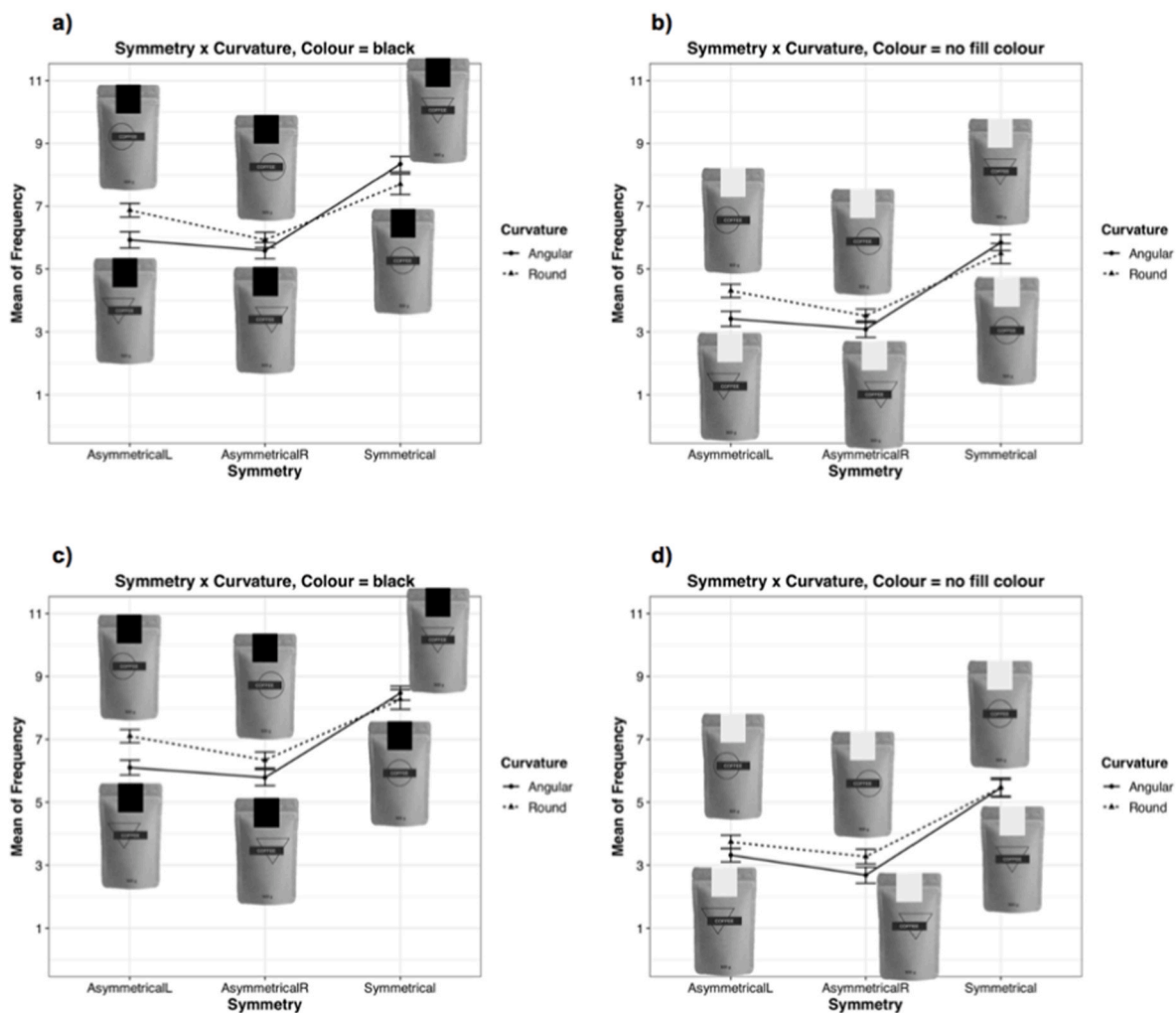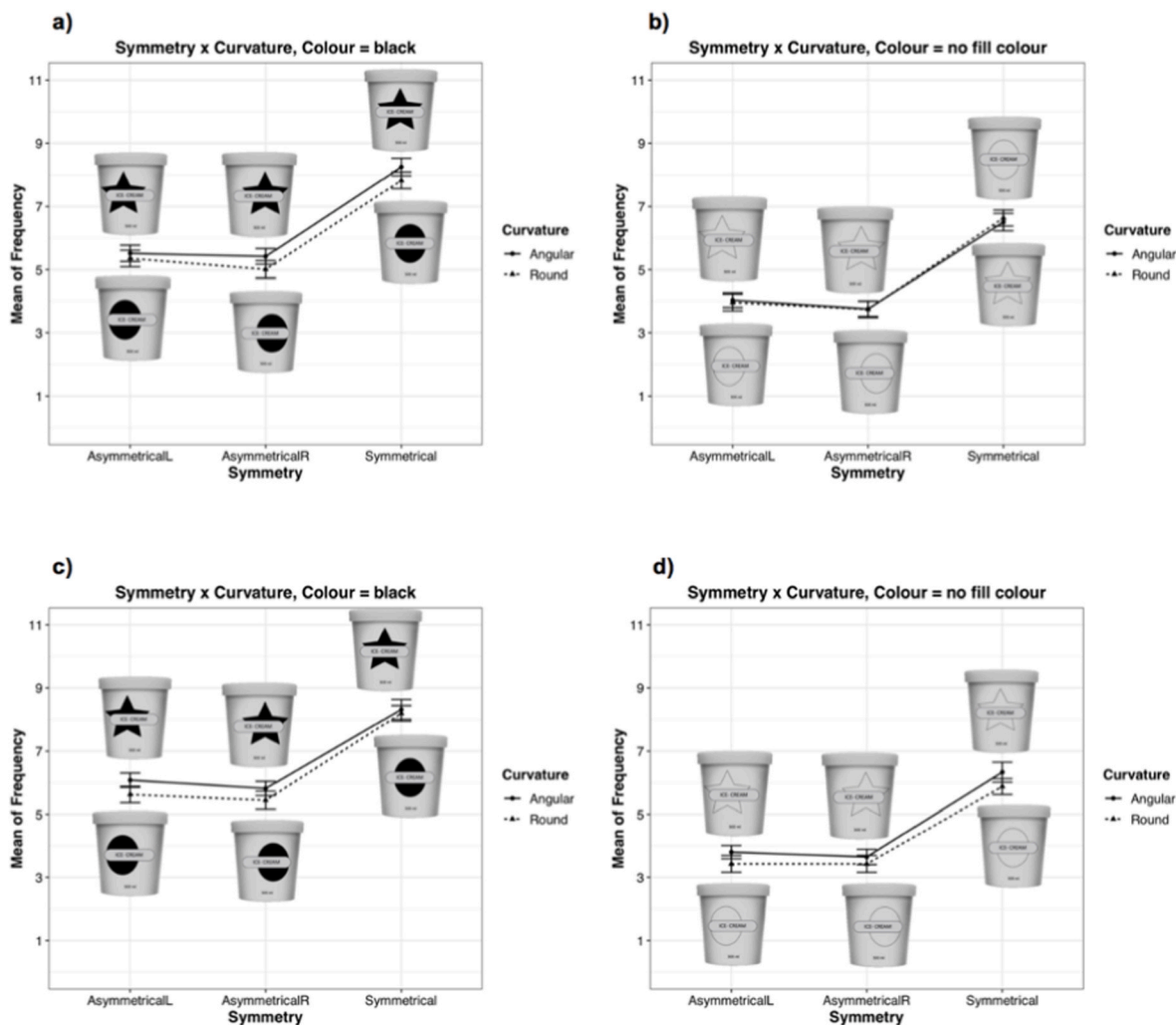

Fig. 3. Interaction plots showing the effect of symmetry and curvature on the premium choice frequency for Coffee. a) Mark = Black, Price = Low, b) Mark = No fill, Price = Low, c) Mark = Black, Price = High, d) Mark = No fill, Price = High. The *error bars* represent the standard error of the means.

Table 4
ANOVA results of the effects of the variables on the choice for ice-cream. Rows shown in bold represent variables with significant results (p < .05).

| Ice-cream						
	Low price			High price		
	F	p	η_G^2	F	p	η_G^2
Symmetry	**80.04**	**<.001***	**.171**	**64.83**	**<.001***	**.150**
Curvature	.187	.666	<.001	.829	.365	.003
Mark	**21.77**	**<.001**	**.063**	**61.15**	**<.001**	**.128**
Symmetry:Curvature	.121	.868*	<.001	.315	.730	<.001
Symmetry: Mark	.021	.980	<.001	.565	.570	<.001
Curvature: Mark	**5.19**	**.025**	**<.001**	.060	.807	<.001
Symmetry:Curvature: Mark	1.40	.249	<.001	1.76	.175	<.001

*p-values corrected with the Huynh-Feldt correction.

Fig. 4. Interaction plots showing the effect of symmetry and curvature on the premium choice frequency for Ice-cream. a) Mark = Black, Price = Low, b) Colour = No fill, Price = Low, c) Mark = Black, Price = High, d) Mark = No fill, Price = High. The *error bars* represent the standard error of the means.

Table 5
ANOVA results of the effects of the variables on the choice for jam. Rows shown in bold represent variables with significant results (p < .05).

Jam						
	Low price			High price		
	F	p	η_G^2	F	p	η_G^2
Symmetry	**294.5**	**<.001***	**.409**	**223.1**	**<.001***	**.304**
Curvature	2.74	.102	.007	.905	.344	.003
Mark	.139	.710	<.001	.219	.641	.001
Symmetry:Curvature	1.66	.194	<.001	.003	.997	<.001
Symmetry: Mark	.994	.372	<.001	.055	.946	<.001
Curvature: Mark	.080	.779	<.001	.019	.913	<.001
Symmetry:Curvature:Mark	.081	.910*	<.001	.103	.354*	<.001

*p-values corrected with the Huynh-Feldt correction.
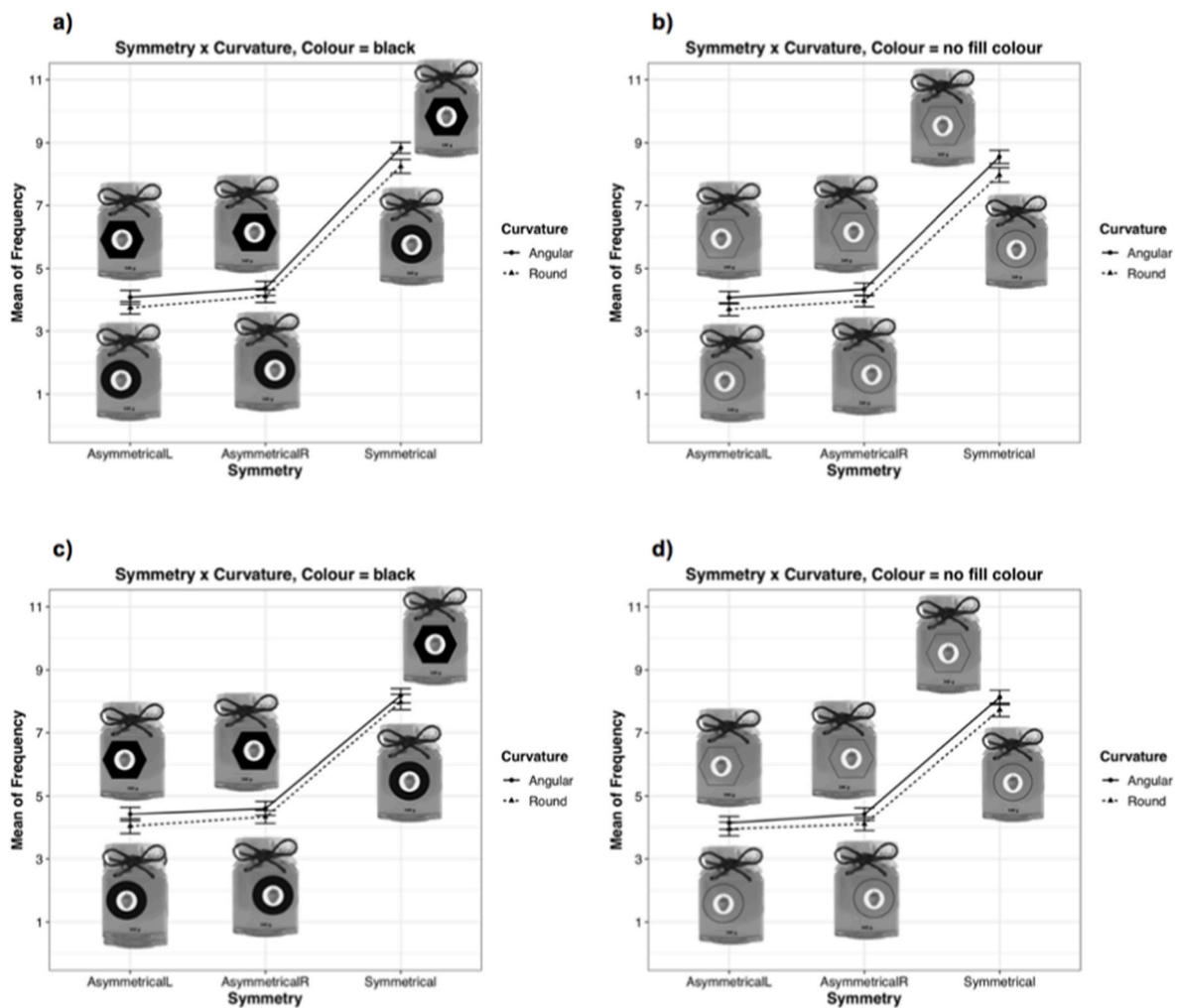
Fig. 5. Interaction plots showing the effect of symmetry and curvature on the premium choice frequency for Jam. a) Mark = Black, Price = Low, b) Mark = No fill, Price = Low, c) Mark = Black, Price = High, d) Mark = No fill, Price = High. The *error bars* represent the standard error of the means.

5. Discussion

5.1. Summary of the results

We presented a study designed to assess whether symmetry, curvature, and mark would influence people's perception of premiumness in food packaging of different products and prices. This approach is built upon research that suggests that sensory attributes can be used to communicate brand propositions (Spence, 2016; Velasco and Spence,

2019b). It was assumed that some individual attributes would be perceived as more premium, specifically, packages with symmetrical vs. asymmetrical (H1), angular vs. round (H2), and black vs. no fill designs (H3). That was the case for symmetry and mark (though not for one product), though not for curvature, across products and price conditions. For curvature, only one significant effect was observed, though the effect size was rather small. Pombo and Velasco (2021) observed similar results in their research, with a main effect of symmetry on premiumness, an effect which was not documented for curvature.

Table 6

Summary of the significant results from the different ANOVA performed (p < .05*; p < .001***).

	Chocolate		Coffee		Ice-cream		Jam	
	Low	High	Low	High	Low	High	Low	High
Symmetry	***	***	***	***	***	***	***	***
Curvature		*						
Mark	***	***	***	***	***	***		
Symmetry: Curvature	*		***	*				
Symmetry: Mark								
Curvature: Mark					*			
Symmetry: Curvature: Mark				***				

We did not have specific expectations about the interactions between the different features. The initial analysis revealed that although a significant interaction effect was found between symmetry and curvature in the low-price chocolate condition and the low and high-price coffee conditions, the effect sizes were small. In addition, an interaction was observed between curvature and mark in the low-price ice-cream condition, but again, the effect size was small. Even though price is an inherent characteristic of premiumness, there was no influence of price in this study and the results for low price and high price condition were almost equal. Overall, the initial analyses revealed a similar pattern of results for the variables of interest in the different product and price conditions (see Table 6).

Taking individual evaluations of premiumness of specific design characteristics into account in the post-hoc analysis presented in *Appendix B* it is possible to assert that there may be more interactions between symmetry, curvature, and mark than the initial statistical analysis revealed. In line with our expectations, across all products, symmetric, black labels are among the more frequently matched with premium designs, and the asymmetric, white (no fill) labels are among the least. The post-hoc analysis furthermore revealed that there are some important differences in interaction effects across products and in the distribution of evaluations across individuals.

5.2. Theoretical implications

Aesthetics has been identified by some authors as a key element of luxury and premiumness (Dubois et al., 2001). Extrinsic cues, such as a package's visual appearance, are often used to set expectations about a product (e.g., quality) when intrinsic cues are not available or measurable (Bajaj & Bond, 2018; Orth et al., 2009; Velasco et al., 2020). Thus, packaging is a powerful tool to provide information to consumers (Sundar et al., 2020). Attractive packaging design is frequently associated with higher quality, and with a higher price (Orth et al., 2009), hence may contribute to the overall perception of premiumness.

Our findings add to the literature in many ways. First, we linked symmetry and premiumness. This effect is related (or extends the) to the literature that suggests that symmetry signals quality (Sheperd and Bar, 2011; Orth and Malkewitz, 2008), as well as being aesthetically pleasing (Palmer et al., 2013). Notably, though, in our study, the choice for symmetry as premium is done when compared to asymmetry. In that sense, our results may be driven by a negative response towards packages with asymmetrical designs. Otherwise, people may consider asymmetry as less premium than symmetry but not necessarily because they associate symmetry with premiumness. Asymmetrical patterns can be seen as messy and untidy, hence, not premium designs (Mugge et al., 2015). Nevertheless, these findings are in line with previous research that suggests that there is a general tendency to prefer, and associate quality with, symmetry, which can be found across different products categories in relation to dimensions found in premiumness and luxury (Pombo and Velasco 2021).

Second, these results fall in line with previous studies that suggested black is related to luxury, premium or dimensions such as sophistication, among others (Ampuero and Vila, 2006). The main effect of mark was significant in three out of four products tested (e.g., Howell and Schifferstein, 2019). Even though the results associated with jam followed a different direction, the associations have been documented in different markets and cultures, thus this just illustrates the flexible and context and consumer dependent nature of colours in general. Jam is a type of product related to fruity flavours and probably the least expected to be related with colour black but, in any case, further research should address this relationship to provide more insights on the use of black in food packaging. It is also worth pointing out that the jam had relatively different design elements compared to the other packages, which might have influenced the results.

Colour is one of the more salient cues in packaging and an important tool in marketing (in particular, food marketing), but there can be group and cross-cultural differences in its meaning (Spence and Velasco, 2018). What is more, future research should aim to assess systematically how different degrees of the variables manipulated (e.g., different shades of gray or symmetry) may influence preference and choice.

The effect of curvature was small in most of the conditions. The literature suggests that people in general tend to prefer round vs. angular shapes across different cultures (Gómez-Puerto et al., 2018). However, a preferred characteristic (e.g., round patterns) do not necessarily signal premiumness. Although previous research has suggested that manipulating only shape contour, angular shapes are more likely associated with premium products than rounder ones (Corredor, 2017), we did not find compelling evidence in line with such an idea. Perhaps, when combined with other visual elements such as symmetry or colour, the effect of curvature is not noticeable, or not as salient as the others, and hence does not actively contribute to the perception of premiumness. When the effect was significant though, the direction of the effect followed the prediction, being packages with angular designs, more frequently associated to premium than round ones (expect for the post-hoc analysis of coffee).

In summary, it appears that properties associated with the spatial structure of packages that signal quality might (e.g., symmetry) contribute to differentiate a brand as premium. Future research may follow up on this and study the extent to which preference and quality need to overlap in a feature's meaning (as in symmetry, not in curvature, which is only like but does not signal quality) in order to enhance premiumness perception.

One of the aims of multisensory marketing is to understand how and why one may find additive, subadditive or superadditive effects between different within and between senses features in relation to specific brand propositions (Velasco and Spence, 2019a). This study also aimed to explore the interactions between sensory features, to assess whether there are this kind of effects when combining visual cues in food packaging. The post-hoc analysis revealed a number of significant interaction effects, with some of them differing across product types. Overall, the results indicate that one or two salient attributes used correctly (e.g., symmetry and mark) may be enough when trying to convey premiumness, although aesthetic features have shown to be more subtle than other elements (e.g., semantic ones) to signal premiumness, especially in high quality products (Pombo and Velasco, 2021). Future research could, for instance, explore the use of genetic algorithms for optimal product design proposed by Balakrishnan and Jacob (1996) to deeply study the interaction between different packaging design attributes when it comes to premiumness perception.

5.3. Managerial implications

These findings have interesting implications for practitioners in the luxury marketing and food packaging designers as what sort of features convey premiumness. First, consumers can make inferences about the

premium character of a product based on its packaging design. Therefore, marketers should invest not only in the intrinsic quality of a product but also in the design and materials of the packaging that will be used to present it to the consumer. Second, our results provide useful information concerning the impact of symmetry in packaging on consumer perception. Symmetry and black labels always appear to lead to premiumness, whether for being more aesthetically pleasing or signalling more quality than asymmetry. Third, the post-hoc analysis revealed individual differences in packaging appraisals, and that these appraisals to some degree can be predicted by demographic variables *(see Appendix B)*. This holds important implications for decision making around segmentation, targeting, product development, and packaging. Being able to predict the average effects of packaging on different groups will allow marketers more efficiently to target specific segments, while avoiding packaging characteristics that potentially would push away key customers.

Fourth, the effects of colour on food package design depend on the product. Our findings provide reasons to believe that the use of dark colour should be taken carefully because it may not always relate to premiumness. Consequently, marketers should address the meanings of colours individually for each kind of product, considering also other associations (e.g., taste and colour, or cultural associations) that people may have with them. Ultimately, curvature appears to be least important in the context of premiumness, even though more research is needed to fully understand its implications for such brands (e.g., manipulating contour instead of label curvature).

5.4. Limitations and future research

There are some limitations associated with the present research that should be noted. Background data about the participants of this study suggest they are not always premium consumers *(see Appendix A)*. However, even for this kind of non-premium consumers there could be some hints of premiumness in packaging that could apply to more basic products to differentiate them from their competitors. Moreover, although we currently focused on visual cues, the importance of cues from other senses in food packaging (e.g., sound) is expected to also be important concerning the perception of premiumness.

In our attempt to keep the designs of the stimuli as neat and realistic as possible, a number of design variations might have influenced the results obtained. For example, we utilized multiple shades of gray in the marks across the product categories. Other variations in the stimuli include: 1) Certain packages included variations of curvature through a specific shape whereas others included different geometric shapes, 2) in one case we used images (e.g., strawberry image in jam) whereas in the others we used generic words to provide information about the product. The jam packaging, in contrast with the others, also includes a white circle. Whilst these variations might have affected the absolute values of our results, we believe that the relative differences present (e.g., mark vs. no fill) remain relevant. Future research, though, may explore how specific variations in the manipulations included in our study may systematically influence the perception of premiumness.

The product designs used may not be as realistic as the products found in the typical supermarket and most were generic (unbranded). Indeed, there are several other variables of packaging that were not manipulated that future research may consider (Spence, 2016; Velasco and Spence, 2019b). Also, the variables manipulated, even though conceptually the same, presented slightly differences on how they were incorporated in each product packaging. We limited this study to the visual domain because it is dominant for this category, food and beverage packaging, at least at the moment of purchase (Fenko et al., 2010; Spence, 2016). More research is needed to better understand how the different cues associated with different senses in a product's packaging, may influence the perception of brand premiumness and other brand propositions. Whilst our manuscript is one of the first contributions toward linking the perception of premiumness, with visual

perception research, and evolutionary theories, the relationship between these needs to be further explore as little research has focused on this, specifically. For example, future research may focus on understanding the circumstances under which features varying in terms of how strong they signal an attribute such as quality (e.g., symmetry, colour, but perhaps also belonging to other senses), may result in superadditive or subadditive effects in relation to the perception of premiumness.

Moreover, the evaluation of premiumness entails a subjective element that should be further investigated (Brun and Castelli, 2013; Dubois et al., 2001). Based on the literature and the consensus captured in the Oxford Dictionary, we defined premiumness as "*relating to or denoting a commodity of superior quality and therefore a higher price*". This is a functional definition, nevertheless, future research should focus on elaborating on how premiumness differ from other concepts that gravitate the premium and luxury worlds, and thus, help to further delimit the concept.

The post-hoc analysis revealed the importance of taking individual differences into account, for both aesthetics and consumer research, and suggests that future research may explore further predictors for these evaluations. Furthermore, although the type of task used (a 2-alternative forced-choice task) has proven to be effective in terms of predicting preference and choice, it has its limitations. Binary choices do not necessarily consider all the possible options that participants have in a supermarket, nor the scenario of no choice. Other methodologies and study designs may be used in the future.

In this study, we tested the different conditions in different groups of participants and overall, the results were consistent throughout these groups. However, the study was conducted in a sample of UK participants so there is a need to test this experiment in other countries, in order to evaluate whether they extend beyond the UK or whether there are any cross-cultural differences. Differences between male and female respondents and its correlation between fluctuating asymmetry and success should also be assessed in future research.

Finally, whilst we compared clear categories of symmetry, curvature, and mark, one may wonder what sort of "premium" perception thresholds relate to different degrees in these variables. For instance, symmetry is not only achieved through a central design element (as in the present experiment) but may involve many other aspects of the product (e.g., the contour, label, etc.). From this perspective, one may consider the degree of symmetry or balance necessary to create the perception of premiumness.

6. Conclusions

Our results demonstrate that among visual features, symmetry has a special relevance and symmetrical patterns are consistently matched to premium in different products. In addition, we provide evidence for the association of black and premiumness even though this feature does not seem to be suitable for every product. When considering individual differences, several interaction effects were found to be statistically significant, but with clear differences between products. That being noted, the combination of symmetry and black is consistently perceived as among the most premium package design characteristics.

These findings add to the literature of multisensory packaging design, showing that there is indeed a relationship between visual features of packages and the perception of premiumness in the food and beverages context. Further research is needed to better understand the interaction between visual features as well as the interaction with other senses in relation to premium package design.

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Author statement

Elena Romeo-Arroyo: conceptualization, investigation, data curation, formal analysis, writing. **Henrik Jensen**: methodology, data curation, formal analysis. **Auke Hunneman**: methodology, validation. **Carlos Velasco**: conceptualization, methodology, data curation, formal analysis, funding acquisition, project administration, writing.

Implications for gastronomy

Considering that the present research focuses on how design features influence the valuation of food, the present research has implications when it comes to consumer perception and behaviour in gastronomy. Understanding how the design characteristics of food and food packaging can influence the perception of premiumness is important for the differentiation of products or services based on quality. In that sense, the sensory cues that accompany a given food can influence its corresponding perceived quality. In the competitive premium market, where packaging has only a few seconds to make an impact (at least on the offline or online shelf), brands need to ensure that their packaging communicate effectively and engage the target consumers. Packaging design has the ability to enhance the sensory properties and enjoyment of food and, ultimately, the end user experience. Considering that packaging is just one of many touchpoints between consumers and food, this research may well extend to other touchpoints in gastronomy. Knowledge on how to communicate quality and engage consumers effectively can be transferred to haute cuisine professionals, and to all those involved in the food value chain, to deliver great consumer experiences. Our research suggests that premium food brands can differentiate based on packaging cues such as symmetry and colour.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data has been made available on OSF

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijgfs.2022.100656.

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