‘Shaping perceptions’: Exploring how the shape of transparent windows in packaging designs affects product evaluation

SHORT COMMUNICATION

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Abstract

Much previous work has demonstrated that the shape of different design elements, when viewed in relation to food, can influence consumers' evaluations, perceptions, and intentions regarding the food viewed. However, relatively few studies have focused specifically on packaging design and, to date, none have considered the shape of transparent packaging, a prevalent feature on packaging designs. We report the results of two within-participants online studies aimed at rapidly exploring the consequences of any crossmodal correspondences elicited by shape in the novel context of transparent windows on packaging design. Across both experiments, 209 participants viewed a subset of 7 window shapes, across 4 'faux' brands in different product categories. Each packaging design was rated for expected overall liking of the product, willingness to purchase, tastiness, sourness, and sweetness, design innovativeness, and design attractiveness. Certain previous findings were replicated, in that a preference for circular (vs. rectangular) windows, and for upwards- (vs. downwards-)pointing triangles, was found. However, crossmodal correspondences between circular shapes and sweetness, and angular shapes and sourness, were not robustly observed. Explanations for this unpredicted finding are suggested. Furthermore, implications and recommendations for commercial practitioners of packaging design are made.

Keywords: Packaging; Packaging design; Transparent packaging; Shape; Crossmodal correspondence; Willingness to purchase

1. Introduction

The majority of food and drink products are sold packaged, with a label of some sort having been designed, then printed or otherwise attached onto it. While some information on this label is mandated by law (for example, in the European Union, the front-facing label must at least display the product's name, nutritional information, weight, and use by/best before date; see UK Government, n.d.), other information—both textual and graphical—is often added to help inform the consumer, encourage favourable product expectations, and enhance the consumption experience. Some of this additional information communicates explicitly with the prospective consumer (i.e., stated clearly with little room for interpretation; e.g., through text-based claims telling the consumer what the product is, and what it will taste like), yet much of it will instead be 'implicit' in nature (i.e., being implied or understood without being directly expressed textually; e.g., the subtle use of colours, shapes, etc.). These 'implicit' influences tend to exploit a correspondence or association between a certain visual attribute (e.g., colour, shape, position, symmetry, volume, and so on), and some other information, be it sensory (e.g., taste or flavour), hedonic (i.e., the 'pleasantness' of a previous experience where this attribute was also present), or another evaluation (e.g., product quality or price). Despite such 'crossmodal correspondences' (i.e., where the correspondence is entirely sensory in nature; see Spence, 2011, for a review) and other associations seeming potentially far-fetched in some cases, they have been documented as levying a replicable and

sometimes sizeable influence on consumers (e.g., Velasco, Salgado-Montejo, Marmolejo-Ramos, & Spence, 2014).

The interactions between shapes and expected and perceived taste have received considerable attention in recent years (for reviews, see Spence, 2011, 2012; Spence & Ngo, 2012; Spence, Ngo, Percival, & Smith, 2013; Velasco, Woods, Petit, Cheok, & Spence, 2016). Researchers now have a clearer idea of how the shape of the food itself (e.g., Wang, Carvalho, Persoone, & Spence, 2017); of the plate (or container) it sits on (or in; e.g., Fairhurst, Pritchard, Ospina, & Deroy, 2015; Piqueras-Fiszman, Alcaide, Roura, & Spence, 2012; Van Doorn et al., 2017); of other elements in the environment not related to the food itself, like abstracted shapes or typeface (e.g., Salgado-Montejo et al., 2015; Velasco, Hyndman, & Spence, 2017); and of the package in which it is presented (e.g., Ares & Deliza, 2010; Velasco, Woods, Petit, Cheok, & Spence, 2016) can all influence our expectations, and hence perceptions, of taste/flavour. Taken together, shape curvilinearity consistently seems to be the most important factor in consideration, wherein (more) rounded elements are associated with (or prime) the perception of product sweetness, whereas (more) angular design elements similarly encourage the perception of product sourness or bitterness (cf. Turoman, Velasco, Chen, Huang, & Spence, 2018; Velasco, Hyndman, & Spence, 2017).

Additionally, and aside from these crossmodal correspondences, a number of separate (but potentially related) associations have also been identified between the use of shapes on packaging designs and consumers' evaluations of food and drink products.

For example, a number of studies have identified a generalised preference for (again) rounded shapes (e.g., Bar & Neta, 2006; Westerman et al., 2012), which may lead to greater purchase likelihood if such rounded shapes are applied in the design of product packaging. Similarly, related experimental work suggests a preference for upward- (as opposed to downward-) pointing triangles, also leading to greater purchase likelihood when applied to the design of packaging (Shen, Wan, Mu, & Spence, 2015; Velasco, Woods, & Spence; 2015; Westerman et al., 2013). Therefore, the many implicit associations with shapes seen on packaging designs culminate in influencing consumers' expectations of product taste, evaluations of how much a product or its packaging design is liked, and subsequently, how likely it is that the product may be purchased. Thus, through careful use and manipulation of the shapes found on product packaging, it would appear that one can alter the consumers' evaluations, expectations, and intentions, without necessarily having to change the product itself.

It should, however, be noted that tentative evidence suggests certain effects of shape can be minimised in particular situations. For example, weakened effects have been observed when the shape of the background (e.g., a plate) is manipulated, rather than that of the foreground (e.g., food on the plate; see Fairhurst et al., 2015); and when the attributes of a shape do not closely correspond to attributes of the food (i.e., in cases when foods/drinks might have a relatively mild sour taste, or a sour taste overshadowed by other tastes; e.g., orange juice; e.g., Kim & Lee, 2015, see also Piqueras-Fiszman, Alcaide, Roura, & Spence, 2012). Furthermore, Engels (2015)—the only research to date

that has focused on the shape of transparent windows—reported that angular window shapes led to enhanced expected tastiness of the product (penne pasta) packaged within, better post-consumption taste experience, higher ratings of packaging attractiveness, and greater purchase intent. Such findings run contrary to previously-discussed research that finds a generalised preference for rounded shapes, perhaps due to a lack of congruence between the taste of pasta (being relatively bland), and either sweetness or sourness[1]. Finally, it is also important to consider what happens when certain expectations are either disconfirmed or discordant. According to the Assimilation-Contrast Theory (Schifferstein, Kole, & Mojet, 1999), the difference between expectations of product taste, and either actual taste or other expectations established by subtle cues such as shape, needs to be sufficiently small for an effect to be produced (see also Piqueras-Fiszman & Spence, 2015; Wang, Carvalho, Persoone, & Spence, 2017). That is, for the effects identified in the existing literature to be replicated, expectations set must not be over-inflated or -deflated in relation to the likely product experience. Together, these provisory conditions raise the question of whether the effect of shape might be context-specific, and if so, which real-world applications may be able to replicate prior findings. In the present research, we manipulate the shape of transparent windows in multiple product

[1] Could it be that congruence was instead established between the angular pasta shapes (being penne) and the angular window (being triangular), leading to a more generalized product liking for angular windows and thus overshadowing any general preference for rounded shapes? Further work to clarify this, by identifying how product shape and window shape both interact to influence product preference, would certainly be valuable.

packaging designs, where food appears in the behind the window, and observe how this influences participants' taste expectations. Indeed, transparent windows are a prevalent feature of modern packaging, appearing on as many as 50% of all packaging designs (see Simmonds & Spence, 2017, 2019), yet have received little attention from the academic literature (cf. Simmonds, Woods, & Spence, 2018a, b), making them an attractive candidate for applied research.

1.1. Aims

This study had four key aims:

1. To explore whether the shape of transparent windows on packaging designs influences a broad range of product evaluations and expectations.
2. To identify whether rounded transparent windows are generally preferred over angular transparent windows (thus extending the work of Bar & Neta, 2006; Westerman et al., 2013).
3. To identify whether a 'bouba'-shaped transparent window is seen as significantly sweeter, and a 'kiki'-shaped window is seen as significantly more sour, than the other (extending the work of Spence et al., 2013).
4. To identify whether transparent windows in the shape of an upward-pointing triangles are generally preferred to transparent windows in the shape of a

downward-pointing triangle (extending the work of Shen, Wan, Mu, & Spence, 2015; Velasco, Woods, & Spence, 2015; Westerman et al., 2013).

2. Materials and Methods

To facilitate the investigation of a broad range of window shapes, while minimising participant fatigue, two distinct experiments were conducted in parallel: one, with four 'basic' window shapes, and the other with three more 'complex' window shapes.

2.1. Participants

In the 'basic' shape experiment, 105 participants (49 male, 56 female) were recruited from Prolific Academic (https://www.prolific.ac). They ranged in age from 18–62 years (M = 32.7, SD = 10.84). In the 'complex' experiment, 104 participants (45 males, 59 females) were recruited, ranging in age from 18–64 years (M = 33.6, SD = 12.00). For both experiments, only UK residents with (corrected-to-)normal full-colour vision were eligible to take part (as identified by self-report); there were no other exclusion criteria. The participants took part in return for a payment of 0.45 GB pounds. Both experiments were conducted on 25/07/2016 between 13:00–16:30 BST. Participants took an average of 456s to complete the 'basic' experiment (SD = 148s; average payment of £3.55/hr), and 363s to complete the 'complex' experiment (SD = 156s; average payment of £4.46/hr). This

149 research was approved by Oxford University's Medical Sciences Inter-Divisional Research
150 Ethics Committee (approval # MSIDREC-R43591/RE001).

151

152 *2.2. Stimuli*

153 Both the 'basic' and 'complex' experiments used stimuli covering four product
154 categories, chosen to ensure there were a range of sweet (chocolates), sour (lemon
155 mousse), and relatively bland products (granola and dried pasta). These stimuli were
156 'faux-brands', as in Simmonds, Woods, and Spence (2018a, b), having been designed
157 specifically for the purposes of this research, while nevertheless aiming to be as
158 ecologically valid as feasible[2]. Seven shapes were applied as the windows, with four in
159 the 'basic' experiment (a rectangle, a circle, and both upwards- and downwards-pointing
160 triangles), and three in the 'complex' experiment (a 'leaf' shape, the 'bouba' shape, and
161 the 'kiki' shape; the latter two being adapted from Spence et al., 2013). All of the stimuli
162 are presented in Figure 1. Window position was kept constant, the centre of each shape
163 being the same for all shapes within each product category. Total window area was,
164 however, not kept constant, to preserve realism (i.e., so windows with a larger 'bounding

[2] Note that certain design elements commonly required by law on food products (such as, for instance, nutritional information, 'use-by' or 'sell-by' dates, product weight or volume, and so on), as well as additional product information (such as price or flavour descriptions), were purposefully omitted from these designs. This was done in order to reduce the amount of potentially biasing information; for example, providing specific flavour descriptions might have introduced bias through individual flavour preferences.

box' but smaller total area did not take up a disproportionately large amount of space on the packaging).

2.3. Design

A 4x4 (product category by window shape) within-participants design was used for the 'basic' experiment, and a 4x3 within-participants design for the 'complex' experiment. There were seven measures in total: overall product liking, Willingness-To-Purchase (WTP), expected product tastiness, expected product sourness, expected product sweetness, perceived design innovativeness[3], and perceived design attractiveness. Each measure was asked for each product category in turn (the order of product categories being randomised on every measure). Thus, there were 28 trials in total for both experiments. The order of each measure was held constant (i.e., in the order described above) across participants.

[3] Note that perceived design innovativeness was included in a largely exploratory fashion, and without specific hypothesis (though note some preliminary research has been conducted in the context of brand logo design, finding a significant main effect of asymmetry on perceptions of innovativeness, which in turn led to more positive brand perceptions for certain brands only; c.f. Batra, Seifert, & Brei, 2015). That is, innovativeness was included here as a measure such that its role in forming other product evaluations might be established.

2.4. Procedure

All experimentation was conducted online, using Xperiment (https://www.xpt.cloud/), with responses being made on a 1000 × 350-pixel 'box scale' (as in Van Doorn et al., 2017; Simmonds, Woods, & Spence, 2018a), on which maximal (right-hand side) and minimal (left-hand side) responses were anchored (e.g., for overall product liking: 'Like the product very much' and 'Don't like the product at all', respectively). The question for the respective measure was displayed above this box scale, with all window shapes being presented for the respective product category above this (for an example, see Simmonds, Woods, & Spence, 2018a, Figure 2). To provide a response, participants dragged the stimulus into the box, with the position on the horizontal axis denoting the score between 0–100. The relative order of the window shapes was randomised in each trial. Participants also provided information concerning their age, sex, and whether they had bought a product from any of the four product categories in the past six months[4].

3. Results

3.1. Descriptive comparisons

[4] This information was collected for the purpose of a hierarchical segmentation analysis, to identify any individual differences across measures. However, no significantly different segments, as defined by these demographic variables, could be identified across the (admittedly small) sample.

Looking observationally at the data (presented in Figure 2), important trends can be identified between different stimuli and measures. Comparing the stimulus set, consistently higher average scores were recorded for the circular, the leaf-shaped, and the rectangular windows on measures of overall liking, WTP, expected tastiness, and perceived design attractiveness. This pattern can be seen across all four of the product categories. In contrast, the downwards-pointing triangle, the 'bouba'-shaped, and the 'kiki'-shaped windows all performed consistently poorly on these same measures. For measures of innovativeness, this pattern seems largely to be reversed, where both triangular windows, the 'bouba' window, and the 'kiki' window received higher average scores than all other shapes. For sweetness, the circular window always received the highest average score, with the 'bouba', leaf-shaped, and rectangular windows also receiving higher-than-average scores. Conversely, for sourness, the triangular and 'kiki' window shapes received relatively higher scores.

Looking across measure and product category, some important findings can also be seen. For example, a 'halo-effect' can be seen across measures of overall liking, WTP, expected tastiness, and perceived attractiveness, wherein the assessments of these different product attributes seem strongly related. This seems to be supported by correlational analyses between measures (irrespective of product category; see Table 1, wherein correlation coefficients between these scores were always moderate-to-strong ($0.5 \leq r \leq 0.7$). Note also that scores for these measures seem broadly comparable across product categories. For ratings of sourness and sweetness, the scores generally conform

to common sense: for example, the boxed chocolates, and to a lesser extent, the granola products are expected to be generally sweet, and not sour. Furthermore, the pasta category is not expected to be either sweet or sour. Finally, the lemon product was expected to taste both sweet and (to a slightly lesser extent) sour.

3.2. Hypothesis testing

Tests for normality, made using the Shapiro-Wilk method and Q-Q plots, identified a non-normal distribution in the dataset, with non-parametric tests being adopted as a result. The following comparisons were made using Wilcoxon's Signed-Ranks Test: (1) scores for the rectangular window against scores the circular window, for all measures (intended to test the effect of angularity); (2) scores for the 'bouba'- vs. 'kiki'-shaped window, for all measures (intended to also test the effect angularity, but in the specific context of shapes that have been found to be associated with 'sweetness' and 'sourness'); and (3) scores for the upwards- against the downwards-pointing triangle windows, for all measures (intended to test the effect of triangle orientation). In all cases, multiple comparisons were controlled for using the Hochberg Procedure (see Huang & Hsu, 2007).

3.2.1. The effect of angularity ('basic' shapes)

The following comparisons compare stimuli featuring the circular transparent window with stimuli featuring the rectangular transparent window, as detailed in Table 2. Across all product categories, stimuli with the circular transparent window received significantly higher ratings for WTP, expected product tastiness, and perceived design attractiveness scores. Additionally: in three product categories (granola, chocolate, and lemon mousse), these 'circle' stimuli also received significantly higher ratings for overall product liking; in two product categories (granola and lemon mousse), for expected product sweetness as well; and finally, in the pasta category, also for perceived innovativeness. Descriptively, the 'circle' stimuli almost always had higher median scores than the 'rectangle' stimuli on all measures, with the exception of sourness.

3.2.2. The effect of angularity ('complex' shapes)

Only three significant differences were identified between the stimuli with the 'bouba'- and 'kiki'-shaped transparent windows, as detailed in Table 3. That is, the 'bouba' window received significantly higher WTP scores in the pasta and lemon mousse categories, and also received significantly higher overall product liking scores in the lemon mousse category. Descriptively, the 'bouba' stimuli received marginally higher median scores than their 'kiki' counterparts in a majority of cases (with most exceptions being in the chocolates category, where scores were very similar).

3.2.3. The effect of triangle orientation

The following analyses compare stimuli featuring the upward- vs. downward-pointing triangle-shaped transparent windows, as detailed in Table 4. Across all product categories, stimuli with the 'upward-pointing triangle' window received significantly higher ratings for overall product liking and WTP scores. Additionally: in three product categories (granola, chocolate, and lemon mousse categories), these 'upward-pointing triangle' stimuli also received significantly higher ratings for perceived design attractiveness; and in a further three categories (in this case, chocolate, pasta, and lemon mousse), also for perceived product tastiness. Descriptively, the 'upward-pointing triangle' stimuli almost always had higher median scores than the 'downward-pointing triangle' stimuli on all measures.

3. Discussion and Conclusions

The pair of experiments reported here were designed to identify whether the shape of transparent windows in packaging design would exert a significant influence over the expectations and evaluations of consumers. Indeed, the present results suggest that window shape certainly can exert such significant effects on the consumer (at least in the short term), and therefore, that the choice of the shape of a transparent window is by no means a trivial one.

A significant preference for rounded (over angular) window shapes was identified, as well as a significant preference for transparent windows in the shape of an upward-pointing (as compared to downward-pointing) triangle, both validating and extending prior research (e.g., Bar & Neta, 2006; Westerman et al., 2012). These generalised preferences formed part of a 'halo-effect', wherein a generally positive evaluation was linked to perceptions of the product being tastier, the design being more attractive, and the product being more likely to be purchased. Indeed, a marginal effect of shape was identified for perceived innovativeness, with the triangular, leaf, 'bouba', and 'kiki' shapes repeatedly being rated as relatively more innovative, although perceptions of innovativeness were not strongly related to other positive product or design evaluations. However, note that certain angular shapes were also well-liked, with the rectangle- and leaf-shaped windows both consistently achieving higher scores than the other angular window shapes that were tested (i.e., the upward- and downward-pointing triangles, and the 'bouba' and 'kiki' shapes).

However, even by applying previously-identified crossmodal correspondences between shape (i.e., rounded/angular) and taste (i.e., sweet/sour, respectively), expected product sweetness and sourness were not often altered significantly by manipulating window shape. This was the case both for 'basic' shapes (i.e., a circle vs. a rectangle), and for 'novel' shapes (i.e., 'bouba'-shaped vs. 'kiki'-shaped). Indeed, the two window shapes that consistently received the most favourable product perceptions were the circular and leaf-shaped windows, though it remains unclear precisely why this might be. For

example, while it may be that circular shapes are generally preferred (as per Bar & Neta, 2006), this explanation does not seem able to account for the relative success of the leaf-shaped design. Could it be that this window shape evokes notions of naturalness, freshness, or organic credentials, the perceptions of which then cause a positive 'halo-effect' onto other product evaluations? Or indeed, might a generalised preference exist for natural objects, as with rounded shapes (as indicated in: Kanaya, Kariya, & Fujisaki, 2016; Nikolaidou, 2011)? Further research would certainly be valuable in ascertaining this (c.f., Koutsimanis, 2012; Labbe, Pineau, & Martin, 2013).

The results of the present study therefore question the limiting factors as far as trying to elicit crossmodal correspondences in packaging design is concerned. For example, could it be that the shapes of only certain elements can evoke such correspondences (e.g., typeface, see Velasco, Woods, Hyndman, & Spence, 2015)? Indeed, are there other correspondences between shapes and tastes or flavours that are as yet undetected (e.g., spiciness and angularity, see Gil-Pérez et al., 2019)? If so, which the authors believe likely to be the case, it would be helpful in future research to identify those design element(s) that are most effective in terms of exerting influence on the consumer and their product experience, and further, how and whether the effect of shape (or curvilinearity) of multiple design elements might interact. Could it also be the case that the strength of any shape-taste correspondence is weakened in the presence of other, perhaps more reliable, product cues, such as being able to see the product directly? Further, could it be that the effect of shape is different depending on whether it is displayed in the

316 foreground (printed on the packaging), rather than being produced out of 'negative
317 space' (as was the case in the present research, when a window was cut out of the
318 packaging)[5]; or could the window act as a 'frame', as surrounding a painting, which might
319 affect how the contents of this window are evaluated (e.g., Arnheim, 1988)? Future
320 research would certainly be valuable in answering these questions, and especially in
321 trying to understand how multiple 'crossmodal' cues interact when embedded in
322 packaging designs, or how expected taste varies when an image of the product is
323 (un)available. Indeed, it would also be valuable to see whether these expectations
324 established by window shape can manipulate product experience (as in, for example,
325 Engels, 2015), and if so, in what circumstances expectations might be disconfirmed.

326 Taking these results together, the present research findings provide some key insights
327 to brand manager and packaging designers; most importantly, that the design of their
328 food and drink packaging has a meaningful influence over the expectations, and perhaps
329 even the experiences, of their consumers (e.g., Spence, 2016). In terms of concrete
330 recommendations, the present findings advocate for the use of circular windows, due to
331 their widespread appeal across many diverse products, and the advantageous

[5] This is certainly an area in desperate need of further applied research. Since previous research has identified foreground-background differences in colour–taste crossmodal correspondences (see Woods, Marmolejo-Ramos, Velasco, & Spence, 2016), it could very well be that other foreground-background distinctions are also having meaningful effects on product packaging too (see Fairhurst, Pritchard, Ospina, & Deroy, 2015; Piqueras-Fiszman et al., 2012; Spence, 2017, for a further example of important foreground-background shape differences in the context of plated food).

expectations they bring (e.g., of relatively tastier products, and more attractive designs). In contrast, novel and complex shapes should best be avoided.

In closing, it is worth noting that the role of individual differences (e.g., in 'sensitivity to design', as defined by Bloch, Brunel, & Arnold, 2003) have yet to be comprehensively investigated in the context of the different elements commonly used in packaging designs (cf. Becker, van Rompay, Schifferstein, & Galetzka, 2011), despite knowing that some cross-cultural differences have been identified in the case of taste-shape associations (e.g., Wan et al., 2014, Bremner et al., 2013). Indeed, it may well also be that a team of designers with more experience than the present authors could incorporate a range of potential window shapes into a crafted design to much greater appeal than identified here. And additionally, it is not known if there would be some instances where a product image would be better printed on-pack, in preference to some window shape (i.e., where a product image might look so tempting that it would outweigh any possible benefits of conveying information by varying window shape; see also Simmonds, Woods, & Spence, 2018a, where the attractiveness of the food is thought to be a key component in the relative success of using transparency in packaging design). Finally, it should be noted that all measurements in these experiments were made for hypothetical faux-brands, using box scales which lacked concrete end-points. As such, there are limits the extent to which findings can confidently be extrapolated. Future research using tried-and-tested behavioural paradigms (e.g., a second-price sealed auction, binomial choice experiments, etc.) or actual sales data (e.g., Kühn, Strelow, & Gallinat, 2016), would be

especially valuable in proving the validity of the present conclusions. Because of these limitations—combined with the unique traits of each brand, their consumers, and their needs—it is probably advisable to test prospective packaging designs prior to launch (i.e., rather than relying solely such as that reported here). Doing so will allow design effectiveness to be quantified, and highlight avenues for designs to be optimised; in such a competitive industry, where the focus is often solely on taste, it would seem a missed opportunity to utilise the design itself as a key ingredient.

Authors' contributions

GS and CS conceived the experimental design. GS, AW, and CS all contributed to the writing of this paper. GS and AW programmed the experimental procedures, and GS ran all statistical analyses on the datasets. All of the authors read and approved the final version of the manuscript.

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Figure Legends

Figure 1. The experimental stimuli shown to participants. The four categories of product (granola, chocolates, lemon mousse, and pasta) are displayed for each of the seven window shapes (rectangular, circular, upwards-pointing triangle, downwards-pointing triangle, leaf-shaped, bouba-shaped, and kiki-shaped, respectively).

Figure 2. Mean score for each window shape and measure, split by product category: (A) for the granola category, (B) for boxed chocolates, (C) for pasta, and (D) for lemon mousse.

Figure 1


Florida Granola
Nutty granola with currants
ELLIOT BÉRINGER
Manor Farm Bakery
Lemon Mousse
THE PASTA COMPANY
ROTINI / FUSILLI

Figure 2

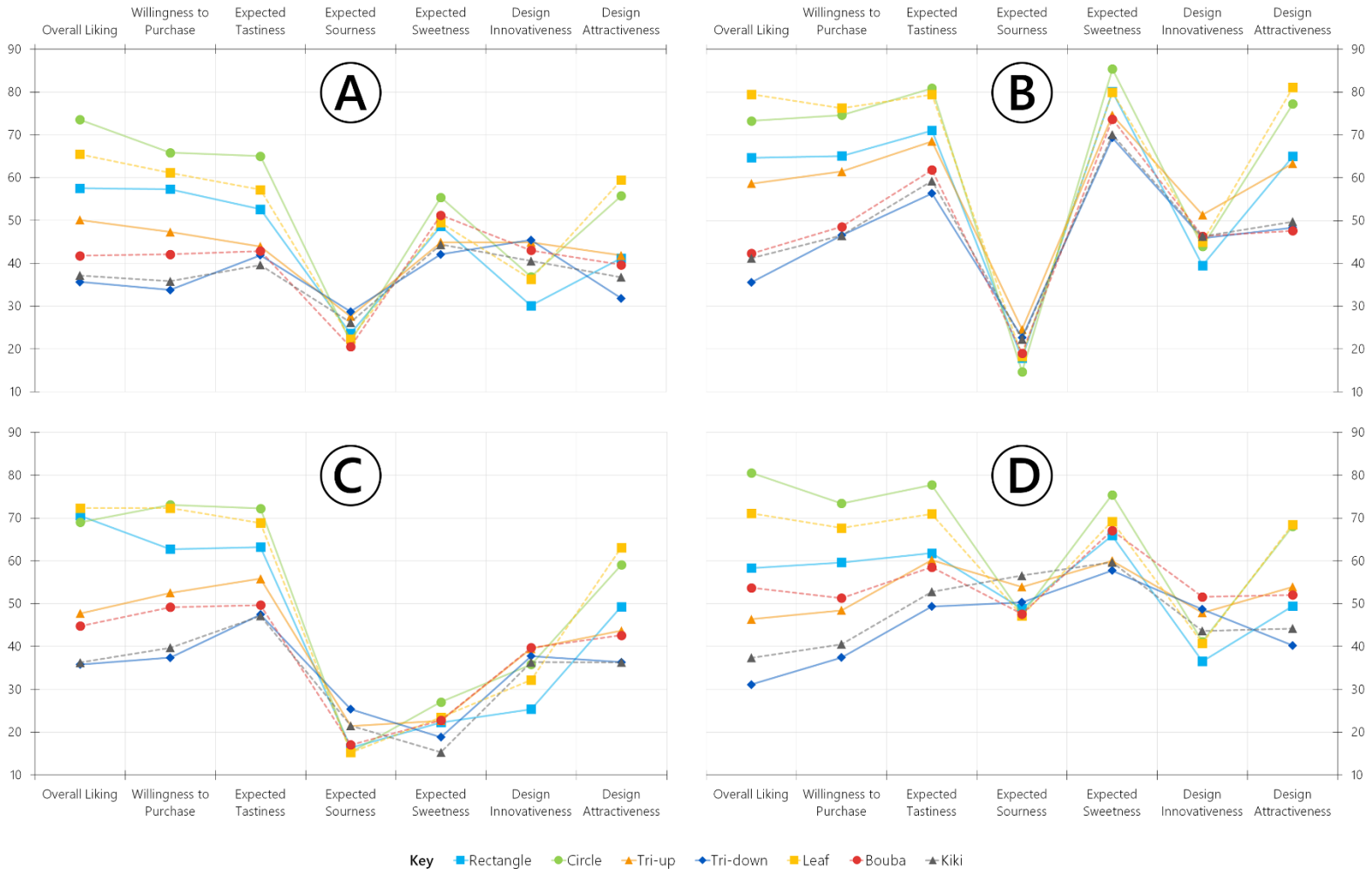
Overall Liking
Willingness to Purchase
Expected Tastiness
Expected Sourness
Expected Sweetness
Design Innovativeness
Design Attractiveness
A
B
C
D
90
80
70
60
50
40
30
20
10
Key
Rectangle
Circle
Tri-up
Tri-down
Leaf
Bouba
Kiki

Table 1

Correlation matrix of measures, across all product categories and window shapes.

	(a) Overall product liking	(b) WTP	(c) Expected product tastiness	(d) Expected product sourness	(e) Expected product sweetness	(f) Perceived innovativeness	(g) Perceived design attractiveness
(a)	-	0.68	0.53	-0.05	0.20	0.14	0.51
(b)		-	0.67	-0.08	0.25	0.16	0.57
(c)			-	-0.09	0.32	0.19	0.56
(d)				-	0.07	0.23	0.01
(e)					-	0.17	0.29
(f)						-	0.36
(g)							-

Note. All correlations are significant to $p < .001$.

Table 2

Results of angularity of window shapes (circular/rectangular) by category.

	Circular		Rectangular					
	M	SE	M	SE	*z*	*r*	*p*	Sig.?
Granola								
Overall Liking	73.55	2.56	57.50	2.61	-4.49	0.31	>.0001	**Yes**
WTP	65.81	3.00	57.31	2.98	-3.30	0.23	.0010	**Yes**
Tastiness	65.00	2.94	52.60	2.97	-4.03	0.28	.0001	**Yes**
Sourness	21.74	2.67	23.64	2.53	-1.20	0.08	.2321	No
Sweetness	55.39	2.68	48.65	2.51	-3.00	0.21	.0027	**Yes**
Innovativeness	36.89	2.73	30.10	2.48	-2.25	0.16	.0244	No
Attractiveness	55.77	3.05	41.20	2.82	-4.81	0.33	>.0001	**Yes**
Chocolate								
Overall Liking	73.25	2.63	64.67	2.49	-2.96	0.20	.0031	**Yes**
WTP	74.61	2.44	65.07	2.88	-2.98	0.21	.0029	**Yes**
Tastiness	80.88	2.04	71.05	2.91	-2.85	0.20	.0044	**Yes**
Sourness	14.71	2.05	17.84	2.52	-0.75	0.05	.4518	No
Sweetness	85.39	1.52	80.08	2.06	-2.73	0.19	.0063	No
Innovativeness	43.96	3.03	39.52	2.85	-1.43	0.10	.1539	No
Attractiveness	77.22	2.26	65.01	2.74	-3.87	0.27	.0001	**Yes**
Pasta								
Overall Liking	69.00	2.60	70.55	2.69	-0.54	0.04	.5901	No
WTP	73.10	2.52	62.70	2.71	-3.19	0.22	.0014	**Yes**
Tastiness	72.24	2.33	63.20	2.69	-3.20	0.22	.0014	**Yes**
Sourness	15.34	2.20	16.38	2.17	-1.01	0.07	.3148	No
Sweetness	27.05	2.99	22.26	2.74	-2.35	0.16	.0187	No
Innovativeness	35.81	2.93	25.37	2.48	-3.60	0.25	.0003	**Yes**
Attractiveness	59.04	2.84	49.31	3.01	-3.27	0.23	.0011	**Yes**
Lemon Mousse								
Overall Liking	80.56	2.05	58.32	2.94	-5.12	0.35	>.0001	**Yes**
WTP	73.39	2.54	59.64	2.80	-4.31	0.30	>.0001	**Yes**
Tastiness	77.73	2.25	61.77	3.15	-4.76	0.33	>.0001	**Yes**
Sourness	47.44	3.00	48.85	2.93	-0.60	0.04	.5465	No
Sweetness	75.40	2.07	65.91	2.29	-3.99	0.28	.0001	**Yes**
Innovativeness	41.15	2.84	36.53	2.73	-0.81	0.06	.4182	No
Attractiveness	68.02	2.65	49.42	3.20	-4.53	0.31	>.0001	**Yes**

M = mean score; SE = standard error; *r* = effect size (see Pallant, 2007, p. 225); Sig.? = measures where scores are significantly different using the *p*-value derived from the Hochberg procedure.
Note. *N* = 105.

Table 3

Results of the 'bouba/kiki effect' of window shapes by category.

	'Bouba'		'Kiki'					
	M	SE	M	SE	*z*	*r*	*p*	Sig.?
Granola								
Overall Liking	41.78	2.67	37.15	2.65	-1.77	0.12	.0770	No
WTP	42.11	2.81	35.81	2.53	-2.39	0.17	.0171	No
Tastiness	42.88	2.67	39.59	2.75	-1.94	0.13	.0521	No
Sourness	20.53	1.94	26.20	2.81	-1.53	0.11	.1250	No
Sweetness	51.24	2.57	44.37	2.34	-2.44	0.17	.0146	No
Innovativeness	43.02	2.97	40.54	2.81	-1.32	0.09	.1860	No
Attractiveness	39.65	2.80	36.76	2.62	-1.22	0.08	.2231	No
Chocolate								
Overall Liking	42.30	2.62	41.20	2.77	-0.70	0.05	.4814	No
WTP	48.54	3.01	46.54	2.98	-0.74	0.05	.4597	No
Tastiness	61.81	2.77	59.25	2.92	-1.68	0.12	.0930	No
Sourness	19.02	2.15	22.30	2.83	-0.99	0.07	.3234	No
Sweetness	73.67	2.41	70.05	2.98	-1.29	0.09	.1962	No
Innovativeness	46.35	2.90	46.33	2.77	-0.15	0.01	.8828	No
Attractiveness	47.62	2.87	49.74	2.89	-0.21	0.01	.8358	No
Pasta								
Overall Liking	44.78	2.70	36.25	2.66	-2.83	0.20	.0047	No
WTP	49.19	2.66	39.71	2.75	-3.45	0.24	.0006	**Yes**
Tastiness	49.68	2.66	47.14	2.86	-1.54	0.11	.1243	No
Sourness	17.05	2.03	21.49	2.84	-2.04	0.14	.0419	No
Sweetness	22.76	2.62	15.29	1.71	-2.78	0.19	.0055	No
Innovativeness	39.72	3.04	36.35	2.85	-2.06	0.14	.0398	No
Attractiveness	42.60	2.84	36.31	2.48	-2.23	0.15	.0258	No
Lemon Mousse								
Overall Liking	53.72	2.94	37.35	2.73	-4.87	0.34	>.0001	**Yes**
WTP	51.29	2.99	40.53	2.86	-3.48	0.24	.0005	**Yes**
Tastiness	58.53	2.78	52.77	2.83	-1.95	0.13	.0516	No
Sourness	47.59	2.66	56.58	2.77	-2.67	0.19	.0075	No
Sweetness	67.09	2.33	59.67	2.68	-2.41	0.17	.0159	No
Innovativeness	51.59	2.98	43.65	2.76	-3.01	0.21	.0026	No
Attractiveness	52.04	3.08	44.19	2.90	-2.55	0.18	.0107	No

M = mean score; SE = standard error; *r* = effect size (see Pallant, 2007, p. 225); Sig.? = measures where scores are significantly different using the *p*-value derived from the Hochberg procedure.
Note. *N* = 104.

Table 4

Results of orientation of triangular window shapes (upwards-pointing/downwards-pointing) by category.

	Upwards		Downwards					
	M	SE	M	SE	*z*	*r*	*p*	Sig.?
Granola								
Overall Liking	50.13	2.70	35.67	2.95	-4.30	0.30	>.0001	**Yes**
WTP	47.33	2.59	33.78	2.56	-5.21	0.36	>.0001	**Yes**
Tastiness	43.94	2.65	41.88	2.75	-1.15	0.08	.2522	No
Sourness	27.63	2.86	28.74	3.02	-1.05	0.07	.2945	No
Sweetness	44.93	2.45	42.08	2.30	-0.97	0.07	.3334	No
Innovativeness	44.90	2.87	45.45	3.11	-0.76	0.05	.4459	No
Attractiveness	41.84	2.72	31.80	2.73	-4.15	0.29	>.0001	**Yes**
Chocolate								
Overall Liking	58.65	2.89	35.59	3.13	-5.46	0.38	>.0001	**Yes**
WTP	61.45	2.63	46.58	2.94	-4.90	0.34	>.0001	**Yes**
Tastiness	68.52	2.46	56.37	3.33	-4.25	0.29	>.0001	**Yes**
Sourness	24.57	2.85	22.70	2.95	-0.86	0.06	.3919	No
Sweetness	74.62	2.54	69.33	3.06	-2.73	0.19	.0063	No
Innovativeness	51.31	2.79	45.87	3.00	-1.28	0.09	.1991	No
Attractiveness	63.32	2.63	48.35	3.08	-4.81	0.33	>.0001	**Yes**
Pasta								
Overall Liking	47.73	2.72	35.80	2.89	-3.87	0.27	.0001	**Yes**
WTP	52.52	2.62	37.42	2.83	-4.67	0.32	>.0001	**Yes**
Tastiness	55.85	2.51	47.48	2.94	-3.58	0.25	.0003	**Yes**
Sourness	21.47	2.50	25.37	3.10	-2.10	0.15	.0355	No
Sweetness	22.68	2.50	18.83	2.21	-0.98	0.07	.3258	No
Innovativeness	39.52	3.01	37.77	3.21	-0.19	0.01	.8482	No
Attractiveness	43.69	2.84	36.33	3.03	-2.57	0.18	.0102	No
Lemon Mousse								
Overall Liking	46.36	2.66	31.13	2.67	-4.79	0.33	>.0001	**Yes**
WTP	48.46	2.65	37.45	2.88	-3.95	0.27	.0001	**Yes**
Tastiness	60.18	2.68	49.36	2.94	-4.40	0.30	>.0001	**Yes**
Sourness	53.91	2.87	50.33	2.93	-0.56	0.04	.5760	No
Sweetness	60.03	2.63	57.75	2.73	-1.67	0.12	.0946	No
Innovativeness	47.87	2.46	48.70	3.03	-0.49	0.03	.6228	No
Attractiveness	53.90	2.81	40.25	2.74	-4.69	0.32	>.0001	**Yes**

M = mean score; SE = standard error; *r* = effect size (see Pallant, 2007, p. 225); Sig.? = measures where scores are significantly different using the *p*-value derived from the Hochberg procedure.
Note. *N* = 105.