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The influence of packaging shape on perceived

taste for familiar and unfamiliar brands

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Abstract

In marketing communication, packaging can play a vital role by attracting a consumer's attention and by conveying a message about the product it contains. All its external sensory features such as shape, weight, and color help consumers with making assumptions about the product and its taste. When these features are congruent with the taste of the product, a crossmodal correspondence is brought into play. A frequently found correspondence is for instance one between rounded shapes and sweetness.

The heuristic of brand awareness is also often applied by consumers when buying products. A brand's name is seen as an important quality cue, and consumers favor products they are familiar with.

No research to date has studied both the influence of brand familiarity and taste-shape correspondences on taste perception. Therefore the present study asked the following research question: "What is the influence of packaging shape on perceived taste for familiar and unfamiliar brands?". An experiment was carried out to study the research question. To improve ecological validity, 3D packages were made. Two rounded and two angular packaging shapes and two familiar and two unfamiliar brands were used. In the package a piece of chocolate was placed that participants tasted, being dark or milk chocolate of the corresponding brand.

Packaging shape had little effect on taste perception, although a strong effect of brand familiarity was found. Participants who preferred dark chocolate liked milk chocolate in a rounded package more than milk chocolate in an angular package. For participants who preferred milk chocolate, the opposite was true for familiar brands. Unfamiliar brands were liked more than familiar brands, which was contradictory to the expectations. No other effects were found.

Packaging shape is but one part of the puzzle of multisensory marketing. Combined with other stimuli, it might have a bigger influence on taste perception.

Introduction

"Life is like a box of chocolates. You never know what you're gonna get"
    - Forrest Gump

From a marketing communication perspective, the abovementioned quote might be less true. Imagine you are walking through town and decide to have a look at some clothes. You enter a nearby shop, and whilst setting your foot on the doorstep, a pleasant smell can be detected. The stage is set. The next thing you notice is the background music, guiding you through the shop. The colors used, the lights: everything seems to match. And before you know it, you bought that shirt you did not really need – but it felt right at that moment. What just happened there, is the effect of multisensory marketing. Marketeers are increasingly altering the promotion of their product towards a complete consumer experience (Spence, Puccinelli, Grewal, & Roggeveen, 2014; Lindstrom, 2005; Krishna & Schwarz, 2014). They are focusing their attention on something called cross-sensory associations, where everything sensorial is matched to the image they wish to convey. By doing so they are letting you see, smell, and touch *exactly* what they want you to get. Imagine that clothing shop was an Abercrombie & Fitch store. Its stores strongly resemble luxurious night clubs: an association is made.

    In addition to a store conveying a certain feeling, the packaging of a product can also communicate specific product attributes (Velasco, Salgado-Motejo, Marmolejo-Ramos, & Spence, 2014). Its shape, color, and the typeface used can all convey an idea about what is inside the container. These external sensory features motivate consumers to make assumptions about the product and its taste (Becker, Van Rompay, Schifferstein, & Galetzka, 2011). As a result, packaging can play a major role in influencing consumers' decision making as well as in attracting their attention to the product (Ares & Deliza, 2010). For instance, the purple color of Cadbury's is associated with gustatory pleasure (Spinney, 2013). From a marketing communication point of view, the color use allows for brand differentiation and assists in brand recall. It can be said that here, color makes the brand (Aslam, 2006). The company has had an ongoing battle in court to trademark the color in order to prevent competitors from using it and, in an indirect way, prevent them from using the meaning it

conveys.

When consumers enter a supermarket, their eyes come across the packaging of a product first. One of the first visual cues is the shape of the packaging (Spence, 2016). As consumers cannot usually sample a product before buying it, they generally buy a product based on their expected taste and flavor (Simmonds & Spence, in press). By creating packaging that fits the product's attributes, a more appropriate expectation can be formed by the consumer (Velasco et al., 2014). So, when brands use a certain packaging shape in their marketing communication strategies that is congruent with the taste of the product, they may expect an advantage in the marketplace since people process the information more fluently and their initial expectations are met (Velasco, Woods, Petit, Cheok, & Spence, 2016). On the other hand, unfulfilled expectations can increase product distrust, and consumers will continue to evaluate the product more negatively for a long time (Spence, 2012).

Alongside packaging shape, other cues can play a role too in defining a consumer's liking and perceived taste. As McDonald and Sharp (2000) state, consumers tend to prefer brands they are familiar with, and feel like those taste better than unfamiliar brands. In such way, a brand name acts as a quality cue for consumers while shopping for food (Paasovaara, Luomala, Pohjanheimo, & Sandell, 2012). To get a better insight into the effects of packaging shape and familiarity on taste perception, the present research studies both concepts to a greater extent.

1. Literature review

1.1. Crossmodal correspondence

If the shape of a product matches with the taste of the actual product, a compatibility effect is perceived through two different sensory modalities: vision and taste (Spence, 2011). This association between two sensory modalities is called crossmodal correspondence (Spence, 2012). Crossmodal correspondences are defined by Spence (2016, p. 8) as "the surprising cross-sensory associations that many of us share between seemingly unrelated dimensions of experience in different sensory modalities". Crossmodal correspondences appear to operate on an implicit level and can have a positive impact on the consumer's overall multisensory experience (Spence, 2011; Spence, 2012). Consumers might be able to see, hear or feel different stimuli, but are unaware of the meaning this might have on their perception and expectations of the product itself (Spence, 2011). As a result, consumers will not experience any conscious resistance towards a product. A large quantity of research has indicated that consistent crossmodal correspondences between different stimulus features from different sensory modalities exist, suggesting crossmodal matches are universal and robust (for review see Spence & Deroy, 2013).

1.1.1. Types of crossmodal correspondence

An often asked question is how crossmodal correspondences come about. Spence (2011) states that there may be different kinds of crossmodal correspondence: statistical, structural and semantically mediated correspondences. These kinds might have different consequences for human perception, information processing, and behavior. First, correlations in nature can lead to crossmodal associations, such as the correspondence between mass and frequency. An example are associations with pitch, like the correspondence of a low pitch sound with heavy objects (Spence, 2011). This association can be explained by the mass of the object: when an elephant (a large animal) would trumpet, this would have a lower pitch than a mouse's squeak (a small animal). This is called statistically mediated correspondence and relates to the regularities of the world we live in. Second, neural connections that are present at birth can naturally induce crossmodal correspondence. This is known as structurally mediated correspondence. Finally, the terms that people use to describe stimuli can imply multiple modalities. For example, the word

'low' can describe a low pitch, but also has a spatial meaning (low to the ground). The author refers to this as a semantically mediated correspondence. In the following sections, some of the most studied examples of crossmodal correspondence are discussed.

1.2. Crossmodal correspondences observed through language and sounds

In marketing, crossmodal associations can be used to describe products. Crossmodal correspondences can be translated into language, such as the language that wine experts use to define a certain type of wine (Spence & Deroy, 2013). They might call a particular type of wine round, elegant, or even silky, which can be seen as a metaphorical use of language (Caballero & Suárez-Toste, 2008). By doing so, they are able to communicate the complex sensory experience of tasting wine to others. Rhetorical devices such as metaphors can also be used to transfer a quality of one sensory modality to another (Smirnova, 2016). Here, comparisons are borrowed from other modalities, such as vision and touch. An example is the Skittles slogan "Taste the rainbow".

Furthermore, as reported by Lowrey & Shrum (2007), the sound of words can transfer a distinct meaning. Here, particular word sounds can be used to convey a certain sensory association with a product (Spence & Piqueras-Fiszman, 2014). This association between word sounds and specific stimulus attributes is known as sound symbolism (Spence, 2012). For instance, as reported in the review of Spence (2012), an association was found between the letter 'i' and smallness. This sound symbolic relationship was detected by giving people the option to describe a table by using the words 'Mil' or 'Mal'. For a small table, the word 'Mil' was preferred, while for a large table, the word 'Mal' was used to describe it. The same result was found across different languages (Sapir, 1929, in Spence, 2012).

Another research on sound symbolism found that participants prefer brand names of which the attributes of the vowel sounds were congruent with the attributes of the product mentioned (Lowrey & Shrum, 2007). The research showed that words that contained front vowel sounds (e.g. sounds which are lighter and smaller such as "heat") were preferred when the product was a knife or a two-seater convertible. Words with back vowel sounds (e.g. sounds that are perceived to be larger and duller such as "hood") were preferred when the product was a SUV or a hammer. The same results were replicated in a study of Boltz, Mangigian, and Allen (2016). Small and large products were compared with each other, and

congruent pairings (words with front vowels and for instance soap, and words which contained back vowels with for example a refrigerator) led to an enhanced brand name and a better product recall.

Besides the effect of sound and language on one's perception, many studies also show that associations exist between sound and taste. In Ngo, Misra, and Spence's study (2011), milk chocolate was associated with softer sounding words such as the nonsense word 'maluma', whereas dark chocolate was associated with sharper sounding words such as 'takete'. Strong evidence has also been found for the association between the frequency of a sound and the intensity of a tastant. When the intensity of a tastant increases, higher frequency sounds are associated with it (Simner, Cuskley, & Kirby, 2010). This result has been stable across different tastants. For example, there seems to be a robust correspondence between bitterness and a lower pitched sound (Spence, 2012).

Finally, sound-shape symbolism has been a subject of research over the years. In different experiments, people constantly link the nonsense word 'bouba' to rounded shapes, and the word 'kiki' to angular shapes, even across different (remote) cultures (Bremner, Caparos, Davidoff, de Fockert, & Linnell, 2013).

1.3. Shape symbolism

A different form of crossmodal correspondence used in marketing is shape symbolism. Within shape symbolism, abstract shapes are matched to other sensory attributes, such as oral-somatosensory attributes (creaminess, texture, crispiness), tastes, and flavors (Spence, 2011; Spence, 2012). A common example of shape symbolism is people's association of round shapes with sweet tastes (Spence, Ngo, Percival, & Smith, 2013; Spence, 2011; Spence & Deroy, 2013). This type of crossmodal correspondence is discussed further in the present study. Previous studies have used various methods to research shape symbolism. Some investigated the effect of shape on taste, while others focused on the effect of taste on shape. Examples of prior research on the crossmodal correspondence of shape and taste are summarized below.

1.3.1. The effect of shape on taste

Consumers nearly always look at a product before they pick it up. As a result, using the right type of package for the right type of product has become an important factor for the long-

term success of products (Spence, 2016). Amongst other visual cues such as color and typography, shape plays an important role in communicating the taste of a product. Hence, several studies have suggested that the shape a product is presented in can affect the perceived taste of a product.

An example is the recent research of Van Doorn, Colonna-Dashwood, Hudd-Baillie, and Spence (2015) on latté art in which they explored the presence of latté art, the shapes used on the froth of milk-based coffee drinks, and the effect of latté art shapes and latté art presence on estimated price and quality. The results showed that participants were not only willing to pay more for a drink with latté art, but also expected the drink with an angular latté art shape to be more bitter, to be of better quality, and to be liked more than a round shape on the froth. No results were found on sweetness and intensity perceptions.

In another research on shape-taste associations, participants in a supermarket were shown a short movie of an angular or a round yoghurt carton making a 360 degrees rotation (Becker et al., 2011). Afterwards, they were asked to taste a yoghurt sample. Participants reviewed angular shapes as more fitting with intense taste sensations. However, this result did not reach significance. Only participants with a sensitivity to design rated the yoghurt's taste as more intense when associated with the angular package.

A contradictory outcome came forward in the study of Velasco et al. (2014). In their research on sweet and sour products and round and angular packages, participants had to rate virtually designed packaging shapes, which were shown on a screen. They had to indicate as quickly as possible whether they found the showcased packaging shape to be more appropriate for a sweet or sour product, as well as rate the packages based on how sweet or how sour they thought the product inside the packaging might be. The researchers found that sweet tastes were paired with rounded shapes, and sour tastes were paired with angular shapes. However, tasting of a product was not included in their experiment.

From the discussed studies above it seems that shape does have an influence on taste perception, although outcomes vary and different research methods were used to test the effect of shape on taste. Angular shapes seem to be associated with both sour and bitter tastes, as well as with intensity. Rounded shapes seem to match with sweet tastes.

1.3.2. The effect of taste on shape

In addition to the research on shape affecting taste, various studies have shown that taste

can also affect shape choices. For instance the study by Ngo et al. (2011), in which participants tasted different types of chocolate and rated those along visual scales. On the right end of the scale an angular shape was placed, and a rounded shape was placed on the left end of the scale. Participants were asked to place a mark anywhere on the line after tasting the chocolate. The research showed that participants associated dark chocolate (70-90% cocoa) with more angular shapes, while milk chocolate (30% cocoa) was associated with more rounded shapes.

Another study on taste-shape correspondence is the research of Deroy & Valentin (2011) on the association between beer samples and 2D and 3D images. In their study, participants tasted three kinds of beer which were presented in plastic cups under red light to cover up the color of the beer. After tasting each beer, the participants were asked to select a drawing from a proposed set that best suited and characterized the flavor of the tasted beer. The participants were also asked to verbally describe the flavor of the tasted beer. The results revealed that participants matched sweet flavors with rounded, voluminous, and regular shapes and sparkling, bitter flavors with angular shapes.

To summarize, the taste-shape studies suggest that angular shapes are associated with more bitter tastes, and rounded shapes are associated with sweeter tastes. It can be said that the taste-shape studies show more consistent outcomes than the studies on the effect of shape on taste.

On a concluding note, it is worth mentioning that crossmodal correspondences are likely to be bidirectional: if sweetness is paired with roundness, roundness will most probably be paired with sweetness (Spence & Deroy, 2013). Therefore, the preceding studies do altogether contribute to a growing body of literature that might clarify congruency between shape and taste.

1.4. Familiarity

From the abovementioned research, it seems that the success or failure of a product on the supermarket shelf almost solely depends on the cross-sensory associations that are made (Spence, 2016). However, in addition to these cues, the preference for a brand can play a role of importance too. In many purchase situations, consumers spend minimal time and effort on choosing brands, and rely on the basis of a simple heuristic such as the price and packaging of a product. Another option is to rely on brand awareness. Reported by

Macdonald and Sharp (2000), consumers prefer products they are familiar with. In their study, which was a replica of the study of Hoyer and Brown (1990), participants showed a higher preference for high awareness brands despite quality and price differences. High awareness brands were defined as brands that were recognized by the participants in a pre-test of unprompted recall.

Familiar brands are also associated with stronger purchase intentions (Paasovaara et al., 2012). This can be explained by the awareness heuristic: consumers stick to their habit of using awareness as a guide for their purchase behavior (Macdonald & Sharp, 2000). Therefore, a brand's name acts as an important quality cue for consumers, as food is often bought regularly and under time pressure (Paasovaara et al., 2012).

Finally, brand familiarity can be related to taste perceptions too. Consumers feel that familiar brands taste better than unfamiliar brands. The influence of brand familiarity on product preference is strong: various research has shown that when participants get to blind taste a product, they often prefer the taste of the unfamiliar brand over the taste of the familiar brand, while when brand names were shown, the familiar brand is often favored (Vransevic & Stancec, 2003 in Paasovaara et al., 2012; Makens, 1965, in Paasovaara et al., 2012; Hoegg & Alba, 2007, in Paasovaara et al., 2012). But when familiarity decreases, the impact it has on choice decreases as well. Here, the external features of packaging might be of more help in providing customers with information about the product.

1.5. The key to influencing consumer decision making

Nowadays, changing the shape of packaging is cheaper for companies than before (Spence, 2012). Depending on the familiarity with a product and its packaging, a consumer can use shape features to clarify which taste to expect (Velasco et al., 2016). On the other hand, when consumers are familiar with a brand, they might rely more on the knowledge they have of the brand to determine a product's taste than on the shape of the packaging. Consequently, the conditions under which consumers would rely on shape information are not completely clear. If a familiar brand name is used on the packaging, does shape still have an effect on perceived taste, or does the brand awareness heuristic hold a more powerful grip on a consumer's taste perception? There has not yet been conducted any research on the interaction of the familiarity of a brand on perceived taste and taste-shape correspondences.

Second, packaging does not only play an important role upon the point of sales, but also at the point of consumption. As Simmonds and Spence (in press) state, little research has been carried out to analyze what the effect is of seeing a product on subsequent product evaluations, such as taste. The review of Velasco et al. (2016) shows that there has been less research on matching actual tastants with packaging shapes. Although several studies show that people match bitterness with angular shapes (Van Doorn et al., 2015; Deroy & Valentin, 2011) and sweetness with rounded shapes (Spence et al., 2013; Spence, 2011; Spence & Deroy, 2013), the effect of packaging shape on taste perception has not been assessed in these studies, neither did the discussed research show consistent results. Therefore, Velasco et al. (2016, p. 21) state that "research is still needed in order to determine the extent to which the shape features of a product's packaging influence the taste of the product itself".

Furthermore, in the studies of Becker et al. (2011), Velasco et al. (2014), and Deroy & Valentin (2011), participants rated perceived or expected taste based on virtual 2D or 3D shapes. This does not come close to an actual consumer experience, and so a study with more ecological validity is needed to research the effect of shape on taste perception.

The present research seeks to gain more insight in product design and the role of familiarity with a brand, and how this can influence taste. It also seeks to confirm the suggested associations between sweetness and rounded packaging shapes and bitterness and angular packaging shapes. Therefore, the research question asked is: "What is the influence of packaging shape on perceived taste for familiar and unfamiliar brands?". The present study suggests that:

H1a. A round package leads to a perceived sweeter taste of the product.

H1b. An angular package leads to a perceived more bitter and intense taste of the product.

H2. The taste of familiar brands is preferred over the taste of unfamiliar brands, despite the (in)congruency of packaging shape.

H3. Congruent taste-shape products are liked more than incongruent taste-shape products.

H4. Packaging shape plays a more important role in defining taste when an unfamiliar brand is tasted than when a familiar brand is tasted.

2. Method

2.1. Subjects

As the number of participants varies in similar research focused on matching tastes and shapes, the number of participants of previous research was reviewed to determine a correct sample size for the present study. Previous sample sizes ranged from 20 participants (Ngo et al., 2011) to 151 participants (Becker et al., 2011). Having taken the aforementioned research in consideration, 62 participants were used for this study. Participants were recruited via the online Radboud Research Participation System and the personal network of the researcher. Of the 62 participants 49 were female and 13 were male. Their average age was 23. An overview of their educational level can be found in Table 1.

Table 1.   The educational level of the participants and frequencies

Educational level	Number of participants
Secondary education	10
Intermediate vocational education (MBO)	1
Bachelor's degree at university of applied sciences (HBO)	6
Bachelor's degree on university level (WO)	27
Master's degree or higher	18

2.2. Research design

A 2x2x2 within subjects design was used to carry out the research with the independent variables packaging shape (angular vs. rounded), chocolate (dark vs. milk), and familiarity (familiar vs. unfamiliar). Participants rated all conditions of shape and corresponding taste. Randomization of presentation order was used to prevent unsystematic variation. Qualtrics was used to automatically randomize the presentation order. Each condition was given a random number, and according to the number mentioned by Qualtrics on the computer screen to the participant, the right package was brought to the participant by the researcher.

2.3. Materials

Four different shapes of packaging of chocolate were used (two angular and two rounded). The packaging was made via the means of 3D printing, as it is more versatile then other designing methods. The designs were found online via the website thingiverse.com[1]. The shapes were printed in grey to prevent any pre-existing color-taste associations. Although the spiky design is a rounded shape in its totality, previous research on the "Bouba-Kiki" effect has shown significant results with using a similar spiky surface (Fryer, Freeman, & Pring, 2014). Figure 1 displays the packages used in the experiment.

The chocolate variations that were tested were milk chocolate and dark chocolate (at least 46% cacao content, according to the cacao ratios of the brands used). Small sized chunks of chocolate were served. For the familiar brands, Tony's Chocolonely and Côte d'Or were used, and Åkesson's and Delaviuda were used as unfamiliar brands. These four brands were rated as respectively most familiar and most unfamiliar in a pre-test. The actual chocolate of the familiar brands was used to prevent participants from noticing differences between the taste of the chocolate and the presented brand. For the unfamiliar brands, chocolate from a local chocolate shop was used to have more or less the same chocolate quality. The brand name was written on a card, which was placed before the packaging shape, as depicted in Figure 2.
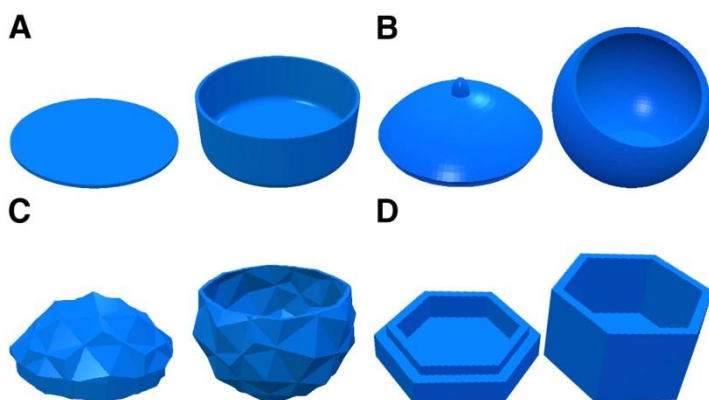

Figure 1.   3D containers. A and B represent rounded packaging shapes, while C and D represent angular packaging shapes

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[1] Design A was designed by Walter Hsiao (user name walter). Design B was designed by Thingiverse user name Thomas S.. Design C was designed by Thingiverse user pmoews. Design D was designed by Alessandro Damiani (user name alex80it).

Figure 2.   Example of shape B with a familiar brand in the
               experiment set-up

2.4. Pre-test

To check if the manipulation of brand familiarity was successful, a pre-test was carried out. Fifteen persons who did not take part in the experiment rated a total of ten different (foreign) chocolate brands which varied in familiarity. Their average age was 24. Nine of the participants were female and six participants were male. A Qualtrics survey was used to record their responses. A detailed description of the results of the pre-test can be found in Appendix I. The two most familiar brands were Milka and Tony's Chocolonely. As Milka does not sell dark chocolate in The Netherlands, the third most familiar brand was chosen, which was Côte d'Or. The two brands rated as most unfamiliar were Åkesson's and Delaviuda.

2.5. Instrumentation

Taste and liking were defined as dependent variables. Taste was measured on a seven-point Likert-scale, with questions asked as:

1. *How bitter is this chocolate?*
   Not bitter at all   1   2   3   4   5   6   7   Very bitter
2. *How sweet is this chocolate?*
   Not sweet at all   1   2   3   4   5   6   7   Very sweet
3. *How intense is this chocolate?*
   Not intense at all   1   2   3   4   5   6   7   Very intense

Liking was measured on a seven-point hedonic scale of Peryam & Pilgrim (1957) as follows:

1. *How much do you like this chocolate?*

Very much dislike   1   2   3   4   5   6   7   Very much like

2.6. Procedure

The experiment was conducted in a controlled setting in the olfactory lab of the CLS Laboratory of the Radboud University Nijmegen. After an explanation of what the participant could expect and after having signed the consent form, the participant was asked to start with the online Qualtrics questionnaire provided on a computer in the room. The questionnaire was divided into three phases. In the first phase participants were asked to answer questions regarding demographics (age, gender, education). After filling in these questions, a number was presented on the screen. This brought participants to phase two, which consisted of the tasting of the chocolate and rating it. The participant told the researcher of the study the given number and the researcher prepared the corresponding combination of shape, brand and chocolate. The researcher ensured that all combinations of chocolate, brand familiarity and packaging were equally used throughout the experiment. For hygienic purposes, a spoon was used to scoop up the chocolate pieces and to place them in a container. Next, the participant was brought the first container with one piece of chocolate. The other containers, as well as the labels with brand names, and the different types of chocolate were not visible for the participants. The researcher opened the container, as to prevent a third variable from intervening (touch). Participants could then take the piece of chocolate out of the container and taste it. The participants proceeded to rating the taste and liking of the chocolate. To neutralize taste, cups of water were present and participants were explicitly asked in the questionnaire to take a sip of water in between tasting. Consecutively they proceeded to the second container, which followed the same process as mentioned above, until the final (eighth) container. In the third and final phase, participants were asked to answer questions about their buying behavior and their chocolate preference, as well as their idea on what the research could be about. These questions were asked to get an insight of the consumer profile of the participants and to be able to run different follow-up tests to study if these variables had any influence on shape-taste correspondence. As the present research was combined with another research on

crossmodal correspondences (juice and color perception), participants needed about half an hour to complete the whole experiment. To minimize effects of experiment order, the order of the chocolate and juice experiment was counterbalanced. At the end of the experiment, all participants were asked if they were interested in partaking in a raffle, in which they could win a €25 VVV gift card or a Tony's Chocolonely gift package.

2.7. Analysis model

In Figure 3, the analysis model that was used in the current research is shown. Familiarity, chocolate type, and shape were all independent variables. Familiarity was defined as a nominal variable with two levels (familiar or unfamiliar), as well as chocolate type (milk or dark) and shape (angular or rounded). Liking and taste were both defined as dependent variables. Liking and taste were interval variables.
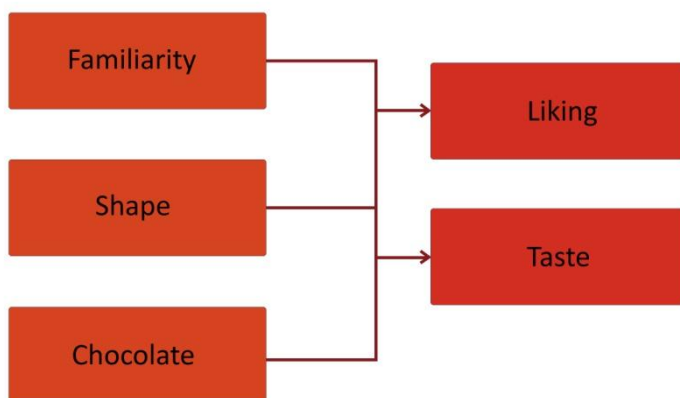

Figure 3.   Analysis model

2.8. Statistical treatment

The statistical treatment used for this experiment were various three-way repeated-measures ANOVA's.

3. Results

3.1. Reliability of the dependent variable scales

After analyzing the results, it was shown that the reliability of the bitterness scale relative to the chocolate type, brand familiarity, and packaging shape was relatively low, Cronbach's α = .66. The reliability of the sweetness scale relative to the chocolate type, brand familiarity, and packaging shape was adequate, Cronbach's α = .73. The reliability of the intensity scale relative to the chocolate type, familiarity, and packaging shape was adequate, Cronbach's α = .70. The reliability of the hedonic scale relative to the chocolate type, brand familiarity, and packaging shape was low, Cronbach's α = .53.

3.2. Normality tests

Kolmogorov-Smirnov and Shapiro-Wilk tests were used to check the assumption of normality for all dependent variables. They all proved to be statistically significant ($p < .05$). Therefore, the assumption of normality was violated for all dependent variables. Although ANOVA is robust against violations, this does mean that caution is needed when interpreting the results.

3.3. Between-subject factors

Besides the effects of the independent variables on taste perception and liking, a couple between-subject factors were analyzed. Any possible effects of the answers on the questions of phase three of the questionnaire (chocolate preference and buying behavior) were studied. Possible effects of the experiment order were studied as well. Concerning chocolate preference, sixteen of the participants preferred dark chocolate, while 36 participants preferred milk chocolate. Ten participants liked both chocolate types equally. Regarding buying behavior, three participants bought chocolate every day, 29 participants bought chocolate every week, twenty bought chocolate every month, seven participants bought chocolate every few months, and three participants never bought chocolate. The variable buying behavior was restructured into two categories to obtain bigger group sizes. The participants were divided into participants who often bought chocolate (every day and every week: 32 participants), and participants who bought chocolate every now and then or never (every month, every few months, and never: 30 participants). The results are given for each

dependent variable below. The same type of ANOVA was used for all dependent variables as described in section 3.4. Therefore, the statistical tests and the corresponding variables are not described again in sections 3.5, 3.6, and 3.7.

3.4. Bitterness

A repeated measures ANOVA on ratings of bitterness with chocolate type (milk versus dark), shape (round versus angular), and familiarity (familiar versus unfamiliar) as within-subject factors showed a significant main effect of chocolate type (F (1, 61) = 302.30, p < .001, η_p^2 = .83). Milk chocolate (M = 1.81, SD = .74) was perceived as significantly less bitter than dark chocolate (M = 4.38, SD = 1.14). There was also a significant main effect of familiarity (F (1, 61) = 80.49, p < .001, η_p^2 = .57). Unfamiliar brands (M = 2.61, SD = .79) were perceived as significantly less bitter than familiar brands (M = 3.58, SD = .95). None of the interactions were significant (p > .05).

Controlling for chocolate preference

A mixed ANOVA with chocolate type (milk versus dark), shape (round versus angular), and familiarity (familiar versus unfamiliar) as within-subject factors and chocolate preference (dark, milk, both, neither) as between-subject factor showed that chocolate preference did not affect ratings (F (2, 59) = 1.36, p = .265, η_p^2 = .04), nor did it interact with any other variables (p > .05).

Controlling for buying behavior

A mixed ANOVA with chocolate type (milk versus dark), shape (round versus angular), and familiarity (familiar versus unfamiliar) as within-subject factors and buying behavior (often versus every now and then or never) as between-subject factor showed a significant main effect of buying behavior (F (1, 60) = 6.36, p = .014, η_p^2 = .10). Participants who often buy chocolate (M = 3.32, SD = 1.02) rated the chocolate tasted as significantly more bitter than participants who buy chocolate every now and then or never (M = 2.85, SD = 1.02). These main effects were qualified by a significant interaction effect between familiarity and buying behavior (F (1, 60) = 4.79, p = .032, η_p^2 = .07). From a simple effects analysis with Sidak correction the following results were found. Participants who often buy chocolate (M = 3.91, SD = 1.26) rated familiar chocolate as significantly more bitter than participants who buy

chocolate every now and then or never (M = 3.22, SD = 1.26). No effects were found for unfamiliar chocolate. There was also a marginally significant interaction between chocolate type and familiarity (F (1, 60) = 3.79, p = .056, η_p^2 = .06). Participants rated familiar milk chocolate (M = 2.17, SD = 1.06) as significantly more bitter than unfamiliar milk chocolate (M = 1.44, SD = .62). Participants rated familiar dark chocolate (M = 4.96, SD = 1.31) as significantly more bitter than unfamiliar dark chocolate (M = 3.79, SD = 1.31).

Controlling for experiment order

A mixed ANOVA with chocolate type (milk versus dark), shape (round versus angular), and familiarity (familiar versus unfamiliar) as within-subject factors and experiment order (juice first versus chocolate first) as between-subject factor showed a significant main effect of experiment order (F (1, 60) = 4.56, p = .037, η_p^2 = .07). Participants who first completed the juice experiment rated the chocolate as significantly more bitter (M = 3.30, SD = 1.02) than participants who started with the chocolate experiment first (M = 2.90, SD = 1.02). There was no interaction effect between experiment order and any of the independent variables.
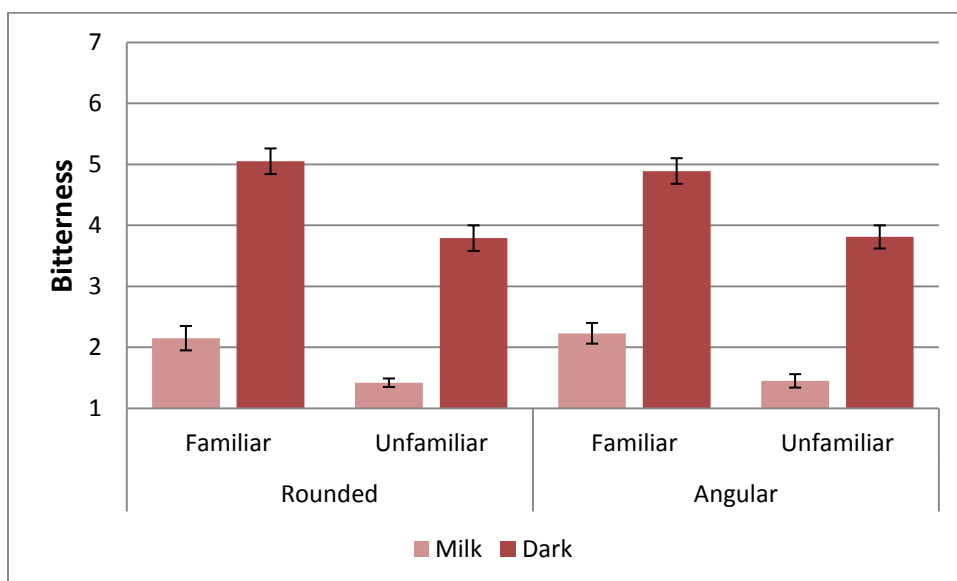

Figure 4.   The mean and standard error of bitterness ratings (1 = not bitter at all, 7 = very bitter)

3.5. Sweetness

A significant main effect of chocolate type was found (F (1, 61) = 265.66, p < .001, η_p^2 = .81). Milk chocolate (M = 5.37, SD = 1.01) was perceived as significantly sweeter than dark

chocolate (M = 3.02, SD = .92). There was also a significant main effect of familiarity (F (1,61) = 28.89, p < .001, η_p^2 = .32). Unfamiliar brands (M = 4.49, SD = .93) were significantly perceived as sweeter than familiar brands (M = 3.92, SD = .84). None of the interactions were significant (p > .05).

Controlling for chocolate preference

Chocolate preference did not affect ratings (F (2, 59) < 1, p = .720, η_p^2 = .01), nor did it interact with any other variables (p > .05).

Controlling for buying behavior

A marginally significant interaction was found between familiarity and buying behavior (F (1, 60) = 3.98, p = .051, η_p^2 = .06). A simple effects analysis with Sidak correction for familiarity and buying behavior showed no significant results. None of the simple effects were close to significance. There was no main effect of buying behavior (F (1, 60) < 1, p = .504, η_p^2 = .01).

Controlling for experiment order

Experiment order did not affect ratings (F (1, 60) < 1, p = .547, η_p^2 = .01), nor did it interact with any other variables (p > .05).
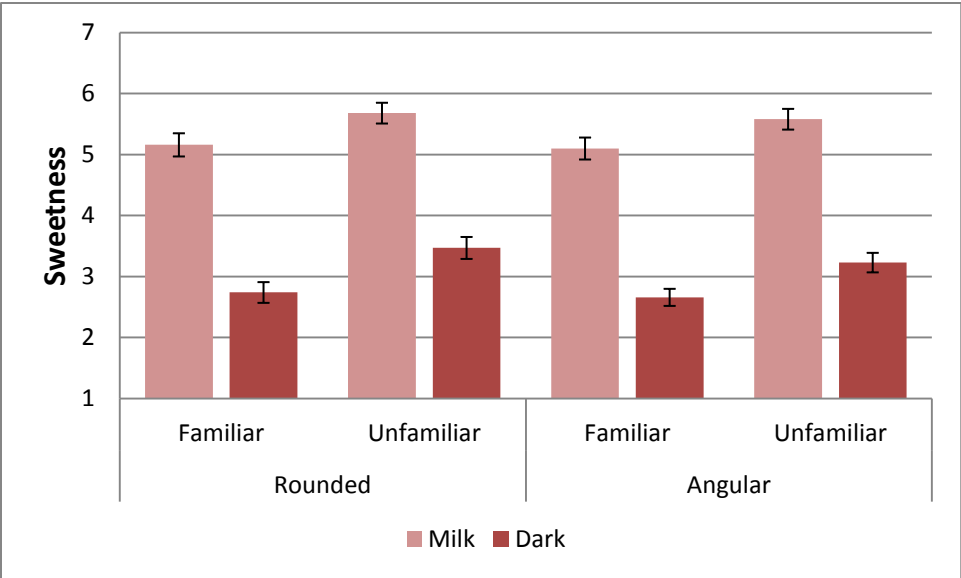

Figure 5.   The mean and standard error of sweetness ratings (1 = not sweet at all, 7 = very sweet)

3.6. Intensity

A significant main effect of chocolate type was found (F (1, 61) = 25.15, p < .001, η_p^2 = .29). Dark chocolate (M = 4.74, SD = .86) was perceived as significantly more intense than milk chocolate (M = 3.88, SD = 1.21). There was also a significant main effect of familiarity (F (1,61) = 46.13, p < .001, η_p^2 = .43). Familiar chocolate (M = 4.66, SD = .93) was perceived as significantly more intense than unfamiliar chocolate (M = 3.96, SD = .87). These main effects were qualified by a significant interaction effect between chocolate type and familiarity (F (1, 61) = 6.48, p = .013, η_p^2 = .10). From a simple effects analysis with Sidak correction the following results were found. Participants rated familiar dark chocolate (M = 5.19, SD = 1.02) as significantly more intense than unfamiliar dark chocolate (M = 4.28, SD = .94). Participants rated familiar milk chocolate (M = 4.12, SD = 1.42) as significantly more intense than unfamiliar milk chocolate (M = 3.63, SD = 1.18). None of the other interactions were significant (p > .05).

Controlling for chocolate preference

Chocolate preference did not affect ratings (F (2, 59) < 1, p = .44, η_p^2 = .03), nor did it interact with any other variables (p > .05).

Controlling for buying behavior

As above, a significant interaction effect between chocolate type and familiarity was found (F (1, 60) = 6.50, p = .013, η_p^2 = .10). Buying behavior did not affect ratings (F (1, 60) < 1, p = .337, η_p^2 = .02), nor did it interact with any other variables (p > .05).

Controlling for experiment order

A significant interaction effect was found between chocolate type and familiarity (F (1, 60) = 7.51, p = .008, η_p^2 = .11). The interaction effect gave the same result as the interaction effect mentioned in the first paragraph. There was no main effect of experiment order (F (1, 60) < 1, p = .412, η_p^2 = .01). There was also a significant interaction effect between chocolate type, familiarity, and experiment order (F (1, 60) = 10.68, p = .002, η_p^2 = .15). Based on the interaction effect between chocolate type, familiarity, and experiment order I looked at the data separately for each experiment order. For participants who had the juice experiment first there was a significant interaction effect between chocolate and familiarity (F (1, 30) =

15.71, $p < .001$, $\eta_p^2 = .34$). Participants who had the juice experiment first rated familiar dark chocolate ($M = 5.26$, $SD = 1.06$) as significantly more intense than familiar milk chocolate ($M = 4.00$, $SD = 1.55$). For participants who had the chocolate experiment first no significant interaction effects were found.
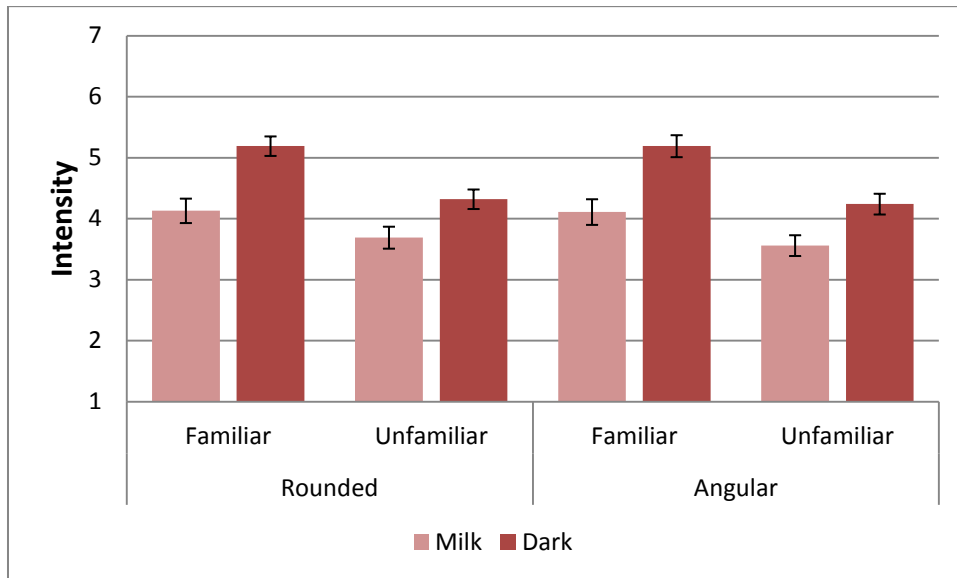

Figure 6.   The mean and standard error of intensity ratings (1 = not intense at all, 7 = very intense)

3.7. Liking

A significant main effect of chocolate type was found ($F (1, 61) = 8.49$, $p = .005$, $\eta_p^2 = .12$). Milk chocolate ($M = 4.40$, $SD = 1.17$) was liked significantly more than dark chocolate ($M = 3.81$, $SD = 1.08$). There was also a significant main effect of familiarity ($F (1,61) = 4.51$, $p = .038$, $\eta_p^2 = .07$). Unfamiliar brands ($M = 4.26$, $SD = .96$) were liked significantly more than familiar brands ($M = 3.95$, $SD = .99$). None of the interactions were significant ($p > .05$).

Controlling for chocolate preference

A significant interaction effect was found between chocolate type and chocolate preference ($F (2, 59) = 21.80$, $p < 1$, $\eta_p^2 = .43$). From a simple effects analysis with Sidak correction the following results were found. Participants who preferred milk chocolate liked milk chocolate ($M = 4.70$, $SD = 1.42$) significantly more than dark chocolate ($M = 3.26$, $SD = 1.18$). Participants who preferred dark chocolate liked dark chocolate ($M = 4.58$, $SD = 1.73$) significantly more than milk chocolate ($M = 3.67$, $SD = 2.20$). A contrast analysis showed that

there was a bigger effect of liking for participants who preferred milk chocolate than for participants who preferred dark chocolate (F (2, 59) = 21.80, $p < .001$, $\eta_p^2 = .43$).

There also was a significant interaction between chocolate type, shape, familiarity, and chocolate preference (F (2, 59) = 3.79, $p = .028$, $\eta_p^2 = .11$). Based on the interaction effect between chocolate type, shape, familiarity, and chocolate preference I looked at the data separately for each chocolate preference. For participants who preferred dark chocolate there was a significant interaction effect between shape and chocolate (F (1, 15) = 4.68, $p = .047$, $\eta_p^2 = .24$). A pairwise comparison showed that milk chocolate in an angular package ($M = 3.38$, $SD = 1.56$) was liked significantly less than milk chocolate in a rounded package ($M = 3.97$, $SD = 1.36$). Dark chocolate did not show significant results.

For participants who preferred milk chocolate there was a significant interaction effect between shape and familiarity (F (1, 35) = 4.95, $p = .033$, $\eta_p^2 = .12$). A pairwise comparison showed that unfamiliar chocolate in a rounded package ($M = 4.29$, $SD = 1.14$) was liked significantly more than familiar chocolate in a rounded package ($M = 3.64$, $SD = 1.26$). For participants who preferred milk chocolate there also was a significant interaction effect between chocolate, shape, and familiarity (F (1, 35) = 7.45, $p = .010$, $\eta_p^2 = .18$). A pairwise comparison showed that milk chocolate of a familiar brand was liked significantly more in an angular package ($M = 4.97$, $SD = 1.68$) than in a rounded package ($M = 4.17$, $SD = 1.74$). No significant results were found for chocolate of an unfamiliar brand or dark chocolate. There was no main effect of chocolate preference (F (2,59) = 2.03, $p = .14$, $\eta_p^2 = .06$).

Controlling for buying behavior

A marginally significant interaction effect was found between chocolate type, shape, and buying behavior (F (1, 60) = 3.89, $p = .053$, $\eta_p^2 = .06$). Based on the marginal interaction effect between chocolate type, shape, and buying behavior I looked at the data separately for each category of buying behavior. For participants who often bought chocolate there was a significant interaction effect between chocolate type, shape, and familiarity (F (1, 31) = 5.81, $p = .022$, $\eta_p^2 = .16$). Based on the interaction effect between chocolate type, shape, familiarity, I looked at the data separately for the familiar and unfamiliar brands. For familiar brands there was a significant interaction effect between chocolate and shape (F (1, 31) = 5.17, $p = .030$, $\eta_p^2 = .14$). A pairwise comparison showed that for chocolate of a familiar

brand, milk chocolate was liked significantly more in an angular package (M = 4.53, SD = 1.81) than dark chocolate in an angular package (M = 3.28, SD = 1.64). For chocolate of an unfamiliar brand, no significant results were found.

For participants who bought chocolate every now and then or never there was a significant interaction effect between chocolate and familiarity (F (1, 29) = 5.68, p = .024, η_p^2 = .16). A pairwise comparison showed that milk chocolate of a familiar brand (M = 4.47, SD = 1.48) was liked significantly more than dark chocolate of a familiar brand (M = 3.67, SD = 1.26). Another pairwise comparison showed that dark chocolate of an unfamiliar brand (M = 4.32, SD = 1.15) was liked significantly more than dark chocolate of a familiar brand (M = 3.67, SE = 1.26). There was no main effect of buying behavior (F (1, 60) < 1, p = .515, η_p^2 = .01).

Controlling for experiment order

Experiment order did not affect ratings (F (1, 60) = 1.23, p = .272, η_p^2 = .02), nor did it interact with any other variables (p > .05).
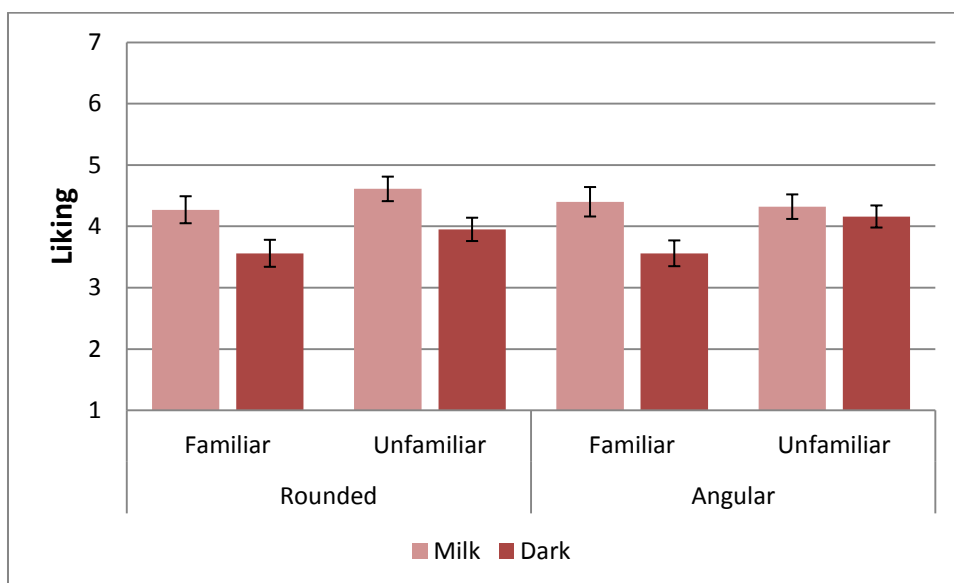

Figure 7.   The mean and standard error of liking ratings (1 = very much dislike, 7 = very much like)

4. Conclusion

The goal of this study was to analyze the effects of packaging shape and familiarity on taste perception for marketing communication purposes. Thus, the following research question was asked: "What is the influence of packaging shape on perceived taste for familiar and unfamiliar brands?". From the results of the statistical tests it can be concluded that packaging shape had no effect on taste perception, although it did have an effect on liking for specific groups of participants. Familiarity and chocolate type did have an effect on taste perception. Milk chocolate was perceived as less bitter, sweeter and less intense than dark chocolate. This affirms that the difference between the two types of chocolate was distinct. Milk chocolate was also overall liked more than dark chocolate. For each hypothesis, the results are discussed in further detail below.

Hypothesis 1a: A round package leads to a perceived sweeter taste of the product.

No significant effects of shape on sweetness were found. Therefore, H1a is rejected.

Hypothesis 1b: An angular package leads to a perceived more bitter and intense taste of the product.

No significant effects of shape on bitterness or intensity were found. Therefore, H1b is rejected.

Hypothesis 2: The taste of familiar brands is preferred over the taste of unfamiliar brands, despite the (in)congruency of packaging shape.

The chocolate of familiar brands was perceived as more intense, less sweet, and more bitter than unfamiliar brands. No results of an interaction between familiarity and shape were found. As unfamiliar brands were liked more than familiar brands, H2 is rejected.

Hypothesis 3: Congruent taste-shape products are liked more than incongruent taste-shape products.

Participants who preferred dark chocolate did like milk chocolate in a rounded package more than milk chocolate in an angular package. However, for participants who preferred milk chocolate the opposite was true concerning familiar brands. They liked milk chocolate of a

familiar brand more in an angular package than in a rounded package. Participants who often bought chocolate also liked milk chocolate of a familiar brand in an angular package better than dark chocolate of a familiar brand in an angular package. This is opposite to the expected preference of dark chocolate in an angular package. H3 is therefore neither accepted nor rejected.

Hypothesis 4: Packaging shape plays a more important role in defining taste when an unfamiliar brand is tasted than when a familiar brand is tasted.

As seen with H3, participants who preferred milk chocolate liked milk chocolate of a familiar brand more in an angular package than in a rounded package. It can be said that packaging shape played a more important role when familiar chocolate was tasted, as it did have an significant influence on liking – although it did not provide the expected results. No significant results of shape on unfamiliar brands were found. Therefore, H4 is rejected.

5. Discussion

The present research sought to confirm the suggested crossmodal associations between sweetness and rounded shapes and bitterness and angular shapes. It also sought to investigate the difference in influencing power of the heuristic of brand awareness compared to the influence of shape symbolism on taste perception and liking. Although the crossmodal correspondence between sweet tastes and round shapes has been well-established in various previous studies, this result was not replicated in the current study. A possible explanation could be the effect of the chocolate pieces on the oral-somatosensory system. For instance, it is known that the way vegetables are cut can affect flavor perception (Beans, 2016). As the chocolate for this research was cut into small pieces, varying in shape, the texture of the chocolate chunks could have had an influence on taste perception when put in one's mouth (Spence & Piqueras-Fiszman, 2014). Despite trying to cut the chocolate into small chunks with no specific shape, some sharper pieces might have had a different mouth-feel than more rounded pieces of chocolate. Additionally, the way the chocolate was presented might have differed from the way participants usually eat a piece of chocolate: they might take a bite directly from the chocolate bar or break off pieces with their own hands.

However, the findings of this research are consistent with the findings of Van Doorn et al. (2015), which also showed no significant outcomes of shape on sweetness and intensity ratings. In their research it was argued that the latté art with a rounded shape looked less professional than the latté art with an angular shape. The two coffee beverages that were used in the experiment also varied in other visual properties, which might have led to different participant expectations and perceptions (Van Doorn et al., 2015).

Furthermore, the findings on intensity ratings are also consistent with the results of Becker et al. (2011). In their research, an explanation is given by the level of sensitivity to design of the participants. Only participants with a sensitivity to design found that an angular packaging shape contributed to a more intense taste sensation. This variable was not included in the present research.

Another probable explanation for the found results is offered by Velasco et al. (2016). In their review, it is suggested that angular shapes can also be associated with sourness,

umami, or saltiness, and not just bitterness. Questions on these basic tastes were not included in the survey.

Moreover, the present research differs from previous research which found significant results as it uses real-life 3D packages, instead of shapes on a computer screen. Although participants did acknowledge the packages (e.g. one participant commented on the shapes by saying that they looked funny), they might have focused more on rating the taste of the chocolate itself. In previous research participants were often asked to explicitly look at the shapes on screen or at a visual scale and then to proceed to answering questions on shape or taste (Ngo et al., 2011; Deroy & Valentin, 2011). It is possible that in this research the packaging shapes were brought to the attention of the participants in a too implicit manner, which resulted in no significant outcomes. This would imply that consumers need to be made aware of the packaging shape to have an effect on perceived taste. However, this would undermine the assumption that crossmodal correspondences operate on an implicit level.

Finally, image molds might explain the results that were found on shape-taste symbolism. Image molds are particular packaging shapes that are associated in the mind of consumers with a specific class of product or brand (Spence, 2016). The chocolates used for the experiment are usually presented in rectangle bars. It might be that the participants were confused with the new way of presenting the chocolate with which they had already existing associations, resulting in different ratings.

Another unexpected finding was that the chocolate of unfamiliar brands was preferred over chocolate of familiar brands (hypothesis 2). A question which was frequently posed after the experiment by participants was if the chocolate used was indeed the chocolate of the brand mentioned on the label. They often believed that it was not the actual chocolate, and might have rated it less favorable because of that – even though it was really the right chocolate.

A different possible explanation is that participants did not like the taste of the chocolate of these particular brands. Côte d'Or is known for its more "smoky" taste, while the dark chocolate of Tony's Chocolonely might have been too spicy for participants who preferred milk chocolate due to its 70% cacao content. It might have been possible that the participants only liked the familiar chocolate when presented in its original package, implying that the brand is liked more than the chocolate itself. This leaves us to wonder if

the chocolate of unfamiliar brands would still be liked more when the familiar chocolate would have been presented in their original image mold. To test this, a pre-test could be carried out in which the chocolate of the familiar brands are presented in the original image mold with their own logos, and questions could be asked on likability.

As it is very likely that the participants were acquainted with the familiar brands, they might have already had pre-existing expectations or ideas about the chocolate of these brands. They might have bought them before, or might have been in contact with the brand via social media, advertising, or customer care. Although the heuristic of brand awareness implies that familiar brands are favored, some participants might have had negative experiences with a brand. As participants first viewed the card with the brand name on it, they might have activated these negative or positive expectations or judgments about the chocolate and its taste in their minds. This could have resulted in participants giving different ratings on liking than expected.

Furthermore, the results on congruency between taste and shape contradict each other (hypothesis 3). Participants who preferred milk chocolate liked milk chocolate of a familiar brand more in an angular package than in a rounded package and participants who often bought chocolate liked milk chocolate of a familiar brand in an angular package more than dark chocolate of a familiar brand in an angular package. These results might be explained by the effect sensory incongruity can have. Sensory incongruity can be described as when the sensory features of two different modalities do not match (Spence & Piqueras-Fiszman, 2014). The most common example is when the visual attributes of a product do not match with the actual expected taste of the product, which is for instance the case with angular shaped packaging and milk chocolate. This type of sensory incongruity can result in either a negative or a positive hedonic assessment. Spence and Piqueras-Fiszman (2014) state that for more familiar foods, a confirmation of expectation may not affect the consumer's hedonic appraisal but instead result in boredom. It is possible that the participants in the present research were positively surprised by the incongruity between shape and taste, and therefore liked the milk chocolate of a familiar brand in an angular packaging shape more. However, it has to be kept in mind that sensory incongruity can make a familiar food more exciting, but too drastic changes can have a negative effect on people's hedonic evaluation.

In addition, the effect of one's self-construal on aesthetic preference might have played a role. As Zhang, Feick, and Price (2006) state, self-construal is defined as the way one sees himself as separate from others or connected with others. Often, a culture defines one's self-construal, such as for instance the Chinese culture, which is highly collectivistic. When analyzing aesthetic preference, individuals with independent self-construals often perceive angular shapes as more attractive, while individuals with interdependent (collectivistic) self-construals perceive rounded shapes as more attractive. Zhang et al. (2006) explain this by the following existing associations: angular shapes convey associations with strength and energy, whereas rounded shapes convey associations with harmony and friendliness. It it is possible that since most participants in the present research were Westerners (who live in an individualistic society), an aesthetic preference for angular shapes existed, which was not controlled for. When these participants also had a preference for milk chocolate, they might have favored different shape-taste associations than what was expected. On a side note, changes are possible in aesthetic preference. An example given by the authors is that after people have seen a football game, they can be more inclined to prefer angular shapes.

5.1. Limitations of the study

As the chocolate brands were selected via the means of a pre-test, the cacao percentages could not be controlled for in the experiment. Therefore, the cacao percentages were not equal for all brands. The dark chocolate of Côte d'Or contained at least 48% cacao, Tony's Chocolonely dark chocolate contained 70% cacao, and the dark chocolate used for the unfamiliar brands from a local chocolate shop contained 65% cacao. As mentioned previously, Côte d'Or is also known for its more smoky taste, which might have influenced the ratings and liking of the chocolate. Therefore, in future research, attention needs to be paid to the distinct tastes of each chocolate brand used.

Another limitation is the way the chocolate was presented. Participants were presented with the chocolate inside a container, after which they were allowed to take the piece and eat it. By doing so, participants could see the color of the chocolate and therefore already determine what kind of chocolate it was. In the study of Ngo et al. (2011), the researchers placed a piece of chocolate in the hand of a participant, who was not allowed to

look at the chocolate. It is possible that by having seen the chocolate, participants already made up associations in their mind of what the chocolate was going to taste like. As a result, the packaging shape might have played a less important role in affecting taste.

Besides the cacao percentages and the presentation of the chocolate, the scales used for the variables intensity and likeability had a low reliability. This means that the scales cannot be interpreted consistently across different situations (Field, 2013). Therefore, it is possible that if the experiment was to be carried out again, nonidentical results might be found. Although the same questions were asked as in the experiments of Becker et al. (2011) and Van Doorn et al. (2015), the reliability of the scales was low. In order to prevent low reliability, it might be an option to include more questions for each dependent variable and, if necessary, delete those with the lowest reliability. For instance, the likeability scale might improve by adding a question such as "I would recommend this chocolate to others", for which a high assessment implies that participants like the product a lot – otherwise they would not recommend it. For the dependent variable bitterness, questions with synonyms and antonyms of bitterness can be added, such as the words "sharp" and "harsh", or "bland" and "agreeable".

Concerning the composition of the sample used in the experiment, more women than men took part and most participants had a high educational level. Consumer research showed that men actually eat more chocolate than women do, 72% of men compared to 70% of women ("Mannen eten meer chocolade", 2009). Moreover, as reported by the Dutch Centraal Bureau voor de Statistiek, most of the Dutch consumers (40%) have an intermediate vocational educational level ("Hoogst behaald onderwijsniveau", n.d.). Also, most participants in this experiment preferred milk chocolate, although most Dutch chocolate consumers prefer dark chocolate (Lambert, 2016). Thus, this limits the outcomes of the research as the sample used in the present research did not represent the consumer group. Therefore, future research should use a representative sample of the consumer segment in order to provide meaningful insights for marketing communication purposes.

Next, due to time constraint, most participants were from the researcher's own network. Many of them followed the same Master's education in communication and persuasion. For that reason, they might have been more cautious while partaking in the experiment and might have had a feeling of being manipulated. In order to be able to make reliable assumptions on crossmodal correspondences, a bigger and more representative

sample size of a consumer group is needed.

Finally, due to difficulties with participant recruitment, the experiment was combined with another experiment on crossmodal correspondences. The experiment order did have an effect on perceived bitterness: those who first completed the juice experiment rated the chocolate as more bitter. Ratings of bitterness might have been different if all participants started with the chocolate experiment first.

5.2. Recommendations for future research

Future research on shape-taste symbolism should consider the product used for the experiment. As participants doubted the legitimacy of the chocolate used anyway, it might be an option to use the same chocolate, or different chocolate types which have small differences between them. It is recommended to not only conduct a pre-test on familiarity, but also on the taste of the chocolate itself. By doing so, the chocolates with the smallest differences in taste perception can be selected. It is also of importance to use two distinct chocolate types with greater differences in cacao percentages. In the research of Ngo et al. (2011), for dark chocolate a cacao ratio of at least 70% up to 90% was used, compared to 30% for milk chocolate.

As mentioned above, the participants were able to see the chocolate they tasted. Blind tasting might lead to different (significant) outcomes, as shown in the study of Ngo et al. (2011). Accordingly, future research could incorporate blind tasting in the experiment and thereby eliminate other sensory cues that might have had an effect on taste perception, such as the color of the chocolate and the tactile experience when participants pick up the chocolate pieces.

In the light of marketing communication, another improvement to this research would be to include questions on brand liking. As participants might have activated previous negative or positive experiences with the familiar brands used in the experiment, they might have rated them differently. These experiences are different for each individual, and by controlling for brand liking, a distinction can be made between participants who favor or disfavor a brand.

When analyzing the research method, a different type of questions could be used. The research of Deroy and Valentin (2011) and the research of Ares and Deliza (2010), which both showed significant results on the effect of shape on taste experience or expectations,

asked participants to describe either the beer they tasted or the expected taste of dessert packages they saw. By using word association or asking participants for verbal descriptors, participants might be better able to express the feeling they get when tasting a particular product. By allowing participants to use their own words, new insights on shape-taste associations might surface or confirm existing shape-taste associations.

Besides this, participants might have to be made more aware of the shapes the chocolates are presented in. It could be an option to ask participants which taste they expect before tasting. By doing so, participants are asked to think about the product and their expectations of it – much like what they would (subconsciously) do before buying a product in the supermarket, unless it is a repetitive purchase. After tasting the chocolate, the same questions on taste perception could be asked. Van Doorn et al. (2015) also used this method, although the first time participants saw the product it was in 2D, and the second time it was presented in 3D.

Another suggestion to improve this study would be to conduct it independently from other studies, instead of combining it with another study. A final recommendation is to use a bigger, more representative sample size which is comparable to a consumer segment, while keeping the self-construal of its consumers in mind.

5.3. Practical implications

The present research investigated the effect of packaging design on consumer perception for integrated marketing communication purposes. By doing so, the research gives insights in the development of a more whole consumer experience. It also contributes to the existing body of literature on shape symbolism by using real-life 3D packaging, although no direct effects of shape on taste perception were found. However, by working with 3D packaging, the research approaches an actual consumer experience better than previous research did. It also brings another variable into the equation, being the heuristic of brand awareness. This cue is also often used by consumers when making a purchase decision. Unfortunately, the familiarity of brands did not have the expected effect on liking. Nevertheless, the results for participants who had a particular chocolate preference are promising. Shape did seem to have an effect on liking. More research is needed to further explore the potential of shape symbolism.

Although changing a packaging's shape is now cheaper than before (Spence, 2012), the advantages of crossmodal associations for marketing communication purposes should weigh up against the logistical costs. As a star-shaped or round container is more difficult to ship than a square one, there should be a clear advantage in order to modify packaging design. Besides this, the ethical side of the story is debatable. How far is a company allowed to go to influence a consumer? When companies are manipulating associations on a subconscious level, a consumer stands more or less powerless.

As Velasco et al. (2015) stated, crossmodal correspondences can be thought of as yet another layer of analysis in marketing communication. Shape only plays one part in multisensory flavor perception and combined with other stimuli such as color, music, and texture it might be able to make a difference for a consumer's perception of (expected) taste. Multisensory marketing continues to play an increasingly important role in giving consumers the optimal product experience (Spence et al., 2014; Krishna, 2012). Even so, a product or brand needs more than correspondence with one's expectations. Amongst other things, a successful branding strategy, strong consumer research, and excellent customer care can make a product or brand succeed on the market (Spence, 2016; Tsai, 2005). In the end, all ingredients are needed to make a consumer's experience whole.

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Appendix I

Pre-test

A pre-test was carried out to determine the brands to be used in the experiment. Ten existing (foreign) chocolate brands were used: Côte d'Or, Tony's Chocolonely, Milka, Lindt, Cadbury, Delaviuda, Camino, Sarotti, Valrhona, and Åkesson's. Every subject in the pre-test was given the same statement for the different brands:

1. *I am familiar with … (name of the brand).*
   Completely disagree   1   2   3   4   5   6   7   Completely agree

The brand familiarity scale had a relatively low reliability, Cronbach's $\alpha = .60$. In Table 1 the means are given for each chocolate brand. As Milka does not sell dark chocolate in The Netherlands, Côte d'Or was chosen instead.

Table 1.   The means, the standard deviations (between brackets) of the brands used in the pre-test and the level of familiarity per brand (1 = completely unfamiliar, 7 = highly familiar)

Brand	Mean
Côte d'Or	6.73 (.59)
Tony's Chocolonely	6.84 (.35)
Milka	6.87 (.52)
Lindt	4.27 (2.74)
Cadbury	1.67 (1.54)
Delaviuda	1.33 (.62)
Camino	1.47 (1.10)
Sarotti	1.60 (1.06)
Valrhona	1.73 (1.53)
Åkesson's	1.40 (.74)