Is eye-appeal half the deal?

Investigating the effect of crossmodal congruence between the colour and shape of coasters on the perceived flavour, liking and willingness to pay for an alcoholic beverage

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Abstract

The human tendency to match information across different sensory modalities in order to experience and make sense of the multisensory world around us is called crossmodal correspondence or crossmodal association. Numerous previous studies have explored crossmodal associations on a wide variety of different manipulations, foods and beverages, but to date the possible influence of one of the most well-known and common product-extrinsic cues used in the beverage industry has been completely overlooked by researchers, namely the coaster. This thesis is the first ever study to investigate the crossmodal (in)congruence effects of both the colour and the shape of coasters on the taste, liking and willingness to pay for an alcoholic beverage, whilst also trying to bring forth its possible marketing capabilities. The research data was obtained by asking consumers to partake in an experiment involving the tasting and rating of four (identical) Vedett Extra Blond premium lager beers on perceived taste, liking and willingness to pay, as they were presented on four different coasters that varied in colour [red, black] and shape [round, angular] in each condition. The statistical findings of this experimental study revealed that both coaster colour [red, black] and coaster shape [round, angular] did not have a significant (interaction) effect on the perceived liking, taste and willingness to pay for an alcoholic beverage. However, even though all hypotheses were rejected accordingly, the current study does provide a solid theoretical basis that opens the door to future research on the effects of crossmodal colour and shape congruence and its marketing implications in the beverage industry.

Keywords: crossmodal congruence, shape, colour, coasters, taste, marketing communication

"There is no such thing as a bad beer. It's that some taste better than others."

- Billy Carter

In a way, this quote by Billy Carter, the younger brother of former President of The United States of America Jimmy Carter (1977 – 1981), seems to reflect the subjectivisms of the human flavour perception or taste. A beer that tastes good to one person might taste horrific to another. Our preferences, likings, dislikings and our flavour perceptions appear to differ from person to person and may therefore come across as subjective (Imram, 1999; Morrot, Brochet, & Dubourdieu, 2001). The subjective character of the human flavour perception is due to individual or cultural differences between people and the way their senses construct their reality of the world and how they experience it. Humans experience the entire world in a way that is multisensory (Stafford, Fernandes, & Agobiani, 2012; O'Callaghan, 2017). We do not assess the world around us merely through one of our five senses (sight, touch, hearing, smell and taste). It is the combination of cooperation and coordination of all those sensory modalities that lets us experience and understand the world around us (O'Callaghan, 2017).

Crossmodal associations

Because we experience the world in a multisensory way, this creates the tendency to match information across sensory modalities. This 'tendency to match information in one sensory modality with information in another' (Velasco, Wan, Salgado-Montejo, Woods, Oñate, Mu, & Spence, 2014, p. 50) is called crossmodal correspondence or crossmodal association. To date, a large body of research has demonstrated that crossmodal correspondences exist between the majority of the human sensory dimensions and that these correspondences are predominantly

consistent among people with the same cultural background (Shankar, Levitan, & Spence, 2010; see Spence, 2011, for a tutorial review; Piqueras-Fiszman, Velasco, & Spence, 2012; Wadhera & Capaldi-Philips, 2014; Velasco et al., 2014; Wan, Velasco, Mu, Woods, & Spence, 2014; Spence, 2015; Velasco, Woods, Deroy, & Spence, 2015; Wan, Woods, Jacquot, Knoeferle, Kikutani, & Spence, 2016; Carvalho, Moors, Wagemans, & Spence, 2017). So, there seems to be an underlying, intersubjective tendency to share the same associations among these culturally related groups.

A key element of crossmodal correspondences is that the associations need to uphold for a considerable amount of people. Moreover, it is believed that some crossmodal associations might even be universally shared (Spence, 2011). According to Spence (2011) there are three types of mediated crossmodal correspondences: statistical, structural and semantic. All three shine a different light on the mechanisms that may underlie crossmodal correspondences and may affect the way people process information accordingly. Firstly, statistical correspondences result from (statistical) regularities that we naturally find in the environment, as we will see further on (Spence, 2011). Secondly, structural correspondences result from the fundamental neural connections that are present at birth, which we use to code sensory information in different sensory stimuli. For example, dimensions like size and loudness or loudness and brightness appear to be processed by the human brain in a similar way (Spence, 2011; Velasco, Woods, Petit, Cheok, & Spence, 2016). Thirdly, semantic, or linguistic correspondences seem to develop in language when terms that are used to describe stimuli information become linked to more than one sensory modality. For example, we use the words ‘high’ and ‘low’ to describe not only pitch, but also elevation and spatial frequency (Spence, 2011; Velasco et al., 2016). Even though these three types differ, they are not mutually exclusive and possibly compatible (see Spence, 2011, for

a further information on the crossmodal correspondence trichotomy; Velasco et al., 2015; Velasco et al., 2016).

Although crossmodal associations likely exist between different pairings of sensory modalities, the present study will focus primarily on the crossmodal correspondences that exist between sight and taste as this is one of the most important associations. Research has looked into crossmodal associations between shape and taste, and colour and taste. Both colour and shape can influence consumers' expectations of palatability of foods and beverages and can therefore affect the consumers' choices (Gates, Copeland, Stevenson, & Dillon, 2006; Spence, Levitan, Shankar, & Zampini, 2010; Wadhera & Capaldi-Philips, 2014).

An experimental study conducted by Gal, Wheeler and Shiv (2007) on crossmodal influences on gustatory perception demonstrated that shapes presented in temporal proximity before the consumption of a taste stimulus affected the sensory qualities of the taste stimulus. At the start of the experiment participants were asked to estimate the surface area of several, either pointy or rounded, geometrical shapes. Immediately after, they tasted a piece of cheddar cheese, which then had to be evaluated. The results revealed that the participants who evaluated the surface area of the pointy geometrical shapes perceived the taste of the cheese to be significantly sharper than those who had to evaluate the surface area of the round geometrical shapes. In the same vein, one of the studies that explored the possible crossmodal associations between colour and taste was carried out by Piqueras-Fiszman, Alcaide, Roura and Spence (2012). Their study focused on the effect(s) plate colour could possibly exert on the liking and taste of the food that was presented on the plate. Fifty-five gram of identical red frozen strawberry mouse was presented to the participants both on a white and on a black round plate. The results showed that the participants rated the red frozen strawberry mouse served on the white plates as significantly

more sweet (10%) and more flavourful (15%) as compared to the same mouse that was presented to them on the black plate.

Keeping Spence's (2011) three mechanisms underlying crossmodal associations in mind, the crossmodal associations between colour-taste, and shape-taste may partially be explained in terms of statistical regularities that we naturally find in the environment (Spence, 2011; Tu, Yang, & Ma, 2016; Cavazzana, Larsson, Hoffmann, Hummel, & Haehner, 2017). Overall, people tend to associate round shapes with voluminousness and sweetness, and angular shapes with thinness and bitterness (Deroy & Valentin, 2011; Velasco et al., 2015; Velasco et al., 2016). For instance, a large variety of fruits, or vegetables like apples, strawberries or tomatoes get rounded forms when ripe, which naturally pairs with sweetness. Moreover, not only shape, but also colour and taste change during the ripening of fruit. Research has also shown that the basic human tastes (sweetness, bitterness, sourness, saltiness and umami) correspond with particular colours (see Spence et al., 2010, for a review; Spence, Wan, Woods, Velasco, Deng, Youssef, & Deroy, 2015). A bright red colour in strawberries, varieties of apples and tomatoes signifies that they are sweet and edible (Velasco et al., 2014, Velasco et al., 2016). Therefore, bright colours like pink and red are associated with sweetness, while on the other hand black and purple are associated with bitterness (Piqueras-Fiszman & Spence, 2012; Spence et al., 2015; Carvalho et al., 2017).

Multiple sensory modalities, like sight, touch, hearing, smell and taste send perceptual information to the brain simultaneously via the triggering of so called neurons. In short, neurons are cells that transport electrochemical signals (messages) from and to the brain through the human nervous system with incredible precision and pace. Not only does this allow us to control our bodily movements and keep balance, it also enables us to process the environmental information we receive through our sensory modalities (Khan Academy, n.d.). This often happens

in the form of unrelated stimulus features (Spence, 2011). For example, you cannot taste colour, but it does influence taste perception. The human brain is used to processing certain sensory cues together. While doing so, the brain develops associations which can influence the taste expectations and perception of foods and beverages (Mirabito, Oliphant, Van Doorn, Watson, & Spence, 2017). When the brain acquires one out of two, two out of the three (and so on) cues, the last missing cue is filled in automatically through a(n) (crossmodal) association (Stevens, 2018). So, imagine hearing the frying pan crackle and smelling the melted butter, you can almost taste the dish. This is an example of the automatic crossmodal associations the human brain makes, and how it could be relevant for communicating consumer-relevant information. However, when consumers perceive a product 'the first taste is almost always with the eye' (Imram, 1999).

Crossmodal associations in marketing

In order to understand the crossmodal correspondences between sight and taste in consumers, we first need to take a better look at the many different elements that affect consumers' behaviour and experience. In a consumer environment, we subconsciously rely on our senses to provide us with information about the products that we wish to attain. Through the interaction between the sensory attributes of a product and the consumers' psychological, behavioural and cognitive state within the consumer experience, the consumers' perception of the product is influenced (Imram, 1999). Visual cues and structural attributes of products, like appearance (e.g. colour or (packaging) shape), texture, taste, smell, packaging, labelling and font type to name a few, play an important role in identifying and categorizing products. Moreover, these product-extrinsic cues forecast certain customer expectations (Imram, 1999; Ngo, Piqueras-Fiszman, & Spence, 2012; Carvalho et al., 2017). These expectations can alter the perceived taste, and (dis)liking of

the product based on the congruity of the expectations and the actual taste (Cardello, Maller, Masor, Dubose, & Edelman, 1985; Stafford et al., 2012; Wadhera & Capaldi-Philips, 2014; Barnett & Spence, 2016; Barnett, Velasco, Spence, 2016; Carvalho, Wang, De Causmaecker, Steenhaut, van Ee, & Spence, 2016; Carvalho et al., 2017).

Then, after the consumption process has taken place, both the sensory and the hedonic (liking or disliking) experience provide the consumer with feedback, which in turn creates consumption memories about the sensory attributes of that specific product. This may influence future buying behaviour, leading people to select products which have created a positive consumption memory in the past (Imram, 1999; Barnett & Spence, 2016; Cavazzana et al., 2017). Therefore, sensory evaluation of product-extrinsic cues plays an important role in consumer buying behaviour (Ngo et al., 2012).

Imagine seeing a bright red strawberry in the supermarket shelf. Due to its vibrant red colour, you assume that the strawberry is ripe and you can already almost taste its sweetness. This particular crossmodal association (between redness and sweetness) is addressed by marketeers not only in the food, but also in the beverage industry. Picture yourself buying a strawberry flavoured Yogi drink in that same supermarket. There is a fair chance that the product label will have ripe and red strawberries on it. Moreover, the drink itself is most likely coloured reddish or pinkish. However, what a lot people do not know is that the strawberry flavoured Yogi drink gets its reddish colour from a colouring agent called carminic acid or E number 120. The reason the colour of the Yogi drink is embellished is to evoke the same subconscious crossmodal association between redness and sweetness that real ripe strawberries do (Keuringsdienst van Waarde, 2017).

If product-extrinsic cues influence human flavour perception and liking (Shankar et al., 2010; Spence, 2011; Piqueras‐Fiszman & Spence, 2012; Wadhera & Capaldi-Philips, 2014; Barnett & Spence, 2016**;** Cavazzana et al., 2017) they might also influence the amount of money consumers are willing to spend on a product (Oberfeld, Hecht, Allendorf, & Wickelmaier, 2009; Barnett & Spence, 2016). An example was demonstrated in a study by Wan, Zhou, Woods, and Spence (2015) on the influence of glassware on the perception of alcoholic drinks. The authors found that the willingness to pay increased when alcoholic beverages were served in appropriate glassware (beer in a beer glass, soda in a soda glass etc.). Another study by Raudenbush, Meyer, Eppich, Corley and Petterson (2002) found that pleasantness was significantly higher when beverages had been drunk from containers that were appropriate, and therefore congruent with the expectations of the participants.

This use of sensory marketing is applied by marketeers to further enhance the customer or consumer experience with a product or service (Krishna, 2011; Wan et al., 2016; Cavazzana et al., 2017). Krishna (2011, p.1) defines the term *sensory marketing* as ‘marketing that engages the consumers' senses and affects their perception, judgment and behaviour’. Sensory marketing can subconsciously activate the basic human senses. By doing so the consumers’ buying behaviour is influenced. Instead of trying to persuade the consumer verbally (e.g. with smooth advertisement texts), marketeers appeal to the human senses to ‘self-generate’ a subconscious feeling of engagement towards a specific product by stimulation of the human senses (see Krishna, 2011, for a review on sensory marketing).

Crossmodal associations for beverages

As we have seen, a lot of scientific research has explored the effects that different kinds of product-extrinsic cues have on consumer perception and behaviour. Numerous studies have explored crossmodal associations in beverages on a wide variety of different manipulations (e.g. glass shape, bottle shape and colour) and beverages, both hot and cold, non-alcoholic as well as alcoholic. For example, studies have been carried out using juices, soft drinks, sparkling and still water, coffee, tea, hot chocolate, as well as wines and to a minor extent whiskeys and beers (Pliner, 1982; Raudenbush et al., 2002; Spence, 2011; Piqueras-Fiszman & Spence, 2012; Ngo et al., 2012; see Spence & Wan, 2015, for a review; Arboleda & Arce-Lopera, 2015; Cavazzana et al., 2017). The consumption of beer accounts for roughly 75% of the world's total alcohol consumption by volume (The Economist, 2017). Given the global popularity of beer and the fact that research on beverages provides useful insights into crossmodal associations and marketing, it is important to try and study all product-extrinsic cues that may impact our beer drinking experience.

Only a small body of research has looked at a few different product-extrinsic cues that may affect beer drinking experience. For example, Barnett, Velasco and Spence (2016) looked into different associations consumers had with either bottled or canned beer. They discovered that container material influenced taste perception in beer. The results showed that beer was rated as tasting significantly better when it was consumed from a bottle, as compared to beer that was consumed from a can. Another study by Carvalho et al. (2017), examined the influence colour had on the consumers' experience of beer. Overall, the results of their study demonstrated that participants expected dark coloured beers to be significantly more expensive than pale or amber coloured ones. Even though a small body of research has looked into product-extrinsic cues that

may affect beer drinking experience, the possible effects of one of the most well-known and common product-extrinsic cues that people are confronted with has been completely overlooked by researchers, namely the coaster. In most Western European countries, when going out and having a drink, especially a beer, the beverage is served on a coaster. The coaster might have an effect on consumers' expectations and subsequently may affect the consumers' experience, behaviour and enjoyment of an (alcoholic) beverage.

Coasters come in a range of different colours and shapes and are therefore an ideal marketing communication or advertising tool. As far as I am aware, no research has been conducted on the effects of coaster advertising. Coasters do not merely exert the practical function of absorbing the condensation that drips from a glass. From a marketing communication perspective coasters may help consumers identify and analyse possible qualities a beverage might have.

Even though shape-flavour and colour-flavour crossmodal correspondences have been studied extensively, they have not been studied for coasters. Moreover, their influence has been studied separately in most research to date. Since visual images are a key factor in the human quality perception (Imram, 1999), the colour and shape of a coaster could be helpful tools to guide consumers expectancies. Therefore, this will be the first study to investigate the crossmodal (in)congruence effects of both the colour and the shape of coasters on taste, whilst also trying to bring forth its possible marketing capabilities. An effect of congruence might be found between colour and shape because both colour and shape can uniquely affect human flavour perception, liking and willingness to pay. It has been shown that both round shapes and the colour red are associated with sweetness, whilst angular shapes and the colour black are associated with bitterness. Moreover, when we combine both matching modalities of colour and

shape (red and round versus black and angular), a congruency effect of sweetness or bitterness might occur. The underlying idea is that when stimuli are paired together congruently, the human brain can match these stimuli more fluently, thus more likely acknowledging the expected taste. A high fluency of processing is associated with positive hedonic experience which in turn elicits more favourable evaluations of the target stimulus (see Winkielman, Schwarz, Fazendeiro, & Reber, 2003, for an extensive study on the hedonic marking of processing fluency). As such, congruence can increase processing fluency, which in turn may lead to higher (sensory) evaluation ratings of products, making them more favourable over others (Tu et al., 2016; Velasco et al., 2016; Mirabito et al., 2017). Therefore, it is expected that colour-shape congruence will result in higher sweetness perception for rounded, red coloured coasters and higher ratings on bitterness for angular, black coloured coasters, as compared to incongruence between the colour and shape of the coasters (a round black coaster and a red angular coaster).

It also has to be noted that in some cases disruption of what is expected might also elicit a positive evaluation effect. According to McQuarrie and Mick (1996; 1999), who investigated the effects of visual rhetorical figures in advertisements, a disruption in the form of a visual rhetorical figure can lead to an increased cognitive elaboration and to a higher degree of pleasure because of the artful deviation in the rhetorical figure. However, in order to do so the recipient processing the advertisement has to possess specific sociocultural knowledge in order to understand and enjoy the rhetorical figure. The aforementioned research results may also play a role in the current experimental study. Altering the shape and the colour of coasters might provoke a feeling of artful deviation among the participants, which in turn may positively influence the evaluation of the beer(s) in the four different conditions.

Hence, the main objective of the current research will be to examine the possible effect(s) of crossmodal (in)congruence between the shape and the colour of coasters on the perceived liking, perceived taste and how much money consumers are willing to pay for an alcoholic beverage (willingness to pay). Accordingly, the following research question was drawn up:

RQ: What is the effect of coaster shape and colour on the perceived liking, taste and willingness to pay for an alcoholic beverage?

Along with the aforementioned research question, the following hypotheses were formulated:

H1a. A red coaster increases the perceived sweetness of the beer.

H1b A black coaster increases the perceived bitterness of the beer.

H2a. A round coaster increases the perceived sweetness of the beer.

H2b. An angular coaster increases the perceived bitterness of the beer.

H3. Colour-shape congruence will lead to even higher ratings for both sweetness and bitterness as compared to colour-shape incongruence.

H4. The perceived liking and willingness to pay increases in cases of colour-shape congruence as compared to colour-shape incongruence.

In sum, the main objective of this research will be to examine whether colour and shape of a product's extrinsic cues, more specifically a coaster, influences the consumer's experience and enjoyment of an alcoholic beverage (Barnett & Spence, 2016). This will be done via an experiment whereby the colour and the shape of coasters will be manipulated to examine the

influence this has on the perceived liking, perceived taste and how much money consumers are willing to pay for the beer (willingness to pay). This study is the first of its kind in the field of crossmodal associations. It is the first study to look at the effect of coasters. Moreover, it is the first study that will look at the crossmodal congruence between taste and shape, and taste and colour in the beverage industry in a real-life consumer setting. Lastly, this current study will shine a light on the marketing implications crossmodal (in)congruity between shape and colour may have for the alcoholic beverage industry.

Methodology

Participants

A G*Power statistical power analysis was performed to determine the minimal sample size required to carry out the current study. G*power is a free statistical software programme that allows users to calculate statistical power. The results of the G*Power analysis indicated that the minimum sample size required for the current study was 36 (see Appendix I, for the detailed results). However, when determining the correct sample size it was also important to take note of the sample sizes used in similar previous studies. The number of participants in similar studies on crossmodal associations regarding vision and taste in beverages where beer was used as an alcoholic taste stimulus ranges from 53 (Mirabito et al., 2017) to 142 (Barnett & Spence, 2016). Given both the aforementioned research and the minimal sample size acquired by the G*Power statistical power analysis, the minimal number of participants defined for this study was 60.

In total 73 participants took part in the experimental procedure. Nine out of the seventy-three participants guessed the purpose of the study correctly and were therefore excluded from the dataset. Accordingly, the data of 64 participants was used in the current study. Of the 64 participants 28 were female and 36 were male. Their mean age was 32, with age ranging from 18 to 70. Their highest achieved degree was university level (13), applied sciences level (HBO) (33), community college level (MBO) (16), secondary school level (1), unknown (1).

Research Design

A 2 [colour: red, black] x 2 [shape: round, angular] within-subjects design was used in the current experimental study. Both the colour of the coaster and shape of the coaster were defined as independent nominal variables. Whilst liking and taste were defined as dependent interval

variables, willingness to pay was defined as dependent ratio variable. Figure 1. visualizes the current research design.

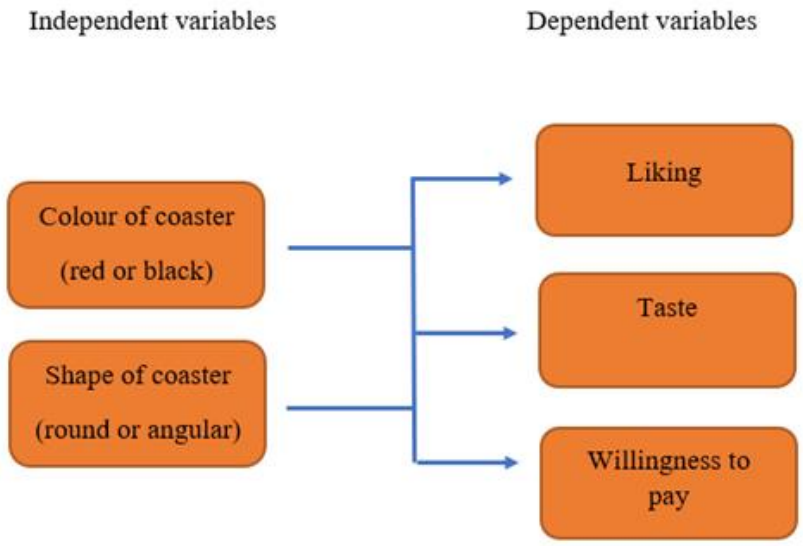

Figure 1. *Research Design.*

Material

In the current research two visual dimensions, colour [red, black] and shape [round, angular], were manipulated to create four experimental conditions. All other stimuli, being the type and the amount of beer, as well as the glassware used, remained constant in each condition.

Coasters.

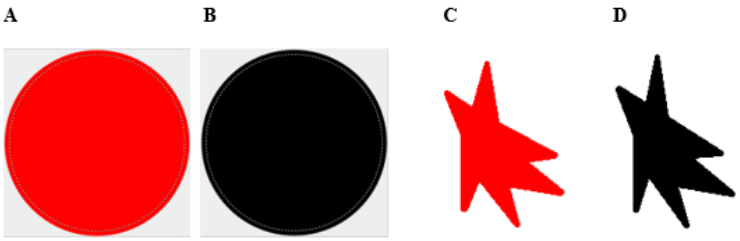

Figure 2. *Virtual representation of the coaster shape and colour per condition.*

The red and black round coasters (10,7 cm in Ø) were ordered pre-fabricated from studentdrukwerk.nl. However, since it was not possible to order angular shaped coasters from studentendrukwerk.nl, square coasters (9,3 cm x 9,3 cm) were ordered and manually shaped according to Figure 2., C and D. The following colour scheme codes were used to match the colours of both the angular and the round shaped (virtual) coasters: red: #FF0000, black: #000000. Based on the virtual representation of the angular shape that was found on http://mindbluff.com/bouba.htm (Figure 2., C and D), a cardboard template was designed and cut out manually (see Figure 3.). The use of this cardboard template guaranteed that all the cut out angular coasters had the same angular shape. The shape of the cardboard template had to be slightly altered compared to the shape of the virtual representation to ensure that there was enough space to place the beer on the coaster, without the coater losing it practical function of keeping the table dry. Figure 4., depicts the actual coasters that were used during the experiment.

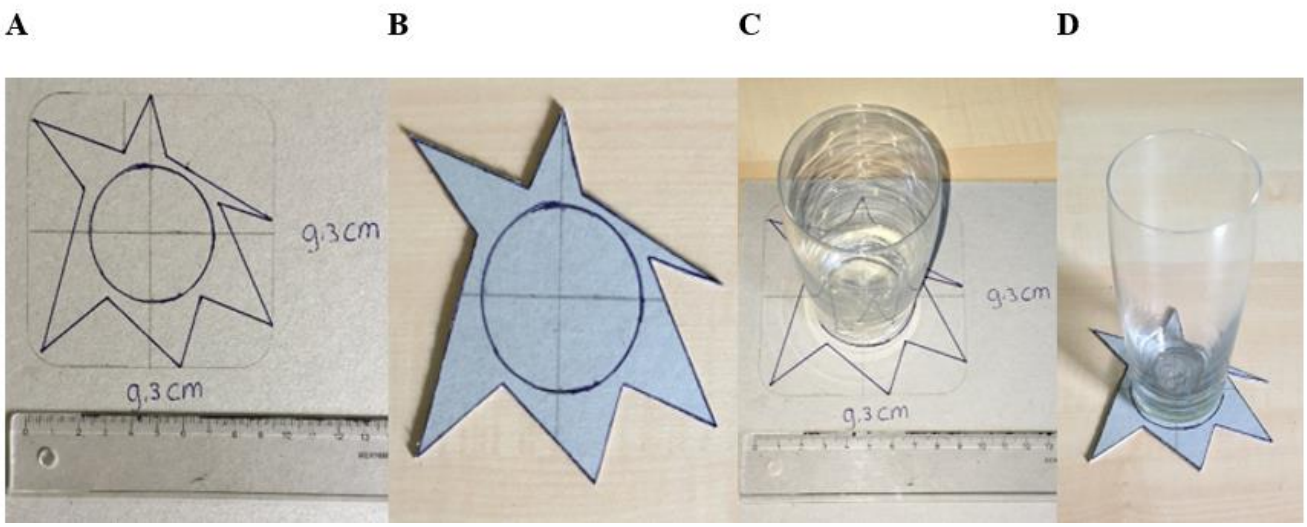

Figure 3. *The drawn and cut out cardboard template for the angular shaped coasters with (C, D), and without (A, B) a beer glass called a "fluitje".*

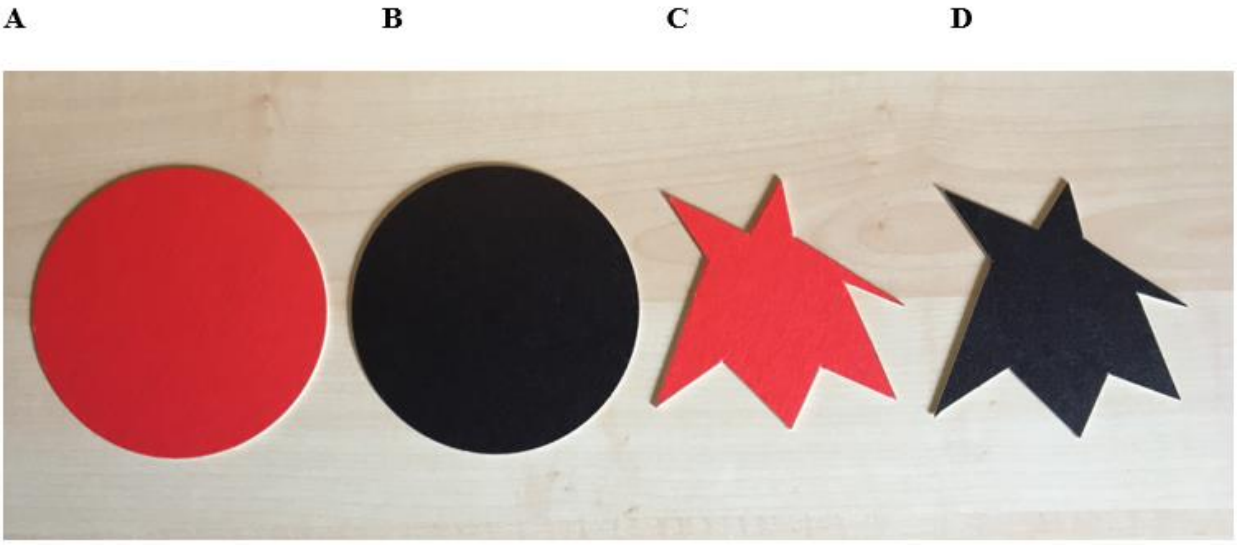

Figure 4. *A representation of the four types of coasters that were used during the experiment.*

Beer.

A national yearly beer survey among Dutch beer drinkers (N=1044) by Nederlandse Brouwers, an umbrella organization that looks after the vested interests of the ten biggest beer breweries in the Netherlands, revealed that lager was the most commonly drunk type of beer in the Netherlands in 2017 (74%) (De Jongh, Van Teeffelen, & De Kruijk, 2017; Nederlandse Brouwers, n.d.). Originally, Dommelsch Pilsner was selected as taste stimulus over other, more sought-after and well-advertised beers. Based on data published by Datlinq, Dommelsch was the least drafted beer in the food service industry in 2016 according to market share. In the province of Noord-Brabant, where the research data was collected, Dommelsch only had a 5% market share in 2016 ("Aandelen biermerken per provincie", 2017). Because of this low percentage, I argued that the taste of Dommelsch Pilsner would probably not be recognized by most participants. Therefore, prior knowledge or experience would not affect the participants' ratings.

However, due to the fact that I was not allowed to bring my own beer to the Biergarten

Tilburg Zomerfestival 2018 (the beer festival where the experiment took place), I was forced to deviate from the original plan to use Dommelsch beer as a taste stimulus. In a strenuous effort to avoid taste recognition of the beer by the participants whilst complying with the regulatory requirements set by the Biergarten Tilburg Zomerfestival 2018, a Belgian lager (Pilsner) was used as stimulus material during this research. Due to relative unfamiliarity in the Netherlands and its close resemblance to regular Pilsner in terms of alcohol percentage and flavour, Vedett Extra Blond was selected as taste stimulus.

The Duvel-Moortgat brewery describes Vedett Extra Blond as ‘a straw coloured, full-bodied premium lager (Pilsner) with a pleasant hoppiness, a slight malty aroma and a lingering fruitiness with subtle notes of vanilla’ (Vedett, 2018). This pilsner contains 5,2% alcohol per 330 mL bottle. The beers were refrigerated at a constant temperature of 3°C prior to the experiment for the sake of flavour consistency. Therefore, the differences in perceived taste were due to the manipulation of the experimental visual stimuli, namely coaster colour and shape.

Glassware.

Because several studies in the same vein have shown that participants rated beverages sampled from appropriate containers as more pleasant (Cavazzana et al., 2017), the beer was served in a common lightweight, colourless and transparent beer glass (a *fluitje*). Due to the fact that it was not allowed to serve beer in actual glassware during the Biergarten Tilburg Zomerfestival 2018, the fluitjes that were used in the current study were made out of polycarbonate. The unbranded fluitjes by Slimresto, a company specialized in producing polycarbonate glassware for the hospitality industry, were a lightweight replicas of actual glass fluitjes. They were bought at the Sligro, a well-known Dutch wholesaler (see Figure 5). Each

fluitje weights 4.2 gr, has the following dimensions 5,5 cm x 13 cm (Ø x H) and can hold up to 19 cL of beer (Sligro, n.d.).

Figure 5. *An example of the fluitjes that were used in the current study.*[1]

Procedure

At the Biergarten Tilburg Zomerfestival 2018, which took place on the 15th and 16th of June, visitors over 18 years of age were asked to participate in a scientific experiment that involved drinking approximately one fluitje worth of beer, and filling out a questionnaire. After the participants provided their written informed consent, the experiment started. At the start of the experiment, participants were instructed (one by one) to take place at a standing table (with two barstools), as if they were standing or sitting at a bar in a local pub or restaurant (see the experimental setting in Figure 6.)

[1] Reprinted from "Slimresto Fluitje kunststof 19 cl*", by Sligro, (n.d.). Retrieved from https://www.sligro.nl/koningsdag-2.htm

Figure 6. *The experimental setting at the Biergarten Tilburg Zomerfestival 2018 in which the experiment took place.*

In each of the four experimental conditions the participants received a fluitje with 40 mL of Vedett Extra Blond (2 [colour: red, black] x 2 [shape: round, angular] = 4 conditions and therefore 4 coasters and 4 beers). After four tasting this accumulated to a maximum total of 160mL of beer per participant. To assure that all the glasses were equally filled with beer, a measuring cup was used to measure the exact amount of beer before it was poured into the beer glass. As we have seen, visual product-extrinsic cues can influence consumer preferences and taste. Therefore, the beer was poured in the beer glass out of sight of the participants. The beer

was presented to the participants on one of the four manipulated coasters in each condition, along with the questionnaire and a glass of still water. Only one coaster was visible to the participants at any given time. The order in which the beers were served on the different coasters was counterbalanced across the participants to control for order effects. Also, the experimenter remained available for answering questions the participants had throughout the experiment.

The participants were then instructed to drink the beer and to fill in the questionnaire. Although the consumption of the entire beer was not mandatory, the participants were advised to take at least one sip of beer per condition. After finishing each glass of beer, the researcher provided the participants with a printed questionnaire on which the participants had to evaluate and rate their drinking experience. Moreover, the participants rated the perceived taste, perceived liking and willingness to pay for the beer per condition. Before moving on the next condition, the participants were asked to cleanse their mouths with still water, which was provided complementary to each beer.

After completion of each condition, the filled in questionnaire was collected by the researcher along with the used beer glass, the used water glass and the coaster. Subsequently, the participants received the next beer served on a different coaster along with a new glass of water and a new questionnaire. The order in which the questions were presented to the participants was randomized.

After the participants completed the experiment, they were asked to fill in their age, educational background and gender, as well as what they believed the purpose of the experimental study was. In addition, the researcher asked the participants if they knew which beer(s) they drank. Although most participants indicated that they drank a regular Pilsner, none of the participants knew which beer(s) they drank during the experiment. Finally, the researcher

stressed the importance of not drinking and driving before debriefing the participants. The experiment took about five to ten minutes to complete. The used glasses, as well as the measuring cup were washed thoroughly in a rinsing-tub after each use. Half-empty bottles of beer were placed back in the refrigerator immediately after the correct amount of beer was poured into the polycarbonate beer glass.

Instrumentation

During the experiment, the participants rated the dependent variables liking, taste and willingness to pay in all four conditions. The instrumentation used to measure the dependent variables was derived from Mirabito et al. (2017) and Carvalho et al. (2017) and will be dealt with below.

Liking

Liking was measured on a seven-point Likert scale, with the following question asked:

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

Dislike very much 1 2 3 4 5 6 7 Like very much

Taste

Taste was measured on a seven-point Likert scale as well, with questions asked as:

2. *How bitter would you rate the taste of the beer?*

Not bitter at all 1 2 3 4 5 6 7 Very bitter

3. *How sweet would you rate the taste of the beer?*

Not sweet at all 1 2 3 4 5 6 7 Very sweet

Willingness to pay

Willingness to pay was measured in an open-ended response, whereby the following question will be asked:

1. *How much would you be willing to pay for a full glass of this beer?*

Statistics

IBM SPSS Statistics 24 (SPSS) was used to analyse the data. To determine whether the shape and colour of a coaster significantly influenced the liking, taste and willingness to pay, four two-way repeated measures ANOVA's with factors shape and colour were performed on the data that was obtained from the participants.

Results

In the following section the results of the present experimental study will be discussed. First, the reliability of the Likert scales that were used to measure the dependent variables will be addressed. Next, the testing of the assumptions that underlie a(n) (repeated measures) ANOVA will be dealt with. Finally, the research findings of the four two-way ANOVA's will be elaborated upon to conclude the results section.

Likert scale reliability

Cronbach's α was used to assess the reliability, or internal consistency, of the Likert scales used in the experimental questionnaire to measure the dependent variables. An analysis of the results indicated that the reliability of the liking scale relative to the colour [red or black] and the shape [round or angular] of the coasters was acceptable, Cronbach's α = .76. The reliability of the bitterness scale relative to the colour and the shape of the coasters was relatively low, Cronbach's α = .59. Further, the internal consistency of the sweetness scale relative to the colour and the shape of the coasters was considered high, Cronbach's α = .81. Finally, the results showed that the reliability of the willingness to pay scale relative to the colour and the shape of the coasters was excellent, Cronbach's α = .94.

In sum, the Cronbach's α's indicate that the data can be analysed reasonably well. The Cronbach's α's for the liking, sweetness and willingness to pay scales varied from acceptable, up to excellent. However, because the Cronbach's α for bitterness was poor the data has to be analysed with caution.

Testing the assumptions of the repeated measures ANOVA's

Four two-way repeated measures ANOVA's were performed on the data to determine whether or not the shape and colour of a coaster significantly influenced the liking, taste (which consists of bitterness and sweetness) and willingness to pay. In order to be able to perform a (two-way) repeated measures ANOVA for all four dependent variables, a few assumptions had to be met. Due to the way this experimental study was set up, the only assumptions that had to be tested with *SPSS* for all four dependent variables in the two-way repeated measures ANOVA's were the assumptions of normality. In order to do so, Kolmogorov-Smirnov and Shapiro-Wilk's W tests were run for all four dependent variables. The results showed that the assumption of normality was not met for any of the dependent variables in either the Kolmogorov-Smirnov tests (all p's <.000), or the Shapiro-Wilk's W tests (all p's < .034). However, a(n) (repeated measures) ANOVA is robust against the violation of this assumption. This can be attributed to the Central Limit Theory which states that for sample sizes (n > 30) one can assume a normal distribution of the retrieved data (Field, 2013). Therefore, this assumption was also met.

In conclusion, it can be said that due to the robustness of the ANOVA we may assume that the required assumptions were met in all four conditions. Nonetheless, because the Kolmogorov-Smirnov and Shapiro-Wilk's W tests were all non-significant (at the p < .05 level) this does entail that the resulting data has to be interpreted with prudence and care.

Liking

A two-way repeated measures ANOVA for the liking scores of beers with coaster colour [red, black] and shape [round, angular] as within-subject factors revealed no significant main effect of either coaster colour (F (1, 63) = .01, p = .94, η_p^2 = .00) or coaster shape (F (1, 63) = .00, p = .95,

η_p^2 = .00). Furthermore, no significant interaction effect between coaster colour and coaster shape was found on the liking of the beer (F (1, 63) = .58, p = .45, η_p^2 = .01). Red coasters did not significantly increase or decrease the liking of the beer as compared to black coasters. Also, round coasters did not significantly increase or decrease the liking of the beer as compared to angular coasters. Thus, neither the colour [red, black] nor the shape [round, angular] of the coasters affected the liking of the beer(s).

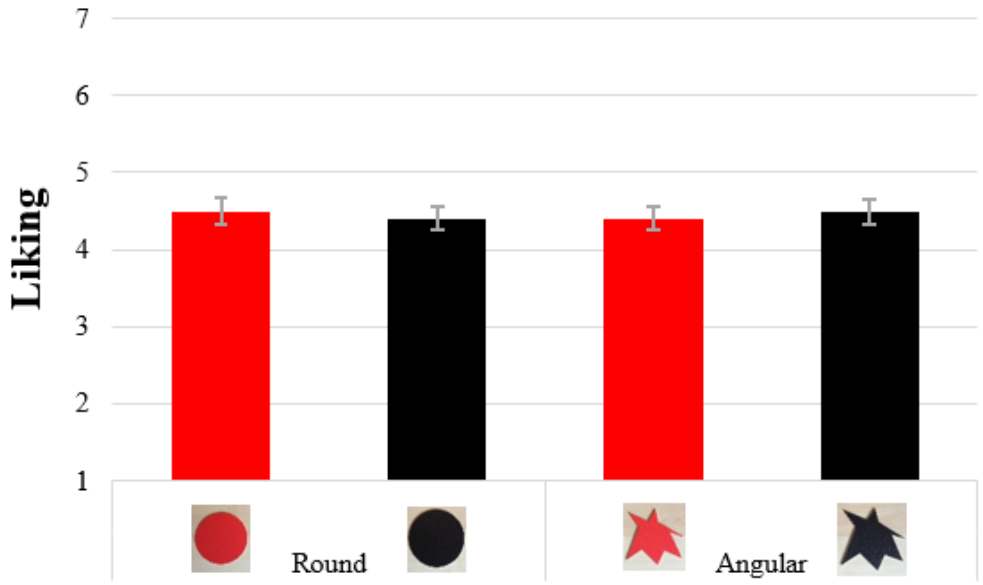

Figure 7. *The mean and std. error of liking rating per condition (n = 64) (1 = dislike very much, 7 = like very much).*

Taste

Bitterness.

A two-way repeated measures ANOVA for the bitterness scores of beers with coaster colour [red, black] and shape [round, angular] as within-subject factors revealed no significant main effect of either coaster colour (F (1, 63) = .32, p = .57, η_p^2 = .01) or coaster shape (F (1, 63) = 2.92, p = .09, η_p^2 = .04). However, there might be a trend for the angular coasters to lead to

slightly higher ratings of bitterness as compared to the round coasters. Furthermore, no significant interaction effect between coaster colour and coaster shape was found on the bitterness of the beer (F (1, 63) = .50, p = .48, η_p^2 = .01). Red coasters did not significantly increase the bitterness of the beer as compared to black coasters. Furthermore, round coasters did not significantly decrease the bitterness of the beer as compared to angular coasters.

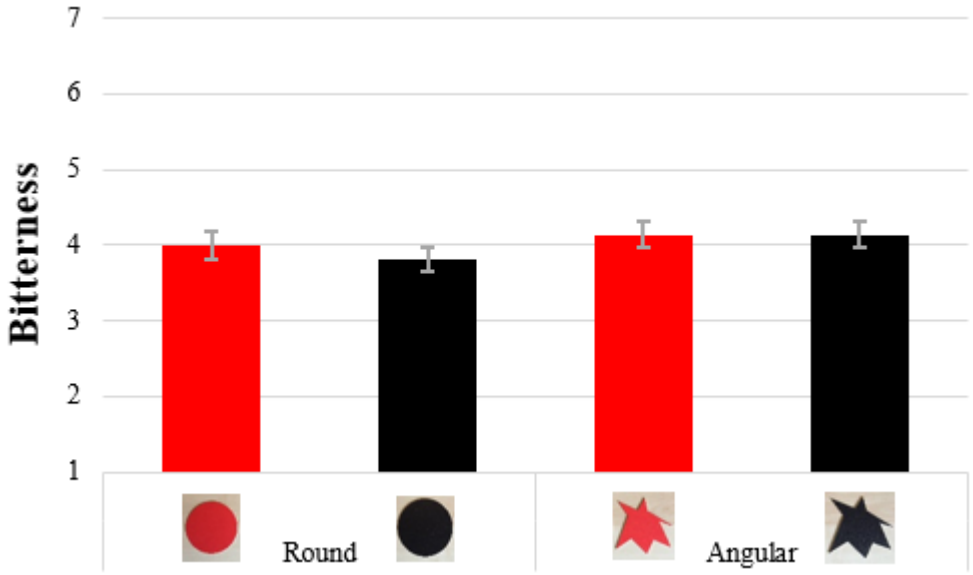

Figure 8. *The mean and std. error of bitterness rating per condition (n = 64) (1 = not bitter at all, 7 = very bitter).*

Sweetness.

A two-way repeated measures ANOVA for the sweetness scores of beers with coaster colour [red, black] and shape [round, angular] as within-subject factors revealed no significant main effect of either coaster colour (F (1, 63) = 1.56, p = .22, η_p^2 = .02) or coaster shape (F (1, 63) = .24, p = .63, η_p^2 = .00). Furthermore, no significant interaction effect between coaster colour and coaster shape was found on the bitterness of the beer (F (1, 63) = .15, p = .70, η_p^2 = .00). Red coasters did not significantly increase the sweetness of the beer as compared to black

coasters. Further, round coasters did not significantly increase the sweetness of the beer as compared to angular coasters. Thus, the colour [red, black] and the shape [round, angular] of the coasters did not affect the perceived sweetness of the beer(s).

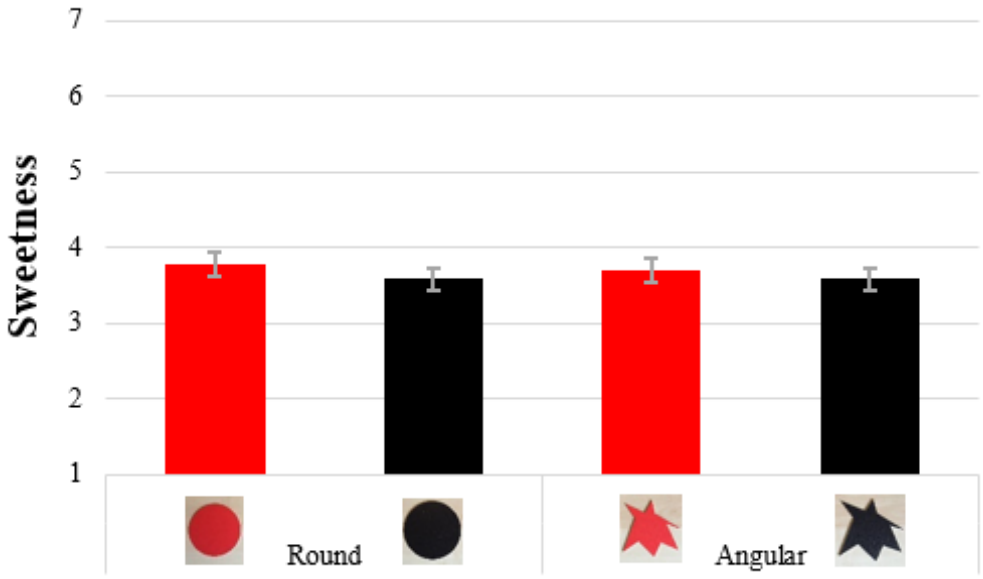

Figure 9. *The mean and std. error of bitterness rating per condition (n = 64) (1 = not sweet at all, 7 = very sweet).*

Willingness to pay

A two-way repeated measures ANOVA for the willingness to pay scores for beers with coaster colour [red, black] and shape [round, angular] as within-subject factors revealed no significant main effect of either coaster colour (F (1, 63) = .04, p = .84, η_p^2 = .00) or coaster shape (F (1, 63) = .43, p = .52, η_p^2 = .00). Furthermore, no significant interaction effect between coaster colour and coaster shape was found on the bitterness of the beer (F (1, 63) = .79, p = .38, η_p^2 = .01). Red coasters did not significantly increase the amount of money the participants were willing to pay for beer as compared to black coasters. Also, round coasters did not significantly decrease the amount of money the participants were willing to pay for beer as compared to angular coasters.

Thus, the amount of money the participants were willing to pay for the beer(s) was not influenced by the colour [red, black] or the shape [round, angular] of the coasters.

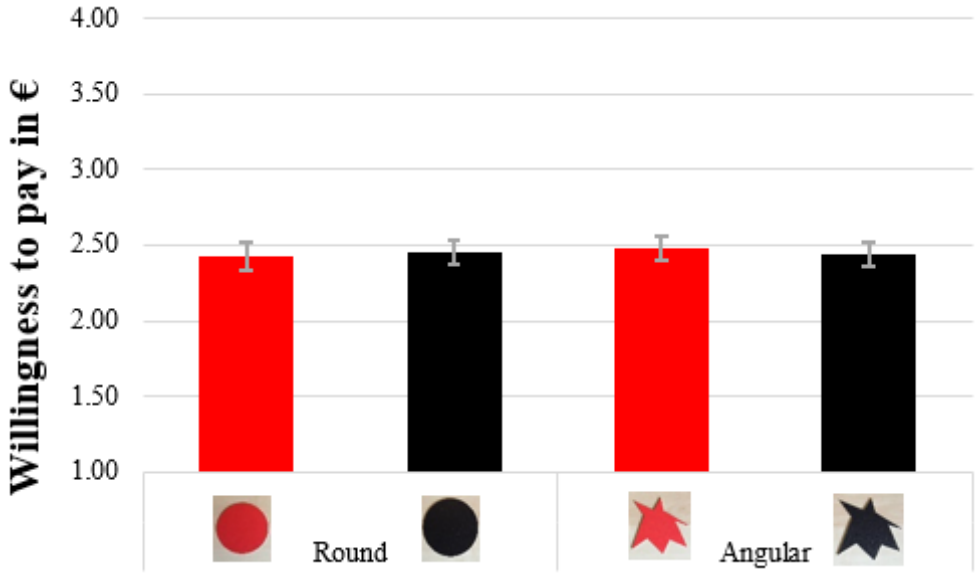

Figure 10. *The mean and std. error of willingness to pay ratings in euros per condition (n = 64).*

Conclusion

The present experimental study was the first of its kind in the field of crossmodal associations. It was the first study that looked into the possible effects of crossmodal congruence between colour and taste and shape and taste of an unstudied product-extrinsic cue in a real-life consumer setting. Specifically, it focussed on the possible effects coaster colour [red, black] and shape [round, angular] might have on consumers' drinking experience. This was done to provide further insight into the importance and possible uses of crossmodal associations in the field of (alcoholic) beverage marketing.

The main purpose of the present research was to examine the possible effect(s) of crossmodal (in)congruence between the shape and the colour of coasters on the perceived liking, perceived taste and how much money consumers were willing to pay for an alcoholic beverage (willingness to pay). The statistical findings of this experimental study revealed that both coaster colour [red, black] and coaster shape [round, angular] did not have a significant (interaction) effect on the perceived liking, taste and willingness to pay for an alcoholic beverage. Accordingly, all the drawn up hypotheses [H1a, H1b, H2, H3 and H4] were rejected.

Discussion

In this section the results of the current research will be discussed in terms of the theoretical framework that was outlined in the introduction of this paper.

Crossmodal associations between basic human tastes (sweetness, bitterness, sourness, saltiness and umami) and particular shapes and colours have been reasonably well-established in previous research (Gates et al., 2006; Gal et al., 2007; see Spence et al., 2010, for a review; Spence et al., 2010; Wadhera & Capaldi-Philips, 2014). Bright colours like red and pink are often associated with sweetness, whilst darker colours like black and purple are commonly associated with bitterness (Piqueras-Fiszman & Spence, 2012; Velasco et al., 2014; Spence et al., 2015; Velasco et al., 2016; Carvalho et al., 2017). Further, round shapes are broadly associated with sweetness and voluminousness, whilst angular shapes are widely associated with thinness and bitterness (Deroy & Valentin, 2011; Velasco et al., 2015; Velasco et al., 2016). Moreover, both colour and shape can influence consumers' expectations of palatability of foods and beverages and can therefore affect the consumers' choices (Gates et al., 2006; Spence et al., 2010; Wadhera & Capaldi-Philips, 2014).

Given the well-established abovementioned associations and its possible effects on the consumption experience of food and beverages, it was hypothesised that these associations might transcend towards a specific product-extrinsic cue associated with beverages that had yet to be scientifically explored, namely coasters. Coasters were chosen as a stimulus for the experiment because they come in a range of different colours and shapes and therefore could possibly be an ideal marketing communication or advertising tool to assist consumers in identifying and analysing possible qualities a beverage might have. Since this was the first study ever to look into the uncharted territory of the possible effects of coasters on drinking experience, it was unknown

whether or not colour, shape and colour-shape congruence (which has never been investigated in such a setting up until now) could alter the taste, liking and willingness to pay.

Nonetheless, based on the theoretical findings of the previously mentioned studies, it was expected that colour and shape would affect taste, liking and willingness to pay for the beers. More specifically, it was hypothesized that red coasters would increase sweetness, whilst black coasters would presumably increase bitterness. Moreover, it was expected that round coasters would positively impact sweetness scores, whilst angular shaped coasters would lead to higher ratings of bitterness. However, the current research revealed that neither the colour nor the shape of the coaster demonstrated a significant effect on the dependent variables. These were rather unexpected and contradictory findings as compared to most of the previous research done on crossmodal associations between colour and taste and shape and taste.

The data resulting from the current study is inconsistent with a study by Piqueras-Fiszman et al. (2012) which focused on the effects of plate colour could have on the liking of food. Piqueras-Fiszman et al. (2012) have shown that plate colour can influence food liking and taste. Therefore, it was hypothesized that the colour of the beverage plate, as coasters can be seen, might affect the participants expectations and eventually liking (Piqueras-Fiszman et al., 2012; Wadhera & Capaldi-Philips, 2014; Cavazzana et al., 2017). However, unlike the colour of a plate on which food is served, the colour of a coasters (which can be described as the plate on which a beverage is served) does not affect the liking or taste of a beverage as it seems. Apparently this association does seem to uphold for food but not for beverages, at least under these conditions.

A possible explanation for the abovementioned could be that in order to properly consume a meal consumers subconsciously pay attention to the plate because their eyes are

focussed on it whilst cutting, slicing or chopping the food on the plate. On the contrary it is not necessary to pay attention to the coaster on which the drink is served when reaching for it in order to consume it. One might for example only take notice of the glass itself as an anchor point when reaching for the beverage, thereby not paying attention to the coaster. Moreover, time might also play an important role in this process. It is also worth considered that slicing food most likely takes up more time and requires more concentration than lifting a beverage from a coaster. Thereby, the consumers could be more exposed to the plate ware which may explain the significant effects of plate colour as compared to the non-significant results found for coaster colour in the current experiment. The addition of the time participants look at either food or coasters could be an interesting topic for a future study and is therefore recommended.

Also, Gal et al. (2007) showed that placement and evaluation of either angular or round geometrical shapes in temporary proximity before the consumption of a taste stimulus affected the sensory qualities of the taste stimulus. Pointy geometrical shapes led to an increased sharpness in taste of the stimulus as compared to the round geometrical shape. When comparing those results to the results of the current research, it can be affirmed that these were not replicated. One must acknowledge that these associations did uphold for the food (cheese) used in Gal et al.'s experiment (2007), but apparently they did not exert any influence over the drinking experience of beers tested in the current experiment. This may have to do with the fact that the participants in Gal et al.'s experiment (2007) were primed with visual input featuring either pointy or round cornered shapes. The participants were instructed to specifically look at one of the shapes, prior to the tasting of the stimulus. In the current experiment the participants were not explicitly instructed to take notice of the coasters. Perhaps not being told explicitly to pay attention to the shape of the coasters might have caused the discrepancy between the current

research results regarding beverages and the findings of Gal et al. (2007) on the effect of shape on taste for food.

Nevertheless, there also seems to be a lead towards potential consistency in the current research results not being significant for coaster shape when these are compared to the findings of Mirabito et al. (2017). Namely, Mirabito et al. (2017) explored whether glass shape, either straight or curved, altered the participants' perception of a glass of craft beer. Their results showed that a curved glass had a positive effect on the perceived fruitiness and intensity ratings of the beer, but most importantly no significant effects were found for bitterness and sweetness, pleasantness and willingness to pay. These findings seem to correspond with the results of the present study in which round shaped coasters did not affect taste, liking and willingness to pay ratings. Even though it can be argued that glassware and coasters are different product-extrinsic cues and therefore these associations might not justify, the results point towards the same direction. However, the consistency in the non-significant research results in both studies does call into question whether or not the right questions were asked about the beer during the current experiment in order to properly evaluate and capture the effect of coaster shape (and colour) on taste. There may be other relevant dimensions that could contribute to the overall taste experience that were not included in the present study. For example, questions about the fruitiness, sourness, intensity or even smoothness of the beer could have also shined a light on the possible effects coaster shape and colour might have had on the taste of the beer in the experiment. In future research these dependent variables should be included in the investigation in order to capture all the relevant dimensions of the taste experience.

Furthermore, contrary to what was expected, colour-shape congruence did not significantly elicit more favourable evaluations towards the target stimulus (beer) for either

liking, taste or willingness to pay. One possible explanation might be that the processing fluency as described by Winkielman et al. (2003) was not increased by means of the colour-shape congruence, whereby it did not affect evaluation ratings of the beer as previous research suggests (Tu et al., 2016; Velasco et al., 2016; Mirabito et al., 2017). Possibly, the processing fluency did not increase due to the inattentiveness of the participants with regards to the coasters during the experiment. This might have to do with a phenomenon called selective attention. Selective attention refers to the processes of selection and focus on particular input, whilst suppressing other nonrelevant input (Stevens & Bavelier, 2012). By means of partaking in the experiment, the participants might have been solely focussing on distinguishing the potential flavour discrepancies of the beers in each condition. Thereby, perhaps they did not take notice of the different coasters that were placed underneath each beer, let alone the coaster colour, shape or colour-shape (in)congruence. After explaining the goal of the experiment to the participants, some of the participants even said that they did not even see the different coasters because they were only paying attention to the beers. This might have caused the inconsistency in research results compared to previous research.

Participants in earlier studies were sometimes instructed to actively pay attention to specific stimulus features like shape and colour before evaluating taste by means of answering a questionnaire. For example, participants in a study by Wan et al. (2016) had to indicate the flavour and rate the familiarity and pleasantness of a drink based on its colour and the receptacle it was in. In a similar study by Shankar et al. (2010) participants also had to indicate the flavour of a drink based on the colour of it. In another research by Deroy and Valentin (2011) participants had to characterize the flavour of a beer by selecting a shape it resembled. The aforementioned research seem to imply that participants may have to be instructed towards focussing on certain

specific features during an experiment. Perhaps if the participants in the current study had been instructed to actively pay attention to the colour and the shape of the different coasters during the experiment, the results might have turned out to be statistically significant. However, in doing so, one would ignore a fundamental aspect of the workings of crossmodal associations, namely that they occur on a subconscious level.

Crossmodal associations and sensory marketing should come into play, by appealing to the subconscious mind of the consumer (Krishna, 2011). However, when the consumer is (completely) unaware of the colour nor the shape of the coasters they might not be subconsciously affected by these product-extrinsic cues because they are in fact not processed as such by the brain. Hereby it might be so that 'the first taste is almost always with the eye' (Imram, 1999) only applies when consumers are consciously processing the stimulus. Additionally, the time the participants had to assess the beers and the coasters on which the beers were served was limited due to time pressure. The Biergarten Tilburg Zomerfestival 2018 only lasted for two days and the researcher needed to gather all the participants and explain and perform the experiment by himself, therefore the experiment time was limited. Even though the current experimental setting mimicked a real-life bar and drinking situation, the time and the amount of beer given to the participants in each condition was limited. Perhaps if the participants had more time to assess the drinks, like one would most likely have in a real-life drinking situation, the altering colour and shape of the coasters on which the drinks were placed would have been more conspicuous. Potentially, this could also have played a role in the overall assessment of the beer and the filling in of the questionnaires.

Another explanation for the non-significant results for colour-shape congruence might be that apparently the altering of the shape and the colour of coasters did not provoke a feeling of

artful deviation and pleasure amongst the participants. By not provoking a feeling of artful deviation and pleasure amongst the participants it is possible that a positive evaluation effect did not carry over to the different dependent variable ratings (McQuarrie & Mick, 1996; 1999). A likely possible explanation could be that the effects McQuarrie and Mick (1996; 1999) found only apply to visual rhetorical figures in advertisements. In the current experiment no real rhetorical figure was used in the coasters, apart from the disruption in shape and possibly colour as not a lot of black coasters are produced. Perhaps if the coasters would be ornamented with rhetorical figures, for example in the form of an alliterating text or a metaphorical picture printed on the coaster, a disruption effect might be found. This would make an excellent topic for future research.

Lastly, perhaps the most plausible comprehensive explanation for the all of the non-significant research results might be found in the sample size used. Possibly, the sample size used in the present experiment was not large enough which may have resulted in the study being underpowered. A study being underpowered can result in non-significant outcomes because the sample size used is not adequately large. In the current experiment for example a trend was observed for the angular coasters to lead to slightly higher ratings of bitterness as compared to the round coasters. If a larger sample size would have been used this might have led to this trending finding becoming statically significant. On the other hand, one must also be aware of the fact that even the most trivial results can become statically significant when the sample size used becomes sufficiently large. Because of this, caution should be taken when generalizing research results due to the chances of a possible fixed-effect fallacy. A fixed-effect fallacy may lead to alpha inflation of the results in what is called a positive bias or a type I error (Meuffels & Van den Bergh, 2005). Considering the current research results, the abovementioned and the number

of participants used in similar studies, a doubling or tripling of the sample size used in the present study possibly could have led to significant research results.

Limitations

Like all scientific papers this work has its limitations that require acknowledgement and further attention in subsequent research. First, the instrumentation used to measure the dependent variables was derived from Mirabito et al. (2017) and Carvalho et al. (2017). Unfortunately, Mirabito et al. (2017) and Carvalho et al. (2017) did not provide any data on the reliability of the scales used. Therefore, the reliability scores cannot be compared to the Cronbach's α's found for the dependent variables in the current study. Looking at the Cronbach's α's for the variables liking, sweetness and willingness to pay scales in the current research they varied from acceptable to excellent, whilst the Cronbach's α for the variable bitterness was poor. A poor Cronbach's α means that the largest portion of the observed test variance is measurement error due to chance instead of manipulation. Hence, the validity of the results cannot be guaranteed when this scale is used across different experiments or when the current experiment would be replicated. Therefore, the results of these experiments could easily differ from the results in the current experiment due to a lack of reliability in the bitterness scale. Because of this, the results for the dependent variable bitterness should be interpreted cautiously.

One possible solution to improve reliability ratings would be to add more questions in order to better capture the essence of (in this case) bitterness in a scale. A factor analyses could be performed before calculating the Cronbach's α's to find out which questions (items in the factor analysis) should be included and which should be excluded in order to best measure the dependent variable bitterness. By reassuring that several items (questions) belong to one factor

(in this case bitterness), the Cronbach's α will most likely increase as well because of the improved internal consistency. For example, statements like 'I tend to like bitter flavours in beverages' might be added. Another option would be to interchange the word bitter(ness) with either a synonym like *pungent* or *sharp*, or an antonym (a word with opposite meaning to another word) like *bland* or *sweet* and reversing the scale to see whether or not the participants answer consistently.

Additionally, the make-up of the sample could also have impacted the results. In order to say something meaningful about the distribution of the sample used in the experiment we need to compare it to other samples used in beer research. In this case, what better sample to take a look at than the distribution of the Dutch beer drinking population according to the national yearly beer survey among Dutch beer drinkers (N=1044). According to this survey more Dutch men (66%) than women (30%) drink beer on a monthly basis. Also, high educated people (57%) tend to drink more often on a monthly basis as compared to community college (51%) and low-skilled (37%) people above 18 years of age (De Jongh et al., 2017; Nederlandse Brouwers, n.d.). These percentages seem to correspond with the sample data obtained in the current experiment. When looking at the demographic data it becomes clear that more men (36) than women (28) participated in the experiment. Also, the majority of the participants had enjoyed a higher education (46) as compared to community college (16) and secondary school (1). Hence, the sample obtained from the real-life experimental setting at the Biergarten Tilburg Zomerfestival 2018 appears to reflect the Dutch beer drinking population quite well even though none of the results were significant.

Furthermore, it has to be considered that the participants who took part in the current study could have been more knowledgeable about the (taste of) beer(s) than the general

population. This assumption is invigorated by the fact that the participants were recruited at the Biergarten Tilburg Zomerfestival 2018 beer festival. It can be assumed that overall more experts visit beer festivals as compared to novices, whilst novices may presumably represent the general population better. If this were in fact the case, then it might be assumed that the participants were more expert in detecting possible differences or in this case similarities in the flavour characterization of the beers they drank in all four conditions. Thereby, being less susceptible for the manipulations that were allegedly done to the beers, even though the actual manipulations were done to the coasters. Possibly this influenced their ratings on the dependent variables scales and overall drinking experience.

It is worth noting that the colours and shapes used in the current experiment were limited to red and black and (perfectly) round and starshaped (six point) angular. It is possible that these colours and shapes did not represent the best matches for sweetness and bitterness. Perhaps the use of other colours and shapes would have provided different results. According to Velasco et al. (2015), the two most frequently used figures in previous research on shape correspondence are an angular seven point, none symmetrical star and an amoeba like shape with rounded edges. These shapes are based on the infamous classical “Maluma-Takete” or “Bouba-Kiki” experiments performed in studies by subsequently Kohler in 1947 and Ramachandran and Hubbard in 2001. The wide use of these figures may indicate that they resemble better matches for enhancing bitterness and sweetness as compared to the round and angular shapes used for the coasters in the current study.

Moreover, consumers’ associations with particular colours can differ or vary depending on the context in which the colour is presented to the consumer (Wan et al., 2014). Nowadays for example, the colour black is associated not only with bitterness, but also with luxuriousness,

expensiveness and high quality products on the one hand. On the other hand however, it has also been associated with grime and dirt under different circumstances (Amsteus, Al-Shaaban, Wallin, & Sjöqvist, 2015). Because of these different associations depending on context, the colour black might not have been the best colour to enhance bitterness in the current experiment. Perhaps if the coasters would have been coloured purple, which as we have seen is also associated with bitterness, this would have been a better match for bitterness and may have provided different research results (Spence et al., 2015). In addition, another study by Tijssen, Zandstra, de Graaf and Jager (2017) revealed that a decrease in the brightness of a red coloured sausage package led to higher sweetness intensity ratings. This may indicate that the red coloured coasters were in fact to brightly coloured. Possibly, lighter shades of red or perhaps pink (as it is also associated with sweetness) could have increased the perceived sweetness scores.

Also, the coasters used in the different conditions did not have any text on them. Perhaps one of the reasons consumers tend to look and play with coasters whilst enjoying a beverage is the fact that their attention is drawn towards the text might be written on the coasters. However, this does not entail that textless, distinctively shaped coasters, like the ones used in the current experiment, do not have external validity as they still look like real coasters and remain just as functional. It is merely suggested that coasters that do have text on them (like most branded coasters) might be more appealing to the consumer due to the fact that the consumer might be curious as to what is written on the coaster. Again, this would make an interesting topic for future research.

Finally, the experiment did not take into consideration the possible beer preferences participants might have had. After the completion of the last questionnaire, participants frequently asked questions about whether the beer was a craft beer or a (lager) draft beer. Initial

beer preferences could have increased or decreased the dependent variables scores based on possible prior experience or associations that underlie these preferences. If, for example a participant prefers craft beer over lager and is under the impression that the beers s/he drank during the experimental conditions were in fact craft beers, then s/he might have based the dependent variable ratings on previous knowledge or associations with craft beer in general. For example, s/he might be willing to pay significantly more for a beer which is thought to be a craft beer, as s/he knows that it is usually more expensive than lager. In the same way prior knowledge or experience may have influenced the liking and taste scores. Therefore, beer preference may have influenced their scoring even though it was not measured in the current experiment.

Practical implications and ethical aspect

The present study provides information on the possible uses of crossmodal associations and crossmodal congruence in the field of (alcoholic) beverage marketing. Specifically, this study provides insight into whether or not certain colour [red, black] and shape [round, angular] characteristics of coasters altered the perceived taste, liking and willingness to pay of several beers that were served to the participants during the experiment. Even though the results of the present study on crossmodal associations and crossmodal congruence between shape, colour and taste turned out not to be statistically significant, these findings do have practical relevance. Marketeers and (alcoholic) beverage companies interested in the workings of the visual aspect of the multisensory consumer experience can still make good use of the current research results.

The abovementioned should at the very least take notice of the mechanisms that seem to underlie crossmodal associations. The impact the shape, colour and shape-colour congruence of coasters might have on the taste experience of their beverages via mechanisms like processing

fluency and selective attention should not be underestimated. Moreover, the outcomes of the present study can point marketeers and future researchers towards potential opportunities when it comes to trying to communicate the perfect taste experience by creating the best fit between a brand specific design and taste and the colour and shape the coasters on which the beverage is served. Altering the shape and colour of coasters might be an easy and cheap way for marketeers to add to the consumers' experience whilst also trying to communicate brand and product specific qualities a beverage may have. Since this form of consumer persuasion happens on a subconscious level, this will most likely not be noticed by the consumer. Therefore, it is very unlikely for consumers to be able to resist this form of sensory marketing.

Marketeers and beverage companies who make an assessment of the costs-benefits analysis should take into consideration that the production of coasters in a wide variety of colours and shapes is possible at a relatively low cost, whilst the possible gains, apart from the communication of brand and beverage specific values and tastes, have to be investigated and scientifically supported by results in future research. The best fitting and most effective ways to colour and shape coasters will probably need to be deliberated on a case-by-case basis. Therefore, it may be wise for beverage companies to experiment with coaster shape and colour in a controlled setting in order to find the perfect fit for a brand or beverage to try to provide the ideal consumer beverage drinking experience, before starting to use the coasters in real-life settings.

When dealing with crossmodal associations and especially in sensory marketing communication, one must keep in mind the ethical aspect of sensory marketing as a tool to improve consumer experience as defined by Krishna (2011). Therefore, the following questions arise: ''How ethically responsible is it to appeal to the consumers' subconscious state of mind for

marketing purposes?'' and ''Is it even possible for consumers to resist this form of involuntary influence?''. These questions are relevant because the persuasion of the consumers through sensory marketing communication happens on a subconscious level. Therefore, sensory marketing communication just might walk the thin ethical line between what is acceptable and what is not.

Future research

Even though the current research results presented here were not statically significant and seem to suggest that colour, shape and colour-shape congruence of coasters did not have an effect on the beer drinking experience, this does not mean that no further attention has to be paid to the subject in subsequent research. On the contrary, since this was the first study ever on crossmodal associations and crossmodal congruence to look at the potential influence of the colour and shape of coasters on taste, liking and willingness to pay, a lot can be gained by future expandatory research performed either in a laboratory or in a real-life setting. The current research findings brought forth possible relevant factors and points of interest to consider that might encourage future research in this particular area of crossmodal associations and in crossmodal correspondences and congruence in general. These will be discussed further below.

Firstly, future research could look into the usage of different colours and shapes of coasters to see whether or not this effects the consumers drinking experience. On the one hand the effects of different hues, shades and tints of red and pink or black and purple could be explored, as this may influence sweetness and bitterness ratings (Amsteus et al., 2015; Spence et al., 2015; Tijssen et al., 2017). On the other hand differently shaped coasters like for example oval, ellipse or flower shaped coasters instead of round ones, or pyramid or hexagon shaped

coasters instead of the star shaped angular coasters could be tested as an alternative to the shapes used in the current experiment and the most frequently used shapes in crossmodal correspondences (Velasco et al., 2015).

Secondly, future research may explore the possibilities and uses of the ornamenting of coasters, for instance by the addition of visual rhetorical figures. This might be done in the form of alliterating texts or metaphorical pictures printed on the coaster. Adding rhetorical figures to the coasters could possibly elicit a disruption effect which may lead to an increased cognitive elaboration and to a higher degree of pleasure for the consumer because of the artful deviation in the rhetorical figure (McQuarrie & Mick, 1996; 1999). Moreover, future research could also compare whether or not coasters that have ornamenting of some sort on them (like most branded coasters) are more appealing to consumer than coasters that lack ornamenting and investigate why that might possibly be the case. This would be a very interesting topic for future research since none of this was ever tested with regards to coasters.

Thirdly, future research should try to operationalize and measure additional relevant dimensions that may contribute to the overall taste experience that were not included in the present study. For example, questions about the fruitiness, sourness, intensity or even smoothness of the beer could be included in future research as these may contribute to a broader understanding of the possible ways in which coaster colour, shape and colour-shape congruence can or cannot influence the taste of a beverage. In future research these dimensions should be included as dependent variables in the investigation in order to capture all the relevant dimensions of the taste experience.

Fourthly, it might also be a good idea for future research to take into consideration the possible beer preferences participants might have in order to control for prior experiences or

associations that may these underlie personal preferences. This would be wise because personal preferences can influence the participants' dependent variable scores. Controlling for personal preferences can possibly be done by adding questions related to beer or beverage preferences at the start of or prior to the start of the questionnaire. The addition of questions on beer or beverage preferences prior to the filling out of the questionnaire should therefore be taken into consideration for future research.

Fifthly, another interesting proposition for future research would be to present the beverage to the participants in an opaque glass or receptacle, so they cannot see the content of the glass. Therefore, no associations can be made regarding the colour or texture of the beverage itself prior to drinking it. The participants would then solely have to base their associations on the shape and colour of the coaster, glass or receptacle, instead of on the colour of the beverage itself. Hereby, perhaps even more attention would be drawn to the coaster, as the contents of the glassware cannot be seen. This could provide for further information on the possibilities coasters might have as an interesting marketing communication tool.

Sixthly future research can draw lessons from and build upon the present research experience. For instance, based on the current experimental process, the gathering of data at beer festival is highly recommended for future research that takes place in a real-life beer drinking setting because the makeup of the sample used represented the (Dutch) beer drinking population adequately. This indicates that the future samples from beer festivals could also be a very good representation of the beer drinking population in a country. Moreover, participants in future studies could possibly be explicitly advised to pay attention to the colour and the shape of the different coasters during an experiment. However, it has to be kept in mind that the possible downside of this could be that the subconscious workings of crossmodal associations might be

compromised.

Finally, future research is advised to use an adequately large sample size. As stated in the discussion section, a doubling or tripling of the sample size used in the current experiment is recommended for future research in order to reach appropriate power levels, thereby eliminating the risk of the study being underpowered.

By using the theory on crossmodal associations as a springboard, the current research has sought to provide insight into the possible effects of crossmodal congruence between the colour and shape of coasters on taste, liking and willingness to pay. The results of the present study did not coincide with previous research on the effects of crossmodal correspondences with regard to vision (colour and shape) and taste, liking and willingness to pay for beverages. None of the results of the current experiment turned out to be statistically significant. Accordingly, all the drawn up hypotheses were rejected. However, it has to be noted that this was an experimental study with the as sole purpose of exploring the possible crossmodal congruence effects between colour and shape for coasters. With this in mind, the current study provides a solid theoretical basis to spark future research on the effects and marketing communication implications of colour and shape congruence in the beverage industry in general, as well as with regards to coasters. Hereby, an extra layer of information was added both to the scientific, as well as the practical knowledge on the use of crossmodal associations and crossmodal congruence in marketing communication.

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Appendix

Appendix I

The results of the G*Power statistical power analysis can be found below in Figure 1.

F tests -	ANOVA: Repeated measures, within factors	
Analysis:	A priori: Compute required sample size	
Input:	Effect size f	= 0.25
	α err prob	= 0.05
	Power (1-β err prob)	= 0.95
	Number of groups	= 1
	Number of measurements	= 4
	Corr among rep measures	= 0.5
	Nonsphericity correction ε	= 1
Output:	Noncentrality parameter λ	= 18.0000000
	Critical F	= 2.6911329
	Numerator df	= 3.0000000
	Denominator df	= 105
	Total sample size	= 36
	Actual power	= 0.9519863

Figure 1. *Results of the G*Power statistical power analysis for the current study.*