TASTING WITH THE HANDS

MASTER THESIS MARKETING COMMUNICATION

THEME: TACTILE INFLUENCES OF PRODUCT PACKAGING ON FOOD PERCEPTIONS

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ABSTRACT

Several past studies have shown cross-modal correspondences between bitter and sweet tastes and angular and round shapes. However, these studies only examined visual or olfactory stimuli. As tactile stimuli are of great importance in the decision-making process of consumers when it comes to products, these influences should be further researched. Furthermore, recent studies have found that congruence between product properties can lead to favorable attitudes towards that product. Another factor that should be taken into consideration is taste description, which should also be congruent with the product. The present study was conducted to receive more insight in the influence of tactile stimuli. The study uses a 2 (coffee vs. hot chocolate) x 2 (angular surface vs. round surface) x 2 (taste description strong vs. taste description soft) experimental design. Tactile influences are examined for two different tastes: bitter (coffee) and sweet (hot chocolate). The dependent variables used in this study are perceived taste, product taste liking, product experience and purchase intention. 3D printed cups with angular and round surfaces were created. A pretest was conducted to find the best fitting taste descriptions for the cups and the drinks, leading to usage of the descriptions “soft” and “strong”. A total of 160 respondents divided into 8 conditions participated in the study. It was found that angular surfaces lead to higher perceived bitterness and stronger taste, whereas round surfaces lead to higher perceived sweetness and milder taste. Furthermore, congruent pairings of drinks and tactile stimuli resulted in more favorable outcomes. Congruence was also found to be important with regard to taste descriptions.

Keywords: Tactile Influence – Product Packaging – Sensory Marketing – Food Perception

CONTENTS

1. INTRODUCTION

When shopping for groceries consumers face a lot of situations in which they have to engage in decision making processes. Stores are filled with products to choose from, with all types of colors, shapes, and sizes. Especially when thinking about products such as coffee or hot chocolate, an image of a highly stocked shelf comes to mind: filled with a great amount of different brands with packages differing on so many levels that the eye of the consumer tries to catch up on something that makes the product distinct from the others. Due to this, product packaging has become more relevant in the last years as it is the first thing that is noticed while grocery shopping. Of course every marketer tries to create packages that lead to awareness and attraction of the product. But what exactly is the best way to achieve this? Are properties such as color, size, and shape enough to draw someone's attention? Even if they are, these packaging characteristics are already used by many brands, leaving less variation between products. Also, the field of such visual product properties has already been studied, leaving out other senses (Blankenburg, Ruff, Deichmann, Rees & Driver, 2006). Thus, it is necessary to go beyond this kind of advertising of products. The next step would then be to think about what else can be highlighted or manipulated of a packaging. Therefore, the tactile input of packages is addressed. Tactile input is the information a product packaging gives regarding touch. Different surfaces of packages are considered to have different influences on consumers' perception of a product. This assumption is in line with Krishna's definition of sensory marketing (2012), as tactile input is one part of sensory marketing. The definition is as follows: "marketing that engages the consumers' senses and affects their perception, judgment and behavior". The relevance of tactile input of packages is also underlined by Schifferstein & Cleiren (2005) who found that it is the most important sensory input alongside visual input. Therefore, it is necessary to create more awareness on tactile sensory input and its helpful features of creating positive perceptions of products among consumers. Thus, this study will focus on tactile input on product packaging. Regarding the marketing domain, the outcome of this study can help marketers in a practical way as they might eventually be able to use the findings to create appropriate product packages for the products they want to sell. Furthermore, the outcomes could lead to a breakthrough with regard to the indistinction of products. This means that by creating insights in new forms of product packages a new awareness of products can be formed amongst customers.

Research showed that one sensory stimuli can lead to changes in other sensory experiences, which means that the tactile aspects of a package can lead to a change in, for example, perceived taste. This is in line with Krishna's definition of sensory marketing, as perceived taste can be seen as a consumer's perception of a product. This phenomenon of the influence of one sensory stimuli on

other sensory experiences is called “cross-modal correspondence” (Schifferstein & Spence, 2008). Besides the taste of a product the product experience can be changed by usage of certain tactile stimuli. This is also in line with the general definition of sensory marketing, as it refers to the change in judgment. Furthermore, the purchase intention is assumed to be influenced by product packaging. This purchase intention eventually leads to purchasing the product, which can be seen as a change of behavior. Nevertheless, a balance should be existent between the packaging of a product and the product taste. This balance can be best explained by the fact that people have a certain need for congruence (van Rompay & Pruyn, 2011). This congruence is, in this case, important between certain factors or stimuli of a product and its packaging. If the stimuli fit well, the consumer will appreciate the product more. Congruency and other factors related to it, such as processing fluency, will be discussed later on in the theoretical framework.

Based on the description of this field of study, with regard to the influence of tactile input of product packages onto taste experience, product experience, and purchase intention the following research question for this study was formulated:

“What are the relative effects of tactile stimuli on consumers’ perception of taste, as well as product taste liking, product experience, and purchase intentions?”

2. THEORETICAL FRAMEWORK

2.1 TACTILE FORM AND TASTE

When it comes to food perceptions several studies have found that the packaging of a product can influence the overall perception of the product (Spence, Harrad & Piqueras-Fiszman, 2012). This is an implicit process in which consumers rely on one property of a product when making assumptions about a second property (Becker, van Rompay, Schifferstein & Galetzka, 2011; Huber & McCann, 1982). Thus, consumers might have a certain expectation of product taste once they get to touch the product packaging. Furthermore, it was found that this implicit process especially occurs when the properties of the product are experienced within a short time frame (Becker et al., Garber, Hyatt & Starr, 2001). Consumers' other perceptions of the product besides taste will be influenced by the materials they are given as well, again leading to a different overall perception of the product (Schifferstein & Spence, 2008; Becker et al., 2011). Especially tactile properties of the packaging are important to create said influences, as it is the most important sensory input (Schifferstein & Cleiren, 2005). It is possible that the packaging either enhances the taste of the product or interferes with it (Piqueras-Fiszman & Spence, 2012). Therefore, if a marketer wants to create a packaging that enhances the taste of the product positively, it is necessary to use materials and shapes that underline the taste of it.

As this study is about two hot beverages, one being coffee, which has a bitter taste to it and one being hot chocolate, which has a sweet taste to it, it is necessary to look at materials and shapes that underline the perception of bitterness and sweetness. Thus, materials are needed that consumers link to a bitter and a sweet taste. A study of Ngo, Misra & Spence (2011) showed that in Western cultures bitterness is often linked to angular shapes, thus harsh shapes and structures. Within this study different shapes were visually presented for the respondents in combination with different types of chocolate, ranging from bitter to milder or sweeter tastes. A cross-modal correspondence was found between the two stimuli. Cross-modal correspondence can be defined as "compatibility effects between attributes or dimensions of a stimulus in different sensory modalities" (Spence, 2012; Chrisinel, Jacquier, Deroy & Spence, 2013). Thus, several sensory stimuli are mapped onto each other. In the study of Ngo et. al (2011) the bitter chocolate was linked to the angular shapes presented and the sweet chocolate was linked to the organic or round shapes that were presented. As found by Zhang, Price & Feick (2006), angular shapes lead to strong associations (conflict) whereas round shapes lead to rather mild associations (gentle). According to Spence & Ngo (2012) various tastes/products have been studied already with regard to cross-modal correspondences found between them and visually presented shapes. Furthermore, these cross-modal correspondences have also been found between visually presented shape stimuli and

olfactory, gustatory, and oral-somatosensory properties of food (Spence, 2012; Spence, Ngo, Percival & Smith, 2013). Further research by Spence et al. (2012) showed that the shape symbolic associations also lead to cross-modal correspondence for other products, more specifically regarding their taste, smell, and texture. However, there is a striking gap in cross-modal correspondence research regarding food products, as they were conducted for visually presented shapes. Thus, tactile surfaces have not been studied in this field. This underlines the importance of the present study in which cross-modal correspondence is measured between tactile form and taste, leading to a closure of the current gap.

With the help of the information above and the findings that the usage of certain materials can enhance the beverage's perceived taste, the following hypotheses can be formulated:

H1a: Product packages with angular surfaces will lead to higher perceived bitterness and a stronger taste perception of coffee and hot chocolate than round surfaced cups.

H1b: Product packages with round surfaces will lead to higher perceived sweetness and a milder taste perception of coffee and hot chocolate than angular surfaced cups.

2.2 TASTE DESCRIPTIONS

As stated above, congruence among different product properties is an important factor. However, it does not only refer to the product packaging and the taste or, more generally speaking, the product itself. Congruence is also an important matter when it comes to textual cues on packages or in advertisements (van Rompay, Pruyn & Tieke, 2009). In the article of van Rompay et al. (2009) it is formulated that congruence between textual cues and product packaging (appearance) leads to an easier assessment of product benefits.

As Piqueras-Fiszman & Spence (2015) stated, information that is presented to consumers before tasting a product leads to expectations about the product. These expectations were found to have an impact on the perception of the consumers. When a textual cue, in this case a taste description, is used informational framing occurs (Sörqvist et al., 2013 & Sörqvist et al., 2015). Informational framing is assumed to have an influence on taste perceptions as shown in research about eco-labels. Thus, it might also be the case that other forms of informational framing have an influence on taste perceptions. As Shankar, Levitan, Prescott & Spence (2009) found, even single words regarding the taste of a product can influence the perceived taste of that product. In their study the word "dark" in combination with chocolate led to a higher perceived chocolate flavor than the word "milk" in combination with chocolate. In a study by Okamoto (2009) it was found that different tastes were liked more when they were combined with words that were related to these tastes, especially in those cases where the combinations of tastes and words were congruent. If a specific taste or flavor has been presented before a product is tasted this taste or flavor is perceived

as being stronger (Distel & Hudson, 2001) and it also stands out compared to other tastes and flavors of the same product (Herz & von Clef, 2001). Thus, it is assumed that textual cues in form of taste descriptions might also have an influence on the perception of the product. Furthermore, the consumer needs to extensively process the information in order to be able to integrate the messages properly (Peracchio & Meyers-Levy, 2005; van Rompay, Pruyn & Tieke, 2009).

Due to the finding that taste descriptions and product packaging (or the appearance of a product) are related, it can also be assumed that taste descriptions and tactile form are somehow connected. Therefore, it might be interesting to address this subject further to find out to what extent additional taste descriptions interfere or enhance the outcomes of the influences made by the product packaging in relation to the served drink. To be more specific, it is an interesting subject if the congruence between a drink and the packaging is changed by further congruence or incongruence with a third aspect, taste description. This is why this variable will also be analyzed in this study. As the goal is to find out which influences can be found when adding this third variable, no hypotheses were made up to this point. However, it is assumed that congruent pairings of taste descriptions and tactile forms will lead to higher results than incongruent pairings.

2.3 DEPENDENT VARIABLES

2.3.1 PRODUCT TASTE LIKING

When it comes to a consumer's liking of a product, or in this case the liking of the taste of a product, one aspect can be seen as a particularly important predictor: processing fluency. Processing fluency describes how easily product properties can be processed by consumers (Reber, Schwarz & Winkielman, 2004; Lee & Aaker, 2004). This ease of processing leads to favorable attitudes towards a product. On the contrary, if stimuli of a product cannot be processed easily, unfavorable attitudes are triggered (Reber et al. 2004).

The processing of product properties can be enhanced by congruence regarding these properties. A study by van Rompay & Pruyn (2011) shows that stimuli that are congruent lead to more positive experiences of the product at hand than when the stimuli are incongruent. In this study two types of shapes of water bottles and two types of typefaces were used, which were either combined congruently or incongruently. It was found that congruence in the properties of the bottle led to more positive outcomes regarding, for example, product credibility. Thus, it is assumed that congruence leads to better processing fluency which then leads to a higher product taste liking. In this study congruence is based on combinations between drink and tactile form. This means that the drink should be matching the tactile form. In this case coffee is best to be combined with angular

shaped surfaces whereas hot chocolate is best to be combined with round shaped surfaces (Zhang et al., 2006; Ngo et al., 2011).Therefore, the following hypotheses were postulated:

H2a: Product packages with angular surfaces will lead to higher product taste liking of coffee than round surfaces.

H2b: Product packages with round surfaces will lead to higher product taste liking of hot chocolate than angular surfaces.

2.3.2 Product experience

The design of products is connected to the experience of that product by consumers (Schütte, 2006). To positively influence product experience it is important to design products that fit the target group and accordingly lead to higher levels of positive product experience. When it comes to defining product experience, one definition comes forth to a great extent in the literature, in which it is described as "the awareness of the psychological effects elicited by the interaction with a product, including the degree to which all our senses are stimulated, the meanings and values we attach to the product, and the feelings and emotions that are elicited" (Hekkert & Schifferstein, 2008; Fenko, Schifferstein & Hekkert, 2009).

Peck & Childers (2003) found that the experience of a product by consumers can be influenced by tactile input. They stated that by giving consumers the chance to touch a product they might feel differently about it. Thus, consumers' attitudes regarding the products might change by using certain tactile materials and/or shapes. This was also found by Desmet & Hekkert (2007), who defined product experience as "a change in core affect that is attributed to human-product interaction". Therefore, it is assumed that the choice of material will lead to the product as being perceived as either good or bad, or as appreciated or not and so on, as the word affect refers to a subjective perception of the product (Desmet & Hekkert, 2007). Regarding the study of van Rompay and Pruyn (2011), where congruence was described to be of importance, the tactile product properties should be in line with the taste of the product, leading to more congruence and higher product liking. In the case of this research, it is assumed that coffee should have a slightly bitter, strong taste, as people often dislike coffee that is too mild. Thus, the use of a material that enhances the bitter, strong taste can change the product experience in a positive way. Regarding the hot chocolate it is necessary to choose a material that enhances the sweet, mild taste, as people find this sweet, smooth taste of hot chocolate particularly comforting. With the help of the findings regarding the linkages between certain shapes and bitter, strong tastes and sweet, mild tastes, the following hypotheses are proposed:

H3a: Packages with angular surfaces will lead to higher product experience for coffee than round surfaces.

H3b: Packages with round surfaces will lead to higher product experience for hot chocolate than angular surfaces.

2.3.3 Purchase intention

If someone wants to know whether consumers are going to actually purchase a product, it is helpful to look at the purchase intention of the consumer. As Fishbein & Ajzen (1975) stated: "if one wants to know whether or not an individual will perform a given behavior, the simplest and probably the most efficient thing one can do is to ask the individual whether he intends to perform that behavior." To be more specific, purchase intention can be defined as the "possibility of a consumer's willingness to buy the products or service they like" (Dodds, Monroe & Grewal, 1991; Rahmawati & Do, 2015). It was found that if a packaging is suitable for a product, the purchase intention of the consumer will be higher (Morwitz, Steckel & Gupta, 2007). This might also be related to the congruence of the packaging properties, making them easier to process (van Rompay & Pruyn, 2011). Thus, if the packaging gives the impression of a bitter, strong taste of coffee, congruence is created which leads to easier processing and more positive outcomes, which is why it can be assumed that the consumer will have a higher intention of actually purchasing this particular coffee. The same goes for hot chocolate and a tactile input that enhances the sweet, comforting flavor of it. This information leads to the following hypotheses:

H4a: Packages with angular surfaces will lead to higher purchase intentions for coffee than round surfaces.

H4b: Packages with round surfaces will lead to higher purchase intentions for hot chocolate than angular surfaces.

Based on the literature research and the postulated hypotheses, the following research model was created:

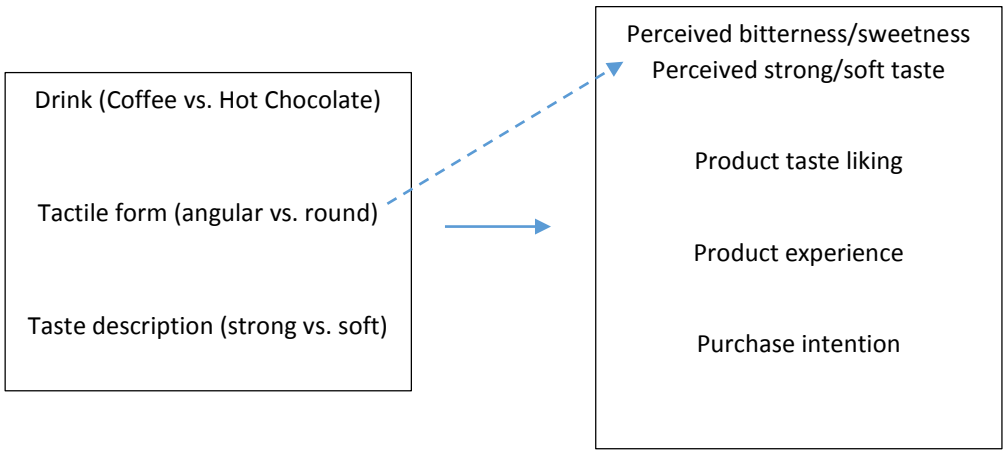


Table 1: Research model with independent variables and dependent variables

3. METHOD

3.1 DESIGN AND CREATION PROCESS OF TACTILE STIMULI

Before starting with the pretest it was necessary to first create the packaging that was used for this study. More specifically, the packaging was designed as a cup where the respondents eventually were asked to drink from in the main study. With respect to the literature study, two designs for cups were made that included the findings of Ngo et. al (2011). Thus, one cup was created that had an angular surface and was intended to underline the strong, bitter taste of coffee and one cup was created that had a round surface which was intended to underline the mild, sweet taste of hot chocolate. With the help of these designs a 3D printable version was created. These designs were then printed in the Design Lab of the University of Twente. The surfaces of the cups were tested by asking five people if they could really feel the texture. As one cup's surface was not as recognizable, another design was made which was again made into a 3D printable version, which was eventually printed in the Design Lab. This second try for the angular cup was significantly more tactile and therefore was used for this study. As the cups were printed in a silvery color which was found to not be attractive for the products, the cups were spray-painted black, making them more neutral.

Picture 1: Cup with round surface

Picture 2: Cup with angular surface

Picture 3: Cup with angular surface

Picture 4: Cup with round surface

In the pictures above the surfaces of the cups as well as their size is shown. For each session at least 20 sample cups were brought. These sample cups fit in the cups, standing out a little on top. Due to using these cups it was not necessary to clean the cups after every respondent as there was no direct contact to the manipulated cups.

3.2 PRETEST

The pretest made for this study was divided into two separate tests. The first test was conducted to find associations people had when they were shown the cups. These associations were later transformed into slogans, which were tested in the second part of the pretest and eventually used for the posters, more specifically the taste descriptions variable. Furthermore, it was necessary to find out whether the cups were realistic in combination with the products and if, vice versa, the cups were actually not suitable if the products were changed.

RESPONDENTS

For the first part of the pretest a small sample of 10 respondents were asked to participate.

PROCEDURE

The participation of the respondents took place separately in a neutral environment at the University of Twente. The respondents were asked to sit at a table, after which they were informed about their tasks and given the first cup. They were then asked to write down every association they could think of regarding the cup. The cups were given to them directly so that they would definitely touch them. The importance of touching the cups was also mentioned in the instructions. On a blank piece of paper, that was laid on the table beforehand, the respondents could write down their associations. There was no limit of words, but after approximately five minutes the respondents were asked to write down the last associations. Then the second cup was given to the respondents, followed by the same procedure. After this the respondents were thanked and free to leave. After five respondents had participated the order in which the cups were given to them was reversed to make sure that there was no bias due to possible influences by one cup on the other. After all the

associations for both cups were written down, the frequency of these associations were counted. Four words were found to be mentioned the most: “intense” and “strong” for the angular cup and “soft” and “mild” for the round one.

The second part of the pretest was done to find out which of the associations were found to be most suitable for the two packages and which of them were least suitable. Thus, the associations were made into slogans which were presented to the respondents who were asked to evaluate them. This was done while showing the participants the cups to make sure that the desired congruence as well as the desired incongruence between the different variables could be identified. All of the variables were included in the second part of the pretest: the cups were presented based on the belonging or non-belonging survey, which included the drink as well as the associations. The associations were the same for both the coffee condition and the hot chocolate condition. By doing this, the suitable and also the not suitable associations for both drinks could be detected. This is important for the main study, where the most fitting and least fitting taste descriptions are used to create different conditions.

RESPONDENTS

For the second part of the pretest another 20 respondents were requested to participate. The respondents were randomly chosen.

INSTRUMENT

Based on the associations from the first part of the pretest eight slogans were created, four for coffee and four for hot chocolate:

1. Try the strong taste of the new Rieke’s Coffee for free	5. Try the strong taste of the new Rieke’s Hot Chocolate for free
2. Try the intense taste of the new Rieke’s Coffee for free	6. Try the intense taste of the new Rieke’s Hot Chocolate for free
3. Try the mild taste of the new Rieke’s Coffee for free	7. Try the mild taste of the new Rieke’s Hot Chocolate for free
4. Try the soft taste of the new Rieke’s Coffee for free	8. Try the soft taste of the new Rieke’s Hot Chocolate for free

Table 2: Conditions for second part of pretest

The names for the product were made up in order to create the impression of a whole new coffee and hot chocolate brand. The slogans were used to create two different surveys. One survey consisted of the slogans for the coffee conditions, whereas the other survey consisted of the slogans

for the hot chocolate conditions. The goal of the surveys was to learn about whether the slogans fit the cups and whether they are realistic. Thus, two questions were put under each of the slogans, the first being: “This slogan is realistic”; and the second one being: “This slogan fits the cup”. A 5-point-Likert scale was used ranging from 1 “I strongly disagree” to 5 “I strongly agree”.

The surveys were developed in Dutch, as the participants were either Dutch or able to speak Dutch. The final measure instrument can be found in the Appendix.

PROCEDURE

As in the first part of the pretest the respondents were invited to a neutral room at the University of Twente, where they were asked to sit at a table. After the respondents assured that they take part in the study out of free will they were given the necessary instructions about their tasks and were told that they could stop at any time. Then they were given the first cup, as well as the belonging survey. If a respondent was given the angular surfaced cup, for example, the survey with the questions about coffee was given to them to fill out. The respondents were then asked to fill out the questions, with regard to the cup at hand. After they had ended the first survey, both the cup and the survey were taken away and the second cup with the second survey were handed over. The respondents also filled out the second form with regard to the cup they were given secondly. One respondent thus had to fill out two surveys and 16 questions in total.

To make sure that no bias could occur due to a possible influence from the first cup and survey onto the second, the order of the cups and surveys was reversed when 10 respondents were reached.

Once all surveys were finished, the Cronbach’s alpha of the two questions was analyzed to find out if the internal consistency of the items was at 0.7 or above, which is seen as a satisfactory value (Howitt & Cramer, 1997). In this case the Cronbach’s alpha had a value of 0.853.

RESULTS OF THE PRETEST

It was necessary to measure the means and standard deviations of the two questions for each taste description and for both drinks separately. Afterwards, the taste description that scored highest and lowest for each drink had to be identified. The taste description “intense” had the highest means in the coffee condition (realistic: M = 4.20; SD = 0.616 & fitting: M = 4.10; SD = 0.641), whereas “soft” had the lowest means (realistic: M = 2.55; SD = 1.234 & fitting: M = 1.65; SD = 0.489). For the hot chocolate conditions the highest means were found with the taste description “soft” (realistic: M = 4.10; SD = 0.788 & fitting: M = 4.25; SD = 0.967), whereas the lowest means were found with the taste description “strong” (realistic: M = 2.50; SD = 0.889 & fitting: M = 2.20; SD = 0.696). Based on these results, “intense” and “soft” should be used as taste descriptions for the coffee conditions and “soft” and “strong” for the hot chocolate ones. Based on the fact that it is easier to use only two words it would have been ideal if “intense” or “strong” were found to be

significant in both conditions. Due to the fact that “strong” still has high means in the coffee condition (realistic: M = 3.75; SD = 0.851 & fitting: M = 4.05; SD = 0.686), it was decided that the words “strong” was an appropriate taste description for the main study. The means for “strong” were also still significantly higher than those of the taste descriptions that were not fitting the condition, which were “mild” and “soft”. Thus, it can be assumed that “strong” is an appropriate taste description for the coffee condition. This was also based on the fact that “strong” and “soft” are direct opposites, whereas “intense” and “soft” are not. Furthermore, the means for “intense” were also higher for the hot chocolate condition than “strong” (realistic: M = 3.00; SD = 1.026 & fitting: M = 2.75; SD = 1.118), which means that this would not have been a good choice for a taste description that does not fit hot chocolate. An ANOVA was made to see whether the differences between the “strong” and “soft” taste descriptions were significant. It was found that for the differences between “strong” and “soft” taste descriptions were significant for both questions for coffee ($p = 0.004$; $p < 0.001$). This was also the case for hot chocolate ($p < 0.001$; $p < 0.001$).

Eventually, “strong” and “soft” were the taste descriptions that were used in the slogans for the main study. Both words were used for both drinks, so that one taste description is suitable and one is not suitable, creating congruence and incongruence.

With the help of the findings above posters were created. In order to create posters that resembled a real product logos and labels were made to create a professional look. As most products have some sort of label on them, especially in coffee and hot chocolate brands, a number of labels was examined. Mostly, labels regarding ingredients could be found. Out of these labels, one type was chosen for each product: “100 % Arabica” for coffee and “fine cocoa” (“edelcacao” in Dutch). These descriptions were made into new labels. This was done to avoid influences of the recognition of already existing labels due to liking or disliking of a brand by the respondents, as it is possible that people transfer an attitude towards one brand onto another one if they make a connection between the two. As stated above, the taste descriptions were most important for the creation of the posters. In total a number of four posters was made: two posters for the coffee conditions and two posters for the hot chocolate conditions. One poster per condition was used to underline the taste of the product, whereas the other poster included a taste description that was not congruent with the taste. For the coffee conditions, one poster was made with the taste description “strong”, which fits the product and one poster was made with the taste description “soft”, which does not fit the product. The same was done for the hot chocolate conditions, but the taste descriptions were used for the opposite effect.

Picture 5: Poster coffee/strong

Picture 6: Poster coffee/soft

Picture 7: Poster hot chocolate/soft

Picture 8: Poster hot chocolate/strong

3.3 MAIN STUDY

3.3.1 METHOD

This study uses a 2 (drink: coffee vs. hot chocolate) x 2 (tactile influence of packaging: angular vs. round) x 2 (taste descriptions: strong vs. soft) experimental design, creating 8 conditions.

Condition	**Drink**	**Tactile form**	**Taste description**
1	Coffee	Angular	Strong
2	Coffee	Angular	Soft
3	Coffee	Round	Strong
4	Coffee	Round	Soft
5	Hot Chocolate	Angular	Strong
6	Hot Chocolate	Angular	Soft
7	Hot Chocolate	Round	Strong
8	Hot Chocolate	Round	Soft

Table 3: Overview of conditions

3.3.2 PARTICIPANTS

As stated above, the influence of packaging shapes that enhance the perception of bitterness and sweetness was found to be common to Western cultures in general, which means that people from a variety of countries in the Western world can be used in this study.. As this research was conducted in the Netherlands, more specifically in Enschede, people from a variety of Western countries could be addressed. Dutch people formed the main target group of the study, but due to the fact that also German people live in Enschede, those people were also able to participate if they could speak and understand Dutch sufficiently. The participants were both male and female as the products used in this study are consumed by both genders. Furthermore, only people between the age of 18 and 60 were asked to participate. While looking for respondents it was made sure that different ages were involved in the study in order to create a valid sample. To be able to have consumers with different demographics for each condition, it was necessary to have at least 20 respondents per condition, making it a total of 160 respondents. The sampling technique that was used is random sampling, which means that everyone with the required characteristics has the same chance to be asked to participate in the study (Robinson, 2014). Thus, people were approached randomly in public places such as in front of a supermarket and asked to participate.

An ANOVA was made in order to find out whether there were significant differences regarding age and gender between the eight conditions. No such differences were found, which

means that the distribution of age (F (7,152) = 0.210; p = 0.983) and gender (F (7,152) = 0.117; p = 0.997) among the conditions was even.

Condition	N	Age		Gender	
		M	SD	male	female
1	20	26.15	10.384	70%	30%
2	20	27.60	10.580	65%	35%
3	20	26.50	11.010	75%	25%
4	20	25.62	9.816	70%	30%
5	20	28.30	11.407	70%	30%
6	20	26.68	12.446	75%	25%
7	20	24.75	10.088	70%	30%
8	20	27.10	10.667	75%	25%

Table 4: Demographics of participants

3.3.3 Materials

In the following section all materials that were used within this study will be described. These include the manipulations used as independent variables that were needed in order to be able to conduct the research. Furthermore, the instrument will be presented.

Manipulations

Tactile stimuli

As stated above, the materials that were used for this study were two different packages in the form of cups, one with an angular shaped surface and one with a round shaped surface.

Drinks

Coffee and hot chocolate were needed for tasting. It was important that the drinks always tasted the same. Thus, the coffee needed to be set with the exact same amount of coffee beans every time the research was performed. In order to find out what amount is right the coffee was set to standards that were found in online instructions. This proportion of coffee beans was then tested by 5 people to see if the coffee itself was seen as either too strong or too weak. The coffee beans that were used were from a middle to high priced brand. The hot chocolate that was used for this study was a convenience product which only had to be warmed up before it could be handed out. It was also a middle to high priced brand. Another factor that was important to consider regarding the quality of the products was how to keep them warm. It was found that both products watered down after a while and were also reduced in heat. Therefore, the research was only done a maximum of two hours at a time, as the products were still good in that time frame. After the two hours new badges had to be made.

TASTE DESCRIPTION

The third dependent variable includes the taste descriptions that were found with the help of the pretest. The posters that were presented above were used as the third manipulation factor within this study.

INSTRUMENT

For this study a questionnaire was made for measuring the effects of the independent variables and thus the manipulations on the dependent variables perceived taste, product experience and purchase intention. In addition, one check question regarding the sugar intake of the respondents was used to see if the preference for a sweeter taste of the product changes the overall opinion about the products that were given to the respondents. For example, it might occur that people who normally do not drink their coffee without any sugar or sweetener like the product less than those who do.

The questionnaire consisted of a total of 23 questions with a 7 point likert scale leading from "strongly disagree" to "strongly agree". Most items were already used in previous studies, some were altered to fit the present study, making it unnecessary to measure validity. For each of the variables the Cronbach's alpha was analyzed to see if the constructs were all reliable. When Cronbach's alpha is measured one can find out whether the internal consistency of the items within a construct is given. A definition for the internal consistency is as follows: "Internal consistency describes the extent to which all the items in a test measure the same concept or construct and hence it is connected to the inter-relatedness of the items within the test" (Tavakol & Dennick, 2011). The range of Cronbach's alpha is from 0 to 1 (Streiner, 2003). As stated in the pretest, a desired Cronbach's alpha is at 0.7 or above (Howitt & Cramer, 1997).

The final questionnaire can be found in the Appendix.

PRODUCT TASTE STRONG & PRODUCT TASTE SOFT

A total of 4 questions regarding the strong taste of the product as well as four questions regarding the soft taste of the product were chosen. These questions were only partly taken from previous studies as the tastes that were measured within this study were very specific. Respectively two taste descriptions were taken from the literature research for both drinks: strong and bitter for coffee and soft and sweet for hot chocolate (Ngo et al. 2011). Two more descriptions were then added for both conditions: "intense" and "powerful" for coffee and "mild" and "light" for hot chocolate. These taste descriptions were taken from the first pretest as they were mentioned in it a few times. As the impression came up during the research that the taste associations were not clearly seen as two groups (strong, intense, powerful, bitter vs. soft, mild, light, sweet), because some people specified the taste to be, for example, both intense and mild, a factor analysis was

made to be able to see how the constructs were actually divided. It was found that strong, intense and powerful were measuring the strong taste and soft and mild the soft taste. Thus, based on these findings the associations were made into new constructs. A possible reason for this outcome could be that, for example, light was seen as a negative word rather than a neutral word. Thus, even if a drink might have tasted rather light, respondents might have thought of light as "weak" which is not a desired association for drinks. The same can be assumed for bitter, as it is usually seen as a negative association among many people. The Cronbach's alpha for the new product taste strong was 0.866 and that of the new product taste soft was 0.718.

PRODUCT TASTE LIKING

The questions for product taste liking were taken from a previous survey about product liking in general (Ludden, Schifferstein & Hekkert, 2012) and altered to fit the previous study. A total of four questions was asked regarding product taste liking. Two questions measured the overall liking of the product taste ("This product is delicious"). Two of the questions were made to measure to what extent the taste is perceived as fitting the product ("The taste of this product should be as it is"). This was done to be able to see the effect of congruence or incongruence on the perceived taste. The Cronbach's alpha for this construct was 0.888.

PRODUCT EXPERIENCE

Product Experience is measured with the help of previous survey questions from Hirschman & Solomon (1984). The questions were slightly altered to match the present study more. A total of five questions was asked for product experience. Within this construct items such as "I like this product" or "This product is attractive" were used. Thus, in contrast to product taste liking, where the focus was on the taste only, product experience items measured the liking of the whole product. The Cronbach's alpha of this construct was 0.954.

PURCHASE INTENTION

A six item scale from Dodds, Monroe & Grewal (1991) was used as a base for this study. In order to keep the questionnaire short, three of the questions were eventually left out. An example question involved in this construct is "I would consider buying this product". The Cronbach's alpha of purchase intention was 0.749.

	Cronbach's alpha	Number of items	Deleted items
Product taste strong	0.866	3	1
Product taste soft	0.718	2	2
Product taste liking	0.888	4	0
Product experience	0.954	5	0
Purchase intention	0.749	3	0

Table 5: Cronbach's alphas of main study

3.3.4 Procedure

In a first step, the Enschede community was addressed and asked if it was possible to stand in front of local supermarkets and other stores and execute the research there. As soon as the permission was granted the research was prepared. This included the gathering of all materials including the products, the posters, the cups and the other materials that were used to build the booth.

The sessions were usually scheduled twice a day, only on days where it was not raining so that respondents would not have to stand in the rain. Furthermore, the material was partly made out of paper. After the right drink, cup, and poster was gathered according to the condition that was being measured in the following session, the material was brought to the supermarket where everything was assembled. Then, the researcher approached potential respondents and asked them if they would like to be part of a taste testing. The reason why people were asked to participate in a taste testing was that it was pretended that the product served to the respondents is a new brand which is coming to the market in the future which is why the company wants to know whether the product is received well. This was done to make sure that respondents will not feel observed. After being addressed the participants received some information about the tasks and were also told that they could stop at any time during the procedure. Furthermore, the respondents were asked if they have allergies or intolerances regarding the products they were given. If people looked either young or old they were asked about their age to make sure that no one under 18 would participate as well as no one above the age of 60. After that the participants received a cup with a drink, depending on the condition they were in. Thus, a person could receive a cup with the angular surface and filled with coffee or a package with the round surface filled with hot chocolate and so on. They were asked to try the drink. While drinking it was made sure that the respondents would also take a look at the posters, so if they did not look at them already they were asked to do so. After drinking the product, the cup was taken from the respondents and the clipboard with the questionnaire was given to them. They then had to answer questions regarding the dependent variables as well as a few demographics: age and gender. The participants were free to go after finishing the survey. Sometimes some questions were asked by respondents about the cups or the new product which were answered after the session. A total of 160 respondents was reached.

4. RESULTS

In this section the relevant results will be described. First, ANOVAs were made for each of the dependent variables, including all three independent variables to see both possible main and interaction effects. It was not intended to measure the influence of the drinks only, which means that main effects of the drinks were not addressed. Furthermore, Bonferroni analysis was used as adjustment for multiple comparisons regarding the main effects. For the interaction effects it was necessary to also find out in which cases the interactions occurred, thus for both sides respectively of the interaction the significance levels were measured.

4.1 PERCEIVED BITTERNESS

To see whether the angular surfaced cup enhances the flavor it was created for, thus bitter, and if the round surfaced cup interferes with this taste, an ANOVA was made for perceived bitterness. A main effect of tactile form on the bitter taste was found ($F(1, 152) = 12.377$; $p = 0.001$). Pairwise comparisons analysis with Bonferroni corrections showed that for the angular surfaced cup the results were more bitter ($M = 3.28$; $SD = 1.786$) than for the round surfaced cup ($M = 2.49$; $SD = 1.350$). No interaction effects were found for this variable.

4.2 PERCEIVED SWEETNESS

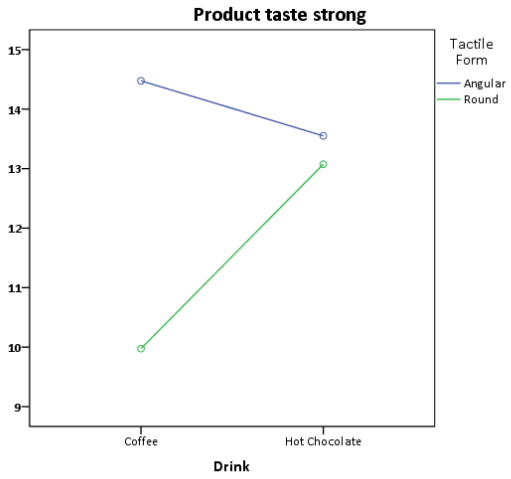
When it comes to the enhancement of the sweet taste a main effect should occur with the round cup enhancing this flavor and the angular cup interfering with it, resulting in lower outcomes. This main effect between tactile form and perceived sweetness was indeed found ($F(1,152) = 16.049$; $p < 0.001$). Pairwise comparisons with Bonferroni corrections resulted in a higher perceived sweetness for the round cup ($M = 4.46$; $SD = 1.786$) than for the angular one ($M = 3.71$; $SD = 1.663$). No interaction effects that are relevant for this study were found.

4.3 PRODUCT TASTE STRONG

An ANOVA resulted in a main effect of tactile form for the dependent variable product taste strong ($F(1,152) = 22.106$; $p < 0.001$). Pairwise comparisons using Bonferroni corrections showed that the angular surfaced cup influenced the perceived strong taste to be higher ($M = 14.01$; $SD = 3.448$) than the round surfaced cup ($M = 11.53$; $SD = 3.884$).

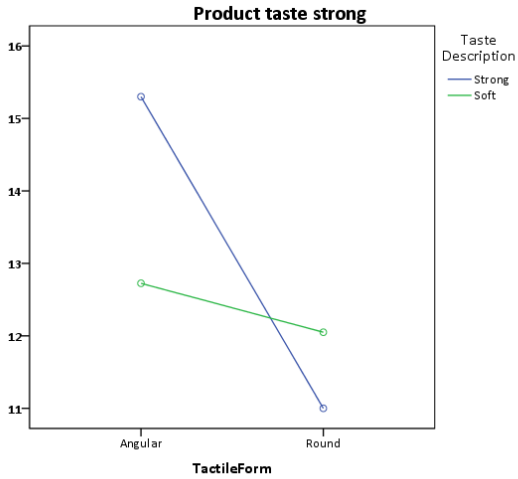
Next to this main effect, two interaction effects could be found. The first interaction effect was that between drink and tactile form ($F(1,152) = 14.470$; $p < 0.001$). It was found that the tactile form of the cups influenced the respondents in the coffee conditions more than in the hot chocolate conditions. The angular cup leads to higher results in the coffee condition ($M = 14.47$; $SD = 3.282$) for strong product taste than the round cup ($M = 9.98$; $SD = 4.300$). This difference between the angular and the round cup for coffee are significant ($p < 0.001$), whereas the outcome of the hot chocolate

conditions are not significant (p = 0.526), even though the angular cup scored higher in this construct.



Graph 1: Interaction effect drink and tactile form for product taste strong

The second interaction effect for strong product taste was found for tactile form and taste description (F (1,152) = 11.736; p = 0.001). The product taste is perceived as particularly strong if the angular cup is combined with the taste description strong (M = 15.30; SD =2.902). The same cup combined with the soft taste description resulted in lower scores (M = 12.73; SD = 12.73). The results for the round cup are not as distinctive. Thus, the difference between the influences of the two taste descriptions for strong product taste is more striking for the angular cup. This is underlined by the fact that the differences in the angular surfaced cup are significant (p = 0.001), whereas the differences for the round surfaced cup are not significant (p = 0.163)



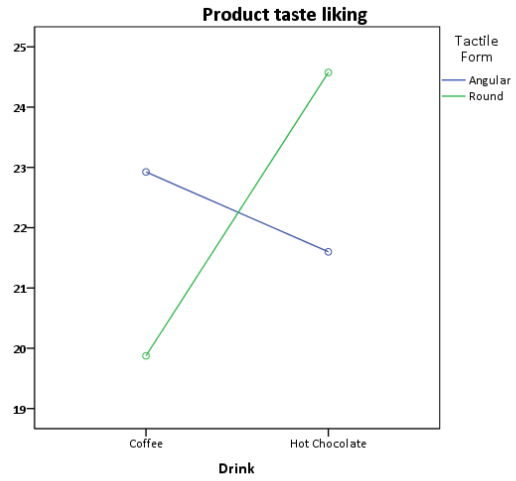
Graph 2: Interaction effect tactile form and taste description for product taste strong

4.4 PRODUCT TASTE SOFT

The ANOVA for soft product taste led to a main effect of tactile form ($F(1,152) = 33.791$; $p < 0.001$). It was found within pairwise comparisons analysis with Bonferroni correction that the round surfaced cup resulted in a higher perceived soft taste ($M = 10.58$; $SD = 1.868$) than the angular surfaced cup ($M = 8.56$; $SD = 2.525$). These were the only significant results for this construct, meaning that no interaction or further main effects were found.

4.5 PRODUCT TASTE LIKING

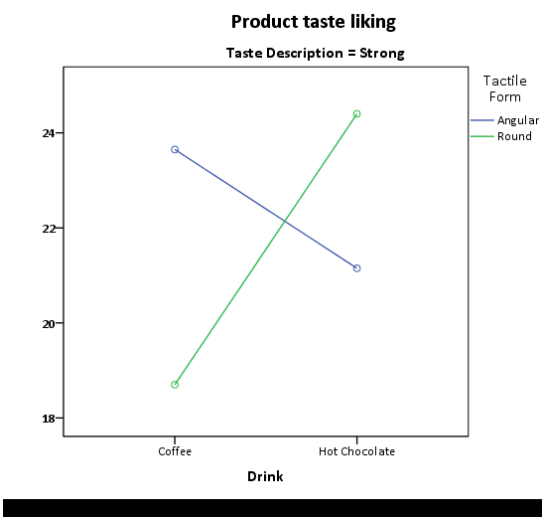
While analyzing the influence of the independent variables for product taste liking, two significant results were found. No main effects were found for tactile form or taste description Thus, two interaction effects were found, one for drink and tactile form ($F(1,152) = 30.268$; $p < 0.001$) and the other one for drink, tactile form and taste description ($F(1,152) = 3.944$; $p < 0.05$). The interaction effect of drink and tactile form onto product taste liking shows that the highest result for this construct can be found when hot chocolate is combined with a round cup ($M = 24.57$; $SD = 2.297$), whereas an angular cup leads to lower results for the same drink ($M = 21.60$; $SD = 3.788$). Furthermore, coffee in combination with an angular cup leads to higher results ($M = 22.93$; $SD = 3.605$) than coffee served in a round cup (19.88; $SD = 4.039$). Both differences are significant ($p < 0.001$). This indicates a favorable attitude towards the taste when congruence is given between the cups and the drink that is being served.



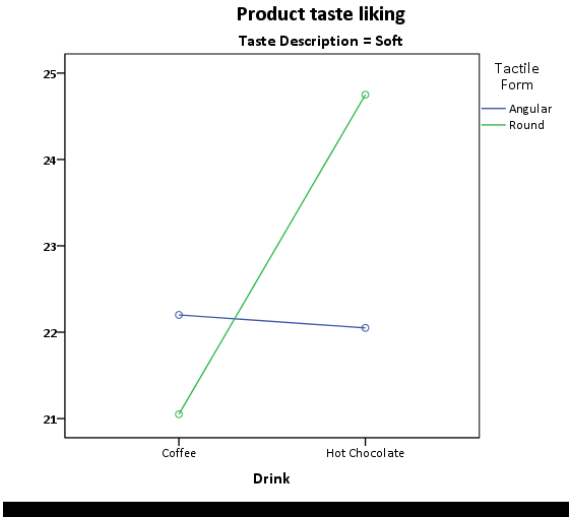
Graph 3: Interaction effect drink and tactile form for product taste liking

The second interaction effect that was found for this construct was, as stated above, between drink, tactile form and taste description. When looking at the graphs it can be found that when the taste description strong is used a larger impact of the tactile form can be found for coffee,

whereas in the condition of the taste description soft the influence of tactile form is larger for hot chocolate. For coffee, the angular cup leads to higher liking of product taste (M = 23.65; SD = 3.617) than the round cup (M = 18.70; SD = 4.092) in the strong association condition. For hot chocolate, these results are the other way around, which means that a round cup leads to higher results (M = 24.40; SD = 2.088) than the angular cup (M = 21.15; SD = 3.514). In the soft taste description condition the liking of product taste was highest when the round cup was combined with hot chocolate (M = 24.75; SD = 2.297). When hot chocolate was served in an angular cup the results were much lower (M = 22.05; SD = 4.084). On the other hand, for the coffee conditions the results were less striking with a higher outcome for the angular cup (M = 22.20; SD = 3.533) than for the round cup (M = 21.05; SD = 3.720). In the strong taste description condition both coffee ($p < 0.001$) and hot chocolate ($p = 0.003$) are significant, whereas in the soft taste description condition only hot chocolate ($p = 0.015$) is significant and coffee is not ($p = 0.295$).



Graph 4: Interaction effect drink and tactile form with taste description strong for product taste liking

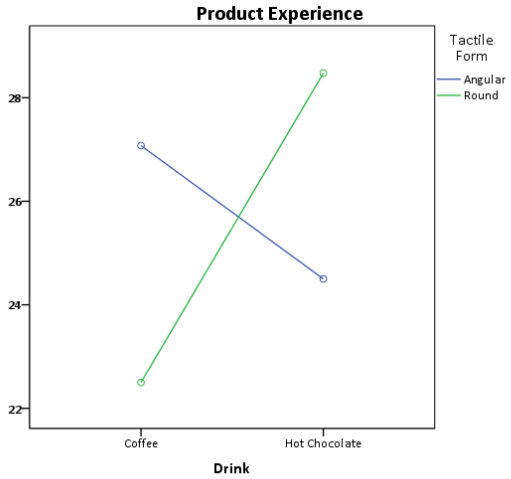


Graph 5: Interaction effect drink and tactile form with taste description soft for product taste liking

4.6 PRODUCT EXPERIENCE

The ANOVA output of the independent variables for product experience shows two interaction effects, as well. There was no main effect for tactile form or taste description. The first interaction effect is that of drink and tactile form ($F(1,152) = 31.176$; $p < 0.001$). It shows that the congruent conditions lead to higher results in product experience, thus the angular surfaced cup combined with coffee (M = 27.08; SD = 4.984) and the round surfaced cup combined with hot chocolate (M = 28.47; SD = 3.242). The incongruent combinations lead to lower results for both drinks. Especially the round surfaced cup in combination with coffee resulted in a low product

experience (M = 22.50; SD = 5.953). The significance in both coffee ($p < 0.001$) and hot chocolate ($p < 0.001$) conditions is given.



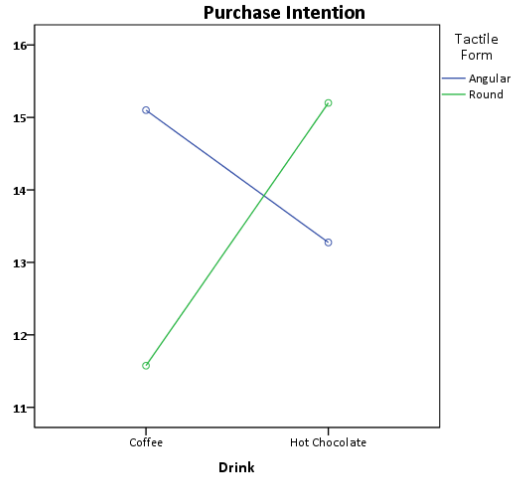
Graph 6: Interaction effect drink and tactile form for product experience

The second interaction effect that was found for product experience was between tactile form and taste description (F (1,152) = 4.644; p = 0.033). It is noticeable that in this case, also, the congruent combinations lead to higher product experience results, with the taste description strong and an angular surface (M = 26.42; SD = 5.661) and the taste description soft and a round surface (M = 26.50; SD = 4.782). The lowest result was found for the textual cue strong combined with the round cup (M = 24, 47; SD = 6.267), followed by the combination of the textual cue soft and the angular cup (M = 25.15; SD = 4.644). However, for both angular and round surfaced cups, the results were not found to be significant. Still, the means and significant outcomes for the interaction in the ANOVA suggest that the interaction is present for both the angular and the round surfaced cup.

Graph 7: Interaction effect tactile form and taste description for product experience

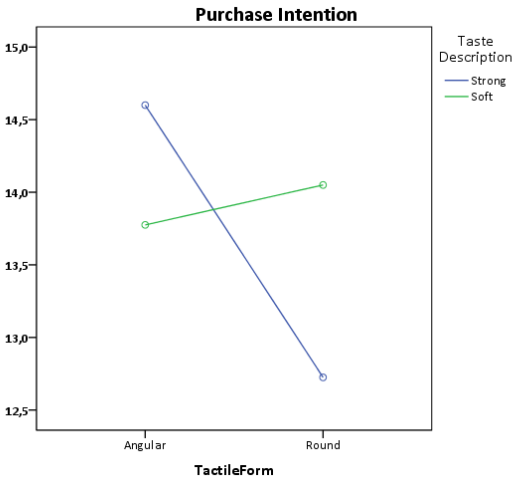
4.7 PURCHASE INTENTION

When it comes to the dependent variable purchase intention a total of three interaction effects can be found. However, no main effects were found for this construct. The first interaction effect occurs between drink and tactile form ($F(1,152) = 33.049$; $p < 0.001$). The difference between the influences of the angular versus the round surfaced cup is bigger for coffee than for hot chocolate. Serving coffee in an angular surfaced cup leads to higher outcomes for purchase intention ($M = 15.10$; $SD = 3.193$) than serving it in a round surfaced cup ($M = 11.58$; $SD = 3.573$). For the hot chocolate conditions the round surfaced cup scored higher ($M = 15.20$; $SD = 2.345$) than the angular surfaced cup ($M = 13.28$; $SD = 3.130$). Both sides of this interaction effect are significant.



Graph 8: Interaction effect drink and tactile form for purchase intention

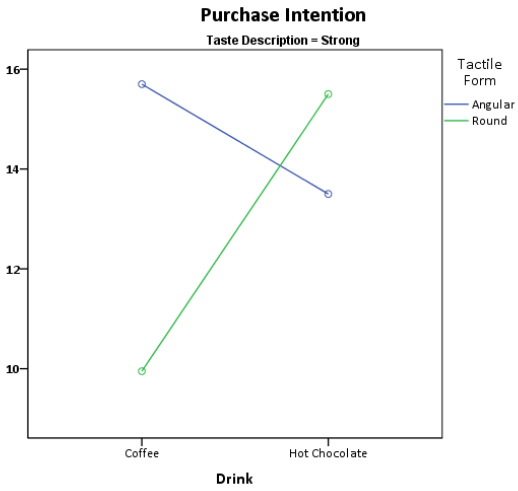
Another interaction effect can be seen for tactile form and taste description ($F(1,152) = 5.143$; $p = 0.025$). The highest score for purchase intention was found for the combination of the angular cup and the textual cue strong ($M = 14.60$; $SD = 3.177$), compared to a lower score for same cup with the textual cue soft ($M = 13.78$; $SD = 3.355$). The soft taste description on the other hand scored higher when combined with the round cup ($M = 13.39$; $SD = 3.513$) than when the same cup is combined with the textual cue strong ($M = 12.73$; $SD = 4.032$). However, only the difference between taste descriptions for the round cup was found to be significant ($p = 0.05$).



Graph 9: Interaction effect tactile form and taste description for purchase intention

The last interaction effect was found for drink, tactile form and taste description (F (1,152) = 5.886; p = 0.016). When looking at the graphs it seems as if the difference between angular surfaced cups and round surfaced cups is larger for the coffee conditions with the taste description strong, whereas it is larger for the hot chocolate conditions for the taste description soft. For the taste description strong the highest result was found for the angular surfaced cup and coffee (M = 15.70; SD = 3.435), whereas the round surfaced cup scored the lowest for the same drink (M = 9.95; SD = 3.531). The difference between angular and round surfaced cup was less striking for hot chocolate, but for both drinks the differences of the tactile form were significant.

When the taste description soft was shown, however, only a marginally significant result could be found for hot chocolate (p = 0.053). Still, the direction of the effect can be seen in this case, as well, as it is in line with the findings for the taste description strong.



Graph 10: Interaction effect of drink, tactile form and product taste strong for purchase intention

Graph 11: Interaction effect of drink, tactile form and product taste strong for purchase intention

Independent variable/s	Dependent variable	F	p
Tactile form	Perceived bitterness	12.377	0.001
Tactile form	Perceived sweetness	16.049	0.000
Tactile form	Product taste strong	22.106	0.000
Drink x tactile form	Product taste strong	14.470	0.000
Tactile form x taste description	Product taste strong	11.736	0.001
Tactile form	Product taste soft	33.791	0.000
Drink x tactile form	Product taste liking	30.268	0.000
Drink x tactile form x taste description	Product taste liking	3.944	0.049
Drink x tactile form	Product experience	31.176	0.000
Tactile form x taste description	Product experience	4.644	0.033
Drink x tactile form	Purchase intention	33.049	0.000
Tactile form x taste description	Purchase intention	5.143	0.025
Drink x tactile form x taste description	Purchase intention	5.886	0.016

Table 6: Significant main and interaction effects

5. DISCUSSION

5.1 CONFIRMATION OF HYPOTHESES

After analyzing the data with the help of analyses of variance it was necessary to give insight in whether the hypothesis were confirmed by the results.

Hypotheses 1A & 1B	Confirmed?
H1a: Product packages with angular surfaces will lead to higher perceived bitterness and a stronger taste perception of coffee and hot chocolate than round surfaced cups. H1b: Product packages with round surfaces will lead to higher perceived sweetness and a milder taste perception of coffee and hot chocolate than angular surfaced cups.	Yes
Hypotheses 2A & 2B	
H2a: Product packages with angular surfaces will lead to higher product taste liking of coffee than round surfaces. H2b: Product packages with round surfaces will lead to higher product taste liking of hot chocolate than angular surfaces.	Yes
Hypotheses 3A & 3B	
H3a: Packages with angular surfaces will lead to higher product experience for coffee than round surfaced. H3b: Packages with round surfaces will lead to higher product experience for hot chocolate than angular surfaces.	Yes
Hypotheses 4A & 4B	
H4a: Packages with angular surfaces will lead to higher purchase intentions for coffee than round surfaces. H4b: Packages with round surfaces will lead to higher purchase intentions for hot chocolate than angular surfaces.	Yes

Table 7: Confirmation of hypotheses

5.2 GENERAL DISCUSSION OF RESULTS

The aim of this research was to identify the relative effect of tactile stimuli onto consumers' perception of taste, as well as product taste liking, product experience and purchase intention.

The results demonstrate that tactile stimuli have a striking influence on all of these factors mentioned above. It was found that only by using different tactile stimuli of a cup the perceived bitterness or sweetness of a drink can be changed. More specifically, the use of angular surfaces consistently leads to products being perceived as more bitter, whereas the use of round surfaces leads to products being perceived as more sweet. These findings underline previous studies of Ngo et al. (2011; 2012), who found that cross-modal correspondences occur between these stimuli. However, a gap existed as only visual or olfactory influences were studied. With the help of the present research a further cross-modal correspondence was found between tactile influences of angular and round surfaces and bitter and sweet tastes. Thus, the findings help create more understanding for the influence of tactile sensory stimuli.

Moreover, it was confirmed that congruence is an important factor regarding tactile influences and drinks. In cases where the tactile form of a cup was congruent with the drink it was served in, the outcomes for product taste liking, product experience and purchase intentions were higher. Thus, matching bitter drinks with a strong taste with angular surfaces and matching sweet drinks with softer tastes with round surfaces results in the consumers not only liking the product taste and the product itself more, but also leads to them being more willing to purchase it. The field of congruence has been researched before, but these findings are still an extension, as the combination of tactile stimuli and drinks has not yet been studied.

When it comes to congruence the findings of taste descriptions of the present study are interesting to look at, as well. It was found that congruence between tactile form and taste descriptions is of importance, as this leads to a better product experience by consumers and also a higher willingness to purchase the product. An additional interesting finding is that even the taste can be enhanced by congruent pairings of tactile form and taste descriptions. More specifically, a drink is perceived as being stronger when an angular surfaced cup is combined with the word strong. Furthermore, the results indicate that framing occurs when taste descriptions are used. It was found that taste descriptions lead to larger differences in product taste liking as well as in purchase intention when presented for the matching drink. This means that the taste description strong leads to larger differences for tactile form when coffee is served, whereas the taste description soft leads to larger differences for tactile form when hot chocolate is served. Thus, not only congruence is an important factor between drinks, tactile form and taste descriptions, but also framing. It can be assumed that taste descriptions lead to the consumer observing the congruent drink more intensely

than drinks that are not congruent with the description. This then leads to larger differences of congruent and incongruent pairings of tactile form and drink.

5.3 CONCLUSION

With the help of the findings presented above it is possible to give an answer to the main research question. The main research question was as follows:

"What are the relative effects of tactile stimuli on consumers' perception of taste, as well as product taste liking, product experience and purchase intentions?"

Within this study it was found that tactile stimuli do in fact have a strong influence on the dependent variables taste perception, product experience and purchase intentions. The tactile stimuli itself influences the perception of taste, as this was found in the main effects for perceived bitterness, sweetness, strong and soft taste. It was found that angular cups lead to higher perceived bitterness and strong taste, whereas round cups lead to higher perceived sweetness and soft taste.

When tactile stimuli are analyzed for different sorts of drinks, this leads to interaction effects between the two inputs. These interaction effects show that congruence is of great importance, as congruent combinations of cups and drinks always resulted in higher product taste liking, product experience and purchase intention.

5.4 IMPLICATIONS

The following section will include the theoretical and practical implications that can be made based on the research. First, the theoretical implications will be discussed. Afterwards, a number of practical implications will be mentioned and described.

5.4.1 THEORETICAL IMPLICATIONS

The present study resulted in interesting insights regarding the use of tactile stimuli and their influences on consumers' perceived taste, as well as product taste liking, product experience and purchase intention. It was found that tactile stimuli in fact have a great influence on consumers' perceptions of a product. Thus, the theory that different tactile stimuli lead to different taste perceptions can be underlined. It is implicated that different tastes can be enhanced by the right usage of tactile stimuli. Furthermore, the idea of congruence between different product properties leading to more favorable attitudes can be confirmed and emphasized with the results of this study. Also, product involvement was found to have an influence on the dependent variables product taste liking and purchase intention.

5.4.2 Practical implications & Recommendations for future research

When it comes to possible practical implications one can say that the usage of the tactile stimuli used in this study should be considered in the marketing field. It was found that angular surfaces in combination with coffee are a good way to increase product taste liking, product experience and purchase intention. Thus, when designing a product packaging for coffee an angular surface should be considered worth trying. For hot chocolate, on the other hand, round surfaced packages should be used.

Further practical implications are that taste descriptions should be used to underline the product. If, for example, a product is of low quality and the producer wants to deviate an undesirable taste the product has by promising a desirable and better fitting taste, this will eventually lead to less positive product taste liking, product experience, and purchase intention. Still, product taste can be enhanced by the use of the right tactile surface, but only if the taste is fitting the product. More specifically, if a product taste does not match the product category, the usage of tactile stimuli for that product category might result in unfavorable attitudes towards the product due to incongruence. However, a marketer can use tactile stimuli to increase a rather weak taste level of a product to a more desirable stronger taste level of that product.

As it was found that tactile stimuli have an influence on the perceived taste and, in combination with different products, on product taste liking, product experience and purchase intention, it is suggested to study different types of products with different types of packages in order to find a variety of combinations leading to the same outcome for these dependent variables. The outcome of the present study shows that taste or flavor can be influenced by tactile stimuli, which is why further tastes and flavors should be considered for future research. There have been studies about different tastes and other types of sensory input, but with regard to tactile input a wide variety of tastes and flavors can still be examined. It might be interesting to focus on sour, salty or umami tastes. Further cross-modal correspondences for these tastes and tactile influences can be used in the future to advertise products in a more appropriate way.

It should also be considered to do research for other types of tactile stimuli and surfaces. This could be done, for example, for roughness versus smoothness of the material that is used for the packaging. Using rough and smooth materials could be interesting when researching certain types of foods with rough or smooth textures. One might also think about crispness of products or creaminess. This means that not only the flavor should be considered for future research, but also textures and mouth feel.

Another suggestion is to study influences of temperature of product packages. Certain types of materials might indicate warmth, whereas other indicate chilliness. This is an interesting factor when it comes to products that are seen as either comforting or refreshing.

If products are supposed to be perceived as especially light, which might be the case for products that are advertised as being healthy, the weight of the packaging might play an important role, as well. If a rather heavy product packaging is used for these types of products this might lead to confusion, resulting in lower product experience. On the contrary, rich food products might be especially attractive when they are presented in heavy packages.

Another suggestion for future research is to use tactile stimuli for other product categories, as well. Based on the finding that stronger tactile stimuli lead to stronger perceptions of the product taste, this might also be the case for the overall perception of the product. Think about detergents, for example. They are often advertised as being particularly strong in cleaning or, in contrast, particularly soft to clothes and skin. Thus, there is a possibility that this desired strength or softness can be underlined by product packaging through angular and round surfaces. This means that if someone is looking for either one of these products, they might be influenced by the tactile stimuli of the packaging.

Furthermore, it might be interesting to research the effects of the tactile stimuli as actual packages rather than cups. To do so, more studies need to be conducted in order to learn about the direct effect of packaging onto, for example, purchase intention, leaving out the actual tasting of the product. With regard to this topic, it is an interesting factor to see whether congruence also positively affects the dependent variables of this study if the product cannot be tasted. In this case, congruence might occur between the packaging and the product without the taste playing a role. It is recommended to do future research with the same products that were used in the present research, this time creating real packages and not cups. These packages should be presented to the respondents, who can touch the packages without them being able to taste the product. This is recommended to be able to see if the packaging itself also leads to more favorable attitudes towards the product. This is important because marketers want to achieve high sales figures. They only have limited options in persuading the consumers, as it is not possible to let the taste of a product speak for itself. Therefore, the packaging should serve as an important means of persuasion.

Summarizing the above recommendations one can say that the present study can be used as a basis for a broad field to explore.

5.5 STRENGTHS AND LIMITATIONS

As in most research, there were strengths and weaknesses in this study, which will be discussed in the following section.

The strengths of this study especially lay in the unique design and combination of tactile stimuli and drinks. Furthermore, the cups that were designed are of high quality due to its creation

with the help of 3D printing. In addition to this, a lot of significant results for both main and interaction effects could be found, leading to a support of all the hypotheses. Next to these hypotheses additional findings were found for taste descriptions. This indicates that the method that was used was appropriate for this study.

For limitations of this study one can say that the target group was not varied to a great extent, meaning that only age, heritage and gender were considered. Thus, variations in demographics were rather limited within this study.

During the sessions it seemed as if the constructs soft and strong were not clear for every participant. A factor analysis was conducted to create new variables for soft and strong taste, leaving out some items. Still, the constructs should have been more distinct so that the respondents would not face confusions, as this might have changed the perception of the product taste and the eventual outcome of the study.

As the respondents were able to see and feel the products within this study one cannot be certain that the visual aspects of the cups did not have any influence on the perception of the product. Thus, there is a possibility that the visual stimuli also had an impact on the outcome of this study. Therefore, it should be taken into consideration that the research is performed once again, with the respondents being blindfolded.

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APPENDIX

QUESTIONNAIRE PRETEST

Geef alsjeblieft aan in hoeverre je het met de volgende uitspraken eens bent (1 – Helemaal niet mee eens, 2 – Niet mee eens, 3 – Neutraal, 4 – Mee eens, 5 – Helemaal mee eens)

Proef nu gratis de intense smaak van de nieuwe Riekes Koffie

	Helemaal niet mee eens	Niet mee eens	Neutraal	Mee eens	Helemaal mee eens
Deze slogan is realistisch	1	2	3	4	5
Deze slogan past bij de beker	1	2	3	4	5

Proef nu gratis de sterke smaak van de nieuwe Riekes Koffie

	Helemaal niet mee eens	Niet mee eens	Neutraal	Mee eens	Helemaal mee eens
Deze slogan is realistisch	1	2	3	4	5
Deze slogan past bij de beker	1	2	3	4	5

Proef nu gratis de milde smaak van de nieuwe Riekes Koffie

	Helemaal niet mee eens	Niet mee eens	Neutraal	Mee eens	Helemaal mee eens
Deze slogan is realistisch	1	2	3	4	5
Deze slogan past bij de beker	1	2	3	4	5

Proef nu gratis de zachte smaak van de nieuwe Riekes Koffie

	Helemaal niet mee eens	Niet mee eens	Neutraal	Mee eens	Helemaal mee eens
Deze slogan is realistisch	1	2	3	4	5
Deze slogan past bij de beker	1	2	3	4	5

Geef alsjeblieft aan in hoeverre je het met de volgende uitspraken eens bent (1 – Helemaal niet mee eens, 2 – Niet mee eens, 3 – Neutraal, 4 – Mee eens, 5 – Helemaal mee eens)

Proef nu gratis de intense smaak van de nieuwe Riekes Chocolademelk

	Helemaal niet mee eens	Niet mee eens	Neutraal	Mee eens	Helemaal mee eens
Deze slogan is realistisch	1	2	3	4	5
Deze slogan past bij de beker	1	2	3	4	5

Proef nu gratis de sterke smaak van de nieuwe Riekes Chocolademelk

	Helemaal niet mee eens	Niet mee eens	Neutraal	Mee eens	Helemaal mee eens
Deze slogan is realistisch	1	2	3	4	5
Deze slogan past bij de beker	1	2	3	4	5

Proef nu gratis de milde smaak van de nieuwe Riekes Chocolademelk

	Helemaal niet mee eens	Niet mee eens	Neutraal	Mee eens	Helemaal mee eens
Deze slogan is realistisch	1	2	3	4	5
Deze slogan past bij de beker	1	2	3	4	5

Proef nu gratis de zachte smaak van de nieuwe Riekes Chocolademelk

	Helemaal niet mee eens	Niet mee eens	Neutraal	Mee eens	Helemaal mee eens
Deze slogan is realistisch	1	2	3	4	5
Deze slogan past bij de beker	1	2	3	4	5

QUESTIONNAIRE MAIN STUDY

Bedankt voor uw deelname aan deze smaakproef. Geef alstublieft aan in hoeverre u het eens bent met de volgende uitspraken (1 – Helemaal niet mee eens, 2 – Niet mee eens, 3 – Eerder niet mee eens, 4 – Neutraal, 5 – Eerder mee eens, 6 – Mee eens, 7 – Helemaal mee eens)

	Helemaal niet mee eens	Niet mee eens	Eerder niet mee eens	Neutraal	Eerder mee eens	Mee eens	Helemaal mee eens
De smaak van dit product bevalt me	1	2	3	4	5	6	7
Dit product is lekker	1	2	3	4	5	6	7
De smaak van dit product past bij de productcategorie	1	2	3	4	5	6	7
De smaak van dit product hoort zo te zijn	1	2	3	4	5	6	7
Dit product is zacht van smaak	1	2	3	4	5	6	7
Dit product is sterk van smaak	1	2	3	4	5	6	7
Dit product is bitter van smaak	1	2	3	4	5	6	7
Dit product is zoet van smaak	1	2	3	4	5	6	7
Dit product is mild van smaak	1	2	3	4	5	6	7
Dit product is krachtig van smaak	1	2	3	4	5	6	7
Dit product is licht van smaak	1	2	3	4	5	6	7
Dit product is intens van smaak	1	2	3	4	5	6	7
Ik ben positief over dit product	1	2	3	4	5	6	7
Dit product bevalt me	1	2	3	4	5	6	7
Dit product is aangenaam	1	2	3	4	5	6	7
Dit product is aantrekkelijk	1	2	3	4	5	6	7
Dit product is aansprekend	1	2	3	4	5	6	7

Ik probeer zo min mogelijk suiker te gebruiken in het dagelijks leven	1	2	3	4	5	6	7
Ik zou overwegen dit product te kopen	1	2	3	4	5	6	7
Ik zou dit product best willen uitproberen	1	2	3	4	5	6	7
Ik zou liever een ander product willen kopen	1	2	3	4	5	6	7

OVERVIEW OF MEANS AND STANDARD DEVIATIONS PRETEST

	This slogan is realistic	**This slogan fits the cup**
Koffie		
Intense	M = 4.20 SD = 0.616	M = 4.10 SD = 0.641
Strong	M = 3.75 SD = 0.851	M = 4.05 SD = 0.686
Mild	M = 2.60 SD = 1.273	M = 1.80 SD = 0.616
Soft	M = 2.55 SD = 1.234	M = 1.65 SD = 0.489
Hot Chocolate		
Intense	M = 3.00 SD = 1.026	M = 2.75 SD = 1.118
Strong	M = 2.50 SD = 0.889	M = 2.50 SD = 0.889
Mild	M = 3.65 SD = 0.933	M = 3.75 SD = 0.851
Soft	M = 4.10 SD = 0.788	M = 4.25 SD = 0.967

Independent variable/s	Dependent variable		M	SD
Tactile form	Perceived bitterness	Angular	3.27	1.786
		Round	2.49	1.350
Tactile form	Perceived sweetness	Angular	3.71	1.663
		Round	4.46	1.786
Tactile form	Product taste strong	Angular	14.01	3.448
		Round	11.53	3.884
Drink x tactile form	Product taste strong	Coffee/Angular	14.47	3.282
		Coffee/Round	9.98	4.300
		Hot Chocolate/Angular	13.55	3.587
		Hot Chocolate/Round	13.08	2.674
Tactile form x taste description	Product taste strong	Angular/Strong	15.30	2.902
		Angular/Soft	12.73	3.501
		Round/Strong	11.00	4.443
		Round/Soft	12.05	3.202
Tactile form	Product taste soft	Angular	8.56	2.525
		Round	10.58	1.868
Drink x tactile form	Product taste liking	Coffee/Angular	22.93	3.605
		Coffee/Round	19.88	4.039
		Hot Chocolate/Angular	21.60	3.788
		Hot Chocolate/Round	24.57	2.297
Drink x tactile form x taste description	Product taste liking	*Taste description strong*		
		Coffee/Angular	23.65	3.617
		Coffee/Round	18.70	4.092
		Hot Chocolate/Angular	21.15	3.514
		Hot Chocolate/Round	24.40	2.088
		Taste description soft		
	Taste description soft	Coffee/Angular	22.20	3.533
		Coffee/Round	21.05	3.720
		Hot Chocolate/Angular	22.05	4.084
		Hot Chocolate/Round	24.75	2.297
Drink x tactile form	Product experience	Coffee/Angular	27.08	4.984
		Coffee/Round	22.50	5.953
		Hot Chocolate/Angular	24.50	5.119
		Hot Chocolate/Round	28.47	3.242
Tactile form x taste description	Product experience	Angular/Strong	26.42	5.661
		Angular/Soft	25.15	4.644
		Round/Strong	24.47	6.267
		Round/Soft	26.50	4.782
Drink x tactile form	Purchase intention	Coffee/Angular	15.10	3.193
		Coffee/Round	11.58	3.573
		Hot Chocolate/Angular	13.28	3.130

		Hot Chocolate/Round	15.20	2.345
Tactile form x taste description	Purchase intention	Angular/Strong	14.60	3.177
		Angular/Soft	13.78	3.355
		Round/Strong	12.73	4.032
		Round/Soft	14.05	2.801
Drink x tactile form x taste description	Purchase intention	*Taste description strong*		
		Coffee/Angular	15.70	3.435
		Coffee/Round	9.95	3.531
		Hot Chocolate/Angular	13.50	2.524
		Hot Chocolate/Round	15.50	2.164
		Taste description soft		
		Coffee/Angular	14.50	2.893
		Coffee/Round	13.20	2.858
		Hot Chocolate/Angular	13.05	3.692
		Hot Chocolate/Round	14.90	2.532