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Can the design of food packaging influence
taste experience of its content?

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Abstract

This study examines the influence of packaging design on the perception of different attributes of lemon yoghurt. In line with previous studies and a pre-test it was assumed that different shapes and color saturations convey various levels of dominance. These can influence the perception of further product attributes via previously formed associations or a spread of stimulus attributes from one sense to another, called cross-modal correspondence. Shape (round versus angular) and color (50 % saturation versus 100 % saturation) of the yoghurt cup were manipulated. It was hypothesized that the dominance levels of shape and color saturation have an influence on taste experience and perceived consistency. Congruency and processing fluency regarding the dominance level of these two attributes of the packaging are assumed to have a positive relation to product attitude and price estimation. Furthermore these effects are expected to be stronger for those people who have a concern for design. Data were collected during a field study in a German supermarket. The results show that shapes and color saturations communicate different levels of dominance and influence perception and evaluation of the yoghurt. An angular yoghurt cup leads to a stronger taste experience, harder perceived consistency, and a more positive product attitude, but only if design is important to participants. The mean estimated price is higher if the yoghurt cup has an angular shape and also if the color is 50 % saturated. Together these results support the hypothesis that the visual elements of a packaging influence the perception of further product attributes and that these effects are mostly limited to those people who pay attention to design.

Introduction

When going shopping and looking for different products, what do we see? The packaging. In daily life people are exposed to a wide range of different product packaging in various product categories during shopping in supermarkets, drugstores or other shops. Within a product category different brands offer items for consumption which can be distinguished from the outside by the design of the packaging with regards to shape, size, color, etc. By looking at the packaging people do not know any further characteristics of the product, apart from previous experiences. Can packaging design have an effect on consumers buying intention and product evaluation? Does the packaging make people draw inferences about the product, attributes, or content? Does the packaging even have the power to modulate the later experiences of the product?

Looking at daily life experiences with products some, simple examples can be found in which the package influences people's expectations. For example, people would seldom expect a cherry taste from brown packaging. Most of the time, they would think of chocolate or coffee flavor due to the color. Wouldn't it be irritating if the color did not coordinate with the final taste? Another example is if a package is not transparent, like Tetra-Pak or drinks cans, one would not expect that it contains water. Normally juice or lemonade is filled in this kind of packaging and water in glass or transparent plastic bottles. Again, the result would probably lead to surprise or confusion. Schoormanns and Robben (1997) showed that that a new package design can negatively influence taste perception. Due to convention and past experiences people seem to form expectations and draw conclusions by just looking at the packaging design.

In agreement with these examples from daily life several theories and studies support the statement that the packaging of a product can evoke certain expectations and inferences. These expectations can even have an effect on the subsequent experience of the product. According to the Implicit Product Theory of Pinson (1986) product characteristics can mediate product inferential judgments. Through cues, for example odor, color, packaging or price people draw inferences on other attributes of a product, which they have not experienced yet. These assumed associations among product attributes are called implicit product schemata. Consumers form a judgment on the basis of these schemata whenever information is missing or incomplete. In accordance with this theory Huber and McCann (1982) have shown that the impact of inferential beliefs on product evaluations can occur and be very significant. A study by Hine (1995) showed that adding 15 % more yellow to the

green of 7-Up cans makes consumers experience the taste as more lemony, although the drink had not been manipulated. A study by Schifferstein (submitted) confirmed that the experience of a product is heavily influenced by the material of a container. One reason for the influence of expectations and inferences on perception of following, previously unknown product elements could be a beforehand formed association. Through rapid co-occurrence of two stimuli, perceiving one stimulus may increase the expectation of the other stimulus (Garber, Hyatt, & Starr, 2001). In the study by Hine (1995) the stimulus color yellow increased the expectation of lemon and by this influenced the final taste perception. Another reason might be that the different sense modalities influence each other during perception of stimuli. Support for this effect comes from the phenomenon “synesthesia” (Baron-Cohen & Harrison, 1997), where stimulation of one sensory or cognitive pathway leads to automatic, involuntary experiences in a second sensory or cognitive pathway. Schifferstein and Spence (2008) referred to the connection people make between different sensory stimuli as “cross-model correspondence”. This means that a strong stimulus in one sensory modality can lead to a strong perception in another sensory modality. Thus people perceive some sort of stimulus similarity between different senses. Boring (1942) showed that perception in different senses seem to share the dimensions of intensity, duration and spatial location. In applying this finding to product packaging an intense visual stimulus might lead to an intense taste experience.

This study investigates the effects of different visual elements of a packaging design on taste, perception, and evaluation of lemon yoghurt. It concentrates on two different attributes of packaging; shape and color saturation.

Shape

The Model of Consumer Responses to Product Form (Bloch, 1995) states that the shape of a product can influence the consumers’ cognitive and affective responses. It can alter consumers’ beliefs about the product and brand (Bitner, 1992; Solomon, 1983) and may evoke feelings of enjoyment regardless of practical considerations (Holbrook & Zirlin, 1985). Nussbaum (1993) showed that the shape or exterior appearance of a product is important as a means of communicating information to consumers. This is supported by Berkowitz (1987), who stated that product shape creates an initial impression and generates inferences regarding the products’ other attributes.

Round and angular shapes can contain different levels of dominance. For example, angular shapes get higher ratings concerning aggressiveness (Guthrie & Wiener, 1966) or

confrontation (Arnheim, 1974) compared to round shapes. This effect can be explained by different and sometimes contrasting, emotional or associative responses which are evoked by these different shapes. Berlyne (1976) showed that angular shapes tend to induce associations with traits that express energy, toughness, and strength. In contrast, rounded shapes tend to induce associations with traits such as approachability, friendliness, and harmony. Furthermore humans associate threat with sharp, primitive elements and warmth with round, primitive elements (Aronoff, Woike & Hyman, 1992).

It is apparent that angular and round shapes convey different levels of dominance which in turn can influence associations, inferences, and perception. In this study the effect of dominance of a yoghurt cups' shape on perception of other attributes of the yoghurt will be tested. It is hypothesized that dominance of the shape is positively related to intensity of taste. Thus, an angular yoghurt cup leads to a stronger subsequent taste experience than a round yoghurt cup.

Color

Color seems to have several emotional and cognitive effects on people during product experience as well. It influences arousal (Crowley, 1993) and generates pleasant feelings (Bellizzi & Hite, 1992). Birren (1956) stated that color can effectively be used to suggest certain product characteristics. Furthermore, people are able to match the taste of a dessert to the right color of packaging (Smets & Overbeeke, 1995). This indicates that color can transpose information to consumers.

Generally the emotional response to color has been found to be consistent (Kastl & Child, 1968). A common finding in literature is that people prefer colors made up from short wavelengths over colors made up from long wavelengths.

Not only the hue but also the saturation and brightness of a color can affect emotional experience. Valdez and Mehrabian (1994) studied the effects of different colors using the Pleasure-Arousal-Dominance (PAD) emotion model (Mehrabian & Russell, 1974). They used 10 hue groups from the Munsell Color System printed on cards and provided representative variations of brightness and saturation for each hue. The participants' emotion was measured with the PAD scales with selected emotion terms for each factor. Brighter and more saturated colors were rated as more pleasant, brightness having a stronger effect. In addition saturation positively influenced arousal, while brightness had a negative effect. They found that less bright and more saturated colors induced greater feelings of dominance. In this case brightness had a stronger influence on perceived dominance of color than saturation.

In this study the effect of a yoghurt cups' color saturations on the perception of a following product experience will be investigated. It is assumed that the more dominant color saturation is, the stronger will be the subsequent taste experience. Thus, a more saturated color will lead to a stronger taste experience than a less saturated color.

Personality

The effects of shape and color saturation on subsequent experiences might vary due to personality factors. In the area of product and packaging design the sensitivity for visual stimuli and elements may play an important role. Osborne (1986) stated that the ability to recognize, categorize, and evaluate product designs is expected to vary within a population. Smets and Overbeeke (1995) compared design and non-design students' ratings of taste and design of desserts. The results show that both groups used the same underlying dimensions, but design students differentiate their judgments more than non-design students. The ability and skill to see and evaluate design seems to have an effect on the perception and processing of visual stimuli. This might also lead to different expectations which in turn influence subsequent perceptions concerning other product attributes. Bloch, Brunel, and Arnold (2003) developed a scale to measure individual differences in the centrality of visual aesthetics. This scale, the Centrality of Visual Product Aesthetics (CVPA), measures if people value, are able to see, and respond to design. Taking the previous studies into account one can expect that people who are sensitive to design will draw more inferences on the basis of the packaging and will be more influenced during later product experience and evaluations than people who do not pay so much attention to it. The hypothesis is that the effect of the packaging design on subsequent perception of further product attributes is stronger for people who score higher on the CVPA scale. In other words the score on the CVPA scale will have a moderating role concerning the effect of the packaging on other attributes of the yoghurt.

Congruency effects

In addition, the effect of the combination of different shapes and color saturations on product attitude and price perception is investigated in this study. As shapes as well as color saturations are chosen, which are either experienced as dominant or not dominant a congruence effect may appear. In a study by Rompay and Pruyn (submitted) the congruence (masculine/feminine) between the shape of a water bottle and typeface design led to higher ratings on attractiveness. This effect can be explained by taking the processing fluency into account. Different stimuli are more easily processed, when they express the same level of an

underlying dimension. The congruency facilitating perception, leads to a more positive evaluation and attitude towards the stimulus (Lee & Labroo, 2004; Reber, Schwarz, & Winkielman, 2004). Higher ratings on product aesthetics influence the price perception toward higher values. It is hypothesized that the variants of the yoghurt packaging, where color and shape express the same level of dominance, will be more liked, rated as more attractive, and expensive.

STUDY 1: DOMINANCE OF SHAPES AND COLOR SATURATIONS

In order to find valid and useable manipulations of shape and color saturation a first study was done to ensure the hypothesized effects on perceived dominance. Different shapes and colors as well as color saturations were included in this study.

Method and Procedure

Overview and participants

The test was carried out via an online questionnaire. By e-mail participants received a questionnaire showing packaging shapes or color saturations. These had to be rated on different dominance related adjectives. In total 40 participants took part in this study.

20 participants (9 male, 11 female) evaluated the different shape manipulations. Their age reached from 22 to 64 ($M = 30.90$, $SD = 13.36$). The questionnaire (see Appendix A) contained 12 items ($\alpha = .73$) had to be rated on a 7-Point-Likert scale ranging from “not at all” to “very”; examples are “rebellious”, “spicy”, and “weak” (reversed score).

Further 20 participants (8 male, 12 female) rated different color saturations of a two lemon-greenish colors (hue 62 and 68). Their age reached from 18 to 64 ($M = 32.90$, $SD = 14.60$). The questionnaire (see Appendix B) had to be rated on a 7-Point-Likert scale ranging from “not at all” to “very” and consisted of 12 items ($\alpha = .86$); examples are “bitter”, “independent”, and “mild” (reversed score).

Manipulations and measurement

Three different yoghurt cup pairs, varying in heights, width and, depth have been with a professional program package (see Figure 1). These pairs consist of a round cup and an angular counterpart. The six different cups were arranged randomly for each participant. A match was placed next to each cup to enable the participants to imagine the size of the objects. Within each pair the cups have the same height, width and also the same volume to prevent any size effects of the objects on the ratings of the participants.

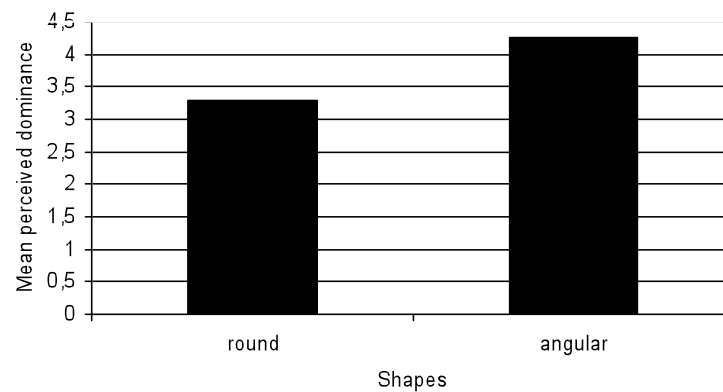
The color saturation manipulations were 100 % saturated color and 50 % saturated color of the two different hues (see Figure 2). The order of the color and saturations in the questionnaire were random.

The dependent measure was the score on the questionnaire for each dominance related item. The items were summed up to the dependent variable “dominance” which is used in the further analysis.

Results

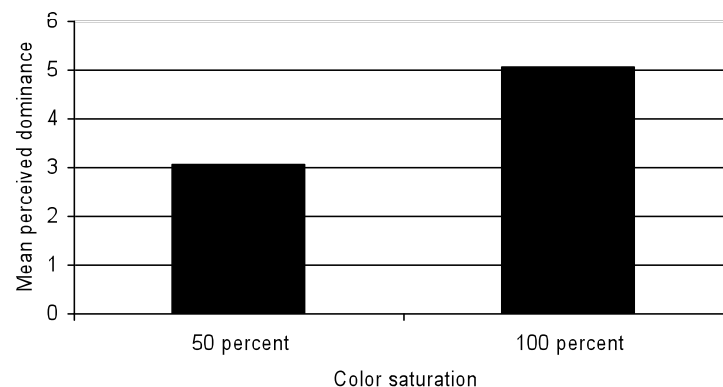
One shape pair (see Figure 1, number 3) differs significantly from each other ($F(1,18) = 14.56, p < .01$) concerning the dominance level. The angular version is rated as more dominant ($M = 4.27, SD = .16$) than the round version ($M = 3.30, SD = .16$); see Figure 3. The other two pairs do only show a marginal significant difference (all $F < 3$).

Figure 3: Mean dominance ratings of round and angular shapes



Both color hues show significant effects concerning the different saturations and the perceived dominance. The color hue 62 shows slightly higher significance level ($F(1,18) = 85.18, p < .01$) than the color hue 68 ($F(1,18) = 66.59, p < .01$). The 50 % saturated color ($M = 3.07, SD = .15$) is rated less dominant than the 100 % saturated color ($M = 5.06, SD = .15$); see Figure 4.

Figure 4: Mean dominance ratings of 50 % and 100 % saturated color



Discussion

This study shows that different shapes and color saturations communicate different dominance levels. The differences in perceived dominance seem to be universal concerning various saturations of any color, as already shown by Valdez and Mehrabian (1994). This effect is not found in the case of the shapes. From the shape pair investigated here only one shows a strong difference in the dominance level. The others pairs do not reach significance. Thus the difference between round and angular shape are also influenced by the width, height, and depth of the object pairs. It would be interesting to study this effect in more detail. Concerning the present study this results will be used only to find strong and reliable manipulations. The shape pair, differing significantly in perceived dominance and the color hue 62 are chosen for the subsequent study. Four different yoghurt cups are created by combining these different manipulations of shape and color saturation (see Figure 5). The influence of these variables on the subsequent taste experience will be investigated. The underlying hypothesis is: the more dominant the shape or color of the yoghurt cup, the stronger the taste experience of the lemon yoghurt. More precisely, an angular yoghurt cup or 100 % saturated color are perceived as more dominant and will lead to a stronger taste experience of the yoghurt compared to a round yoghurt cup or a 50 % saturated color. The congruency of the dominance levels of shape and color saturation are assumed to lead to higher ratings concerning product attitude and a higher estimated price.

Though it was not a main subject of the study the effect of shape on perceived consistency of the yoghurt are investigated marginally. It is expected that the angular cup will lead to a firmer perceived consistency of the yoghurt, due to previously formed associations.

STUDY 2: EFFECT OF DIFFERENT PACKAGING SHAPES AND COLOR SATURATIONS ON OTHER PRODUCT ATTRIBUTES

To test the different effects of visual packaging design on perception and evaluation of the content and further product attributes a field study was conducted following three main steps. First, participants were exposed to one of the four yoghurt cups and then they all tasted the same yoghurt. After that they had to judge different attributes of the yoghurt and the packaging. In the end they all filled in a questionnaire to assess their concern for design.

Method and Procedure

Overview and participants

This study took place in the entrance area of a supermarket in Münster, Germany, affiliated to a chain called “REWE”. Participants were approached and asked to evaluate the taste and the packaging of a new yoghurt, to be launched to the market soon. On a computer which was placed on a bar-height bistro table in the entrance of the supermarket they saw a short display of one of the four packaging first. Then they had to taste a sample of always the same lemon yoghurt. In the following step the participants answered several questions concerning taste, consistency of the yoghurt, packaging evaluation, price and a scale to measure their individual differences in the centrality of visual aesthetics. The study employed a 2 (Color: 50 % saturation versus 100 % saturation) X 2 (Shape: Round versus angular) X 2 (median CVPA score: low versus high) between-subject factorial design. A total of 151 customers (74 male, 77 female) participated in this study and were included in the analysis. Their age varied from 15 to 81 years ($M = 30.68$, $SD = 11.43$).

Manipulations

Prior to the beginning of the test, participants were assigned to one of the four packaging conditions. They all filled in an informed consent and then started the experiment at the laptop. The experiment began for all participants with filling in demographic variables containing age and gender. Then again they got the information that this test is about a new yoghurt which should enter the market soon. Afterwards they watched a 20 second film clip of one of the four yoghurt cups which turned around 180° degree one time. After the film participants were requested by the computer to ask the investigator for a sample of the new

yoghurt. All participants received the same lemon yoghurt, which is a product of the brand “REWE”, on a neutral small aluminum bowl and a plastic spoon.

Dependent measures

Taste evaluation

After trying the yoghurt participants were asked to assess different attributes of the yoghurt. First they rated the yoghurts’ taste intensity on a 7-Point Likert Scale ranging from “not at all” to “very”. The scale consisted of three taste items ($\alpha = .70$); “mild” (reversed score), “bitter”, and “sharp”. Then participants rated the consistency of the yoghurt on a single item on a 7-Point Likert Scale ranging from “soft” to “hard”.

Packaging evaluation

In the following step participants evaluated the packaging of the yoghurt. First they had to rate the toughness of the packaging on a 7-Point Likert Scale ranging from “not at all” to “very”. This item serves as a indicator of the packaging dominance. After this, a scale followed which measured product attitude with 3 items ($\alpha = .80$) on a 7-Point Likert Scale ranging from “not at all” to “very”; “superior”, “eye-catching”, and “high quality”. Then participant had to type the estimate price of the product.

Individual differences in the centrality of visual aesthetics (CVPA)

In the end participants were asked to fill in the scale of individual differences in the centrality of visual aesthetics (Bloch, Brunel, & Arnold, 2003) to assess the ability to recognize, the importance of, and the reaction to design. To make it more difficult for the participant to figure out the intention of the experiment they were informed that a questionnaire in the context of another study about purchase patterns and lifestyle of customers would follow. Then the questionnaire about individual differences in the centrality of visual aesthetics (Bloch et al., 2003) followed, where the participants had to decide, how much they agreed with different statement. An example is: “Owning products that have a superior design makes me feel good about myself” (see Appendix F). This questionnaire addresses three aspects: value, acumen and response. All together the participants they had to answer 11 questions ($\alpha = .90$) on a 7-Point Likert Scale ranging from “not at all” to “very”. Finally all participants were debriefed and thanked.

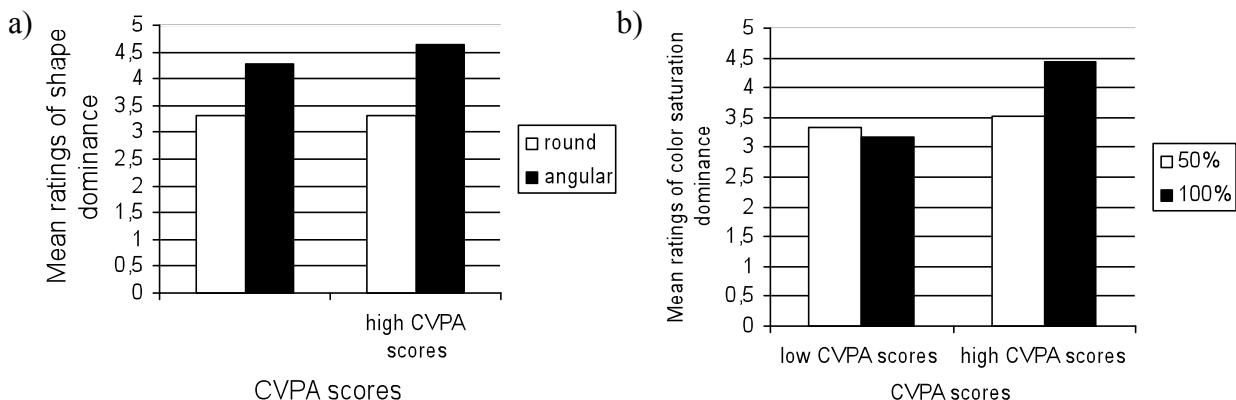
Results

Dominance

An ANOVA analysis is carried out to test the effects of color saturation and shape on the perceived dominance of the four yoghurt cups finally chosen for this experiment. The rating regarding toughness of packaging is used as an indicator for dominance. It reveals a significant main effect of shape ($F(1,143) = 11.87, p < .01$) but no main effect of color saturation ($F(1,143) = 2.48, p = .12$). The round yoghurt cups ($M = 3.21, SD = .17$) are rated as less tough than the angular yoghurt cups ($M = 4.04, SD = .17$). It is found that the score of the participants on the CVPA scale also have a significant main effect on the ratings of toughness of the yoghurt cup ($F(1,143) = 8.74, p < .01$). People who score high on the scale ($M = 3.98, SD = .17$) generally rate the yoghurt cups as tougher than people who scored low on the scale ($M = 3.27, SD = .17$).

No interaction effect between shape and color saturation is found ($F(1,143) = .4, p = .53$), but they both interact with the median CVPA score of the participant. The median CVPA score of the participants interact marginal significantly with shape ($F(1,143) = 3.77, p = .05$) and show a significant simple main effect within this interaction. People, who score high on the CVPA scale ($F(1,143) = 14.59, p < .01$) significantly rate the angular yoghurt cup ($M = 4.64, SD = .25$) as more tough than the round one ($M = 3.33, SD = .25$). No simple main effect is found for those people who scored low on the CVPA scale ($F(1,143) = 1.12, p = .29$); see Figure 6, a.

Figure 6: Mean dominance ratings concerning shape and color in the interaction with CVPA scores



There is a significant interaction ($F(1,143) = 5.01, p < .03$) between the median CVPA score and the color saturation of the yoghurt cup and here a simple main effect can be observed as well. Those participants who score high on the CVPA scale ($F(1,143) = 7.31, p < .01$) rate

the yoghurt cup with the 100 % saturated color ($M = 4.45$, $SD = .25$) significantly as tougher compared to the 50 % saturated one ($M = 3.52$, $SD = .24$). Again no simple main effect is found for those people who score low on the CVPA scale ($F(1,143) = .22$, $p = .64$); see Figure 6, b.

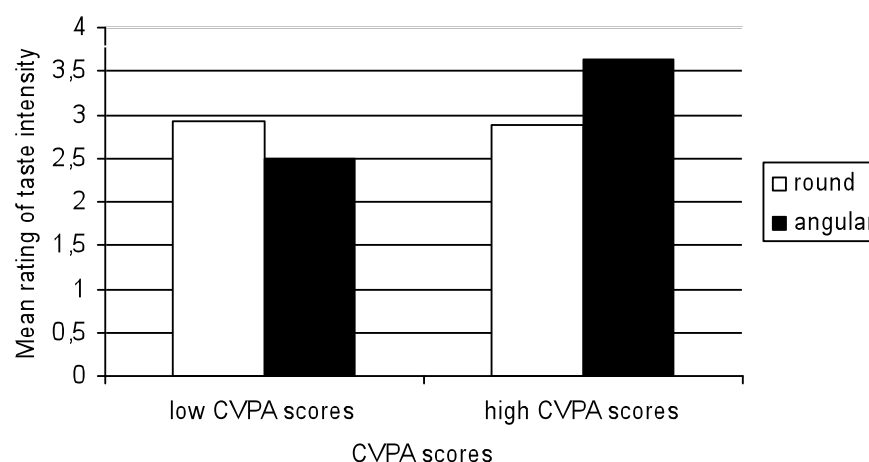
Summarizing, these results show that shape and color saturation of a yoghurt cup influence perceived dominance of it. These effects are moderated by the CVPA score of the participants.

Taste

The strength of taste is not significantly influenced by color saturation or shape (all $F < 1$). The CVPA scores have a significant effect on the ratings of the taste intensity ($F(1,143) = 6.05$, $p < .02$). People who score high on this scale ($M = 3.18$, $SD = .14$), revealing concern for design, rate the strength of the taste to be stronger than those who score low on this scale ($M = 2.71$, $SD = .14$).

Strong taste is also significantly influenced by the interaction of CVPA scores and shape ($F(1,143) = 6.84$, $p < .02$) and again a simple main effect of the median CVPA scores is found in this interaction. Participants with a high score on the CVPA scale rate the taste of the yoghurt significantly ($F(1,143) = 4.51$, $p < .04$) stronger after looking at an angular cup ($M = 3.46$, $SD = .20$) in comparison to a round cup ($M = 2.89$, $SD = .19$). This effect is not found in the group which scored low on the CVPA scale ($F(1,143) = 2.48$, $p = .12$); see Figure 7.

Figure 7: Mean ratings of taste intensity in the interaction with CVPA scores



To test whether perceived 'toughness' of the yoghurt cup mediates the interaction effect of 'shape' and 'CVPA scores' on strong taste, mediation analyses is conducted following Baron and Kenny (1986). As already mentioned above the regression analysis shows that the

interaction between ‘shape’ and ‘CVPA scores’ on strong taste (dependent variable) is significant (Table 1, regression 1). Similarly this interaction between ‘shape’ and ‘CVPA scores’ also influences significantly perceived toughness (the mediator) of the yoghurt cup (see Table 1, regression 2). After all, the interaction between ‘shape’ and ‘CVPA scores’ loses its significance when perceived toughness (the mediator) of the yoghurt cup is added to the regression analysis as a predictor of strong taste, while the effect of the mediator stayed significant (Table 1, regression 3). This shows that perceived toughness of the yoghurt cup mediates the effect of the interaction between ‘shape’ and ‘CVPA scores’ on strong taste.

The influence of the shape of a yoghurt cup on the following taste experience is generally moderated by people’s approach to design and mediated by toughness of the yoghurt cup.

Consistency

Color saturation of the yoghurt cup and CVPA scores do not influence perceived consistency of the yoghurt (all $F < 1$). However, shape of a yoghurt cup significantly influences the perceived consistency of the yoghurt ($F(1,143) = 7.86, p < .01$). Yoghurt from an angular yoghurt cup is rated as harder ($M = 2.88, SD = .16$) than yoghurt from a round cup ($M = 2.25, SD = .16$). This effect is moderated by the CVPA scores of the participants. People with a high score show the above mentioned effect ($F(1,143) = 18.27, p < .01$) in contrast to people with a low score on the scale ($F(1,143) = .01, p = .77$).

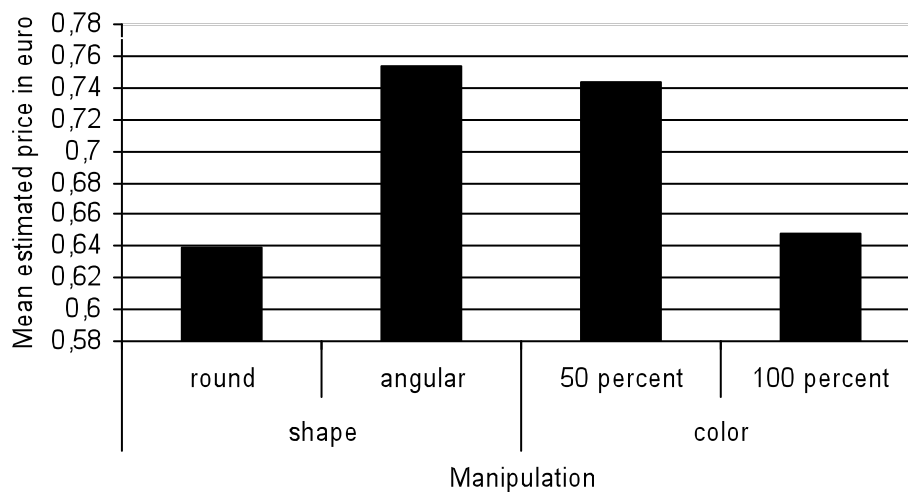
Product Attitude

Color saturation does not influence the product attitude ($F(1,143) = .02, p = .88$), but CVPA scores ($F(1,143) = 6.14, p < .02$) and shape ($F(1,143) = 7.39, p < .01$) do show an effect. People who pay lots of attention to design ($M = 4.59, SD = .15$) have a more positive attitude towards the product than people who are not interested in design ($M = 4.08, SD = .15$). The product attitude concerning the yoghurt is also significantly influenced by the shape of the carton. Participants have a more positive attitude concerning the angular cup ($M = 4.62, SD = .15$) compared to the round cup ($M = 4.06, SD = .15$). This effect is again moderated by the participant’s scores on the CVPA scale. Those who score high show a significant effect of shape on product attitude ($F(1,143) = 4.72, p < .04$) and those who score low do not ($F(1,143) = 2.8, p = .10$).

Price

Price is marginal significantly influenced by color saturation ($F(1,143) = 3.66, p = .06$) and significantly by shape ($F(1,143) = 5.13, p < .03$) of the yoghurt cup, but not by the CVPA scores of the participants ($F(1,143) = .01, p = .94$). The angular cup is thought to be more expensive ($M = .75, SD = .04$) than the round cup ($M = .64, SD = .04$). And the cup with 50 % saturated color is considered more expensive ($M = .74, SD = .04$) than the one with 100 % saturated color ($M = .65, SD = .04$); see Figure 8.

Figure 8: Shape and color saturation effects on price estimation



To identify any mediation effect a regression analysis with price as dependent variable and shape as independent variables is done. As reported above the regression analysis shows that the effect of shape on price perception is significant (Table 2, regression 1). Likewise, shape also significantly influences perceived toughness (the mediator) of the yoghurt cup (Table 2, regression 2). The effect of shape is no longer significant when perceived toughness of the yoghurt cup is added to the regression analysis as a predictor of product attitude, while the effect of the mediator is still significant (Table 2, regression 3). This shows that perceived toughness of the yoghurt cup mediates the effect of shape on price estimation. No such mediation is found for color.

Discussion

The results of this study clearly show that shapes and color saturations of a product's packaging induce different feelings of dominance. The shape of a container has several influences on the consumers' subsequent experience, the evaluation of the content and the product itself. These effects of packaging on other product attributes are strongly dependent on consumers' concern for design.

Explanation of results

The results show that shape and color saturation have an effect on perceived dominance of the yoghurt cup if the beholder has a concern for design. The angular cup and the 100 % saturated color are rated as tougher than the round cup and the 50 % saturated color. This perception of different levels of dominance is not found if a person does not pay special attention to the design of products. These results are in line with the findings of Bloch et al. (2003). They found that people who scored high on the CVPA scale discriminate their evaluation of products more than people who score low on this scale. The present study shows also that this is not only the case if people have to evaluate the product in general, but also if they have to judge the dominance of it. The concern for design of a person determines if a visual element of a packaging influences the perceived dominance. A study by Smets and Overbeeke (1995) concerning design and taste shows also that design students differentiate their judgments more than nondesign students, but that they both use common underlying patterns. Concluding, people who do not pay attention to design might also be influenced by visual stimuli, but not in such a strong, significant way as people who take a close look at design.

Besides the interaction effects discussed above there is also a direct main effect of CVPA scores on the perceived dominance of the yoghurt cup. People, who take a closer look at design and value it, rate the dominance to be higher than those people who scored low on the CVPA scale. It might be that people who consciously pay attention to design are more intensely influenced and form a stronger impression about visual elements and the general product. Sutherland and Sylvester (2000) state, that the more interesting a stimulus is, the more attention to it is paid, and the stronger is its impact on the receiver. Applying this to the present results this would mean that a person, who has a concern for design above average, is more interested in product design, pays special attention to it and is therefore more influenced

or dominated by the stimulus. This might lead to higher perceived dominance of all of the four yoghurt cups, regardless of differences in design.

In the following the results concerning the effects of shape and color saturation on other product attributes will be discussed. The hypothesis that dominance of a yoghurt cups' shape influences the intensity of taste is confirmed. According to the results angular shaped yoghurt cups lead to stronger taste experiences of the yoghurt than round cups, but only if people care for design. This effect is mediated by how dominant the cup is experienced. The more dominant the perceptions of the cups' shape the stronger the taste experience. This effect supports the idea of cross-model correspondence by Schifferstein and Spence (2008) since it shows that a strong experience in the visual sense can lead to a strong experience in sense of taste. Plainly, this means that it is possible to influence and direct the taste experience of people by manipulating the dominance and design of the packaging. However, the effect of this visual element of a packaging on taste is limited to those people who do pay special attention and interest to design, it does not generally influence all people significantly.

The score on the CVPA scale shows a direct main effect on the strong taste as well. People, who appreciate design, rate the taste generally as stronger than the other group. A similar effect has already been found concerning the dominance of the container (see above). It seems that people who pay special attention to design are generally more impressed by the visual stimulation of the packaging. According to Moskowitz (1972) visual perception has a strong effect on the sense of taste. Thus the strong effect of visual stimuli, if perceived by a person who values design and pays attention to it, influences taste experience. This is a again support for the cross-model correspondence from Schifferstein and Spence (2008).

The perceived consistency of the yoghurt is influenced by the shape of the yoghurt cup as well. The shape has an effect on the perceived consistency if people are interested in design. Yoghurt from an angular cup is experienced firmer than from a round cup. This effect can be explained with the associations (see introduction) people generally have with angular shapes. These associations in turn can influence and increase the expectation of something strong and stable. The moderating role of individual differences concerning design in this context might again be explained by the effect that attended stimuli have more impact on people than unattended one (see Sutherland & Sylvester, 2000). If people do pay attention to the design and therefore do perceive dominance of the angular shape they might create stronger associations in this direction and draw more expectations and inferences from it. Thus their subsequent experience is affected or modulated by dominance of packaging compared to people who do not care about design. However, this effect might be more

complicated and can for example be mediated by the taste experience. Christensen (1980) showed that the taste of a solution influences the experience of thickness. As shown above, the shape of a yoghurt cup influences taste experience and this might in turn influence the perceived consistency of the yoghurt. To explain this effect more detailed studies are desirable.

In this study the yoghurt cups was rated more positive, concerning the product attitude, by people who care for design compared to people who do not. Smets and Overbeeke (1995) showed indeed that people who pay more attention to the appearance of products are able to develop stronger attitudes toward it. However this is not leading necessarily to a positive evaluation. The study by Bloch et al. (2003) showed that people who scored high on the CVPA scale did evaluate poor design also more negative than people who scored low on the CVPA scale. The design of the packaging in this study is intended to be positive which appears to be appreciated by the participants, explaining the results.

The congruency effects of shape and color saturation on product attitude did not occur as predicted. The two yoghurt cups which contain visual elements that communicate the same level of dominance are not evaluated more positively. The effect of color saturation might have been overshadowed by the strong effect of shape. This could be explained by the stronger effect of shape in this context. Most yoghurt cups are round, due to functional reasons, and are combined with various colors. A special or strong color might not be very unusual or noteworthy in this category and therefore less influential. In contrast to this, a rare, unusual and extraordinary angular shape might be catching attention and therefore may have more impact (Sutherland & Sylvester, 2000) concerning the perceived dominance in this product category. Since shape surpasses the effect of color in the dominance domain, it is unlikely that they work or are perceived together. This idea is supported by the previously results discussed. Consistency and taste are both only influenced by shape of the yoghurt cup and not by color saturation (further discussed below). It seems quite reasonable that the congruency effect of shape and color does not work in this product category, due to the strong effect of the unconventional shape manipulation.

Product attitude is well influenced by the interaction of shape and CVPA scores. People who have a concern for design have a more positive product attitude towards the angular cup. Peoples' approach to evaluation can be understood by the concept of self-monitoring (Snyder, 1974), which has been related to the way people evaluate products by DeBono (2000). The theory refers to the process through which people regulate their own behavior in order to "look good" so that they will be perceived in a favorable manner by others. It

distinguishes between high self-monitors, who monitor their behavior to fit different situations, and low self-monitors, who are more consistent over different situations. Brunel (1998) showed that high self-monitors are more influenced by product appearance and low self-monitors pay more attention to the functional properties of a product during product evaluation. Applying this finding to the present results, people who have a special concern for design might not take the functional aspects of an angular yoghurt cup into account when developing their product attitude. Thus the angular cup which has a strong visual impression on this group anyway (see above) might influence the evaluation in a positive way. In contrast to this people who do not pay attention to design are more occupied with the functional aspects of the angular yoghurt cup and thus do not develop a more positive attitude towards it. This effect should be studied in more detail in following studies concerning the effect of new design and its functionality on different individuals regarding their personality and concern for visual appearance.

Last, the price estimation of the different yoghurt cups is also not influenced by the predicted congruency effect. Since this hypothesized congruence effect is not found for product attitude, which in turn influences price (van Rompay & Pruyn, submitted), it seems quite reasonable that the effect failed to appear. Nevertheless, price estimation of the product is strongly influenced by the packaging design of the yoghurt cup. The angular shaped yoghurt cup leads to higher price estimation than the round one, regardless if participants are interested in design or not. This effect might be due to the fact that an angular yoghurt cup is rarely found in this product category. Rareness can be used as price strategy which leads to higher price anticipation (Lynn & Bogert, 1996). Concluding, the angular yoghurt cup might be perceived as rare and special and therefore as more expensive. Another explanation of this result is that the effect of shape on price is influenced by the dominance of the yoghurt cup. The angular shape is perceived as more dominant and this leads in turn to a higher price estimation. Thus it seems that a high level of induced dominance of product attributes can lead to higher price estimation. This effect of product dominance on price perception should be also studied in more detail.

The color saturation influences the price estimation as well. The lighter color leads to higher mean price than the 100 % saturated one. This effect of color saturation can be understood by a common strategy in marketing. Strong color can effectively be used attract attention in advertisement (Trenchard & Crissy, 1951), which is often done when a special offer is recommended. The 100 % saturated color might remind participants of sale and thus

they automatically infer that the product is cheaper. The 50 % saturated color on the other hand might appear more fine and selected and thus leads to higher price estimation.

Concerning the price estimation no differences between people, who care for design and those, who do not have been found. Generally design of products is used for aesthetic perception (Veryzer & Hutchinson, 1998) and quality evaluation (Zeithaml, 1988). The quality of a product in turn influences price estimation (Erickson & Johansson, 1985). Essentially this study shows that price estimation is not influenced by individual differences in concern for design. Taking the previous studies into account people possibly take a closer look at the visual appearance of a product when they want to draw inferences about quality and price, no matter if they are normally interested in design or not. Future studies should be concerned with how good packaging design can increase price estimation.

Color saturation of packaging only show few effects on further product attributes of the yoghurt in this study. First, one has to keep in mind that the participants saw the yoghurt cups on a computer screen only. Color saturation does show some significant effects, but possibly attenuated by the visual display. Second, as already stated above, the effect of color saturation, is overshadowed by the strong influence of shape in this product category. The same color was used with different saturation levels. A stronger effect might be found when taking completely different colors. Furthermore color of the yoghurt might itself have a stronger influence on the taste experience and thus outweigh the effect of the packaging color saturation. A study by Hyman (1983) showed that the color of food can influence the taste experience in a very strong way. Participants in this study tasted water or beer which was differently colored. The results showed that people in this study sometimes judge the flavor of the drink completely wrong due to changed color. Taking this study into account it seems reasonable that the effect of the packaging color on taste is exceeded by the color of the yoghurt itself. Inferences and expectations drawn from the packaging color might be disrupted as soon as people see the color of the food itself. This effect should be studied in more detail. In how far does the expectation due to the packaging color alter when consumers see the contents' color, viscosity, structure etc?

In summary these findings demonstrate that visual elements, especially shape, of the packaging have the power to influence following product experiences and evaluations. These effects are limited mostly to those people who care for design. This concern itself has main influences on perception and evaluation of different product attributes. Generally this positive attitude towards design leads to a more intense perception and evaluation of many products' attributes.

Practical implications

The results of this study are relevant for product designers as well as for marketing. It clearly shows that the visual elements shape and color saturation of a product packaging can influence experience and evaluation of the product itself. Product designers can communicate different levels of dominance to the beholders or evoke associations and thereby influence them. In practice this means that the designer of a packaging has the power to influence peoples' experience concerning a product. But this power is often limited to those people who have concern for visual stimuli. Marketing and design of food products is mostly made for general public and not for a special population. But the study by Smets and Overbeeke (1995) showed that people without design skills process and evaluate visual information in the same way as designers do. The difference between these two groups is that designers differentiate their judgment more than non-designers. Thus it might be possible to expand the influence of packaging design to more consumers by directing and focusing attention to the important design elements. In other words, the manipulated visual elements should be made clearly obvious and recognizable. This could happen through slogans, signs or by exaggerating the important design attributes. The usefulness of this idea should be investigated in future studies.

This study shows that the perceived taste intensity of yoghurt strongly depends on the shape of the container. While developing packaging for food, design should play an important role. When a producer intends to develop a food product with a strong taste the packaging shape should also communicate a high dominance level, because a strong visual stimulus positively influences the intensity of taste. In contrast, a mild taste should be packaged in a container that evokes associations as for example weakness. Generally, it has to be made sure that the packaging communicates the intended level of dominance and evokes suitable associations, since it influences the taste experience.

The effect concerning consistency can also be effectively used for certain products which should have special properties. Food, which should be smooth and creamy, as for example pudding or cream cheese, should always be sold in a round package, which supports the softer viscosity perception. Food such as cookies, which should be crunchy and brittle rather than chewy, should be served in an angular container.

Concerning price estimation these results teach an important lesson. Strong colors may be associated with offers and thus also cheapness and should not be used when the product should communicate quality and value. A fine and exquisite product should not attract attention due to its color. In this case a muted and sober color may be more appropriate to

communicate value and direct price expectation. On the other hand packaging shape can well be used to induce higher feelings of dominance and visibility, because this leads to a higher price estimation of the product.

Concluding, taking into account the visual elements of a package design during product development can be a powerful tool to influence, control or strengthen the perception and evaluation of different product attributes.

The idea of cross-model correspondence and the effect of previous associations on product experience in the area of design and marketing have a lot of potential and should be studied in more detail in following studies. To expand this ideas and effects, future research should focus on how other sensual stimuli can evoke association or inferences and how they can influence further perception. Which effect can touch or structure of the packaging have on the taste experience and perception of the product? Does a taste experience have an effect on other sensual perception? What effect can the sound by handling or opening the product packaging have on taste perception or visual appearance evaluation? This study showed that these effects of packaging design are of great importance to direct and intensify consumer experience and can be easily applied in practice.

Effect of packaging design on taste experience

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Appendix A

Evaluation of the different object pairs concerning the dominance levels

	Not at all	very
impressive		
sour		
mild		
weak		
humble		
pure		
bland		
bitter		
compliant		
spicy		
rebellious		
independent		
	Not at all	very

Appendix B

Evaluation of the different colors and saturations concerning the dominance levels

	Not at all	Very
impressive		
sour		
tough		
weak		
compliant		
pure		
humble		
bland		
independent		
mild		
bitter		
sharp		
	Not at all	very

Appendix C

Taste intensity items

Mild

Not at all Very

Bitter

Not at all Very

Sharp

Not at all Very

Appendix D

Dominance item

Toughness

Not at all Very

Appendix E

Product attitude items

Eye-catching

Not at all Very

Superior

Not at all Very

High quality

Not at all Very

Appendix F

The centrality of visual product aesthetics (CVPA)

Value:

Owning products that have a superior design makes me feel good about myself.

I enjoy seeing displays of products that have superior designs.

A product's design is a source of pleasure to me.

Beautiful product designs make our world a better place to live

Acumen:

Being able to see subtle differences in product designs is one skill that I have developed over time.

I see things in a product's design that other people tend to pass over.

I have the ability to imagine how a product will fit in with designs of other things I already own.

I have a pretty good idea of what makes one product look better than its competitors.

Response:

Sometimes the way a product looks seems to reach out and grab me.

If a product's design really "speaks" to me, I feel that I must buy it.

When I see a product that has a really great design, I feel a strong urge to buy it.

Table 1

Regression analyses for strong taste (study 2)

<i>Variable</i>	β	t	p
Regression 1			
Dependent variable: Strong Taste			
Shape X CVPA	.206	2.558	.012
Regression 2			
Dependent variable: Toughness			
Shape X CVPA	.362	4.725	.000
Regression 3			
Dependent variable: Strong Taste			
Toughness	.256	3.054	.003
Shape X CVPA	.113	1.345	.181

Table 2

Regression analyses for price (study 2)

<i>Variable</i>	β	t	p
Regression 1			
Dependent variable: Price			
Shape	.184	2.283	.024
Regression 2			
Dependent variable: Toughness			
Shape	.259	3.271	.001
Regression 3			
Dependent variable: Strong Taste			
Toughness	.184	2.241	.027
Shape	.136	1.654	.100

Figures

Figure 1. JPEG image of the three different yoghurt cup pairs.

1)



2)



3)



Figure 2. JPEG image of the two different color hues and two different

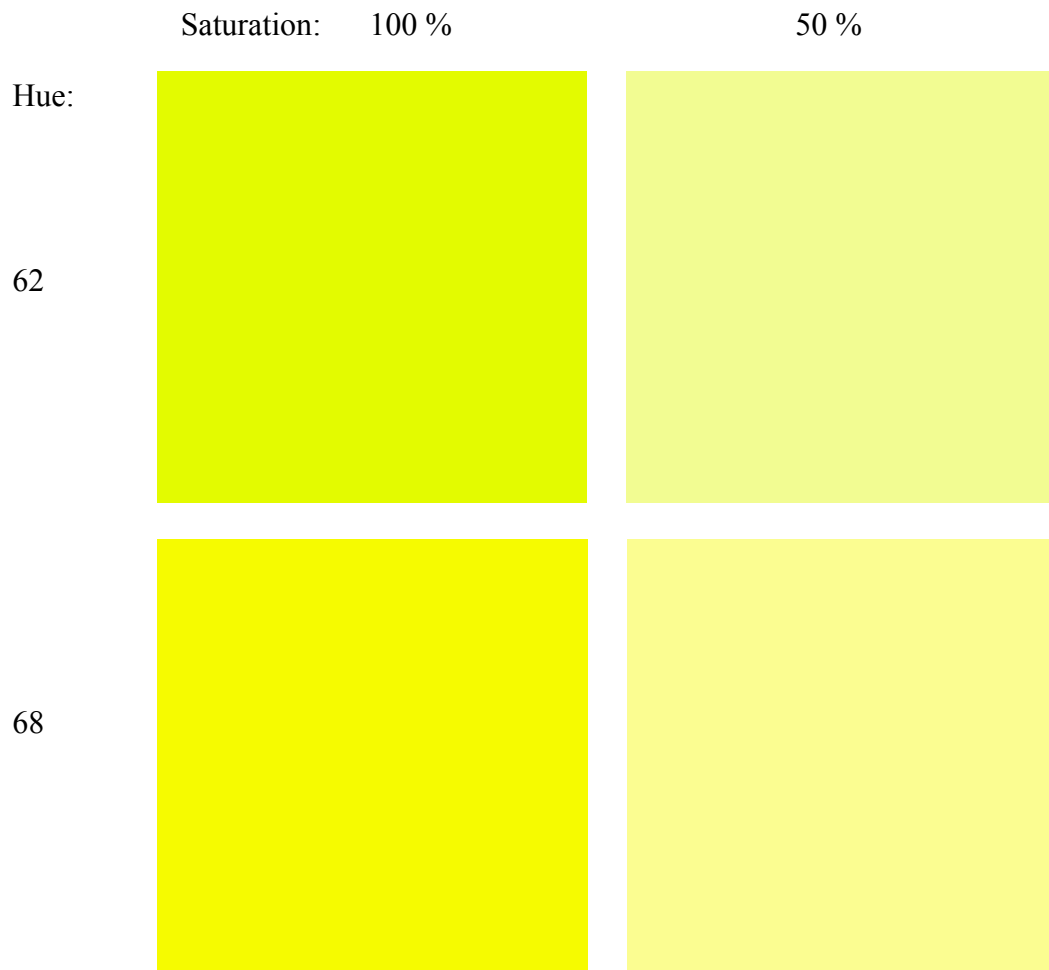


Figure 5. JPEG image of the four different yoghurt cups.

