# In the eye of the consumer: The influence of package shape and package color on perceived product healthfulness


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## Abstract

In order to maintain health, people's food choices and eating behavior are very important. Changing diet is one of the key methods advocated to improve health (Barreiro-Hurle, Gracia & De Magistris, 2010). However communicating healthfulness of food through labelling is not working optimally, therefore research is needed to examine other methods to communicate health in an easy way (Van Kreijl & Knaap, 2004). This study investigated to what extent product packaging, in particular package color and package shape, contributes to the healthfulness of a product. The study examined both a healthy and less healthy product: yoghurt (healthy) and biscuits (unhealthy), therefore the study consisted of a 2 ('healthy' color vs. 'less healthy' color) * 2 ('healthy' shape vs. 'less healthy' shape) * 2 ('healthy' product vs. 'less healthy' product). Study 1 was conducted to determine which colors and which shapes are perceived as healthy and less healthy, for both products. An online survey was distributed to 20 respondents, which had to rate 12 colors and 8 shapes on their association with healthiness, for both products. These colors and shapes were used in Study 2, to manipulate the product packages of yoghurt and biscuits. Data was collected using an online survey, in this survey respondents were asked to judge one of the manipulated versions of the healthy food product and one of the manipulated versions of the unhealthy food product. The online survey measured the Perceived Healthfulness, Credibility, Product Attitude, Intention to Buy, Price Expectation and respondents' General Health Interest. Results show that only package color contributed to the healthfulness of a product, this also only holds true for the healthy product. However both package color and package shape did affect the overall product evaluation, but only in the case of the healthy product yoghurt. Whereas a 'healthy' manipulation of package color and package shape results in a positive product evaluation, in comparison with 'unhealthy' manipulations of the package color and package shape. Manipulations of product package concerning the unhealthy food product did not lead to similar results. These results are interesting for marketers, concerning the fact that packages can be used to communicate healthfulness, however they need to keep in mind that this probably only works for products that are already perceived as healthy.


**Keywords:** *symbolic meaning; perceived healthfulness; product packaging; package color; package shape; consumer expectations.*

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# 1. Introduction

In order to maintain health, people's food choices and eating behavior are very important. Changing diets is one of the key methods advocated to improve health (Barreiro-Hurle, Gracia & De Magistris, 2010). A significant portion of all preventable diseases are caused by a combination of poor diet and low levels of physical activity (WHO, 2002). Moreover, incremental improvement in life span and quality is more likely to result from changes in lifestyle and eating habits than from improved medical care (Wansink, 2006). 'Healthy' foods may also be consumed for non-health reasons such as concern about appearance (Cockerham, Kunz & Lueschen, 1988). Weight control is a major determinant of food choice for individuals concerned about their body weight. Food producers try to respond to consumers' interest in health by conveying messages about product specific benefits that potentially add value to products. Health claims however may influence other product related expectations (Lähteenmäki et al., 2010), for example health labels such as 'reduced in salt' or the 'healthy choices' may have an adverse effect on consumers' taste expectation and on the actual perceived taste of products (Liem, Toraman-Aydin & Zandstra, 2012). Taste is a top priority in consumers' food choices (Lappalainen et al., 1997; Steptoe et al., 1995) and consumers are not willing to compromise on taste for health (Verbeke, 2005). This connection between health labels and negative taste expectation, may be a reason for consumers not to buy products with health claims. Another major problem concerning labelling, is that initial findings on the use of nutritional labelling emphasizes that consumers did not understand the labels and hardly ever really used it when purchasing food products (Jacoby et al., 1977). According to Van Kreijl and Knaap (2004) the forms of labelling are not working optimally. Research is needed how and if products can communicate nutrient information and healthiness on an inventive and innovative way, that makes it easier for consumers to quickly obtain whether a product is healthy (Van Kreijl & Knaap, 2004).

When consumers are shopping for everyday foods or beverages such wine, lemon yoghurt or a low-calorie soda, they often base their purchase decisions on the product's visual appearance (Bloch, 1995; Crilly, Moultrie & Clarkson, 2004; Fenko, Schifferstein & Hekkert, 2010). It is also estimated that 73 percent of purchase decisions are made at point of sale. In scanning packs at point of sale, perception is rapid, and quick recognition is important for inclusion in the decision process (Rettie & Brewer, 2000). The package of a product is a suitable attribute to attract attention, but also to communicate with consumers (Garber, 1995; Moers, 2007). According to Becker, Van Rompay, Schifferstein and Galetzka (2010) package

appearance may be specifically designed in order to portray particular symbolic meanings that modulate subsequent taste evaluations and impact overall product evaluations. Research on consumer cue-utilization (Cohen, 1972; Cox, 1967; Lutz, 1976; Olson, 1978; Olson, 1980) also confirms that a variety of accessed product attributes and product related attributes often serve as cues to infer on other non-accessed product attribute levels. Consumers use visual information that was not directly related to the product, to make inference about the product's characteristics (Mitchell & Olson, 1981). Recent studies for instance show that the package shape and material of the package have an effect on impression of taste (Becker, Van Rompay, Schifferstein, & Galetzka, 2010; Schifferstein, 2009). This is interesting because package shape or package material is not directly related to the taste.

There are several ways to use product packaging or product features to communicate certain symbolic meanings or product characteristics. For instance package shape, package size, images on the package, package color or the font on the package can be manipulated in a certain way that contributes to the communication of symbolic meanings. Past research show that consumers mainly use package shape and package color, to match the design of a product or package with the characteristics of the product itself (Smets & Overbeeke, 1995). The effectiveness of these manipulations will probably depend on product type. It probably will be harder to communicate healthfulness to consumers with a product that is perceived as unhealthy, than with a product that is perceived as healthy. This study will examine to which extent product features, in particular package shape and package color, affect the perceived healthfulness of a product, for both a healthy and unhealthy product.

# 2. Theoretical Framework

## 2.1 Health and Food

Food plays a major role in human health (Van Kreijl & Knaap, 2004). Approximately 10 percent of the total annual deaths in the Netherlands, can be attributed to an unhealthy dietary composition. Obesity is responsible for 5 percent of the fatalities (Van Kreijl & Knaap, 2004). An unhealthy diet is responsible for a significant portion of the morbidity and mortality from cardiovascular disease, diabetes and cancer in the Netherlands. More and more people in the Netherlands are overweight, due to eating too much and eating too much fat, in combination with too little exercise. Changing diet is one of the key methods advocated to improve health (Barreiro-Hurle, Gracia & De Magistris, 2010). It doesn't only have a positive effect on obesity, but also gains overall health. Therefore interest in healthy food increased in recent years (Proper, Bakker, Van Overbeek, Verheijden & Van Mechelen, 2006).

Several studies have shown that foods can be (and often are) categorized as healthy or unhealthy (Carels, Harper & Konrad, 2006; Carels, Konrad & Harper, 2007; Oakes & Slotterback, 2001). In general health food is referred to as 'natural food that is thought to have health-giving qualities'. Van Kreijl and Knaap (2004) indicate that a diet is healthy when the composition and the quantity of all nutrients and other food components are optimal for a person's health. In order for food to be healthy it also needs to be safe. Food is safe when it doesn't contain micro-organisms, chemicals or other substances in amounts that are harmful to humans. Interest in organic food has therefore grown remarkably, because consumers are aware of its central feature, namely that it's chemical-free (Hughner, McDonagh, Prothero, Shultz and Stanton, 2007). Health was the strongest predictor of attitudes towards organic food, purchase intention and purchase frequency of organic food (Magnusson, Arvola, Hursti, Aberg & Sjoden, 2003). Chapman and MacLean studied the meanings of food in adolescent women's culture and found that 'healthy food' was also referred to as 'nutritious food' and 'good food'. 'Unhealthy food' was referred to as 'junk food' or 'fattening food'. Foods were also divided into two groups, with 'good', 'healthy' and 'nutritious' foods being juxtaposed with 'bad', 'junky', 'not good', 'not healthy' and 'not-nutritious' foods. Appendix A shows which characteristics the participants appointed to 'junk food' and 'healthy food'. In general foods that are low in fat and sugar are considered as healthy, such as fruits, vegetables, yoghurt etc. Foods that are high in fat and sugar are generally considered as unhealthy, such as chocolate, chips, cookies etc. Junk food is associated with terms as 'fattening' and 'causes pimples', and healthy food is associated with 'helps maintain weight' and 'helps maintain

clear skin' (Chapman & MacLean, 1993). These associations show that eating healthy is not only associated with avoiding illnesses, but also associated with a good appearance. Cultural discourses generally deem fat unhealthy and unattractive, and thinness signifies health and attractiveness (Kwan, 2009; Katz, Gorden-Larsen, Bentley, Kelsey, Shields & Akkerman, 2004). Participants conflate beauty and health in three ways: indicating that depictions of the beauty ideal are depictions of the health ideal; using beauty indicators as health indicators; and employing beauty as motivator for health goals. For example participants measured their level of healthiness and whether they were reaching their health goals by monitoring their weight on a scale and assessing how they appeared in the mirror (Kwan, 2009). Participants' adoption of aesthetic measures (appearance and weight) to gauge health does not mean that they entirely abandoned biomedical measures (blood pressure, formal physician measures etc.), these measures are often acknowledged alongside each other. There is a gender difference in ideal body image, whereas women ought to be slender and taut and men ought to be lean and muscular (Bordo, 2003; Pope, Phillips & Olivardia, 2000). According to Wright, O'Flynn and MacDonald (2006) young men and women also have different associations with health and fitness. Men value strength, skill and power concerning fitness, whereas women link fitness and healthy eating with maintaining a 'healthy' weight and/ or slim body shape. Previous research has suggested that individual differences also could have an impact on food-related beliefs and accordingly may influence caloric estimation (Carels, Konrad & Harper, 2007). For example even though both dieters and non-dieters were inaccurate in estimating the caloric content of foods, current dieters were less inaccurate showing a smaller discrepancy between their caloric estimations of foods and the actual caloric content of these foods, than did non-dieters (Carels, Konrad & Harper, 2007).

One way to measure the importance of health and taste characteristics of foods in relation to food choice of consumers and thus whether consumers are currently dieting, is through a questionnaire developed by Roininen, Lätheenmäki, and Tuorila (1999). Especially one health scale related to an interest in eating healthily is suited to examine consumers' interest in health, the General Health Interest-scale (GHI-scale) consisted out of eight statements. The scale contained items on low-fat foods and the association between diet and cholesterol. These items have been found to be relevant for healthy eating in Finland. The study shows that the scale was very useful to examine whether there are differences between respondents with a low interest in health and a high interest in health for perceived healthfulness. Respondents with a positive attitude towards GHI (high GHI) rated non-fat milk and reduced-

fat cheese as healthier and full-fat milk, the full-fat chocolate bar, full-fat cheese and the soft drink as less healthy than respondents with negative attitudes towards General Health Interest.

In short, a healthy diet can contribute to health, but also to the ideal body weight. Therefore healthy food needs to be promoted, but there might be differences in effectiveness of promotions between individuals and between product types.

## 2.2 Grounded Cognition and Sensory Marketing

Standard theories of cognition believe thought to be a-modal, such that cognition happens independent of perception. Grounded cognition however suggests that bodily states, situated actions, and mental simulations are used to generate our cognitive activity (Barselou, 2008). Grounded cognition based on bodily states refers to cognition that is affected by an unmoving physical condition that one is in (Krishna, 2012). For instance, a study done by Strack, Martin and Stepper (1988) where participants smile muscles' were compromised by holding a pen tightly with the lips without touching the teeth, or holding the pen with the teeth. Results show that subjects' facial activity affected their funniness ratings of cartoons. Grounded cognition based on situated action refers to cognition impacted by movement that is not locomotive in nature, that is, the whole body is not transported: one's body mass remains in the same coordinates but some parts of the body are moved. Examples arising from sensory marketing research, indicating that changes in a person's environment affects their judgments, are for instance research done by Soriano and Valenzuela (2008). Soriano and Valenzuela (2008) demonstrated through linguistic analysis that social suspicion is metaphorically associated with the sensory experience of smell, in English: a fishy smell. The 'fishy effect' was also examined in a study using a one-shot public goods game (Ledyard, 1995), where people should be less likely to invest in a pool of shared resources if they suspect their partners might not carry their share of responsibility. Smelling something fishy rather than farty or odorless led participants to contribute less money to the public good. Highlighting that incidental exposure to a subtle smell with metaphorical meaning is sufficient to elicit suspicion about the motives and trustworthiness of one's partners, with adverse effects on cooperative behavior. Another example is demonstrated by Williams and Bargh (2008) where respondents holding a warm rather than cold object (cup of warm vs. cold iced coffee) perceive another's personality as warmer and to act in socially warm and caring ways (choosing a reward for a friend rather than for oneself). Highlighting that the impression that someone has a warm personality can be induced by incidental experiences of physical warmth. People who are 'warm and caring' are those who we can trust. Consistent with this

metaphorical association between physical warmth and social warmth, Kang, Williams, Clark, Gray, and Bargh (2010) found that incidental physical warmth can also increase trust in cooperation games. Whereas respondents who had held a warm pack rather than cold pack invested more money in a trust game.

Barselou (2008) stated that many researchers use the term 'embodied cognition' to refer to 'grounded cognition'. The term embodied denotes that bodily states need to be involved for cognition which is not necessarily true since even mental imagery or mental simulation may be enough to drive cognition. Several neuroimaging studies provide evidence for mental simulations whereby conceptual processing of sensory perceptions leads to neural activation of corresponding regions of the brain. For instance Elder and Krishna (2012) show that alternate visual depictions of a product (in an advertisement) can result in less or more mental simulation of using the product and consequently affect purchase intention. Elder and Krishna (2012) shows that mugs displayed with the handle on the right, in comparison with a handle on the left, results in greater mental simulation and higher purchase intention for right handed people.

In short, grounded cognition implies that perceptions affect cognition. Meaning that the way people perceive their environment influences the way they think, and influences the way they create their knowledge. This theory functions as a fundamental principle within sensory marketing. Sensory marketing refers to marketing that engages the consumers' senses and affect their behaviors or marketing that engages the consumers' senses and affect their perception, judgment and behavior (Krishna, 2012). ). This trend within marketing shows that sensation affects perception, which then affects cognition.

Sensory marketing can be used to create subconscious triggers that define consumer perceptions of abstract notions of the product: the brand's personality. Given the scope of advertisements (ads) that consumers see every day for thousands of products that are available in the marketplace, it seems that unconscious triggers, like those appealing to basic senses, may be a more efficient way to appeal to consumers (Krishna, 2012). These sensory triggers may result in consumers' self-generation of (desirable) brand attitudes, rather than those verbally provided by the advertiser. Such deductive engagement may be more persuasive versus deliberate statements (Sengupta & Gorn, 2002). Human senses being primal, people react immediately and subconsciously to hem, unlike to a brand name or an attribute, both which are learned (Krishna, 2010, p. 4). Sensory marketing therefore may be a suitable method to communicate the healthiness of a product towards consumers. In this study it is

examined if package color and package shape can be used to communicate healthfulness, but also to affect overall product attitude. Figure 1 shows the model tested in this research.

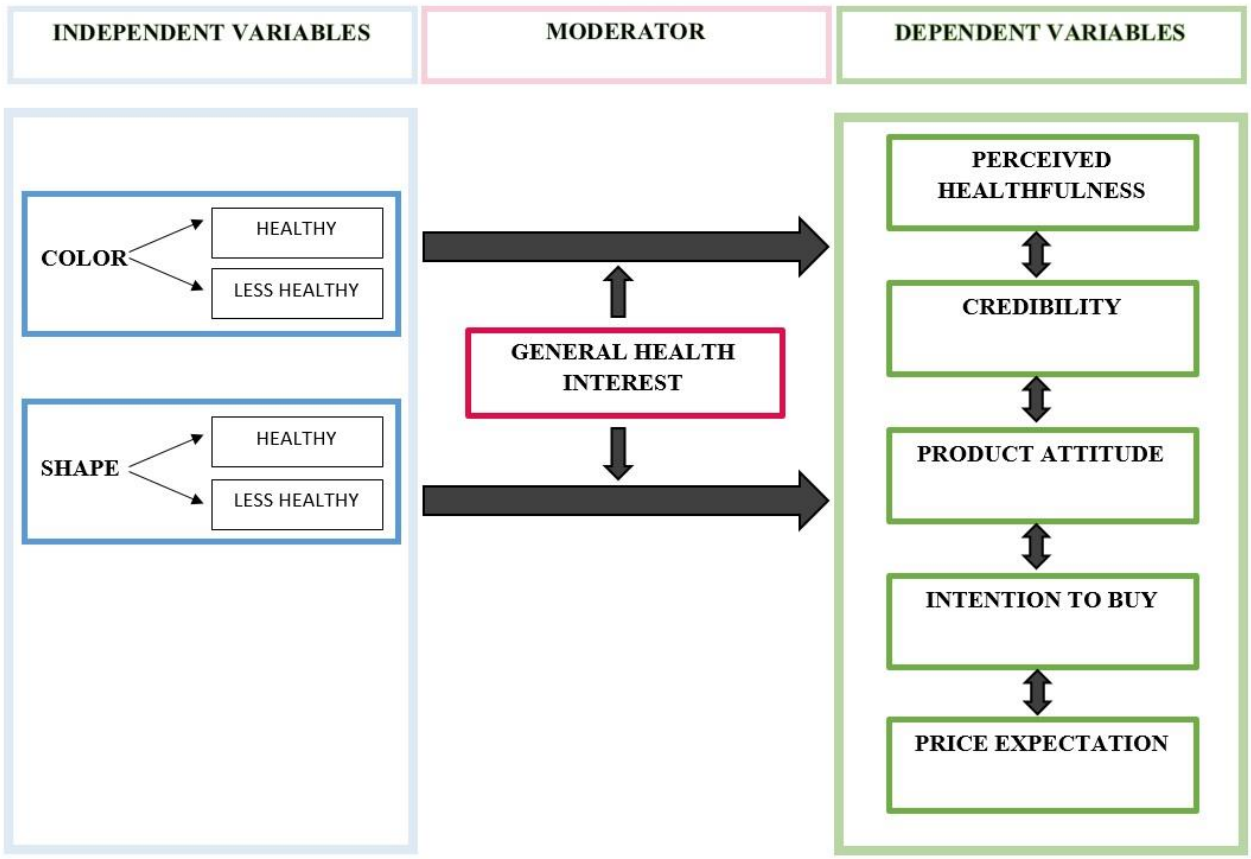



*Figure 1: General model tested in this research.*

## 2.3 Symbolic meaning in product packaging

According to Garber (1995) product packaging can lead to a greater likelihood of attention and the appropriateness of a visually novel brand will indicate a greater likelihood of consideration. For example when people are shopping for everyday foods or beverages such as wine, lemon yoghurt or a low-calorie soda, consumers often base their purchase decisions on the product's visual appearance (Bloch, 1995; Crilly, Moultrie & Clarkson, 2004; Fenko, Schifferstein & Hekkert, 2010). It is estimated that 73 percent of purchase decisions are made at point of sale. In scanning packs at point of sale, perception is rapid, and quick recognition is important for inclusion in the decision process (Rettie & Brewer, 2000). According to Murray and Delahunty (2000) a products' packaging attributes can also predispose the consumers to purchase, whilst products' sensory attributes confirm liking and may determine repeat purchases. Therefore a product’s visual appearance (product package) is an appropriate method to use in order to attract attention from consumers and to communicate with consumers.

The product package is communicating a symbolic meaning through the product features, like shape, logo, font, color and material. The underlying idea is that consumers use the symbolic information of a package to create certain expectations about the product (Bloch, 1995; Govers & Schoormans, 2005; Doyle & Bottomley, 2006; Van Rompay, Hekkert, Saakes, & Russo, 2005). Product packaging may, in addition to shaping expectations, even modulate subsequent product experiences (Cardello, 1994; Schifferstein, Kole & Mojet, 1999). The symbolic and aesthetic role that a product package fulfills also appears to have the most significant effect concerning product preference (Creusen & Schoormans, 2005).

The underlying principle is that consumers create an expectation of one product impression (for instance perceived taste) through the impression of another resource (such as seeing the product package) (Pinson, 1986; Krishna, 2006). This will especially occur when consumers have no previous experience with the product, or when it comes to everyday products (groceries).When buying everyday products consumers often have no time or motivation to gather information and to process product information. People therefore make intuitive connections between sensory perceptions. Schifferstein and Spence (2008) refer to this as the 'cross-model correspondence'.

This study examines whether the symbolic meaning of health (healthiness of a product) can be communicated through packages of foods and what consequences this has for consumer perceptions. A food package is the container that holds, protects, preserves and identifies the product, and which also facilitates its handling, storage and commercialization (Rodríguez Tarango, 2003). The information above leads to the following hypothesis:

*H1: The use of a 'healthy' package design will lead respondents to having a relatively healthier product perception, than with the use of a 'less healthy' package design.*

Concerning the product package, consumers mainly use package shape and package color to match the design of a product or package, with the characteristics of the product itself (Smets & Overbeeke, 1995). Also according to several other authors, shape and color are important features during package design (Ampuero & Villa, 2006; Hutchings, 2003; Marshall, Sutart & Bell, 2006). This study will therefore focus on package shape and package color, to examine whether these features can communicate the symbolic meaning of health. Within this research a 'healthy' package design refers to the package that contains a color that is associated with healthiness, and a shape that is associated with healthiness. A 'less healthy' package design

refers to the package that contains a color that is associated with being less healthy (unhealthy), and a shape that also is associated with being less healthy.

## 2.4 Product Shape

Research in the trade press suggests that a package's shape is a critical way for a brand to differentiate itself, because package design can affect consumers' purchase decisions (Sherwood, 1999). This has led many firms to focus on product and package shape, also small changes in packages shape can have a large influence on sales and profit (Prince, 1994). It is expected that using a shape that is perceived as healthy will lead respondents to rate the product as relatively more healthy, than with using a shape that is perceived as unhealthy. These associations with shapes lead to the following hypothesis:

*H2: Using a package shape that is perceived as healthy, will lead respondents to have a relatively healthier product perception, than using package shape that is perceived as less healthy.*

Arnheim (1974) found that in general angular shapes present a confrontation between stimulus and surroundings, and are therefore readily perceived as expressive of confrontation or conflict. Angular shapes tend to induce associations with traits that express energy, toughness, and strength, whereas rounded shapes tend to induce perceptions of approachability, friendliness, and harmony (Berlyne, 1976). Also angular shapes are associated with masculinity and round shapes with femininity (Schmitt & Simonson, 1997). Rounded logos are also readily perceived as harmonious and gentle, in contrast to angular logos that are associated with conflict and aggressiveness (Zhang, Feick, & Price, 2006). Round shapes therefore symbolize a harmony that refers to nature. These associations with shapes lead to the following hypothesis:

*H3: A product package with round shapes will be perceived as more healthy, than a product package with angular shapes.*

Some preferences for shapes appear to be innate or, at least, acquired early in life (Lewalski, 1988). According to Gestalt theorists, humans delight in order. People inherently prefer objects with symmetry, unity, and harmony among elements (Papanek, 1984). One Gestalt law posits that people hold preference for rhythmic forms that involve repetition of similar

design elements. Although there may be an innate preference for harmony among elements, Berlyne (1974a, 1974b) posits that too much unity becomes boring and generally unwelcome. Novelty, complexity, and variety produce arousal.

According to Westerman et al. (2013) people have a mean preference for rounded designs. The study shows that rounded designs result in greater purchase likelihood, and that rounded designs are more appealing, more pleasing and less annoying. A teleogical perspective explains that there are innate, hardwired preferences for forms that follow natural, organic principles (Mayall, 1968; Papanek, 1984). Manmade objects that resemble organic forms tend to be preferred (Mayall, 1968). For example, supports with wide bottoms are thought to be visually attractive because they mimic a person standing with legs apart. Designs that mimic the human body seem to be preferred, therefore advertisements introducing the 1995 Chevrolet Monte Carlo pair abstract photos of the car with similar forms of the human body. Design can thus mimic the human body. According to Katz, Gorden-Larsen, Bentley, Kelsey, Shields & Ammerman (2004) people associate a heavy, fat body with an unhealthy body and a thin, slim body with a healthy body. It is expected that package designs also can mimic human bodies that are associated with a healthy body and with an unhealthy body. Package designs that have a bigger height in comparison with their width and packages with an hourglass design are expected to be associated with a healthy body. Whereas it is expected that packages that have a bigger width in comparison with their height are associated with an unhealthy body. These expectations lead to the following hypothesis:

*H4: Product packages that mimic a healthy body will be perceived as more healthy, than product packages that mimic an unhealthy body.*

Teological scholars also argue that proportion is particularly significant among innate design preferences (Doczi, 1981). Raghubir and Greenleaf (2006) found that the ratio of the sides of rectangular products and packages affects consumer purchase intentions and preferences and that these ratios are related to actual marketplace demand for frequently purchased consumer goods. Rectangular ratio can also affect consumer product perceptions, and the impact of ratio on purchase intentions and demand can depend on the relative seriousness of the context in which a product is used.

According to Holmberg (1983) product and package shape also has an influence on the perceived volume and heaviness of objects. Consumers use the height of the container or its elongation to simplify volume judgments (Raghubir & Krishna, 1999). A container's height

predicted volume judgments better than or about as well as modals that included width of depth measurements. When containers are tall of elongated, they are perceived as having more of a product than containers that are shorter of squat in shape (Raghubir & Krishna, 1999). According to Folkes and Matta (2004) consumers overestimate the volume of an unusually shaped container, when compared to a more usual shape (when both are presented simultaneously). These results show that volume judgments are contaminated by the attention that an unusual container attracts (Folkes & Matta, 2004).

The findings above indicate that product shape and shape angularity can affect potency perceptions. Nonetheless, shape also influences experiences in non-visual sensory channels (Becker, Van Rompay, Schifferstein & Galetzka, 2011). According to Becker, Van Rompay, Schifferstein and Galetzka (2011) angular shapes may inspire intense taste sensations. Similarly, Ngo, Piqueras-Fiszman, and Spence (2012) reported that angular shapes (used in the context of packaging label designs) tended to be associated with sparkling water, whereas rounded shapes were associated with still water.

## 2.5 Package Color

Although many people are not aware of the effect a color or a color combination has on them, in marketing it is well documented that color can be effectively used to suggest certain product characteristics (Birren, 1956; Cheskin, 1954; Danger, 1968; Favre, 1969; Margulies, 1970). Colors have a powerful effect on humans (Elliot, Maier, Moller, Friedman, & Meinhardt, 2007; Spence, 2010). Color is one of the most potent features in the design of product packaging in the food industry (Deliza, Macfie, & Hedderley, 2003; Hine, 1995). According to Charters, Lockshin and Unwin (1999) shoppers often do not read the information that is presented on packages, they mainly recognize what they want or need in order to make a quick purchase decision. Since color is perhaps the feature of a product package that triggers the fastest response (Swientek, 2001), it is essential to consider the associations and expectations that consumers have with certain colors, in the design process, in order to ensure effectiveness and the successful communication of brand and sensory qualities. It is expected that the use of a healthy package color will lead to a more healthy product perception, in comparison with the use of an unhealthy package color. These associations with colors lead to the following hypothesis:

*H5: Using a color that is perceived as healthy on a product package, will lead to a relatively healthier product perception, compared to using a color that is perceived as less healthy.*

Responses to colors can be explained by a combination of rather physiological factors and of certain traditional uses. Also according to Hine (1995) consumers perceive package color at three levels: the associational, the physiological, and the cultural level. The associational level refers to those packaging color expectations that have become associated with a brand image or even a product category, through consumers having interacted with it over some extended period of time (Cheskin & Ward, 1948; Garber, Hyatt, & Boya, 2008; Spence, 2010). On a physiological level, it can for instance be said that red is known to have arousing effects on behavior, in comparison to green which is said to be 'restful' (Bellizi, Crowley, & Hasty, 1983). The meaning of these findings is clear: the color of a product or of its package may set up expectations about the characteristics of this product (Pinson, 1986). These associations are mostly not general, rather the effect of color appears to be dependent upon the nature of the product, the particular consumer, and the consumer (Pinson, 1986). For cultural associations there are already well-established conventions about what colors are more appropriate to certain product categories, and in certain cultures/ geographical regions (Sacharow, 1970; Spence, 2010; Wheatley, 1973).

A previous study concerning food and color, indicated that food color affects the consumer's ability to correctly identify flavor, to form distinct flavor profiles and preferences, and dominates other flavor information sources, including labeling and taste (Garber, Hyatt, & Starr, 2000). These results show that food color is inextricably linked to expected flavor in the minds of consumers, making the selection of uncharacteristic food color problematical. A good example is provided by crisps (or potato chips). Each flavor variety is typically represented by an arbitrary color: red stands for natural, blue for paprika, yellow for cheese/onion etc. The established convention (Spence, 2011) linking the color to the flavor can help facilitate a shopper's ability to rapidly and effortlessly identify the particular flavor they want. By getting the color 'right', companies should hopefully be able to deliver products that are immediately recognized, that match the expectations of the consumers (those loyal and undecided), and increase not only their satisfaction, but also their sales (Piqueras-Fiszman & Spence, 2011).

With beverages Deliza and MacFie (2001) found that packaging color is an important determinant of sweetness ratings: orange, compared to white, packaging color led consumers to expect a higher level of juice sweetness, and consequently affected taste evaluations. Hence, consumers adjusted their taste ratings in line with the expectations triggered by packaging color. According to Schifferstein and Tanudjaja (2004) highly saturated colors boost perceptions of stimulus intensity, therefore research addressing the relationship between color saturation and potency perception is of particular relevance.

Schuldt (2012) explored whether one under researched aspect of nutrition labels, namely their color, might influence perceptions of a product's healthfulness. Results show that participants perceived a candy bar as healthier when it bore a green rather than a red calorie label, despite the fact that the labels conveyed the same calorie content. It also investigated the perceived healthfulness of a candy bar bearing a green versus white calorie label and assessed individual differences in the importance of healthy eating. Overall, results suggest that green labels increase perceived healthfulness, especially among consumers who place high importance on healthy eating. This study thus shows that when concerning nutrition labels, the color green is being perceived as more healthy than the color red or white, even though white is being associated with 'purity' in several cultures (Aslam, 2006). Also according to Aslam (2006) red is associated with fear and anger and black is associated also with fear and anger, but also with grief. This information leads to the following hypotheses*:*

*H6: A product with a green package color will be perceived as relatively more healthy, than a product with a non-green package color.*

*H7: A product with a red or black package color will be perceived as relatively less healthy, than products with packages that are not red or black.*

### 2.6 Congruence of stimuli

Van Rompay, Pruyn and Tieke (2009) demonstrated positive effects of various types of stimulus congruence on consumer response. One way to understand stimulus-congruence effects, in relation to consumer products, is through processing fluency: stimuli that can be easily processed are generally evaluated in positive terms and inspire favorable attitudes (Lee & Labroo, 2004; Reber, Schwarz, & Winkielman, 2004). Fluent processing indicates that things in the environment pose no danger or cognitive challenges. Van Rompay and Pruyn (2011) argue that stimulus congruence may also facilitate processing and contribute to positive evaluations of products and their corresponding brands. When confronted with products, consumers face the task of integrating meanings connoted across product elements

into an overall impression. Products containing elements (stimuli) that are high in congruence are expected to facilitate impression formation, as opposed to products low in congruence (Hekkert, 2006), explaining why congruent stimuli are preferred compared to incongruent stimuli. Van Rompay and Pruyn (2011) investigated whether impression formation was effected by congruence effects among symbolic meanings portrayed by shape and typeface design, by testing responses to a fictitious brand of bottled water. Results were in line with previous research showing positive effects of shape-typeface congruence on aesthetic evaluations and value perceptions: Congruent variants, as opposed to incongruent variants, were considered more attractive, and in turn elicited higher price expectations. In other words, when meanings connoted by product features, in this case package shape and package color, match rather than mismatch, overall product evaluations are expected to be more positive. This leads to the following hypothesis:

*H8: Shape-color congruency will lead to a more positive overall product attitude and a more healthy product perception compared to shape-color incongruency .*

Similar to the processing of symbolic qualities portrayed by strictly visual product features, impression formation should also benefit from congruence among visual and textual elements (Van Rompay, Pruyn, & Tieke, 2009). Van Rompay, Pruyn and Tieke (2009) indicate that stimulus congruence, among visual and textual elements in visual communications, facilitate impression formation, thereby positively affecting consumer responses. As Van Rompay, Pruyn and Tieke (2009) indicate not only visual elements should be congruent, but there also should be congruence among visual elements, in this case package shape and package color, and textual elements, the display of product type. This leads to the following expectation:

*H9: Stimuli congruency (a healthy manipulated package in combination with a healthy product) will lead to a more positive overall product attitude compared to stimuli incongruency (an unhealthy manipulated package in combination with a healthy product).*

## 2.7 Model of Dependent and Independent Variables

The literature above indicates that there are several factors that can influence consumers' perceptions of products. This study examines the influence of three factors, the independent variables on consumer perception: Color, Shape and General Health Interest (see Figure 2). General Health Interest is used to measure whether participant's difference in health interest might be of influence concerning the consumers' perception. This is important to examine, because the product evaluation and product perception might not only be assigned to the

package color and package shape. Consumer perception consists of five dependent variables in this research: Perceived Healthfulness, Credibility, Attitude, Intention to Buy, and Price Expectation (see Figure 2). This study will examine the influence of the independent variables on consumer perception on two products: a healthy product and an unhealthy product. General Health Interest is used as a moderator, to examine whether consumers' interest in health can affect product evaluation.

It is also expected that the independent variables also affect each other. Perceived Healthfulness is expected to positively affect the other independent variables, especially

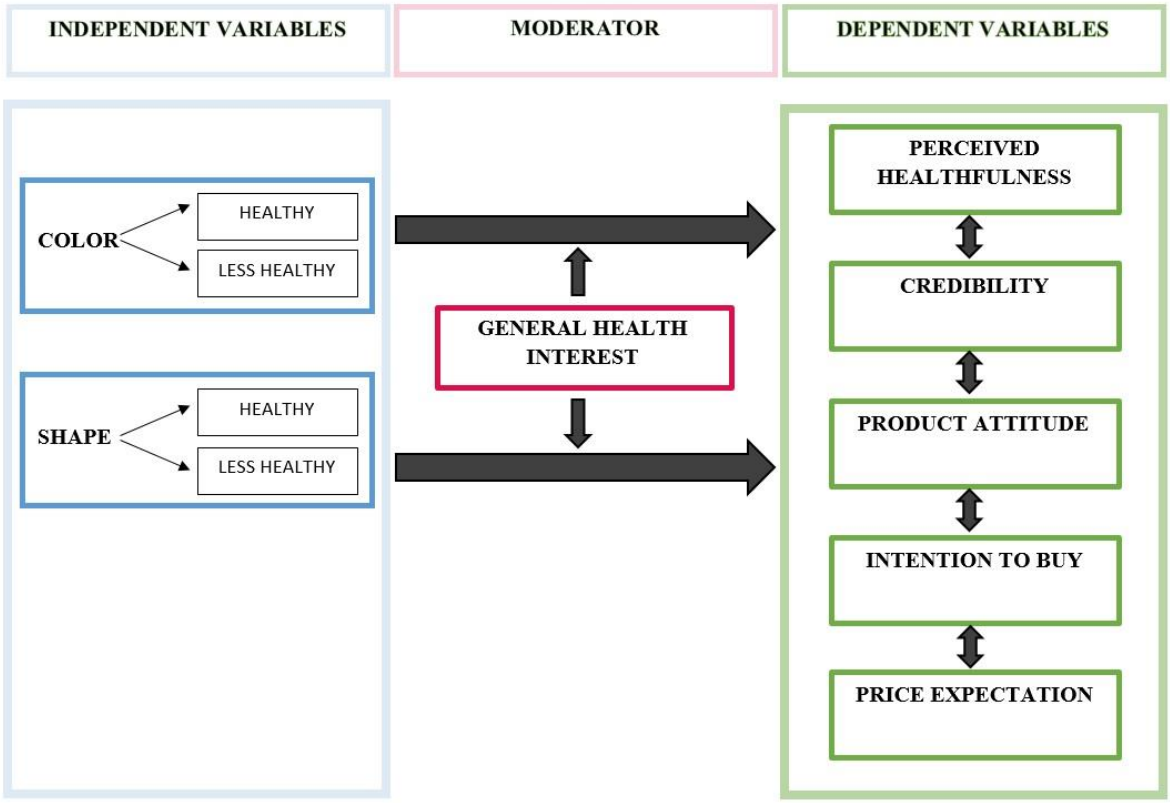



*Figure 2: General model tested in this research.*

when it concerns the healthy product. Credibility is also expected to positively affect the other independent variables, whereas a high credibility will lead to a higher perceived healthfulness, a positive product attitude and a higher intention to buy, in comparison with low credibility.

## 3. Study 1

Study 1 is conducted, in order to construct an appropriate measurement tool for Study 2 (the main study). Study 1 examined which colors and shapes are perceived as relatively healthy and relatively less healthy. This is performed for two food products: yoghurt as a relatively

healthy product, and biscuits as the relatively less healthy product, because these products are considered to be healthy and less healthy (Chapman & MacLean, 1993).

### 3.1 Participants

Respondents are recruited in the researcher's own environment through an online survey. In total 9 males (45%) and 11 females (55%) participated in the pre-study. The participants are between 17 and 55 years old (*M*= 25.60 years, *SD*=9.62). 4 respondents followed a Primary Education study (VWO), 2 respondents followed a Secondary Vocational Education study (MBO), 5 respondents followed a Higher Professional Education study (HBO), and 9 respondents followed a University Education study (WO).

### 3.2 Stimuli

The study examined 8 shapes and 12 colors, for both the healthy and unhealthy product. Therefore 16 shapes and 24 colors are examined in total. Different colors are used for the healthy product (yoghurt) and the less healthy product (biscuits), concerning the fact that in real life also different colors are used for these products. Research is done on which colors are commonly used on the packages of yoghurt and biscuits, and thus best suited to use on these product packages, using information drawn of the internet (Google images) and by visiting several supermarkets. For yoghurt the colors blue, green, red and pink are used in both a light and dark tone. The colors yellow, orange, black and white are also used, but just in one tone. All these colors are displayed on the same package (see Figure 3) , to exclude the influence of other variables such as shape (bias). For biscuits the colors blue, brown, green, purple and red are used in both a light and dark tone. Beside these colors also black and yellow (wheat) are used. These colors are also displayed on the same package (see Figure 3). See appendix B for all the different colors used in the pre-study.

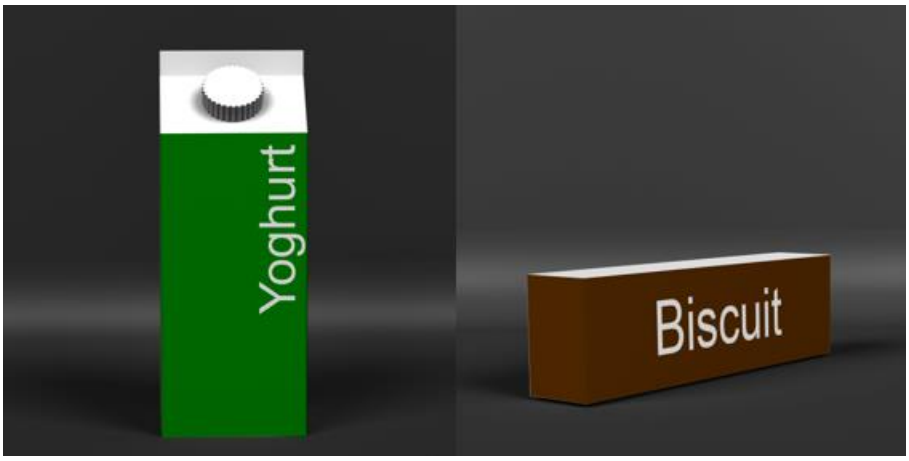



*Figure 3: Packages used for color display in the pre-study.*

Concerning the package shapes there are 8 variants for the yoghurt and 8 variants for the biscuits. For the development of these shapes research is also done using the internet (Google images) and by visiting several supermarkets, to examine which shapes are commonly used for these products. For yoghurt there are two package shapes, a round package shape and an angular package shape, both in the shape of a bottle, that are displayed in two versions: a small, thin version and a big, thick version (see Figure 4).These shapes are used to mimic a healthy body (small, thin version) and an unhealthy body (big, thick version).

*Figure 4: Example of the round yoghurt package displayed in a big, thick version (left) and in a small, thin version (right).*

Beside these shapes there are two more bottle-shaped packages, one round and one angular, and two yoghurt cups, one with round shapes and one with angular shapes. All these shapes are thus designed to determine whether there is a difference in health perception between round and angular shapes, a difference in health perception between bottle shaped packages and cup shaped packages and to determine whether there is a difference in health perception between the small, thin versions and big, thick versions. The same principles are used concerning the design of the biscuit packages. There are two packages (round and angular) that both have a small, thin version and a big, thick version (see Figure 5), two angular

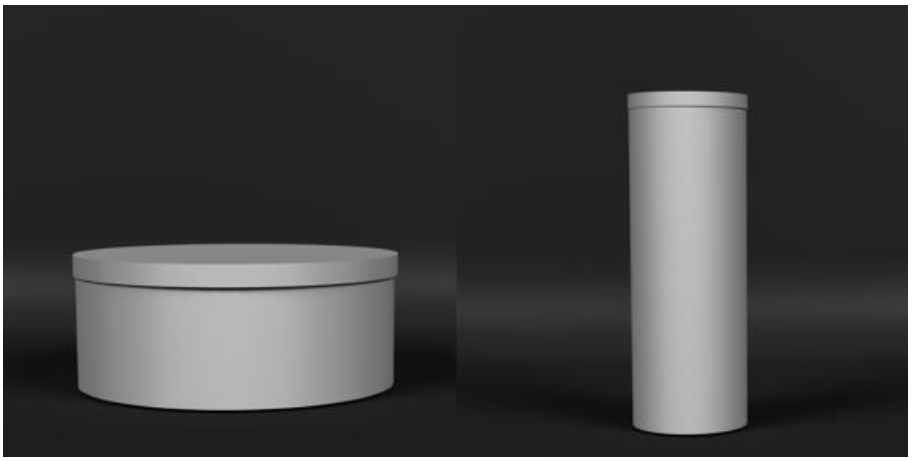


*Figure 5: Example of the round biscuits package displayed in a big, thick version (left) and a small, thin version (right).*

packages with multiple angles and two packages that contain both round and angular shapes. See Appendix C for all the different package shapes used in the pre-study.

### 3.3 Measures

To measure which colors and shapes are perceived as relatively healthy and relatively less healthy, respondents have to rate the healthiness of the different colors and shapes. The following item is used to measure healthiness:

- Healthy- Unhealthy (Gezond- Ongezond);

Three items are added as control variables:

- Natural - Unnatural (Natuurlijk- Onnatuurlijk);
- Pleasant - Unpleasant (Aangenaam- Onaangenaam);
- Good taste- Bad taste (Goede smaak - Slechte smaak).

The colors and shapes are examined using a 7-point semantic differential scale (1= Very Healthy; 7= Very Unhealthy):

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Healthy | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | Unhealthy |
| | 1 | | | | | | 7 | |

### 3.4 Procedure

An online survey is conducted, the advantage of an online survey is that the observer-bias is out of the question. The questionnaire starts with a short introduction where the purpose of the study is discussed, followed by three questions concerning demographic data including gender, age, and education. After that, the respondents first have to rate the 12 different package colors concerning the yoghurt, then the 8 different yoghurt package shapes, followed by the 12 different package colors of the biscuits and the last part of the questionnaire is concerning the 8 different package shapes of the biscuits. In total each respondent has to rate 24 packages on their colors and 16 packages on their shape. An example of the questionnaire can be found in Appendix D.

### 3.5 Data Analysis

The questionnaires are analyzed in SPSS, using ANOVA. Frequencies, Descriptives, Ranking and Pairwise Comparisons are carried out to explore the effects measured in the survey. These methods will lead to the means of the four measured items concerning the 24 different colors and 16 different shapes. Based on these scores, the package colors perceived as most healthy and less healthy are selected for Study 2, for both products. Also the package shapes

perceived as most healthy and less healthy for both products, are selected for the main study (Study 2).

## 3.6 Results

An overview of the highest and lowest mean scores concerning the four measurement items of package colors can be found in chapter 3.6.9: Overview of the highest and lowest means of package colors. And the highest and lowest means scores concerning the package shapes can be found in chapter 3.6.18: Overview of the highest and lowest means of package shapes.

## Results concerning the package colors of yoghurt

### 3.6.1 Healthfulness

The package colors regarding the yoghurt are rated on four items: healthy/unhealthy, natural/unnatural, pleasant/unpleasant and good taste/ bad taste. To measure the healthfulness of the package color, only the 'healthy/ unhealthy' item is analyzed. ANOVA shows significant differences in healthfulness between the package colors ($F(11, 209)= 15.7$, $p<.001$). As Figure 6 shows Dark Green ($M= 1.95$, $SD= .83$) is rated as the most healthy color, followed by the lighter shade of green ($M=2.05$, $SD=.89$). The Pairwise Comparison test shows that Dark Green is significantly different in perceived healthfulness in comparison with Orange ($\rho=.001$), Pink ($\rho=.005$), Dark Blue ($\rho<.01$), Dark Red ($\rho<.001$), Dark Pink ($\rho<.001$), Yellow ($\rho=.002$), Red ($\rho<.001$), and Black ($\rho<.001$). Figure 6 shows that Black ($M=5.50$, $SD= 1.10$) is perceived as the most unhealthy package color concerning yoghurt, followed by Dark Red ($M= 4.25$, $SD= 1.12$). The Pairwise Comparison test shows that Black is significantly different in perceived healthfulness in comparison with Blue ($\rho<.001$), Orange ($\rho<.01$), Dark Green ($\rho< .001$), White ($\rho<.001$), Pink ($\rho<.05$), Dark Blue ($\rho< .001$), Dark Red ($\rho<.03$), Green ($\rho<.001$), Yellow ($\rho=.002$) and Red ($\rho=.001$).

### 3.6.2 Naturalness

ANOVA shows significant differences in perceived naturalness between the package colors of yoghurt, *F* (11, 209)= 19.1, ρ<.001. Descriptive Statistics show that Dark Green is rated as the most natural color (*M*= 1,90; *SD*= .79). Pairwise Comparison shows that Dark Green is significantly different in perceived naturalness in comparison with Blue (ρ<0.04), Orange (ρ<0.001), Pink (ρ<0.001), Dark Blue (ρ<0.001), Dark Red (ρ<0.001), Dark Pink (ρ<0.001), Yellow (ρ<0.001), Red (ρ<0.001), and Black (ρ<0.001). Meaning that Dark Green is not significantly different in comparison with Green (*M*=1.95; *SD*= .76) and White (*M*= 2,85; *SD*= 1,60). Black is rated as the most unnatural package color of yoghurt (*M*=5,95; *SD*= 1,19). The Pairwise Comparison Test shows that Dark Pink (*M*=4,55; *SD*= 1,23) is the only color that is not significantly different from Black.

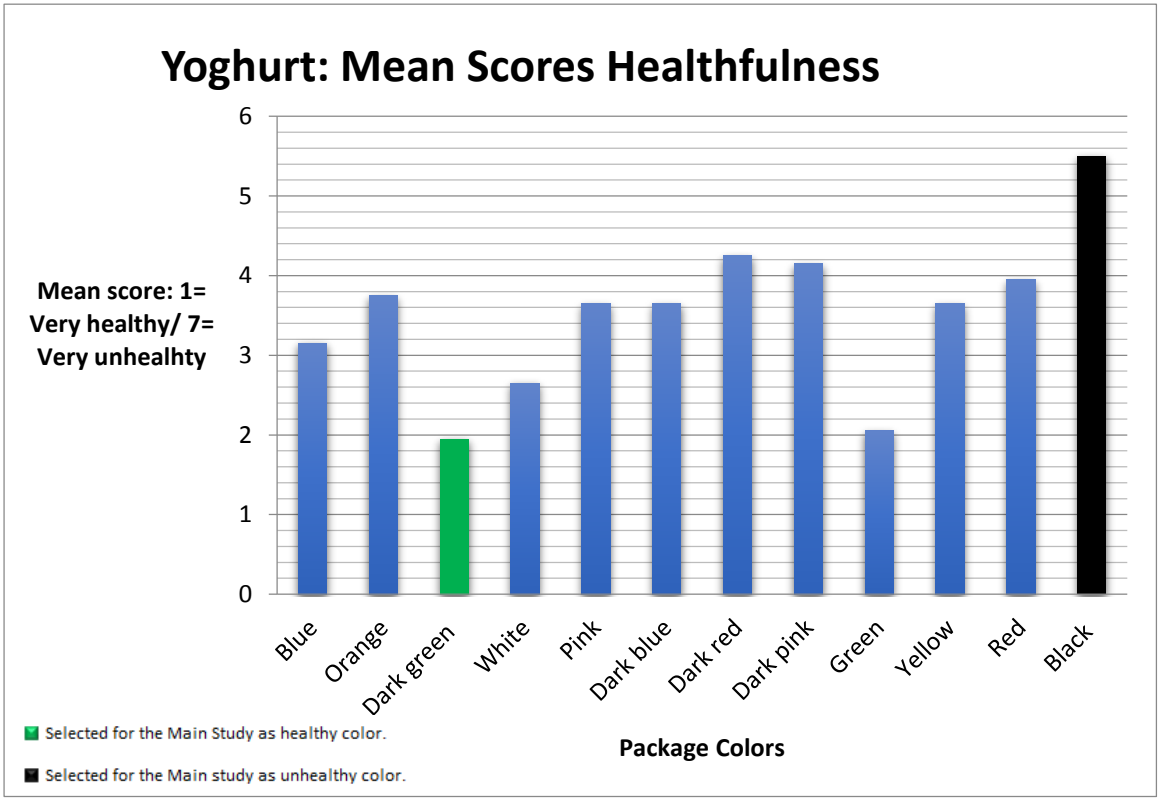



*Figure 6: The mean scores concerning perceived healthfulness regarding the package colors of yoghurt.*

### 3.6.3 Pleasantness

ANOVA shows significant differences in perceived pleasantness between the different package colors of yoghurt, *F* (11, 209)= 11,9, ρ<0.001. Dark Green is rated as the most pleasant package color (*M*= 2,20; *SD*= 1,06). The Pairwise Comparison Test shows that Dark Green is significantly different in comparison with Dark Blue (ρ<0.001), Dark Red

(ρ<0.001), Yellow (ρ<0.04), Red (ρ<0.001), and Black (ρ<0.001). Black is the most unpleasant package color for yoghurt according to the respondents (*M*=5,55; *SD*= 1,28). Pairwise Comparison shows that it is significantly different in comparison with Blue (ρ<0.001), Orange (ρ<0.01), Dark Green (ρ<0.001), White (ρ<0.001), Pink (ρ<0.02), Dark Blue (ρ<0.005), Green (ρ<0.001), and Yellow (ρ<0.02).

### 3.6.4 Tastiness

ANOVA shows that there are significant differences in perceived tastiness between the different package colors (*F* (11, 209)= 8,9, ρ<0.001). Dark Green is most associated with a good taste (*M*=2,35; *SD*= 1,09) and according to the Pairwise Comparison test significantly different in comparison with Dark Blue (ρ<0.005), Dark Red (ρ<0.02), Red (ρ<0.02), and Black (ρ<0.001). Black is the color most associated with a bad taste (*M*= 5,60; *SD*= 1,35). The Pairwise Comparison test shows that Black is significantly different in perceived tastiness in comparison with Blue (ρ<0.001), Orange (ρ<0.01), Dark Green (ρ<0.001), White (ρ<0.005), Pink (ρ<0.02), Dark Blue (ρ<0.01), Dark Red (ρ<0.05), Dark Pink (ρ<0.05), Green (ρ<0.001), and Yellow (ρ<0.05).

## Results concerning the package colors of biscuits

### 3.6.5 Healthfulness

ANOVA shows significant differences in perceived healthfulness between the package colors of biscuits (F(11, 209)= 12.2, p<.001). Figure 7 shows that Green is rated as the most healthy package color ((M= 2.80, SD= 1.32), followed by the color Brown (M=3.00, SD= 1.52). The Pairwise Comparison test shows that Green is significantly different in health perception in comparison with Dark Blue (p<.03), Dark Purple (p<.01), Red (p=.001), and Black (p<.001). The color Brown is only significantly different, according to the Pairwise Comparison test, in comparison with Red (p=.005) and Black (p<.001). Therefore the color Green is selected for the main study as the most healthy package color concerning biscuits. As Figure 7 shows Black (*M*= 5.95, *SD*= .99) is rated as the most unhealthy package color, followed by the color Red (*M*= 4.80, *SD*= .62). The Pairwise Comparison test shows that Black is significantly different in comparison with Blue (*p*<.001), Brown (*p*<.001), Dark Blue (*p*<.001), Dark Brown (*p*<.01), Dark Green (*p*<.001), Dark Purple (*p*<.01), Red (*p*<.01), Green (*p*<.001), Purple (*p*<.005), Red (*p*<.02), and Yellow (*p*<.001).

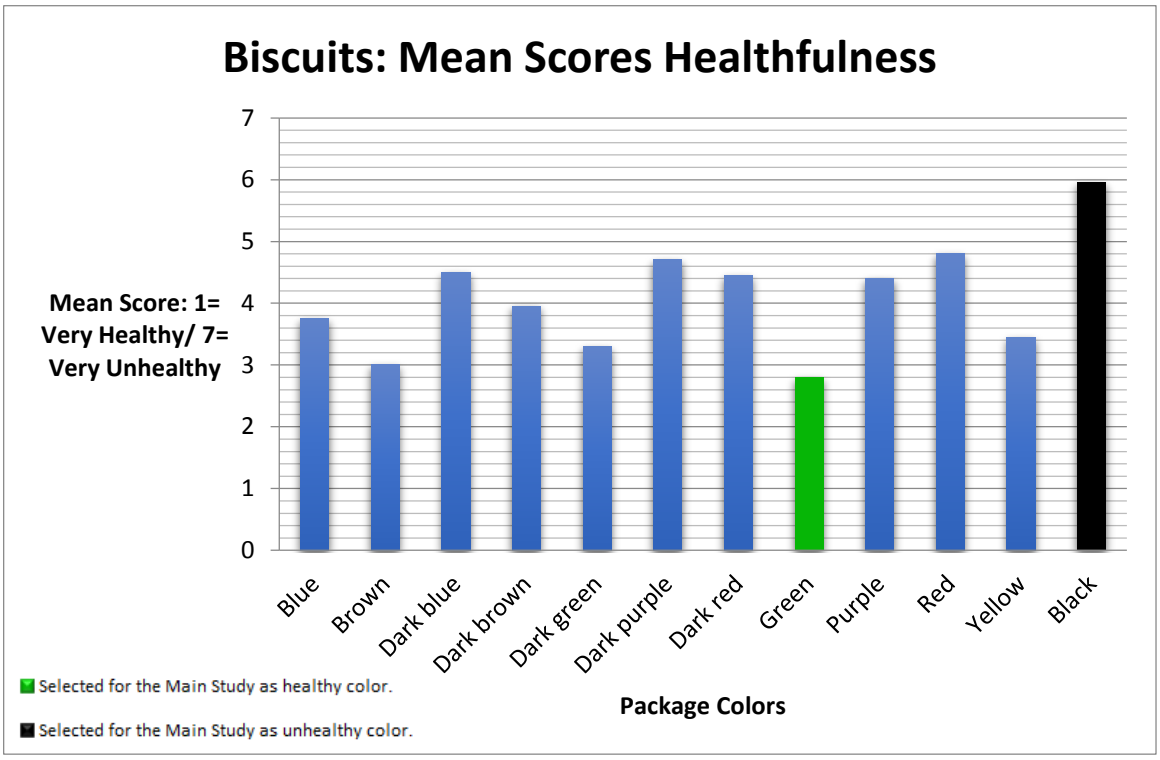



*Figure 7: The mean scores concerning perceived healthfulness regarding the package colors of biscuits.*

### 3.6.6 Naturalness

ANOVA shows that there are significant differences in perceived naturalness between the several package colors, $F$ (11, 209)= 15,7, ρ<0.001. Green is perceived as the most natural color ($M$= 2,80; $SD$= 1,47) and according to the Pairwise Comparison test significantly different in naturalness in comparison with Dark Blue (ρ<0.005), Dark Purple (ρ<0.05), Red (ρ<0.005), and Black (ρ<0.001). Black is rated as the most unnatural color ($M$= 6,05, $SD$=.95). The Pairwise Comparison test shows that Black is significantly different in perceived naturalness in comparison with the other colors (minimal ρ<0.05).

### 3.6.7 Pleasantness

ANOVA shows that there are significant differences in pleasantness between the twelve color packages of biscuits ($F$( 11, 209)= 11,5, ρ<0.001). The color regarded as the most pleasant is Brown ($M$= 2,60; $SD$= .94). The Pairwise Comparison obtains a significant difference in perceived pleasantness in comparison with Dark Blue (ρ<0.01), Dark Purple (ρ<0.02), Red (ρ<0.001), and Black (ρ<0.001). Black is seen as the most unpleasant color ($M$=6,00; $SD$=1,26) and is in comparison with all the other color significant different in perceived pleasantness.

### 3.6.8 Tastiness

There are significant differences in perceived tastiness between the twelve colors, $F$ (11, 209)= 10,2, ρ<0.001. Respondents rate Brown as the color most associated with a good taste ($M$= 2,35; $SD$= .81) and Black as the color most associated with a bad taste($M$= 5,75; $SD$= 1,41). Brown is according to the Pairwise Comparison test significantly different in tastiness in comparison with the colors Blue (ρ<0.001), Dark Blue (ρ<0.001), Purple (ρ<0.01), Red (ρ<0.001), and Black (ρ<0.001). Black is significantly different in perceived tastiness in comparison with all the other colors (ρ<0.05).

### 3.6.9 Overview of the highest and lowest means of package colors

Table 1 shows an overview of the mean scores of the pre-study concerning the package colors of yoghurt and biscuits. Each product category shows the color with the highest and the lowest mean for all of the four items: Healthiness, Naturalness, Pleasantness, and Tastiness.

| | **Package Color** | | | |
|---|---|---|---|---|
| | **Yoghurt** | | **Biscuits** | |
| | ***Mean (SD)*** | | ***Mean (SD)*** | |
| **Items:** | **Highest Mean** | **Lowest Mean** | **Highest Mean** | **Lowest Mean** |
| **Healthfulness** | Dark Green ($M$=1.95; $S$=.83) | Black ($M$=5,50; $SD$= 1.10) | Green ($M$=2,80; $SD$= 1,32) | Black ($M$=5,95; $SD$=.99) |
| **Naturalness** | Dark Green ($M$=1,90; $SD$=.79) | Black ($M$=5,95; $SD$= 1.19) | Green ($M$=2,80; $SD$= 1,47) | Black ($M$=6,05; $SD$=.95) |
| **Pleasantness** | Dark Green ($M$=2,20; $SD$= 1,06) | Black ($M$=5,55; $SD$= 1,28) | Brown ($M$=2,60; $SD$=.94) | Black ($M$=6,00; $SD$=1,26) |
| **Tastiness** | Dark Green ($M$=2,35; $SD$= 1,09) | Black ($M$=5,60; $SD$= 1,35) | Brown ($M$=2,35; $SD$=.81) | Black ($M$=5,75; $SD$=1,41) |

*Table 1: Overview of the highest and lowest means of package colors of yoghurt and biscuits.*

## Results concerning the package shapes of yoghurt

### 3.6.10 Healthfulness

The package shapes regarding the yoghurt are rated on four items: healthy/unhealthy, natural/unnatural, pleasant/unpleasant and good taste/ bad taste. To measure the healthfulness of the package shape, only the 'healthy/ unhealthy' item is analyzed (see Appendix C for all the package shapes). ANOVA shows significant differences in healthfulness between the package shapes of yoghurt ($F$(7, 133)= 3.1, $p$<.01). Figure 8 shows that the shape Y4 ($M$= 2.70, $SD$= 1.26) is rated as the most healthy shape concerning yoghurt, followed by Y2 ($M$=3.55, $SD$= 1.43). The Pairwise Comparison test shows that Y4 is significantly different in perceived healthfulness in comparison with Y1 ($p$<.01), Y3 ($p$<.02), and Y6 ($p$<.02). Y2 isn't significantly different in perceived healthfulness in comparison with the other shapes,

therefore Y4 is selected for the main study as the most healthy package shape concerning yoghurt.

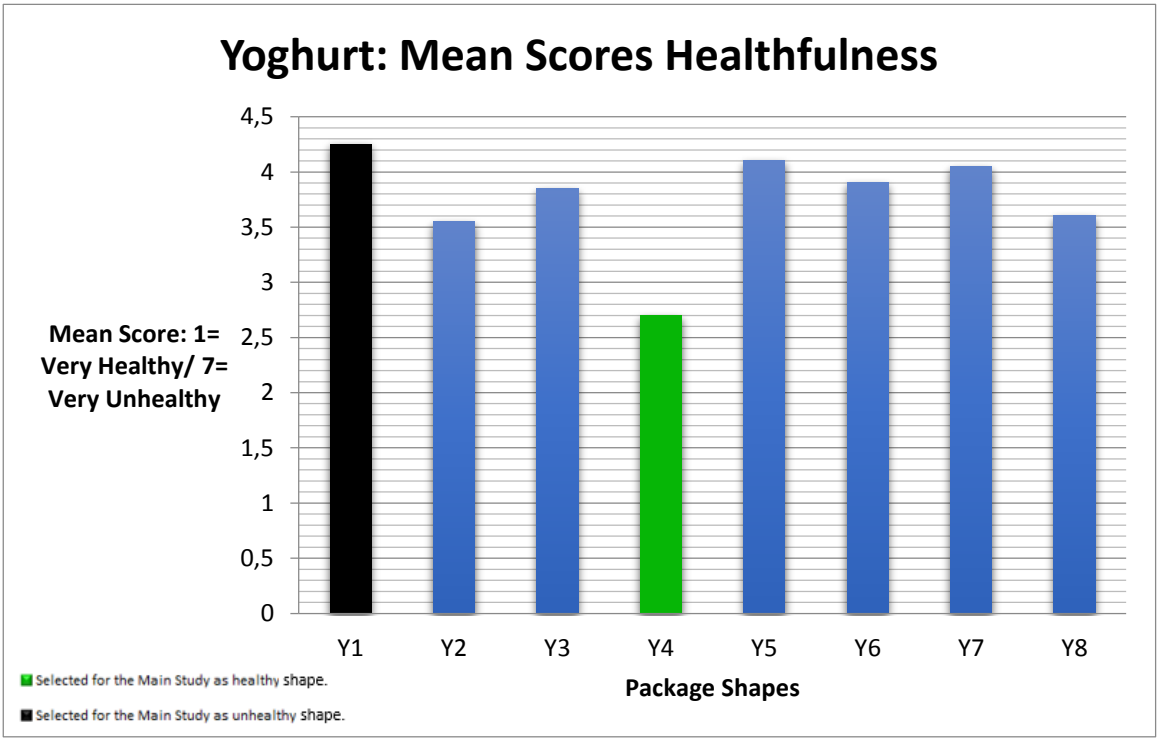



*Figure 8: The mean scores concerning perceived healthfulness regarding the package shapes of yoghurt.*

As shown in Figure 8, Y1 is rated as the most unhealthy package shape (*M*= 4.25, *SD*= 1.21), followed by Y5 (*M*= 4.10, *SD*= 1.83). The Paiswise Comparison test shows that Y1 is significantly different in perceived healthfulness in comparison with Y4 ($p$<.01). Y5 isn't significantly different in perceived healthfulness in comparison with the other shapes, therefore Y4 is selected as the most unhealthy shape for the main study.

### 3.6.11 Naturalness

The package shape of yoghurt also has a significant effect on perceived naturalness, $F(7, 133)=3,7$, $\rho<0.01$. Package Y4 is the most natural shape according to respondents (*M*= 2,80; *SD*= 1,24). This shape is significantly different in perceived naturalness in comparison with the following shapes: Y1 ($\rho<0.05$), Y3 ($\rho<0.005$), Y5 ($\rho<0.01$), and Y6 ($\rho<0.02$). The most unnatural shape of yoghurt is Y5 (*M*= 4,55; *SD*= 1,54). This shape is only significantly different in perceived naturalness in comparison with the most natural perceived shape: Y4 ($\rho<0.01$).

### 3.6.12 Pleasantness

ANOVA obtains significant differences in perceived pleasantness between the different shapes ($F$ (7, 133)= 3,2 , $\rho<0.01$). Y4 is rated as the most pleasant shape (*M*= 3,00; *SD*=

1,45), and Y5 is rated as the most unpleasant shape (*M*= 4,50; *SD*= 1,57). According to the Pairwise Comparison test Y4 is significantly different in perceived pleasantness in comparison with Y3 (ρ<0.02). Y5 however is not significantly different in perceived pleasantness in comparison with the other shapes.

### 3.6.13 Tastiness

According to ANOVA there are significant differences in perceived taste between the eight package shapes, *F*(7, 133)= 4,1, ρ<0.001. Shape Y4 is most associated with a good taste (*M*= 2,75; *SD*= 1,33) and significantly different in perceived taste in comparison with Y3 (ρ<0.01), Y5 (ρ<0.03), and Y6 (ρ<0.005). Y5 is most associated with a bad taste (*M*= 4,30; *SD*=1,63) and is significantly different from only one shape: Y4 (ρ<0.03).

## Results concerning the package shapes of biscuits

### 3.6.14 Healthfulness

ANOVA shows significant differences in healthfulness between the package shapes of biscuits (*F*(7, 133)= 5.4, *p*=.001). As Figure 9 shows K1 is regarded as the most healthy shape (*M*= 3.10, *SD*= 1.25) , followed by the shape K3 (*M*= 3.45, *SD*= 1.15). The Pairwise Comparison test shows that K1 is significantly different in perceived healthfulness in comparison with K4 (*p*<.05), K5 (*p*<.001), K6 (*p*<.02), K7 (*p*<.005), and K8 (*p*<.02). Figure 9 shows that the shape regarded as most unhealthy is K8 (*M*= 4.85, *SD*= 1.42), the second most unhealthy shape is K7 (*M*= 4.60, *SD*= 1.23). The Pairwise Comparison test shows that

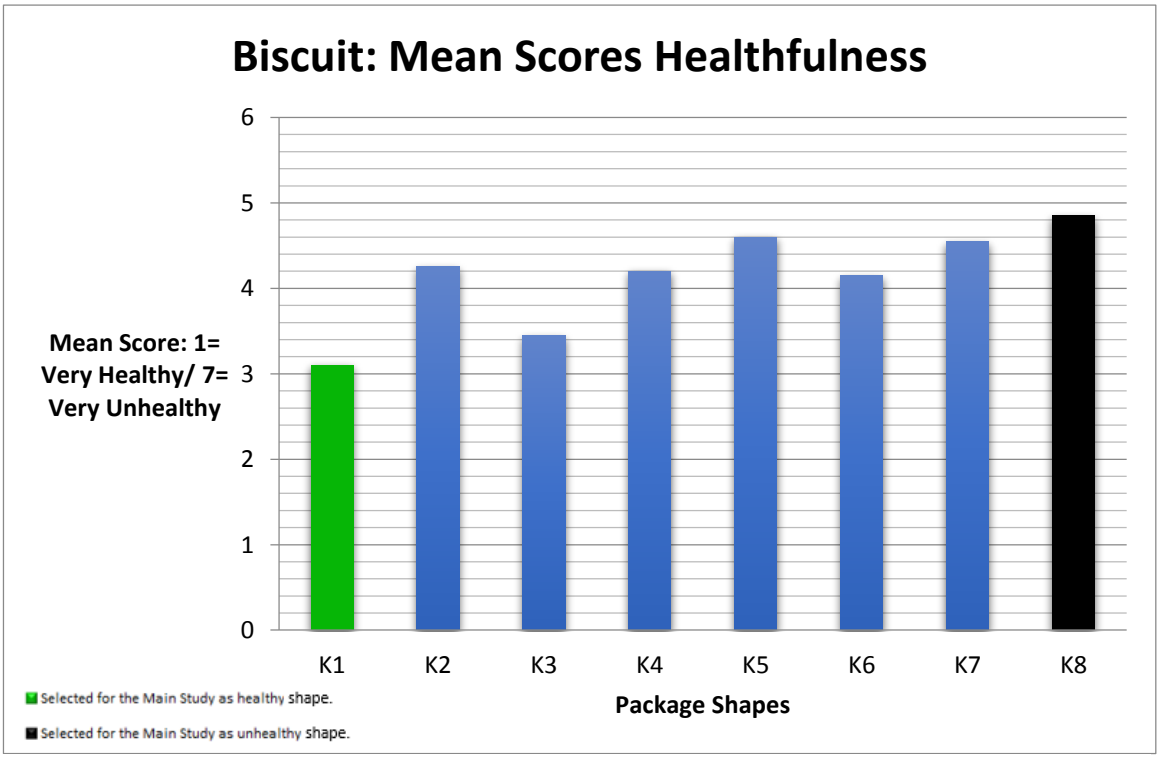



*Figure 9: The mean scores concerning perceived healthfulness regarding the package shapes of biscuits.*

K8 is significantly different in perceived healthfulness in comparison with K1 ($p<.02$). Although K5 is significantly different in perceived healthfulness in comparison with two shapes instead of one (K1 ($p<.001$) and K3 ($p<.05$)), K8 is selected as the most unhealthy shape concerning biscuits, because of the higher mean score on perceived healthfulness.

### 3.6.15 Naturalness

ANOVA shows significant differences in perceived naturalness between the package shapes, $F(7, 133)=5,3$, ($\rho<0.001$). K1 is perceived as the most natural shape ($M= 3,15$; $SD= 1,27$). The Pairwise Comparison test shows that K1 is significantly different in naturalness in comparison with K4 ($\rho<0.03$), K7 ($\rho<0.005$), and K8 ($\rho<0.005$). K8 is rated as the most unnatural shape ($M= 5,25$, $SD= 1,55$) and significantly different in naturalness in comparison with K1 ($\rho<0.005$) and K3 ($\rho<0.02$).

### 3.6.16 Pleasantness

There are significant differences in perceived pleasantness between the eight different biscuit packages ($F(7, 133)= 3,4$ ,$\rho<0.01$). K1 is the most pleasant package according to respondents ($M= 3,15$; $SD= 1,18$), and K8 as the most unpleasant package ($M= 4,55$; $SD= 1,64$). K1 is only significantly different in pleasantness in comparison with K8 ($\rho<0.04$), and K8 is also only significantly different in comparison with K1 ($\rho<0.04$).

### 3.6.17 Tastiness

ANOVA shows significant differences in tastiness between the different package shapes ($F(7, 133)= 4,0$, $\rho<0.001$). K1 is again most associated with a good taste ($M= 3,05$; $SD=1,28$). K1 is however only significantly different in perceived taste in comparison with K8 ($\rho<0.04$). K8 is most associated with a bad taste ($M= 4,45$; $SD= 1,54$) and significantly different in comparison with K1 ($\rho<0.04$), K3 ($\rho<0.03$), and K5 ($\rho<0.04$).

### 3.6.18 Overview of the highest and lowest means of package shapes

Table 2 shows an overview of the mean scores of the pre-study concerning the package shapes of yoghurt and biscuits. Each product category shows the shapes with the highest and the lowest mean for all of the four items: Healthiness, Naturalness, Pleasantness, and Tastiness.

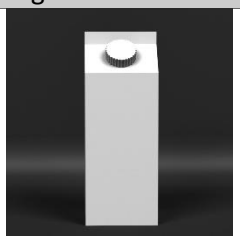
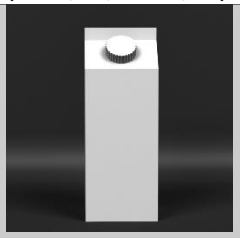
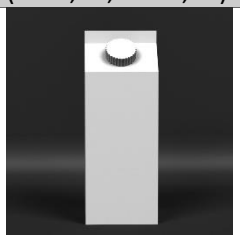
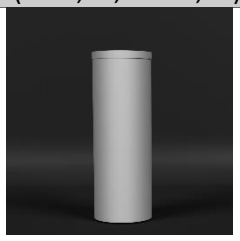
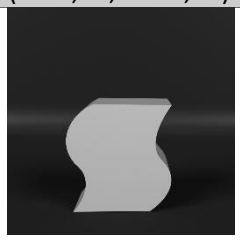
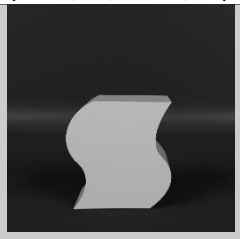
| | **Package Shape** | | | |
|---|---|---|---|---|
| | Yoghurt | | Biscuits | |
| | *Mean (SD)* | | *Mean (SD)* | |
| **Items:** | Highest Mean | Lowest Mean | Highest Mean | Lowest Mean |
| **Healthfulness** |  (*M*=2,70; *SD*=1,26) |  (*M*=4,25; *SD*= 1.20) |  (*M*=3,10; *SD*= 1,25) |  (*M*=4,85; *SD*=1,42) |
| **Naturalness** |  (*M*=2,80; *SD*=1,24) |  (*M*=4,55; *SD*= 1.54) |  (*M*=3,15; *SD*= 1,27) |  (*M*=5,25; *SD*=1,55) |
| **Pleasantness** |  (*M*=3,00; *SD*= 1,45) |  (*M*=4,50; *SD*= 1,57) |  (*M*=3,15; *SD*=1,18) |  (*M*=4,55; *SD*=1,64) |
| **Tastiness** |  (*M*=2,75; *SD*= 1,33) |  (*M*=4,30; *SD*= 1,63) |  (*M*=3,05; *SD*=1,28) |  (*M*=4,45; *SD*=1,54) |

*Table 2: Overview of the highest and lowest means of package shapes of yoghurt and biscuits.*

## 3.7 Discussion

Study 1 conducted to determine which colors and shapes consumers perceive as healthy. Hypothesis 3 is rejected, concerning the fact that the pre-study shows that in case of the healthy product yoghurt, an angular shape is chosen as the most healthy shape. According to Zhang, Feick and Price (2006) rounded logos are readily perceived as harmonious and gentle, in contrast to angular logos that are associated with conflict and aggressiveness. Round shapes therefore symbolize a harmony that refers to nature, but according to the pre-study results this does not hold true for product packages. Hypothesis 4 can be confirmed, because pre-study results show that products with a bigger height in comparison with their width are perceived as healthier, than the products with a bigger width in comparison with their height. As Mayall (1968) indicated manmade objects that resemble organic forms tend to be preferred, such as

supports with wide bottoms are thought to be visually attractive because they mimic a person standing with legs apart. The results from the pre-study show that consumers' associate a thin, slim package (a 'healthy' package) with healthiness, confirming that heavy, fat objects are associated with an unhealthy body and thin, slim objects with healthy body. Another explanation why a shape is perceived as healthy or less healthy, in comparison with another shape, concerns the symmetry of packages. As Papanek (1984) explained, people inherently prefer objects with symmetry, unity, and harmony among elements. The shape rated as least healthy for the unhealthy product biscuits, is an unsymmetrical shape (see Figure 10). Why consumers rate a unsymmetrical shape as unhealthy also may arise from the fact that consumers can associate it with a body that is asymmetrical, for instance missing a leg, which is perceived as unhealthy.

*Figure 10: Package shape for Biscuits rated as least healthy in the pre-study.*

Hypothesis 6 and 7 are confirmed in the pre-study. This confirms research done by Schuldt (2012), indicating that participants perceived a food product as healthier when it contains a green rather than red calorie label, despite the fact that the labels conveyed the same calorie content. Schuldt (2012) shows that green labels increase perceived healthfulness, green is thus seen as a healthy color. It also confirms that the color red and black are perceived as relatively less healthy, because these colors are associated with fear and anger (red and black) and with grief (black) (Aslam, 2006).

# 4. Study 2

## 4.1 Design

To examine whether the manipulation of package color and package shape affects the perceived healthfulness, an online survey is designed. Both package color and package shape are manipulated for two different products, therefore the study consisted of a 2 (color: healthy vs. unhealthy) * 2 (shape: healthy vs. unhealthy) * 2 (product type: healthy vs. unhealthy) design.

## 4.2 Respondents

252 respondents participated in the research, however 104 surveys are useless due to the fact that these aren't filled in correctly or completely. Therefore eventually 148 surveys are filled in correctly, from which 63,5% male respondents and 36,5% female respondents. The age of the respondents ranged from 15 to 74 years old ($M$=38,6; $SD$= 14,14). 3 respondents suffered from lactose intolerance, 1 respondent had a gluten allergy and the other 166 respondents did not suffer from lactose intolerance or gluten allergy. Only one out of the 148 respondents is a vegan. In the table 3 respondent characteristics' are shown per condition. According to a Chi-square test there are no significant differences in gender, between the four conditions for both the healthy and unhealthy product. And according to a T-test there also are no significant difference in age, between the four conditions for both product types.

**Characteristics of respondents by condition**

**Yoghurt**

| Condition | HU | UU | HH | UH |
|---|---|---|---|---|
| **Female respondents** | 16 (41%) | 11 (28,9%) | 12 (34,3%) | 15 (41,7%) |
| **Male respondents** | 23 (59%) | 27 (71,1%) | 23 (65,7%) | 21 (58,3%) |
| **Total number of respondents** | 39 (100%) | 38 (100%) | 35 (100%) | 36 (100%) |
| **Mean age** | 38,1 | 37,8 | 39,4 | 39,4 |
| **Primary Education** | 1 | 1 | - | - |
| **VMBO** | 1 | - | 2 | 2 |
| **HAVO** | 3 | 2 | 2 | 5 |
| **VWO** | 5 | 1 | - | 5 |
| **MBO** | 11 | 8 | 8 | 7 |
| **HBO** | 11 | 19 | 19 | 10 |
| **WO** | 7 | 7 | 4 | 7 |

**Biscuits**

| Condition | HU | UU | HH | UH |
|---|---|---|---|---|
| **Male respondents** | 16 (50%) | 30 (62,5%) | 19 (40,6%) | 29 (80,6%) |
| **Total number of respondents** | 32 (100%) | 48 (100%) | 32 (100%) | 36 (100%) |
| **Mean age** | 36,6 | 40,8 | 36,6 | 39,4 |
| **Primary Education** | 1 | - | - | 1 |
| **VMBO** | 3 | - | - | 2 |
| **HAVO** | 3 | 2 | 3 | 4 |
| **VWO** | 1 | 3 | 3 | 4 |
| **MBO** | 8 | 12 | 9 | 5 |
| **HBO** | 10 | 20 | 13 | 16 |
| **VWO** | 6 | 11 | 4 | 4 |

**Explanation of different conditions:**

**HU=**healthy color/ unhealthy shape; **UU=** unhealthy color/ unhealthy shape

**HH=** healthy color/ healthy shape; **UH=** unhealthy color/ healthy shape

*Table 3: Respondent characteristics by Condition.*

### 4.3 Stimuli

Fictitious product packages are chosen deliberately to prevent that outcomes are attributable to existing associations with the brand. There are eight different conditions of stimuli, concerning the fact that there are two product types (healthy and unhealthy) that are both displayed in a healthy and an unhealthy package color and in a healthy and an unhealthy package shape. Each survey shows two stimuli images, one of the four different manipulated healthy products and one of the four different manipulated unhealthy products. The stimuli is distributed at random, meaning that each respondent receives stimuli in a different condition and in a different order (where one respondent first rates the healthy product, the other respondent first rates the unhealthy product). The eight different product packages are designed by a person with experience concerning programs such as Photoshop. Figure 11 shows the different products and packages used in this study.


*Figure 11: Eight different product and package versions.*

### 4.4 Procedure

The stimulus and 37 questions are incorporated in an online survey, that allows respondents to fill in the survey in their own time and environment (see Appendix E). The survey is constructed through www.thesistools.com. The respondents are recruited through Facebook, Twitter, LinkedIn, by e-mail and through face-to-face communication with friends and family. The respondents are given the idea that the study only considers the influence of product packages, not that it actually concerns the perceived healthfulness.

### 4.5 Research Instrument

In the online survey respondents are first asked some demographic questions concerning their age, sex and education. Then respondents are asked whether they have an gluten allergy, suffer from lactose intolerance or don't have any food allergies. Followed by the question if they are vegan. The survey then contains statements where the dependent variables were examined. These are measured using a 7-point Likert scale (1= Strongly Disagree and 7= Strongly Agree).

| | **Product** | |
|---|---|---|
| **Variable** | **Healthy= Yoghurt** | **Unhealthy= Biscuits** |
| ***Perceived Healthfulness*** | 0.87 | 0.88 |
| ***Credibility*** | 0.96 | 0.91 |
| ***Attitude*** | 0.83 | 0.83 |
| ***Intention to Buy*** | 0.81 | 0.81 |
| ***General Health Interest*** | 0.80 | |

*Table 4: Reliability of scales used in Study 2.*

#### Perceived healthfulness

The survey contains this scale to determine whether participants perceive the healthy manipulated packages as more healthy, than the less healthy manipulated packages. 12 different items are designed for this construct: *To what extent do you rate this product to be: "Nutritional', 'Pure', 'Natural', 'Chemical', 'High fiber', 'Artificial', 'Healthy', 'Full of vitamin', 'Full of calories', 'Unhealthy', 'Fat',* and *'Unnatural'*. Respondents have to point out to what extent they agree with the statements using a 7-point Likert scale. Within the scale, 1 stands for 'Strongly disagree' and 7 for 'Strongly agree'. For the healthy product Yoghurt manipulation checks are a reliable scale ($\alpha$=0.87), same holds true for the unhealthy product Biscuits ($\alpha$=0.88) (see Table 4).

The following dependent variables are measured:

### -Credibility

The credibility of the product packages are measured, to examine whether manipulations concerning the package are realistic. If all packages are perceived as highly implausible or unrealistic, this might affect the results of the other questions. This construct consists of three items, measured with a 7-point Likert scale: *'This product package looks real'*, *'This product package looks credible'* and *'This packaging is appropriate for this type of product'*. Both for the Yoghurt (α=0.96) and Biscuits (α=0.91) it is a reliable method to examine the credibility of the packages (see Table 4).

### - Attitude

Attitude towards the products is measured using three statements: '*This product is appealing to me'*, *'This product looks tasty'* and *'I like this product'* (Yoghurt: α=0.83; Biscuits: α=0.83) (see Table 9). These statements are also measured with the help of a 7-point Likert scale, ranging from 'Strongly disagree' to 'Strongly agree'.

### - Intention to buy

This construct is measured using a 7-point Likert scale, ranging from 'Strongly disagree' to 'Strongly agree'. Four items are used: *'I am prepared to try this product'*, *'I am prepared to buy this product regularly'*, *'This product doesn't suit me'*, and *'I will not buy this product, i am loyal to another brand'*. This construct measures to what extent respondents are willing to buy the product displayed, in the questionnaires. Reliability Analysis shows that for both Yoghurt (α= 0.81) and Biscuits (0.81) the construct is reliable (see Table 4).

### - Price expectation

To measure what price respondents expect to pay for the products, the following open question is added to the survey: *'What is you expectation of the product price in €?'.* This question makes it possible to examine whether respondents expect to pay more for a healthy manipulated product or an unhealthy manipulated product. One statement is add as a control variable, to test whether respondents expect the product to be expensive or inexpensive: *'I expect this product to be relatively inexpensive'*.

## General Health Interest

At last eight statements are add to examine the respondents' general health interest. This reliable scale (α=0.89) is first used by Roininen, Lähteenmäki and Tuorila(1999) and consists of the following statements: *'The healthiness of food has little impact on my food choices'*, *'I am very particular about the healthiness of food i eat'*, *'I eat what i like and i do not worry*

*much about the healthiness of food', 'It is important for me that my diet is low in fat', 'I always follow a healthy and balanced diet', 'It is important for me that my daily diet contains a lot of vitamins and minerals', 'The healthiness of snacks makes no difference to me',* and *'I do not avoid foods, even if they may raise my cholesterol'.* It also is a reliable scale (α=0.80) in this study (see Table 9), to measure how people think about their own health and useful to find out if there is a relation between the general health interest and for instance the attitude towards the product.

## 4.6 Data Analysis

Data is analyzed using Descriptive Statistics and ANOVA in SPSS. The effect of the independent variables Package Shape, Package Color and General Health Interest on the dependent variables Perceived Healthfulness, Credibility, Attitude, Intention to Buy and Price Expectation are examined using separate ANOVA's. Descriptive Statistics are used to examine the differences in means concerning the independent variables, between the healthy manipulations of the package and the less healthy manipulations of the package. Also regression analysis are performed to examine the relationship between the independent variables. These analysis measure to what extend a group of variables (predictors) can predict the variability in the dependent variable.

## 4.7 Results

### 4.7.1 Perceived healthfulness

#### *Perceived healthfulness for Yoghurt packages*

ANOVA is used to examine whether there is a relationship between package features, such as shape and color, and the perceived healthfulness of a food product, in this case yoghurt. ANOVA shows a significant difference in perceived healthfulness between a color perceived as healthy and a package color perceived as less healthy ($F(1,143)=15,44$, $p<.001$). Participants rated the product with the healthy package color as more healthy ($M= 4,92$; $SD= .68$), in comparison with the product with the unhealthy package color ($M=4,33$; $SD= 1.07$) (see Appendix F). Between the healthy package shape ($M= 4,75$; $SD= .91$) and unhealthy package shape ($M= 4,51$; $SD= .96$), there are no significant differences in perceived healthfulness. There also are no significant effects concerning the General Health Interest and no interaction effects.

#### *Perceived healthfulness for Biscuits packages*

ANOVA shows that for Biscuits there are no significant differences in perceived healthfulness between a healthy package color (*M*= 4.36; *SD*=.84) and an unhealthy package color (*M*=4.28; *SD*= .95). There also are no significant differences in perceived healthfulness between the two different package shapes: healthy package shape (*M*=4,43; *SD*= .84) and unhealthy package shape (*M*=4,22; *SD*= .95). Also no significant differences are found for GHI and there are no significant interaction effects.

### 4.7.2 Credibility

#### *Credibility of Yoghurt packages*

Credibility shows a main effect of package color ($F(1,143)=46,60$, $p<.001$). Respondents rated the healthy package color as more credible (*M*= 4,46; *SD*= 1,69), than the unhealthy package color (*M*= 2,61; *SD*= 1,68) (see Appendix F). There also is a significant difference in credibility, between the healthy package shape and the unhealthy package shape ($F(1,143)=7,82$, $p<.01$). Where respondents rate the healthy package shape as more credible (M= 3,92; SD= 1,83), in comparison with the unhealthy package shape (*M*= 3,18; *SD*= 1,94). ANOVA shows no significant differences in credibility for General Health Interest, and there are no significant interaction effects between package color and package shape.

#### *Credibility of Biscuits packages*

ANOVA shows no significant differences in credibility, between a healthy package color (*M*= 3,81; *SD*= 1,49) and an unhealthy package color (*M*= 3,28; *SD*= 1,63) (see Appendix G). A significance difference in credibility is found concerning the package shape, $F(1,143)=15,07$, $p<.001$. Respondents perceive the healthy package shape as more credible (*M*= 4,07; *SD*= 1,60), in comparison with the unhealthy package shape (*M*= 3,03; *SD*= 1,42). No significant differences are found for General Health Interest, and there also are no significant interaction effects.

### 4.7.3 Product Attitude

#### *Product Attitude towards Yoghurt*

Product Attitude shows a main effect of package color ($F(1,143)=10.58$, $p<.001$), where participants hold a more positive attitude towards the product with the healthy package color (*M*= 4,25; *SD*= 1,09), than towards the product with the unhealthy package color (*M*= 3,58; *SD*= 1,44). ANOVA also shows a significant difference in product attitude, between a healthy package shape and an unhealthy package shape ($F(1,143)=4,17$, $p<.05$) (see Appendix F). Respondents with a healthy package shape have a more positive attitude towards the yoghurt (*M*= 4,13; *SD*= 1,25), than respondents with an unhealthy package shape (*M*= 3,72; *SD*=

1,35). For General Health Interest there is no significant difference, the same holds true for significant interaction effects.

#### *Product Attitude towards Biscuits*

ANOVA shows a significant main effect for package color on product attitude ($F(1,143)= 3,95$, $p<.05$ (see Appendix G). Respondents have a more positive attitude towards the product with the healthy package color ($M= 4,08$; $SD= 1,17$), than towards the product with the unhealthy package color ($M= 3,67$; $SD= 1,18$). Shape does not have a significant effect on product attitude ($F(1,143)=1,83$, $p> .05$), there is no significant difference in product attitude between the healthy shape ($M= 3,74$; $SD= 1,28$) and the unhealthy shape ($M= 3,94$; $SD= 1,11$). General Health Interest does not have a significant effect on product attitude either. Also no significant interaction effects are obtained.

### 4.7.4 Intention to Buy

#### *Intention to buy Yoghurt*

There is a marginal effect for color, $F(1,143)= 4,26$, $p<.05$. Respondents that are exposed to a healthy package color report a higher intention to buy the product ($M= 4,64$; $SD= 1,15$), than respondents who are exposed to an unhealthy package color ($M= 3,95$; $SD= 1,41$). ANOVA also shows a significant main effect for package shape ($F(1,143)= 9,60$, $p<.01$) (see Appendix F). A healthy package shape leads to a higher intention to buy the product ($M= 4,62$; $SD= 1,18$), than an unhealthy package shape ($M= 4,00$; $SD= 1,40$). For General Health Interest no significant differences are found concerning intention to buy, neither there is a significant interaction effect.

#### *Intention to buy Biscuits*

Only package color shows a significant difference in intention to buy ($F(1,143)= 4,26$, $p<.05$). A healthy package color results in a higher intention to buy the product ($M= 4,44$; $SD= 1,03$), in comparison with the unhealthy package color ($M= 4,08$; $SD= 1,02$) (see Appendix G). Package shape does not differ in intention to buy, between the healthy variant ($M= 4,16$; $SD= 1,04$) and the unhealthy variant ($M=4,31$; $SD= 1,04$). ANOVA shows no significant main effect for GHI and shows no significant interaction effects.

### 4.7.5 Price Expectation

#### *Price expectation for Yoghurt*

Color does not have a significant main effect on price expectation for yoghurt. Meaning that there are no significant differences in price expectation in euro's between yoghurt with the healthy package color ($M= 1,22$; $SD= .44$) and the unhealthy package color ($M= 1,30$; $SD= .57$). ANOVA shows a significant difference in price expectation, between a healthy package

shape and an unhealthy package shape ($F(1,143)= 4,11$, $p<.05$) (see Appendix H). Respondents expect a higher price in euro's for products with an unhealthy package shape ($M= 1,34$, $SD= .56$), than for products with a healthy package shape ($M= 1,17$; $SD= .44$). There is no significant interaction effect according ANOVA and General Health Interest also does not have a main effect on price expectation.

#### *Price Expectation for Biscuits*

ANOVA shows no significant differences in price expectation in euro's, between a package color that is perceived as healthy ($M=1,45$; $SD= .79$) and a package color that is perceived as less healthy ($M= 1,53$; $SD= 1,01$). There is however a significant difference in price expectation in euro's for package shape ($F(1,143)= 12,72$, $p<.001$) (see Appendix H). Respondents expect a higher price for the products with the unhealthy package shape ($M=1,71$; $SD= 1,01$), than for the products with the healthy package shape ($M= 1,24$; $SD= .72$). General Health Interest also has a significant main effect on price expectation ($F(1,143)= 10,08$, $p<.001$). Respondents with a low general interest in health expect a lower price for the product ($M= 1,28$; $SD= .73$), than respondents with a high general interest in health ($M= 1,69$; $SD= 1,04$). There are no significant interaction effects for price expectation concerning biscuits.

### 4.7.6 Overview of main effects of the dependent variables

#### *Overview of main effects of the dependent variables for Yoghurt*

Figure 12 (next page) shows the model tested in Study 2. In the model only the significant main effects for the relatively healthy product are shown, effects that are not significant aren't displayed in the model.

#### *Overview of main effects of the dependent variables for Biscuits*

Figure 13 (next page) shows the model tested in Study 2. In the model only the significant main effects for the relatively less healthy product Biscuits are shown, effects that are not significant aren't displayed in the model.

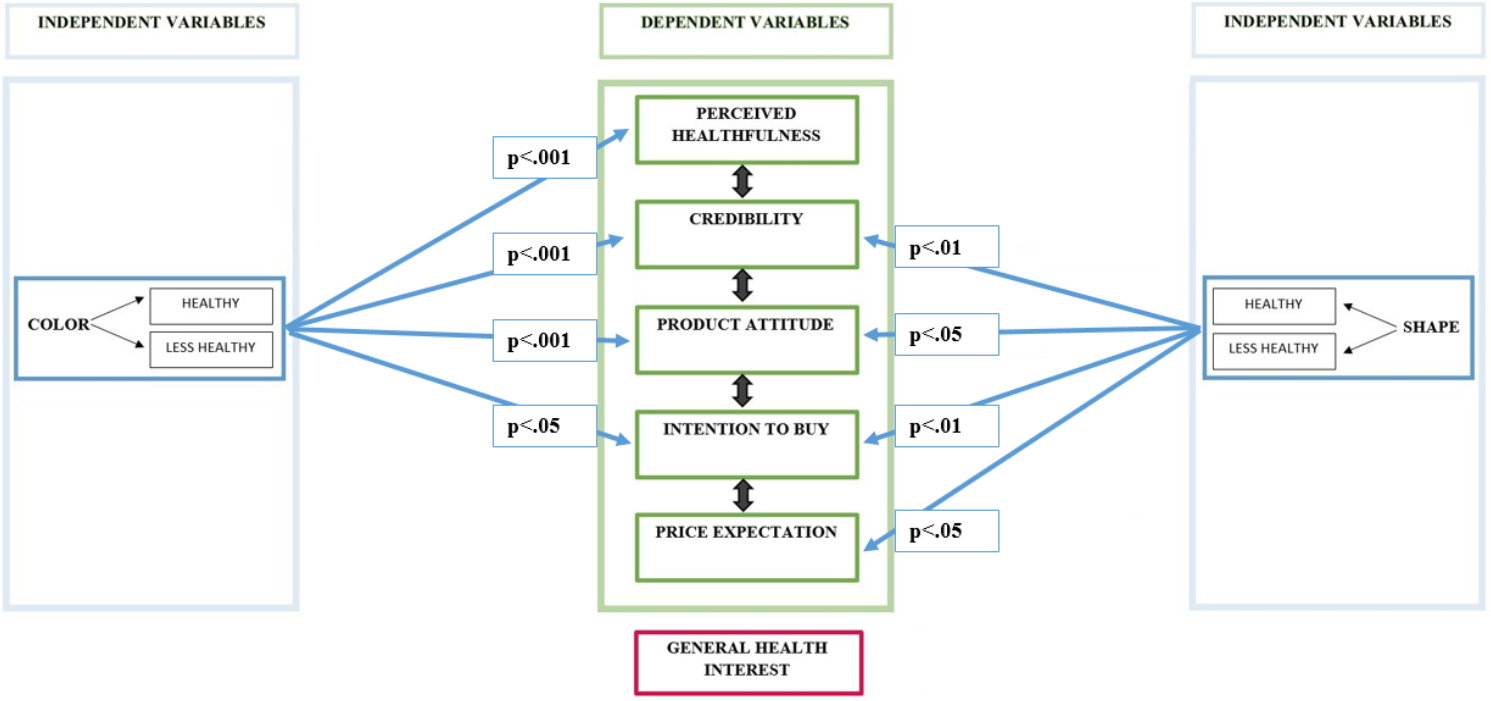



*Figure 12: Model for Yoghurt displayed with the significant main effects.*

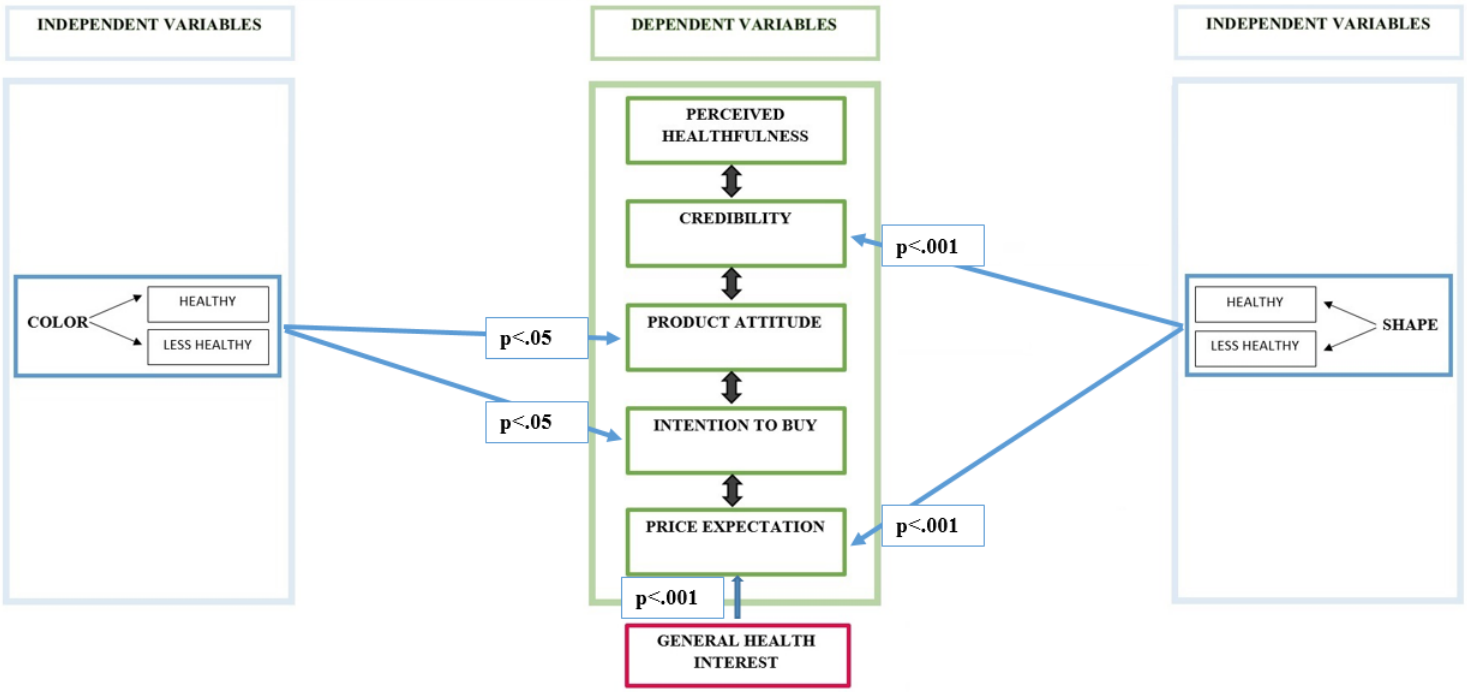



*Figure 13: Model for Biscuits displayed with the significant main effects.*

### 4.7.7 Relations between the Dependent Variables

To examine the relationship between the dependent variables, regression analysis is performed. For every analysis, one of the dependent variables (Perceived Healthfulness, Product Attitude, Credibility, Intention to Buy and Price Expectation) is appointed as the dependent variable in regression analysis and the remaining dependent variables are appointed as the predictors (the independent variables).

#### *Relations between the Dependent Variables concerning Yoghurt*

#### Perceived healthfulness

According to regression analysis 40,3% of the variability in Perceived Healthfulness is accounted for by Product Attitude, Credibility, Intention to Buy, and Price Expectation ($F(4,143)= 24,15$, $p<.001$). Table 5 however shows that only Product Attitude has a significant contribution to the model ($p<.001$).

| | ***b*** | **SE *B*** | **β** | ***p*** |
|---|---|---|---|---|
| **Constant** | 2.65<br>(2.14, 3.15) | 0.25 | | $p<.001$ |
| **Product Attitude** | 0.35<br>(0.21, 0.49) | 0.07 | .49 | $p<.001$ |
| **Credibility** | 0.02<br>(-0.06, 0.10) | 0.04 | .05 | *p=.58* |
| **Intention to Buy** | 0.10<br>(-0.03, 0.23) | 0.06 | .15 | $p=.11$ |
| **Price Expectation** | 0.07<br>(-0.17, 0.30) | 0.12 | .04 | $p=.58$ |
| *$R^2=.40$, $p<.001$* | | | | |

*Table 5: Linear model of predictors of Perceived Healthfulness.*

#### Product Attitude

63,9% of the variability in Product Attitude is accounted for by the predictors Perceived Healthfulness, Credibility, Intention to Buy and Price Expectation, $F(4,143)= 63,37$, $p<.001$. Results show that Perceived Healthfulness, Credibility, and Intention to Buy are significant predictors for Product Attitude (see Table 6). As seen in Table 6 Intention to Buy has the biggest influence on Product Attitude (β=.41) , followed by Perceived Healthfulness (β=.30), and Credibility (β= .27).

| | ***b*** | **SE *B*** | **β** | ***p*** |
|---|---|---|---|---|
| **Constant** | -0.62 (-1.34, 0.09) | 0.36 | | *p*=.09 |
| **Perceived Healthfulness** | 0.42 (0.25, 0.58) | 0.08 | .30 | *p*<.001 |
| **Credibility** | 0.19 (0.11, 0.27) | 0.04 | .27 | *p*<.001 |
| **Intention to Buy** | 0.41 (0.29, 0.53) | 0.06 | .41 | *p*<.001 |
| **Price Expectation** | 0.17 (-0.09, 0.42) | 0.13 | .07 | *p*=.20 |
| $R^2$=.64, *p*<.001 | | | | |

*Table 6: Linear model of predictors of Product Attitude.*

## Credibility

Results show that 36,2% of the variability in Credibility is accounted for by Perceived Healthfulness, Product Attitude, Intention to Buy, and Price Expectation ($F(4,143)= 20,28$, $p<.001$). However only Product Attitude has a significant contribution to the model (see Table 7).

| | ***b*** | **SE *B*** | **β** | ***p*** |
|---|---|---|---|---|
| **Constant** | -0.17 (-1.57, 1.23) | 0.71 | | *p*=.81 |
| **Perceived Healthfulness** | 0.10 (-0.25, 0.45) | 0.18 | .05 | *p*=.58 |
| **Product Attitude** | 0.70 (0.40, 0.99) | 0.15 | .48 | *p*=.18 |
| **Intention to Buy** | 0.18 (-0.09, 0.45) | 0.14 | .13 | *p*<.001 |
| **Price Expectation** | -0.20 (-0.70, 0.30) | 0.25 | -.05 | *p*=.42 |
| $R^2$=.36, *p*<.001 | | | | |

*Table 7: Linear model of predictors of Credibility.*

## Intention to Buy

50,3% of the variability in Intention to Buy is accounted for by the predictors Perceived Healthfulness, Product Attitude, Credibility and Price Expectation, $F(4, 143)= 36,12$, $p<.001$.

Again only Product Attitude is a significant predictor for Intention to Buy (β=.57, $p$<.001) (see Table 8).

| | ***b*** | **SE *B*** | **β** | ***p*** |
|---|---|---|---|---|
| **Constant** | 1.13 (0.29, 1.97) | 0.42 | | $p$<.05 |
| **Perceived Healthfulness** | 0.17 (-0.04, 0.38) | 0.11 | .12 | $p$=.11 |
| **Product Attitude** | 0.57 (0.40, 0.76) | 0.09 | .57 | $p$<.001 |
| **Credibility** | 0.07 (-0.03, 0.17) | 0.05 | .10 | $p$=.57 |
| **Price Expectation** | -0.09 (-0.39, 0.22) | 0.16 | -.03 | $p$=.18 |
| $R^2$=.50, $p$<.001 | | | | |

*Table 8: Linear model of predictors of Intention to Buy.*

## Price Expectation

Results show that 2,2% of the variability in Price Expectation is accounted for by the predictors, the model is however not significant ($F$(4, 143)=0,82, $p$=.51). Meaning that Perceived Healthfulness, Product Attitude, Credibility and Intention to Buy, have no influence on Price Expectation.

## Linear model of the dependent variables concerning Yoghurt

Figure 14 shows the relationships between the dependent variables concerning Yoghurt, and to what degree each predictor affects the outcome of the dependent variable.

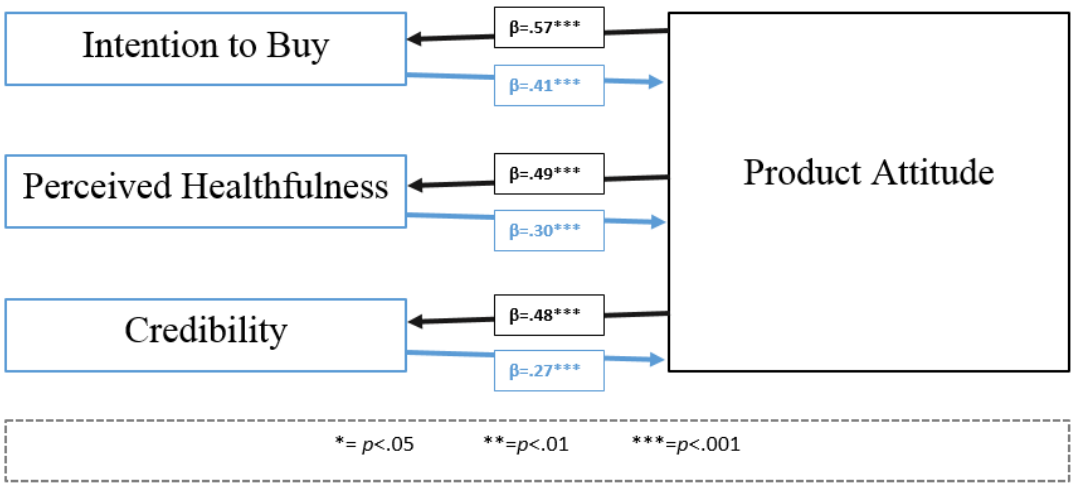



*Figure 14: Linear model of the dependent variables concerning Yoghurt.*

### *Relations between the Dependent Variables concerning Biscuits*

### Perceived Healthfulness

13,2% of the variability in the Perceived Healthfulness of the biscuits is accounted for by the predictors (the other dependent variables), $F$ (4,143)=5,42, $p$<.001. However Table 9 shows that only Credibility is a significant predictor in this model (β=.25, $p$<.01).

| | ***b*** | **SE *B*** | **β** | ***p*** |
|---|---|---|---|---|
| **Constant** | 3.20 (2.56, 3.84) | 0.32 | | $p$<.001 |
| **Product Attitude** | 0.04 (-0.12, 0.21) | 0.08 | .06 | $p$=.61 |
| **Credibility** | 0.14 (0.04, 0.24) | 0.05 | .25 | *p=.16* |
| **Intention to Buy** | 0.12 (-0.05, 0.29) | 0.09 | .14 | $p$<.01 |
| **Price Expectation** | -0.04 (-0.20, 0.12) | 0.08 | -.04 | $p$=.61 |
| *$R^2$=.13, p<.01* | | | | |

*Table 9: Linear model of predictors of Perceived Healthfulness.*

### Product Attitude

48,3% of the variability in Product Attitude is accounted for by the predictors ($F$(4,143)= 33,37, $p$<.001). Table 10 (next page) shows that Intention to Buy is the biggest predictor, followed by Credibility and Price Expectation. Perceived Healthfulness does not have a significant contribution to the model.

### Credibility

28% of the variability in Credibility of the biscuits is accounted for by the predictors, $F$(4,143)= 13,93, $p$<.001. Results show that only Perceived Healthfulness and Product Attitude are significant predictors for Credibility (see Table 11, next page). Product Attitude has a bigger influence on Credibility, in comparison with Perceived Healthfulness.

| | ***b*** | **SE *B*** | **β** | ***p*** |
|---|---|---|---|---|
| **Constant** | 0.12 (-0.73, 0.97) | 0.43 | | *p*=.78 |
| **Perceived Healthfulness** | 0.04 (-0.12, 0.21) | 0.09 | .03 | *p*=.61 |
| **Credibility** | 0.23 (0.13, 0.32) | 0.05 | .30 | *p*<.001 |
| **Intention to Buy** | 0.57 (0.43, 0.72) | 0.07 | .50 | *p*<.001 |
| **Price Expectation** | 0.22 (0.06, 0.37) | 0.08 | .17 | *p*<.01 |
| *$R^2$=.48, p<.001* | | | | |

*Table 10: Linear model of predictors of Product Attitude.*

| | ***b*** | **SE *B*** | **β** | ***p*** |
|---|---|---|---|---|
| **Constant** | -0.16 (-1.49, 1.17) | 0.67 | | *p*=.81 |
| **Perceived Healthfulness** | 0.36 (0.10, 0.62) | 0.13 | .20 | *p*<.01 |
| **Product Attitude** | 0.56 (0.32, 0.80) | 0.12 | .42 | *p*<.001 |
| **Intention to Buy** | 0.05 (-0.22, 0.33) | 0.14 | .03 | *p*=.71 |
| **Price Expectation** | -0.17 (-0.42, 0.08) | 0.13 | -.10 | *p*=.19 |
| *$R^2$=.28, p<.001* | | | | |

*Table 11: Linear model of predictors of Credibility.*

## Intention to Buy

Results show that 39,3% of the variability in Intention to Buy is accounted for by Perceived Healthfulness, Product Attitude, Credibility, and Price Expectation, $F(4,143)= 23,21$, $p<.001$. However Table 12 (next page) shows that only Product Attitude has a significant contribution to the model.

## Price Expectation

5,4% of the variability in Price Expectation is accounted for by the predictors, the model is however not significant ($F(4, 143)= 2,06$, $p=.09$). Remarkable was that although the model is

not significant, results show that Product Attitude is a significant predictor in this model (β=.31, *p*<.01). However when performing regression analysis with one predictor (Product Attitude), results show that this model is not significant. Meaning that Product Attitude is not a significant contribution to the model (β=.16, *p*=.056).

| | ***b*** | **SE *B*** | **β** | ***p*** |
|---|---|---|---|---|
| **Constant** | 1.86 (1.12, 2.60) | 0.37 | | *p*<.001 |
| **Perceived Healthfulness** | 0.11 (-0.05, 0.27) | 0.08 | .10 | *p*=.16 |
| **Product Attitude** | 0.51 (0.38, 0.64) | 0.07 | .59 | *p*<.001 |
| **Credibility** | 0.02 (-0.08, 0.12) | 0.05 | .03 | *p*=.71 |
| **Price Expectation** | -0.09 (-0.24, 0.06) | 0.08 | -.08 | *p*=.22 |
| $R^2$=.39, *p*<.001 | | | | |

*Table 12: Linear model of predictors of Intention to Buy.*

## Linear model of the dependent variables concerning Biscuits

Figure 15 shows the relationships between the dependent variables concerning Biscuits, and to what degree each predictor affects the outcome of the dependent variable.

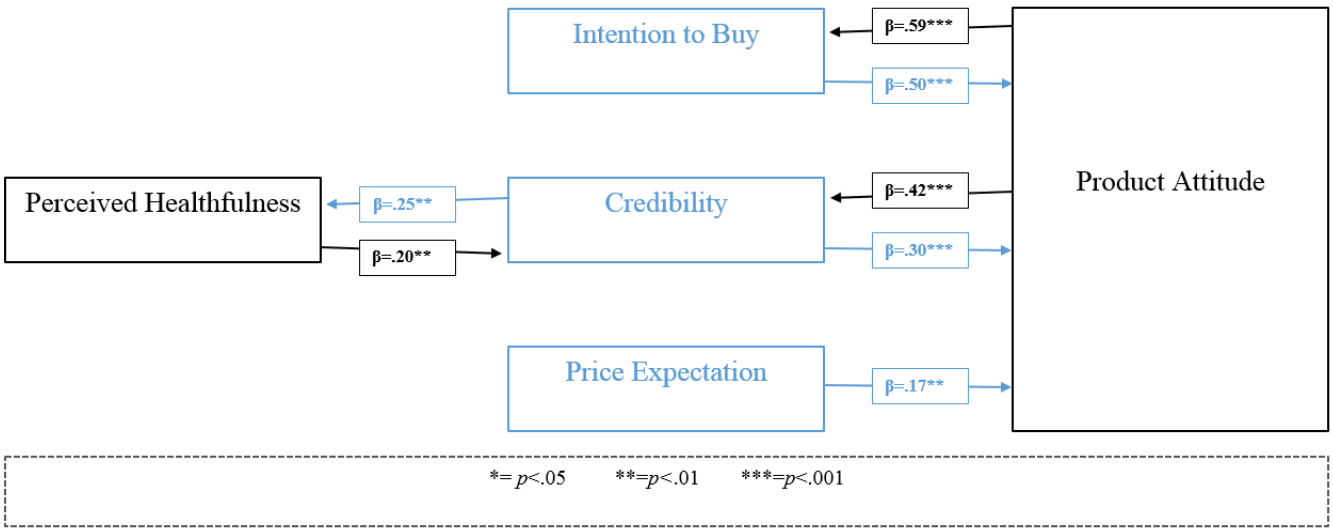



*Figure 15: Linear model of the dependent variables concerning Biscuits.*

## 4.8 Discussion

Results from Study 2 show that package design does influence the perceived healthfulness of consumers, confirming the fact that consumers create an expectation of one product impression through the impression of another resource (Pinson, 1986; Krishna, 2006). But in this research only manipulations in package color effected the perceived healthfulness of a product, and this only holds true for the healthy product yoghurt. Hypothesis 1 is therefore partially confirmed, meaning that product package can contribute to a healthier product perception, but only when it concerns a manipulation in color for healthy products. It can thus be said that color dominates shape in 'healthiness' perception. Past research also found that color is one of the most potent features in the design of product packaging in the food industry (Deliza, Macfie, & Hedderley, 2003; Hine, 1995). It is also one of the features of a product package that triggers the fastest response (Swientek, 2001). Within the food industry it has been previously indicated that food color affects the consumer's ability to correctly identify flavor, to form distinct flavor profiles and preferences, and dominates other flavor information sources, including labeling and taste (Garder, Hyatt, & Starr, 2000). Color it thus known to dominate other product features, when it concerns products in the food industry. This research confirms that package color also dominates other package features when it concerns the perceived healthfulness of products. This confirms hypothesis 5 and rejects hypothesis 2.

Results indicate that manipulations in product packaging, in this case package color, only affect the perceived healthfulness of the healthy product yoghurt. This might be explained by cue congruence: cue congruence can be defined as the degree of fit among characteristics of a stimulus (Bone & Ellen, 1999; Peracchio & Tybout, 1996). There can be congruency among physical aspects of a product as well as among the symbolic meanings of components (Van Rompay & Pruyn, 2011). One way to understand congruence effects, in relation to consumer products, is through processing fluency: stimuli that can be easily processed are generally evaluated in positive terms and inspire favorable attitudes (Lee & Labroo, 2004; Reber, Schwarz, & Winkielman, 2004). Van Rompay and Pruyn (2011) argue that stimulus congruence may also facilitate processing and contribute to positive evaluations of products and their corresponding brands. When confronted with products, consumers face the task of integrating meanings connoted across product elements into an overall impression. Products high in congruence are expected to facilitate impression formation, as opposed to products low in congruence (Hekkert, 2006), explaining why congruent stimuli are preferred to incongruent stimuli. Study 1 demonstrated that the green package color carries a symbolic

meaning in this research: 'healthiness'. When the healthy product contains a green package color, the symbolic meanings of the product and the package color match rather than mismatch, leading to a higher perceived healthfulness. Congruence in symbolic meaning also seems to affect the credibility, attitude, and intention to buy. Whereas for the healthy product, a healthy package manipulation (meaning a 'healthy' color and a 'healthy' shape) leads to a higher credibility, a more positive attitude and higher intention to buy. This confirms research done by Kirshna, Elder and Caldara (2010), showing that cue congruency rather than cue incongruence enhances product evaluations. Krishna et al. (2010) examined the effect congruence between smell (feminine or masculine) and touch (feminine or masculine) and demonstrated that multisensory semantic congruence of smell and texture lead to enhanced haptic perceptions and that congruence of semantic associations lead to more positive perceptions . The semantic associations of the healthy product and the 'healthy' manipulated package color are thus congruent, and therefore enhanced the perceived healthfulness and overall product evaluation. Hypothesis 8 and 9 are therefore confirmed.

However when looking at the unhealthy product, a healthy instead of an unhealthy package shape leads to a higher credibility, meaning that in this case incongruence positively affects consumer judgments. This can be explained by the unusual shape of the unhealthy package, leading to an unrealistic package container, which consumer do not expect for this product. A healthy package color also leads to a more positive attitude towards the unhealthy product and a higher intention to buy the unhealthy product, in comparison with the unhealthy package color. This can be explained by the fact that the unhealthy color is associated with death and grief (Aslam, 2006), leading to a negative thought about the product. As explained above it the color of food dominates other flavor information sources (Garder, Hyatt, & Starr, 2000), the color black leads to an unfavorable attitude towards the product (and therefore also an unfavorable taste expectation). Therefore, it can be said that these effects aren't attributable to the effects of congruency between stimuli, but are more attributable to color preferences in the food industry.

Concerning the price expectation for the products, shape has an effect on the price expectation of both products. The unhealthy package shape leads to a higher price expectation for both products. This can be explained by research done by Holmberg (1983), Holmberg shows that product and package shape has an influence on the perceived volume and heaviness of objects. The unhealthy shapes are probably expected to contain more volume and are therefore expected to be more expensive. Also according to Folkes and Matta (2004) consumers overestimate volume of an unusually shaped container, when compared to a more

usual shape. This especially explains the significant difference in price expectation between the two package shapes for biscuits.

For the unhealthy product *General Health Interest* also affects the price expectation, where respondents with a low GHI expected a lower price, than respondents with a high GHI. People who are interested in their health might unconsciously think of the consequents of eating the unhealthy product and therefore expect to pay a higher price, literally and figuratively. Future research is needed to give a detailed explanation for the difference in price expectation, between respondents with a low and a high GHI.

Results from the regression analysis show that there are significant relationships between the dependent variables Perceived Healthfulness, Product Attitude, Credibility, Intention to Buy, and Price Expectation. The relationships between the dependent variables of Yoghurt are different from the relationships between the dependent variables of Biscuits. For instance the Perceived Healthfulness plays a different role for every product, whereas for Yoghurt it influences and is influenced by Product Attitude, for Biscuits it influences and is influenced by Credibility. Another difference is that Price Expectation does play a role for Biscuits, whereas it is a predictor for Product Attitude, but Price Expectation is not a predictor for any of the dependent variables of Yoghurt. Similarities between the results of the regression analysis of the two products, are that Product Attitude influences and is influenced by both Intention to Buy and Credibility, and that for both products none of the dependent variables has an influence on the Price Expectation. Further research is needed to examine why there are differences in these relationships between the products, and why these relationships exist.

## 5. General Discussion

The goal of this research is to examine to what extend package design, in particular package color and package shape, has an influence on consumers' perceptions. In specific to what extend package design influences the perceived healthfulness of a product. Table 13 shows which hypothesis are confirmed and which hypothesis are rejected. It shows that the 'healthy' manipulation of the product packages only lead to a higher perceived healthfulness, when it concerns a healthy product. Hypothesis concerning the effect of package shape are rejected, while hypothesis concerning the effect of package color are confirmed. The results show that package color dominates package shape, when it concerns the perceived healthfulness of a product. These results show that people have healthy associations with color, meaning that some colors are perceived as more healthy than other colors. However concerning the fact that

| Hypothesis | Supported? |
|---|---|
| 1. *The use of a 'healthy' package design will lead respondents to having a relatively healthier product perception, than with the use of a 'less healthy' package design.* | **yes*** |
| 2. *Using a package shape that is perceived as healthy, will lead respondents to have a relatively healthier product perception, than using package shape that is perceived as less healthy.* | **no** |
| 3. *A product package with round shapes will be perceived as more healthy, than a product package with angular shapes.* | **no** |
| 4. *Product packages that mimic a healthy body will be perceived as more healthy, than product packages that mimic an unhealthy body.* | **yes** |
| 5. *Using a color that is perceived as healthy on a product package, will lead to a relatively healthier product perception, compared to using a color that is perceived as less healthy.* | **yes** |
| 6. *A product with a green package color will be perceived as relatively more healthy, than a product with a non-green package color.* | **yes** |
| 7. *A product with a red or black package color will be perceived as relatively less healthy, than products with packages that are not red or black.* | **yes** |
| 8. *Shape-color congruency will lead to a more positive overall product attitude and a more healthy product perception compared to shape-color incongruency.* | **yes** |
| 9. *Stimuli congruency (a healthy manipulated package in combination with a healthy product) will lead to a more positive overall product attitude compared to stimuli incongruency (an unhealthy manipulated package in combination with a healthy product).* | **yes** |

*= hypothesis is only confirmed for the healthy product Yoghurt

*Table 13: Confirmed and rejected hypothesis.*

shape did not affect the perceived healthfulness, people might not have healthy associations with package shapes. Further research is needed to examine whether people have associations of shapes and healthiness. In study 1 participants had to rate shapes on their healthiness, but

participants were not asked why they rate one shape as more healthy than the other shape. Perhaps respondents did not really thought a shape was healthy, but rated it as healthy because it was the shape mostly used for that product. Qualitative research, in the form of interviews, will examine whether or not people really have associations with a package shape and healthiness. Study 1 did show that packages that mimic a healthy body, and in this case are perceived as being thinner, are perceived as being more healthy, than product packages that mimic an unhealthy body (packages that are perceived as being fatter or bigger). This can be explained by the fact that people perceive a thin body as being healthier, than a bigger of fatter body. However further qualitative research is needed to examine whether people actually have these associations with the package shapes, to ensure the fact that the results can be attributed to these associations . Hypothesis 8 and 9 are confirmed, confirming the fact that congruent stimuli are preferred to incongruent stimuli (Hekkert, 2006). Research in the past also demonstrated that stimuli that is congruent can be easily processed, and will therefore generally be evaluated in positive terms and inspire favorable attitudes (Lee & Labroo, 2004; Reber, Schwarz, & Winkielman, 2004).

## 6. Limitations and future research

This research is carried out with yoghurt and biscuits, but could also be performed with many other products. Currently many other food producers put health claims on their products, these products can also be used in research concerning the effect of product package on perceived healthfulness (drinks, meat products, fish, other deserts etc.). It can also be performed on other unhealthy products, like for instance chips, ice, chocolate etc. It is interesting to examine whether the main effects in this research also apply for other food products. Also in this research the products have no specific brand name, meaning that participants are not familiar with the brand. Main effects therefore will not automatically also hold true for product packages of well-known brands. Underwood, Klein, and Burke (2001) conducted a research where respondents were asked to make purchases in a simulated shopping environment. They examined to what extent a consumer is guided or not guided by the presence of photography in a package, and whether there is a difference between familiar and unfamiliar brands. The results show that brands which are less generally known than the national brands, are more dependent upon visual indications to attract attention. According to Underwood, Klein, and Burke (2001) the theory behind this is that in general consumers use more visual packaging features when they are not of hardly familiar with a brand. Therefore

it might be interesting for future research to examine if the same effects hold true for brands that are nationally known.

Another starting point for future research is the fact that in this research product packages are displayed in an online survey, meaning that respondents did not have any real references. This might have biased the results, therefore making it interesting to carry out the same research, but instead of using images of the package, using actual packages. Respondents then can refer to an actual package, making it easier to make judgments about size, shape and color. Also all respondents will then see the exact same color, whereas displaying the images on respondents' computer screens may lead to perceived differences in package color.

The study took place in the Netherlands, and only Dutch respondents participated in the survey. Therefore findings can't be generalized to other cultures. According to Madden, Hewett, and Roth (2000) there are both similarities and dissimilarities in color preferences and color meaning associations between different cultures. There also might be difference in what is perceived as healthy or unhealthy or there might be differences in associations with shapes, between different cultures. Therefore for future research it is important to include a cultural moderator to examine whether there are also differences in consumer's perceived healthfulness and overall product evaluation. Also what might be interesting for future research is to investigate why consumers perceive certain colors and certain shapes as healthy. In the pre-study healthy colors and healthy shapes are identified, but participants did not explain why these product features are perceived as healthy or unhealthy. In future research a short follow up interview (after participants filled in the survey) can clarify the results. It is for instance remarkable that certain shapes in the pre-study are seen as healthy, but that these healthy shapes did not contribute to a healthier product perception in the main study. Also detailed research as to whether people really associate thin looking package shapes, with thin bodies and therefore rate the shape as healthy, or if there are other reasons behind these perceptions, is needed . More research is thus needed whether and why product features can be perceived as healthy or unhealthy. The same holds true for further investigating why respondents expect a higher price for certain packages and why people with a higher interest in health expect a higher price for an unhealthy product. Additional interviews can clarify and examine the reasons behind consumer's perceptions.

In this research package shape and package color are the package features being manipulated, but for future research it might be interesting to manipulate other package features. For instance logo, font type and package material can be used as independent

variables, to examine whether these can also affect the perceived healthfulness of a product. Underwood and Ozanne (1998) show that packaging is extremely important for food products, because most of the times the actual product cannot be seen. The consumers have to rely on the product package, in order to form a product impression. Also the more sensory characteristics a product or product has, the better a consumer can form a product impression. As Krishna (2010, pp. 1) explains: the more firms can create, accentuate, or highlight the sensuality of their products, the more appealing these products can be for consumers. So for future research, other senses may also be examined, for instance evaluate if and how current manipulations in package color and shape affects taste, but also if taste affects the perceived healthfulness. It is known that consumers think unhealthy food is tastier, real experiments in which participants have to taste the products, might affect their perceived healthfulness. It is also interesting to take haptic and smell into account and examine whether these senses can have an effect on the perceived healthfulness of a product. Interaction between senses is also interesting to examine concerning the perceived healthfulness.

Another starting point for future research can be to examine other personality scales, whereas in this research only the *General Health Interest-scale* is used as an additional scale. General Health Interest only affected the price expectation, but other personality scales might also affect other product perceptions. For instance the Centrality of Visual Aesthetics (Bloch, Brunel, & Arnold, 2003), which measures to what extent someone is sensitive to design. Consumers who have a high score on this scale are 'sensitive to design', and will probably perceive certain effects of a package sooner than consumers that are not sensitive do design. Meyers-Levy and Peraccio (1995) examined the use of color in ad images and the motivation to process these images. They found that the extent to which color in advertisements affects consumers attitudes depends on to what extent consumers are motivated to process the ad. The study shows that a lack of motivation to process the ad in combination with the use of color in an add, yielded more positive attitudes. It is interesting to examine if the same holds true for product packaging. Another personality scale that could be used in future research, is the Need for Touch scale (Peck & Childers, 2003). This can be especially used in research investigating the effect of product features on haptics, or in this case the effect of haptics on perceived healthfulness.

# 7. Marketing implications

Despite the limitations of this study, results can serve as a guideline for food producers trying to sell a healthy product. When it concerns daily groceries, like yoghurt and biscuits, it is very important to distinguish itself from other competing brands. The product package is communicating a symbolic meaning through the product features, like shape, logo, font, color and material. The underlying idea is that consumers use the symbolic information of a package to create certain expectations about the product (Bloch, 1995; Govers & Schoormans, 2005; Doyle & Bottomley, 2006; Van Rompay, Hekkert, Saakes, & Russo, 2005). Product packaging may, in addition to shaping expectations, even modulate subsequent product experiences (Cardello, 1994; Schifferstein, Kole & Mojet, 1999). Marketers and food producers should therefore gather more information concerning the symbolic information communicated through the product packaging.

Brands and products that claim to be healthy, can contribute to the perceived healthfulness, by choosing a green package color. According to the study a green package will lead to a healthier product perception, but this only works for products that are perceived as healthy, and not for products that are perceived as unhealthy. Although the study shows that package shape does not affect the perceived healthfulness, package shape does have an effect on credibility, attitude towards the product, and intention to buy. Package color also have an effect on credibility, attitude towards, and intention to buy. Whereas when a healthy product has a healthy package color or healthy package shape, the product will be perceived as more credible, respondents will have a more positive attitude, and a higher intention to buy the product. The healthy manipulation of the product package concerning a healthy product can therefore increase sales, which is interesting for food producers, product designers and marketers. Results also suggest that it is important that the product package is perceived as credible for both the healthy and unhealthy product, this will generally lead to a positive attitude, and a higher intention to buy the product. Food producers should therefore first test whether the designed food container or product package is rated as credible, because when it is perceived as credible this can positively influence product perception and sales.

# 8. Conclusion

This research is conducted to examine whether packaging, in particular package shape and package color, can contribute to perceived product healthfulness. Study 1 shows that, as expected, green is perceived as the most healthy package color, and black is perceived as the least healthy package color. Package shapes are not judged as expected, packages with round

shapes are in general not perceived as more healthy than packages with angular shapes. However packages that mimic a healthy body (packages that are thinner and smaller) were generally perceived as more healthy, than packages that mimic an unhealthy body (packages that are bigger and fatter). Although this effect was expected, further research is needed to examine whether these associations between package shape and body silhouettes really exist. More detailed research may examine if these effects are genuinely attributable to the expected associations between shapes and bodies. Study 2 reveals that only package color has an effect on the perceived healthfulness, where the healthy package color leads to a higher perceived healthfulness, in comparison with the unhealthy package color. This however only holds true for the healthy product Yoghurt. This can be explained by congruence in symbolic meaning: the symbolic meanings of the product and the package color match rather than mismatch, which enhances the perceived healthfulness of the product. These results are interesting for food producers of healthy products, concerning the fact that 'healthy' manipulations of package color can lead to a healthier product perception. Package color also has an effect on other variables such as credibility, product attitude (only for the healthy product), and the intention to buy. For all these variables, the healthy package color leads to a higher (more positive) score, in comparison with the unhealthy package color.

Although package shape does not affect the perceived healthfulness, it does affect the credibility of the product. Whereas an unhealthy product package, leads to a lower credibility of the product. According to regression analysis there is a positive relationship between credibility and product attitude, meaning that when the credibility is high, the product attitude will also be high (positive). This is important for marketers and food producers: when using the right package shape for a product, the credibility of the product will be higher, which also leads to a more positive product attitude. There also is a positive relationship between product attitude and intention to buy, meaning that when the product attitude is high, the intention to buy will also be high. Thus when products have the right package shape, this will lead to a higher credibility, that will result in more positive product attitudes, which increases the intention to buy. When designing a product package producers should keep in mind that package colors and package shapes affect product evaluation. For healthy food products a healthy package color can lead to a higher perceived healthfulness, as well as increasing its credibility, product attitude (also holds true for the unhealthy product) and intention to buy (also holds true for the unhealthy product). Package shape does not influence the perceived healthfulness, but it does affect the product credibility. When the credibility is high, this can eventually lead to increases of product sales.

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# 10. Appendices

## 10.1 Appendix A

| ***Junk Food*** | ***Healthy Food*** |
|---|---|
| Not good for you | Good for you |
| High in one or more of:<br>*Sugar*<br>*Fat*<br>*Cholesterol*<br>*Salt*<br>*Calories* | Low in:<br>*Sugar*<br>*Fat*<br>*Cholesterol*<br>*Salt* |
| Contains:<br>*Additives*<br>*Preservatives*<br>*Artificial ingredients* | Lower in calories than junk food |
| Doesn't do anything for you | Low in:<br>*Additives*<br>*Preservatives*<br>*Artificial ingredients* |
| Fattening | Natural |
| Causes pimples | Contains:<br>*Vitamins*<br>*Minerals*<br>*Protein* |
| Convenient | Helps maintain weight |
| Tastes good | Helps maintain clear skin |
| Affordable | |

## 10.2 Appendix B

**Yoghurt Package Colors**

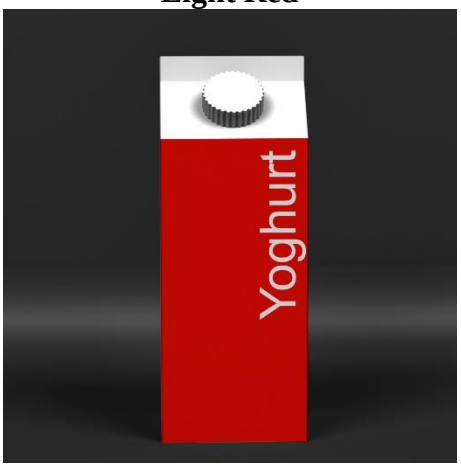
**Light Blue**


**Dark Blue**

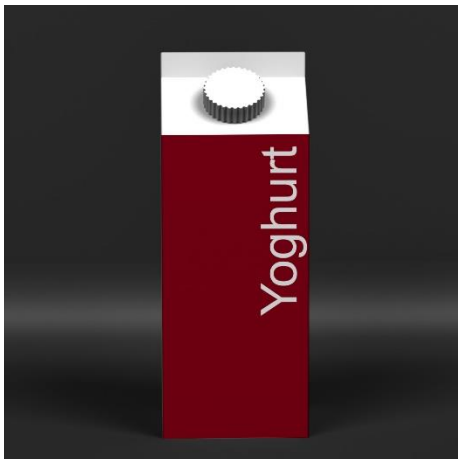

**Light Green**


**Dark Green**


**Light Red**




**Dark Red**



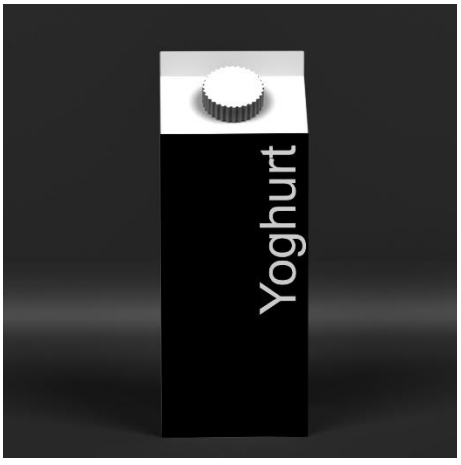
**Light Pink**


**Dark Pink**


**Yellow**


**Orange**

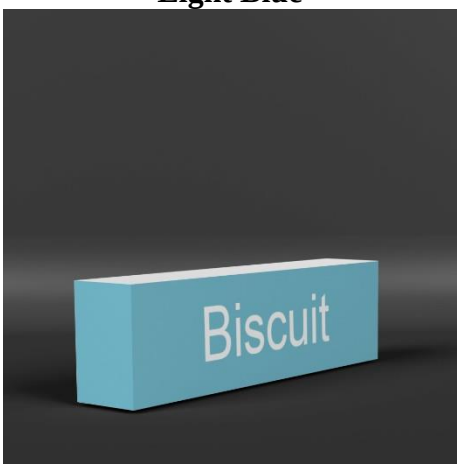

**Black**



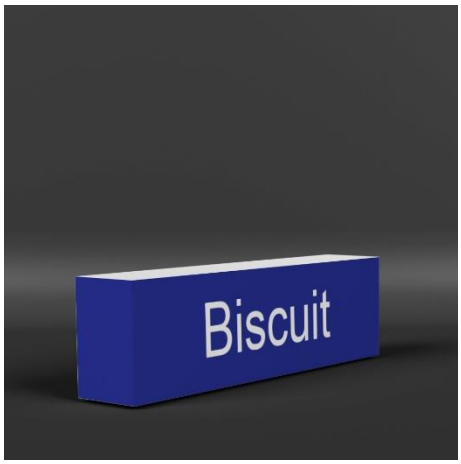

**White**

**Biscuit Package Colors**

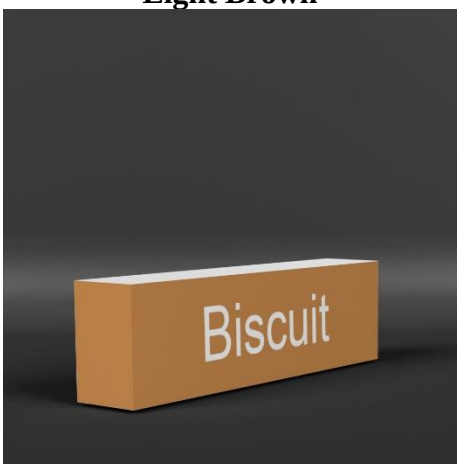
**Light Blue**



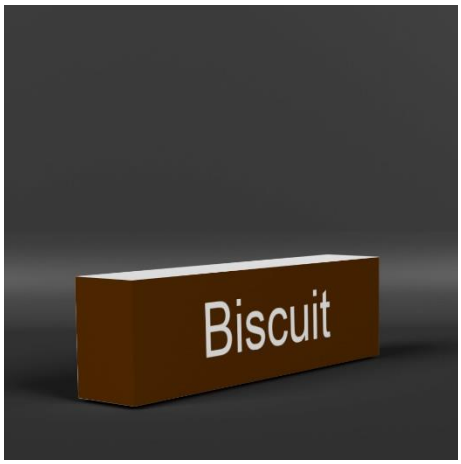

**Dark Blue**




**Light Brown**

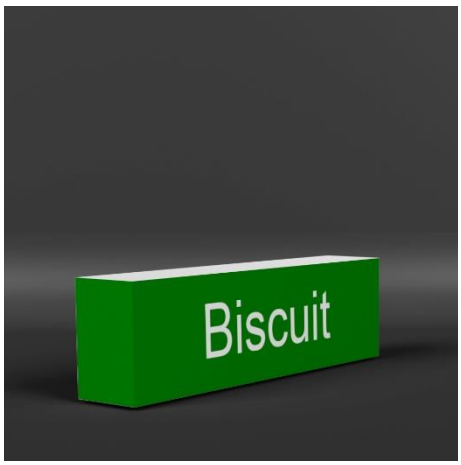



**Dark Brown**

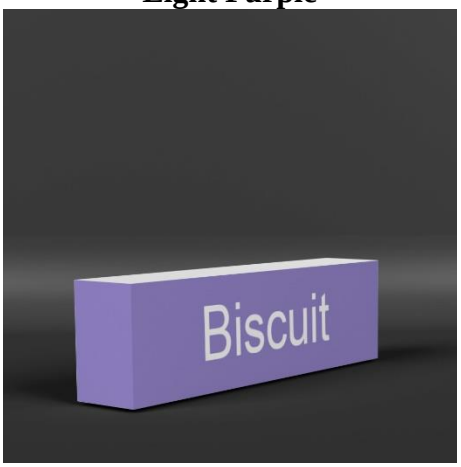



**Light Green**


**Dark Green**

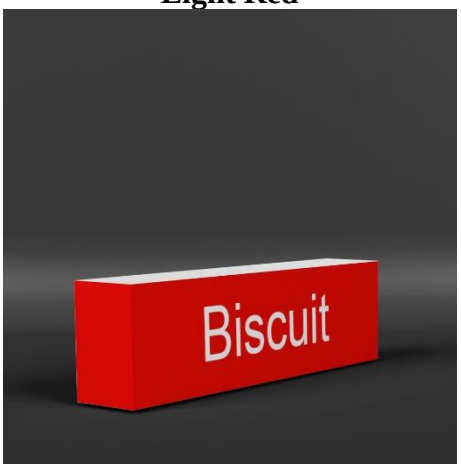


**Light Purple**




**Dark Purple**


**Light Red**




**Dark Red**


**Yellow (Wheat)**


**Black**

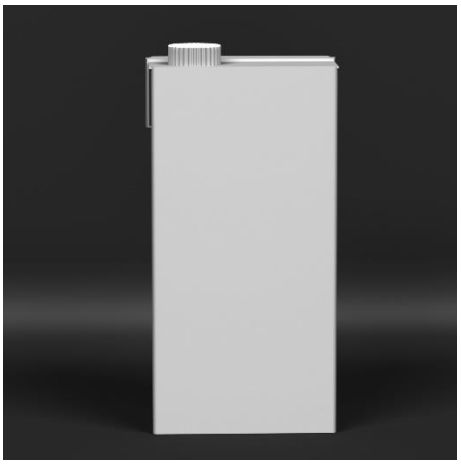
## 10.3 Appendix C

**Yoghurt Package Shapes**

**Y1**

**Y2**

**Y3**

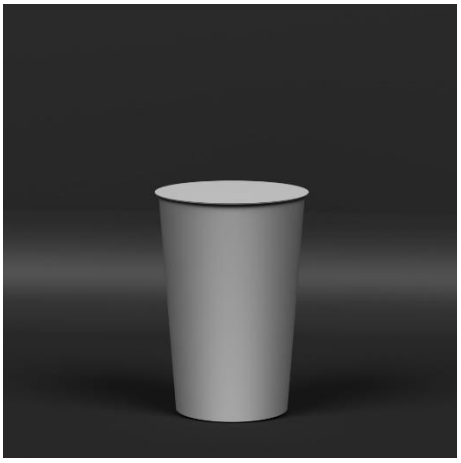


**Y4**

**Y5**

**Y6**

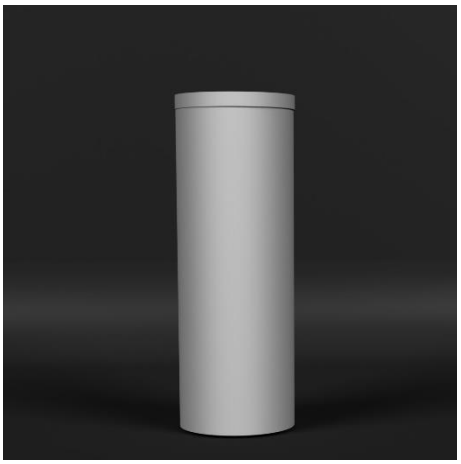
**Y7**



**Y8**

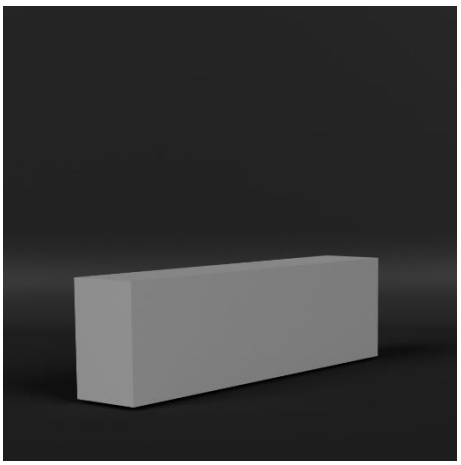
**Biscuit Package Shapes**

**K1**

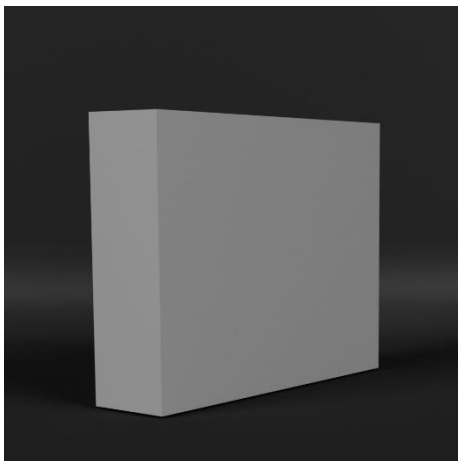


**K2**

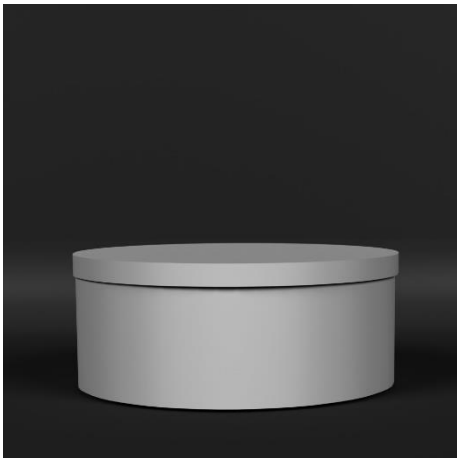
**K3**



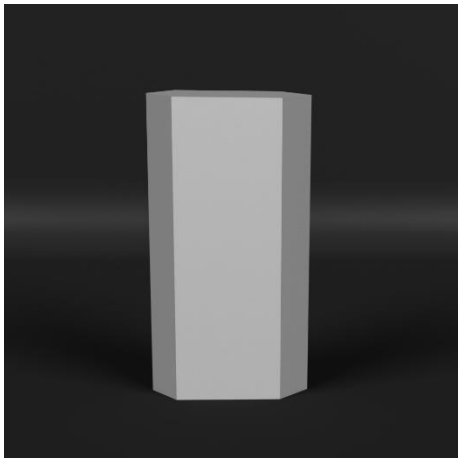
**K4**



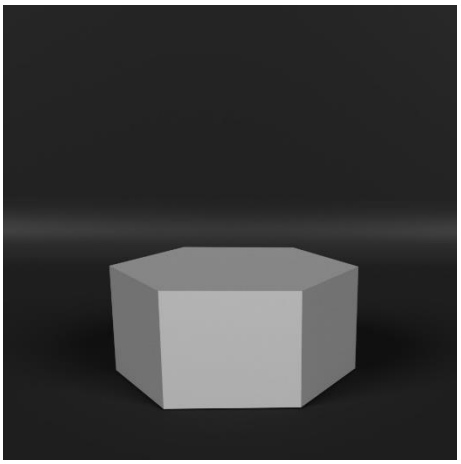
**K5**



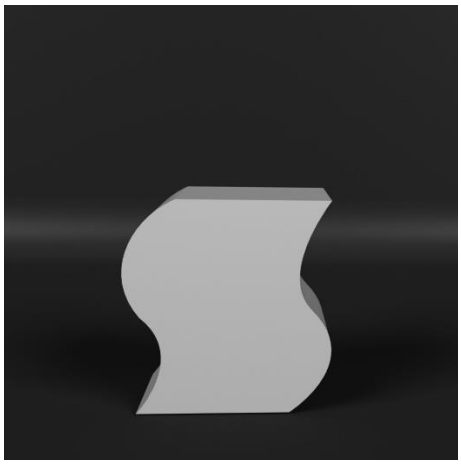
**K6**



**K7**



**K8**



## 10.4 Appendix D

**Wat is uw leeftijd?***

0

3.

**Wat is uw hoogst genoten opleiding?**

- ☐ Basisonderwijs
- ☐ VMBO
- ☐ HAVO
- ☐ VWO
- ☐ MBO
- ☐ HBO
- ☐ WO

Volgende pagina

www.thesistools.com

**In het volgende onderdeel beoordeelt u de kleur van twaalf yoghurt verpakkingen aan de hand van de verschillende stellingen. Probeer dit zoveel mogelijk op gevoel in te vullen, zonder er te lang bij na te denken.**

4.

**Ik beoordeel dit product als:**

| | | |
|---|---|---|
| Gezond | ○ ○ ○ ○ ○ ○ ○ | Ongezond |
| Natuurlijk | ○ ○ ○ ○ ○ ○ ○ | Onnatuurlijk |
| Aangenaam | ○ ○ ○ ○ ○ ○ ○ | Onaangenaam |
| Goede smaak | ○ ○ ○ ○ ○ ○ ○ | Slechte smaak |

## 10.5 Appendix E

### Introduction online survey

As part of my Master's program at the University of Twente, I'm carrying out a study concerning packaging design. Completing this questionnaire will take approximately ten minutes.

The data will be processed anonymously and will only be used for this research. When interested in the results of this study, please fill out your e-mail at the end of the survey.

Thank you for your cooperation!

Inge Ruumpol

### Demographics

Age :

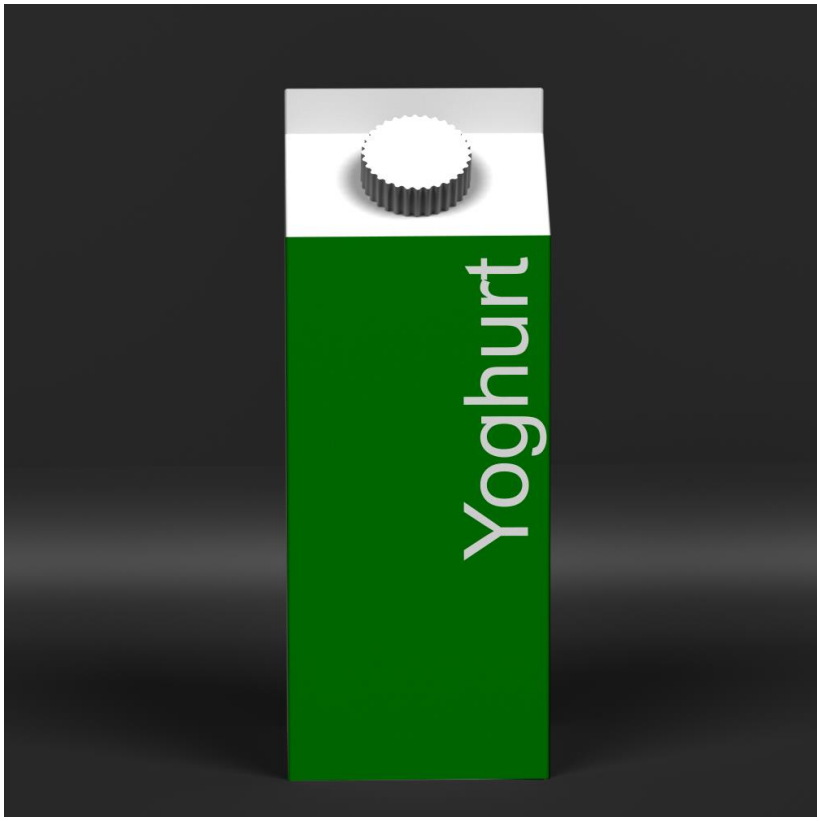
Sex : - Male.
- Female.

Highest level of education : - Primary education.
- Preparatory Secondary Vocational Education.
- Higher General Secondary Education.
- Pre-university Education.
- Vocational Education study.
- Higher Professional Education study.
- University Education study.

Do you have a food allergy? : - No.
-Yes, Lactose intolerance.
- Yes, Gluten allergy.

Are you vegan? : - Yes.
- No.

The following pages contain several statements related to the product shown below. The aim is to indicate to what extend you agree with these statements. Where 1 = "strongly disagree" and 7 "strongly agree."




## Health perception of the product

To what extend do you rate this product to be:

| | Strongly disagree | Disagree | Tend to disagree | Don't disagree/ Don't agree | Tend to agree | Agree | Strongly agree |
|---|---|---|---|---|---|---|---|
| Nutritional | | | | | | | |
| Pure | | | | | | | |
| Natural | | | | | | | |
| Chemical | | | | | | | |
| High fiber | | | | | | | |
| Artificial | | | | | | | |
| Healthy | | | | | | | |
| Full of vitamin | | | | | | | |
| | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Full of calories | | | | | | | |
| Unhealthy | | | | | | | |
| Fat | | | | | | | |
| Unnatural | | | | | | | |

## Product Attitude

| **Statements:** | Strongly disagree | Disagree | Tend to disagree | Don't disagree/ Don't agree | Tend to agree | Agree | Strongly agree |
|---|---|---|---|---|---|---|---|
| **General** | | | | | | | |
| *This product is appealing to me.* | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| *This product looks tasty.* | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| *I like this product.* | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| **Intention to buy** | | | | | | | |
| *I am prepared to try this product.* | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| *I am prepared to buy this product regularly.* | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| *This product doesn't suit me.* | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| *I will not buy this product, i am loyal to another brand.* | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| **Price expectation** | | | | | | | |
| *I expect this product to be relatively inexpensive.* | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| *What is your expectation of the product price in €?* | *€....,.....* | | | | | | |
| **Stimuli credibility** | | | | | | | |
| *This product package looks real.* | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| *This product package looks credible.* | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| *The packaging is appropriate for this type of product.* | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |

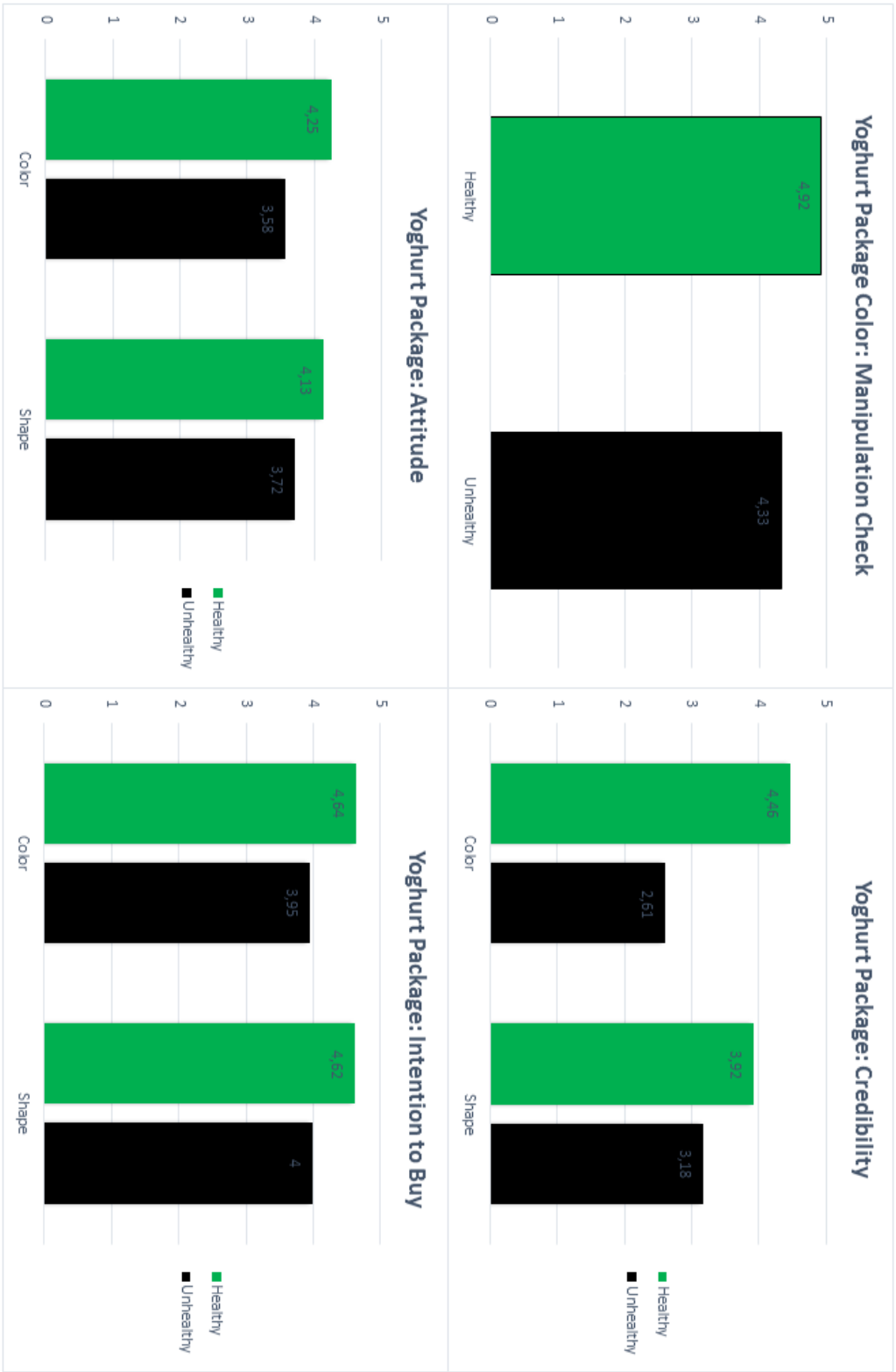
## General Health Interest

This part concerns your eating habits, the intention is to indicate to what extent you agree with these statements.

| **Statements:** | Strongly disagree | Disagree | Tend to disagree | Don't disagree/ Don't agree | Tend to agree | Agree | Strongly agree |
|---|---|---|---|---|---|---|---|
| *The healthiness of food has little impact on my food choices.* | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| *I am very particular about the healthiness of food I eat.* | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| *I eat what I like and I do not worry much about the healthiness of food.* | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| *It is important for me that my diet is low in fat.* | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| *I always follow a healthy and balanced diet.* | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| *It is important for me that my daily diet contains a lot of vitamins and minerals.* | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| *The healthiness of snacks makes no difference to me.* | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| *I do not avoid foods, even if they may raise my cholesterol.* | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |

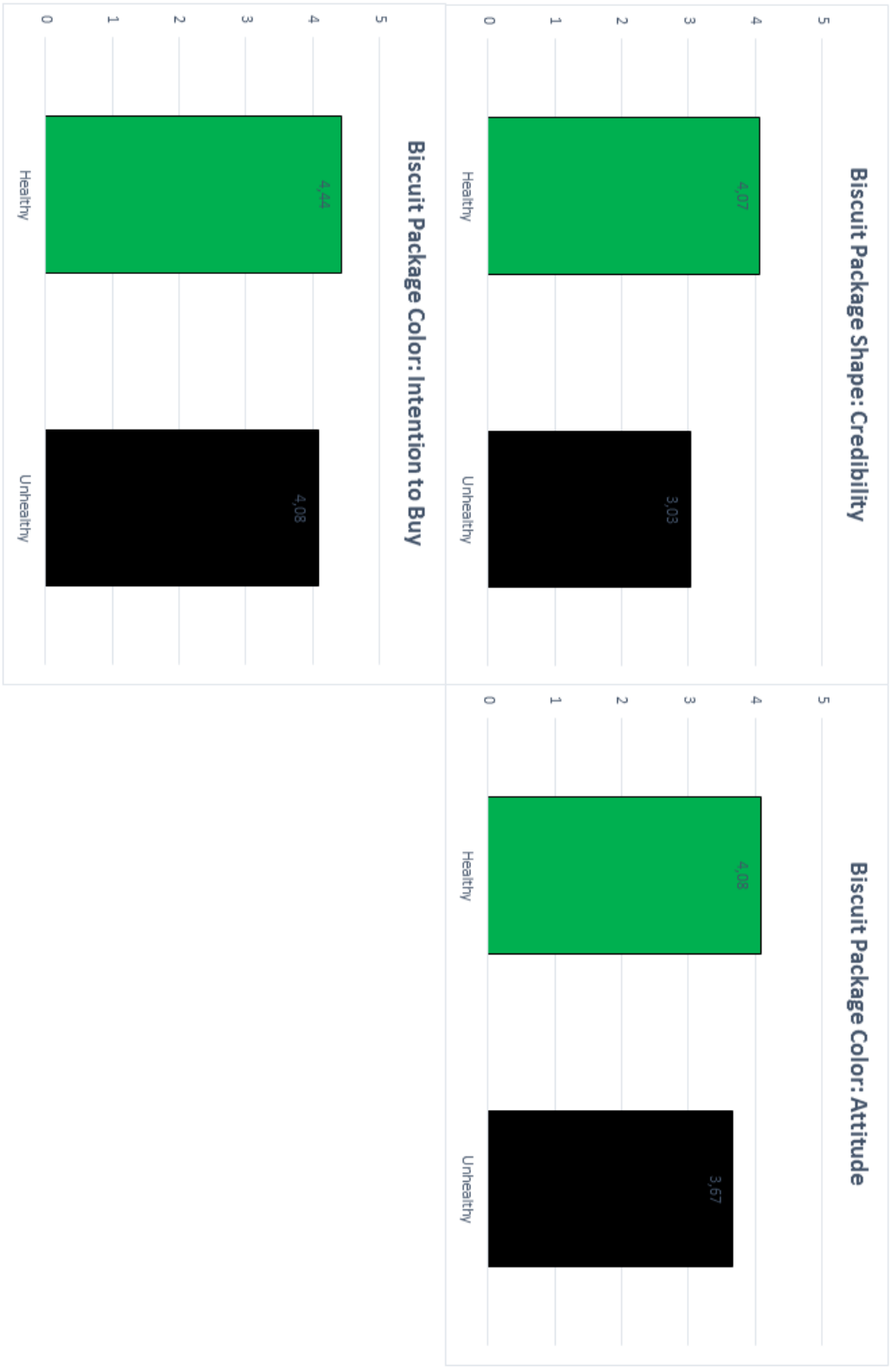
## 10.6 Appendix F

### Significant main effects of Yoghurt



## 10.7 Appendix G

## Significant main effects for Biscuits



## 10.8 Appendix H

## Significant main effects concerning the Price Expectation