'How would it feel like?'
Using haptic imagery to influence online product experiences

Master thesis

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Abstract

In times in which online shopping becomes increasingly important, it is highly relevant to obtain knowledge about possibilities to increase the richness of consumer product experience. In this research, the effects of haptic imagery on the richness of product experience, product liking and purchase intention are investigated. Consumers were exposed to online shopping websites with different combinations of pictures and texts (e.g. haptic text vs. haptic pictures, haptic text vs. non-haptic pictures, non-haptic text vs. haptic pictures, non-haptic text vs. non-haptic pictures, haptic text vs. no pictures and non-haptic text vs. no pictures) to measure the effect of haptic imagery on consumer responses towards two different products: a tactile product (a smartphone) and a non-tactile product (a TV). The results demonstrate that manipulating haptic imagery through pictures and words in case of a tactile product can enrich a consumer's product experience, but not for the non-tactile product. Also, the effect of manipulating haptic imagery is higher for consumers with a high need for touch. Though this enriched product experience also leads to a higher degree of product liking in case of a tactile product, it appears not to necessarily lead to a higher purchase intention. So as an online marketer, one can efficiently use haptic pictures and text to manipulate haptic imagery resulting in richer product experiences and a higher product liking in case of a tactile product.

Keywords: haptic imagery; product experience; online environment; purchase intention; sensory modalities; need for touch.

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18 May 2015
Master thesis - Communication studies

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1. Introduction

In an online shopping environment, tactual information about the product is limited for consumers. In case of products for which touch is highly important, or for consumers who regard information gained through touching a product as essential, the absence of touch-information can have a major influence on their experiences with the product. Therefore, stimulating the imagination of touch can be a relevant option in improving online shopping.

In a human-product interaction, consumers continuously receive information through their senses. This sensory feedback is also used to operate the product (e.g. Akamatsu et al., 1995). All sensory modalities can provide multiple assets of product information, although some can be overlapping. In everyday life of consumers, many situations can occur in which not all sensory modalities can be used in a human-product interaction. As mentioned, in an online store, a consumer cannot touch the actual product that he or she is looking for. The absence of the modality touch has a large effect on the product experience, because simply touching a product can create a perception of ownership and make consumers value the product higher, also known as the 'endowment effect' (Kahneman, Knetsch & Thaler, 1990; Knetsch & Sinden, 1984; Thaler, 1980).

According to Schifferstein and Cleiren (2005) and Desmet and Hekkert (2007), the term product experience can be defined as *the complete set of psychological effects a product has on a consumer*. Thus, the product experience includes the identification process, the cognitive associations it may trigger, the memories it activates, the feelings and emotions that may be experienced and the evaluative judgements it can create. For example, a tactual experience is likely to have substantial emotional components (Fisher et al., 1976).

Several researches have investigated the effect of the absence of a sensory modality on the product experience. The research of Calvert, Spence and Stein (2004) showed that people are able to use information derived from one sensory modality and use this in another. Research has also shown that people can integrate impressions that are created by different sensory modalities into one, rich perception (Stein & Meredith, 1993). Therefore, it is a logical thought that a product experience may still be rich when a particular sensory modality cannot be used. The research of Schifferstein and Desmet (2007) indicated that blocking a person's vision resulted in the largest loss of functional information, followed by touch, which therefore also provides a large number of details about a product. Interestingly, another result came forward which was in line with the research of Welch in 1978, who claimed that a person will develop an adaptive strategy to compensate for a loss in sensory perception. The study of Schifferstein en Desmet namely indicated that participants used their other senses more because one modality was blocked. According to this research, this led to a different product experience, in which product characteristics that were unattended when all sensory modalities were used, now did play a role.

When looking at a possible solution for the loss of touch-information, previous research showed the effect of haptic imagery on perceived ownership (Peck, Victor & Webb, 2012). This study showed that haptic imagery can serve as a surrogate for touch when people imagined touching a product with their eyes closed. They even felt an equal amount of perceived ownership when they imagined touching the product as when participants were actually touching the product.

Because research in haptic imagery is still quite limited, it would be relevant to investigate the effect of haptic imagery on the richness of a product experience. In such a research, it has to be kept in mind that the importance of touching a product may differ between different product groups. Regarding the research of Schifferstein (2006), it was indicated that the importance of touch-information differs between different product groups (for example food products, fashion products). Therefore, it is relevant to distinguish the effect of haptic imagery on products for which touch is important (tactile products) and products for which touch is less important (non-tactile products). Because of the possibility that haptic imagery may be able to create a richer product experience, which is of high relevance for, for example, online shops, the following research question will have to be answered in this study:

RQ: *'To what extent can haptic imagery increase the richness of the product experience (leading to a higher purchase intention) for different product types (tactile and non-tactile products)?'*

2. Theoretical framework

As mentioned above, the research of Peck et al. (2012), showed that haptic imagery can be used as a surrogate for touch, because imagining touching a product can have a similar effect on the perceived ownership as physically touching the product. To investigate the effect of haptic imagery on the richness of product experiences, it is relevant to discuss some definitions of the concepts of haptic imagery, product experiences and sensory modalities.

2.1 Haptic imagery

According to MacInnis and Price (1987), 'imagining' can be described as *a cognitive process in which sensory information is presented in the working memory.* As perception is a multi-modal experience, imagery may also function as a mental recreation of an experience, which may involve multiple senses. In line with the research of Bone and Ellen (1992), imagery may involve sight, smell, taste and tactual sensations. Scientists also demonstrated that there exists a relationship between haptic imagery and visual imagery (Campos, López & Perez, 1998; Zhang, Weiser, Stilla, Prather & Sathian, 2004), and that images are able to contain tactile factors (Heller, 1991). According to Kaski (2002), haptic imagery can be referred to as *the formation of mental representations of touch information*. In case of a human-product interaction, haptic imagery can be explained as the process of making a representation of the information that would be gained through touching the product, in one's mind. Concerning this, giving a consumer the right information to manipulate the haptic imagery during interaction with a product may result in a richer experience.

Although not much scientific research has been done particularly in the field of haptic imagery, some studies are conducted to find out what effects the imagination of sensory information can have. For example, in the research of Köster et al. (2014), olfactory imagination is successfully manipulated using words to describe the olfaction. This empirical research showed that people who claim to have a high olfactory imagery process odours different than other people. Another research, done by Bulsing et al. (2007), experiments in which different types of words were used to describe certain odours resulted in significant differences in attitude towards these odours between different word

groups. In this case, participants also did not get to smell the actual odour, but it was shown that people did associate certain words with an odour. Because of the possibility in these researches to manipulate sensory imagery through words, this current research also used words to try to manipulate haptic imagery. The words that were used in this study were selected using the study of Fenko et al. (2010), in which it was indicated which words can describe a consumers' touch-experience the best. In another research, done by Weiss et al. (2013), haptic advertising was used in the form of pictures to stimulate the purchase intention (e.g. pictures of a towel were shown closely). Furthermore, another recent study by Cian et al. (2014), showed that pictures can enhance ones dynamic imagery (*an image the viewer perceives to have a sense of movement)*. This research succeeded in using pictures to affect the attitude of consumers and their engagement.

Because of the effectiveness of both words and pictures in influencing sensory imagery in several scientific researches mentioned above, this current research investigates the effects of both words and pictures in manipulating haptic imagery. Concerning the dual coding theory, pictures are able to enhance the memory of written information (Paivio, 2007). Therefore, the effects of combining these two are tested in this current study, to discover the relation between using pictures and words and to see if this combination is able to increase the richness of the product experiences of consumers.

2.2 Product experience

According to the research of Desmet and Hekkert (2007), product experience has a personal and layered nature. In case of human-product interaction, there is an instrumental interaction, a non-instrumental interaction and a non-physical interaction. The instrumental interaction consists of for example using or managing the product (e.g. a consumer is irritated when the TV does not respond to the remote control). A non-instrumental interaction is an interaction that does not directly counts as the usage of the product (e.g. a consumer can be happy when he sees the shine of his car). A non-physical interaction refers to imagining or fantasising about the usage of the product (e.g. a consumer thinks the product will break if he pushes it too hard). Non-physical interactions also include the imagination or fantasy about the possible consequences of the interaction (e.g. a consumer feels the desire to buy a new abdominal work-out device because he/she imagines that the usage of this product will lead to having a perfect body). All these consequences can generate different affective responses. In this research, the focus will be on the non-physical interaction with a product in the form of haptic imagery.

According to Russel (2003), the term 'core affect' is used in psychology to refer to all types of emotions and experiences which involve a *perceived goodness or badness* (the emotion or experience consumers have in a specific event or situation). Product experience is regarded as a change in core affect that is assigned to the human-product interaction.

Regarding the general framework for product experience, that is applicable on all affective responses that could be experienced in a human-product interaction, three levels (or components) can be distinguished (Desmet & Hekkert, 2007). The aesthetic experience refers to a product's ability to satisfy one or more of consumers' sensory modalities. For example, a product can smell nice, look good, or feel great. The experience of meaning within consumers concerns the cognitive process, such as interpretation, associations and the ability to memorize. Some consumers are attached to

several products because they make them feel independent, confident, relaxed or secure (experience of luxury and attachment). Emotional experience refers to affective phenomena. In everyday language, it refers to emotions such as love, disgust, fear, pride, irritation and happiness. Human emotions are functional, because they attract us to certain people and for example push us away from certain events or actions (Desmet, 2002). This basic principle counts for all types of emotions, such as intense emotions (basic survival needs) or subtle emotions (in case of a human-product interaction).

In this research, all the levels of product experience have to be taken into consideration to be able to investigate the effect of the haptic imagery on the richness of the product experience. As mentioned in the research of Roozendal et al. (2008), *richness* of product experiences can be described as '*the growth potential of an activity by assessing the variety and complexity of thoughts, actions and perceptions as evoked during the activity*'. The more variety and complexity a person experiences, the higher the level of experienced richness will be. The aim of the current research is to enhance the richness of product experiences by manipulating haptic imagery. Because it has been demonstrated that haptic imagery can be used as a surrogate for touch, this phenomenon could also improve one's product experience. As already mentioned, previous scientific studies imply the possibility of manipulating imagery through text as well as pictures, which both could be able to increase the richness of product experiences in online stores. Therefore, the following hypothesis has been set up:

H1. *Enhancing the haptic imagery of consumers by showing haptic pictures and written texts during an online human-product interaction results in a richer product experience.*

As already stated, the current research will use both pictures and text in order to manipulate haptic imagery. Therefore, it is relevant to take the dual coding theory into account. This theory suggests that because people process text and pictures via two independent cognitive subsystems, pictures are able to enhance the memory of written information (Paivio, 2007). Based on this theory, it is a logical thought that in this current research, manipulating haptic imagery, resulting in richer product experiences might succeed on a higher level when haptic pictures are combined with haptic text, so that they can strengthen each other. For that reason, three sub hypotheses have been designed:

H1a. *Enhancing haptic imagery through haptic text results in richer product experiences as opposed to enhancement without haptic text.*
H1b. *Enhancing haptic imagery through haptic pictures results in richer product experiences as opposed to enhancement without haptic pictures.*
H1c. *Enhancing haptic imagery through the combination of haptic text and haptic pictures results in richer product experiences than when only text or only pictures are used.*

2.3 Need for touch

As mentioned before, haptic imagery aims to create information that would have been present when one touches an object. As the research of Peck and Childers (2003) claims that the effects of touch are stronger for one person than for another, it may be possible that this 'need for touch' has influence on the degree to which a manipulation of the haptic imagery of a person will succeed. The concept of 'need for touch' (NFT) is defined by Peck and Childers (2003) as *a person's preference for*

the extraction and utilization of information obtained through touch. This research also revealed that a written instrumental text containing haptic information functioned as compensation when participants with a high need for touch had to evaluate a product. It appeared that they were less frustrated and more confident after reading the written instrumental information about the product, while they were not able to actually touch the product. Therefore, the following hypothesis is set up in this current research:

H2. *For consumers with a high need for touch (NFT), enhancing the haptic imagery results in a richer product experience than for consumers with a low need for touch.*

In several former researches, scientists also have indicated that there exists a difference between men and women regarding the importance of sensory modalities. Citrin, Stem, Spangenberg and Clark (2003) found that women need a greater amount of tactual input for making product evaluations than men. Also in the research mentioned above of Schifferstein (2006), the results indicated that women use the information that they perceive through their senses more often to make judgements than men. This indicates that it is possible that women are more aware of their sensory modalities and have more attention for bodily sensation than men. It is also possible that women have a better ability to judge which information gained through their sensory modalities they use. To investigate whether there is a difference in the effect of manipulating haptic imagery between men and women, the following hypothesis has been set up:

H3. *Because women need a greater amount of tactual input for making product evaluations, manipulating haptic imagery will be able to enrich the product experience of women more than of men.*

2.4 Preference for consistency

To discover the effect of manipulating haptic imagery through text and pictures, this study will use a mixture of haptic or non-haptic text and haptic or non-haptic pictures. Therefore, in some cases, the manipulation through text and pictures will be non-matching. According to Cialdini et al. (1995), people are motivated to achieve consistency. As a result, consumers will alter their beliefs, attitudes, actions and perceptions to achieve consistency.

Because consumers live in an extensively information-rich world, they look for ways to reduce the information load (Neuberg & Newsom, 1993). One possible way to do this is to structure the world into a more consistent form and to reduce the amount of information to which they should search for.

Taking this information into account, it is imaginable that in cases in which pictures and text are non-matching, people who are motivated to achieve consistency will have a lower degree of product liking, because they will alter their attitudes and perceptions to achieve consistency. This is described formally into the following hypothesis:

H4. *For consumers with a (high) preference for consistency (PFC), product liking will increase when the pictures and text describing the product are matching.*

2.5 Importance of sensory modalities for different types of products

As Schifferstein (2006) demonstrates in his research, although popular beliefs hold that vision is the most important sensory modality in a human-product experience, this does not has to ensure that consumers regard vision as the most valuable sensory modality in the interaction with every type of product. All the different sensory modalities are able to determine different aspects of information about a product. For instance, vision has a high sensitivity to determine spatial locations and gives the clearest view on the shape and size of an object (Abranavel, 1971; Jones, 1981, Rock & Victor, 1964). Complementary, touch is considered as the sensory modality that is best in determining the texture properties of an object, such as softness or roughness (Klatzky, Lederman & Reed, 1989; Heller, 1989; Picard, Dacremont, Valentin & Giboreau, 2003). Touch is also the most important modality in perceiving weight and temperature. Audition is seen as the most valuable modality in determining temporal properties of objects (Nazarro & Nazarro, 1970; Lhamon & Goldstone, 1974; Welch, DuttonHurt & Warren, 1986). Olfaction and taste together are most important in evaluating whether it is safe or not to bring a particular object in contact with our body. In other words, these sensory modalities react to the chemical composition of an object (Logue, 1991).

Regarding the same research of Schifferstein (2006), vision is the most important for the product categories home decoration, fashion, food, drinks and vehicles. For fashion and personal care products, touch is also a highly important modality, whereas taste and smell are most relevant in the food and drinks category. Concerning these researches, it is clear there exists a difference between different types of products regarding the importance of touch. Obviously, for some products touch is more important than for other products. Therefore, this current study will investigate the effect of manipulating haptic imagery on two types of products, namely a tactile product (a smartphone) and a non-tactile product (a TV). Formally:

H5. *The degree of success in enhancing the haptic imagery, resulting in richer product experiences differs between different types of products (tactile and non-tactile products).*

To test the different hypothesis, pictures and text will be used in the current study to see the effect of these on the product experiences, product liking and purchase intentions. The differences between high NFT and low NFT consumers and high PFC and low PFC consumers will be taken into account (see figure 1 below).

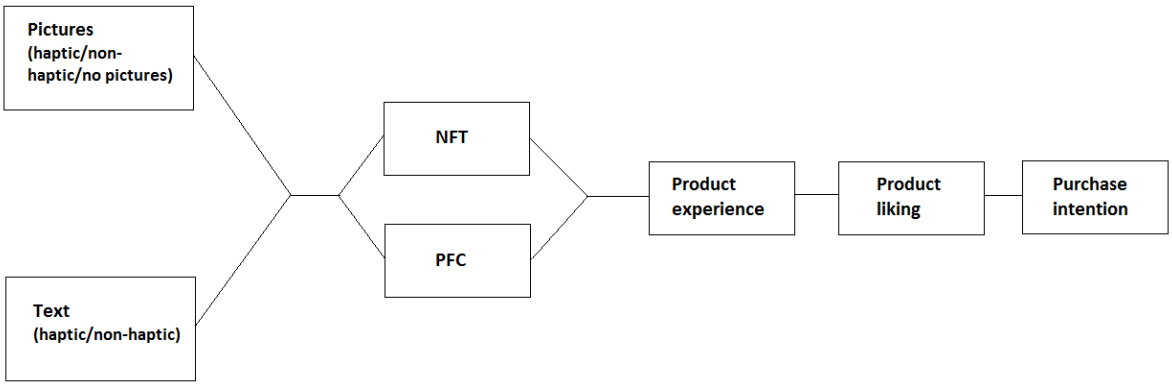

Figure 1: Research model main study

3. Methodology

The main goal of this study is to test to what extent haptic imagery can increase the richness of the product experience (resulting in higher purchase intentions). In this experiment, the haptic imagery of participants has been manipulated by showing respondents pictures and written information that aim at stimulating haptic imagery. For example, the written information that was showed to the treatment groups contained words such as *solid (strong)* and *lightweight.* These words were selected using the ratings of modalities, studied by Fenko et al. (2010). This study investigated, amongst other things, which words are regarded most important in describing ones touch-experience. The words used for the treatment groups in this current experiment scored high on the touch-modality in the research of Fenko et al. The pictures that were shown to the treatment groups also aimed at the stimulation of haptic imagery. The effects of these pictures on the haptic imagery have been tested in a pre-study.

3.1 Pre-study

To select the pictures that could be used in the main study, a pre-study was executed to see which pictures were able to stimulate the haptic imagery.

3.1.1 Methods

Participants
Participants were randomly selected in this pre-study (N=30), were aged between 18 and 65 and 47% were male.

Stimuli and measures
Twelve pictures (Appendix A) were shown to all participants. Participants had to indicate to what extent they thought 11 keywords fitted the picture (on a scale from 1 to 5). A mixture was made between haptic (*solid/strong, lightweight, smooth, big, flat)* and non-haptic (*beautiful, clear, modern, bright, easy, fast)* keywords. These words were selected using the research of Fenko et al. (2010), in which the haptic words used in this pre-study scored high on the touch-modality and the non-haptic words scored higher on vision, audition, olfaction or taste modalities. The pictures were shown to the participants in a random order, to increase the reliability of the judgements of participants.

Analysis
Repeated measures ANOVA was performed to establish the differences between the mean ratings on the keywords per picture.

3.1.2 Results

This pre-study showed which pictures significantly stimulated haptic imagery. Firstly, picture number 1 (Appendix A) proved to be significantly better in associating with the word *solid (strong)* (M=4.83, SE=.08) than the other pictures (all p<.05). This is graphically displayed in figure 2 below:

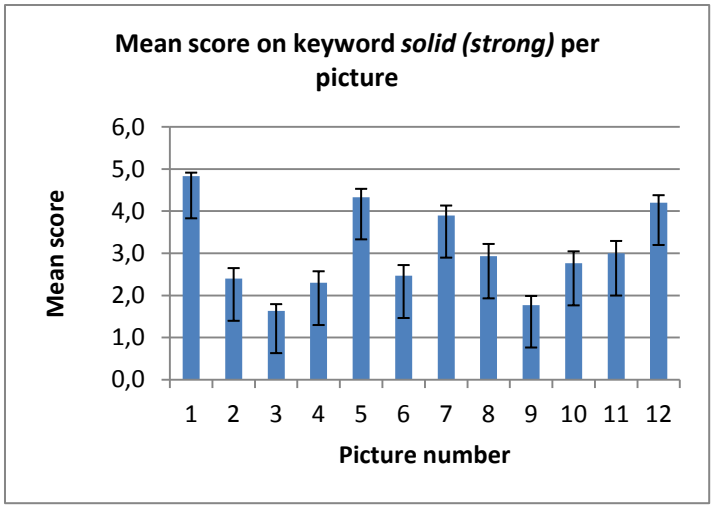

Figure 2: Mean score on keyword solid (strong) per picture

Secondly, picture 3 was found to significantly be better in associating with the keyword *lightweight* (*M*=4.97, *SE*=.03) than the other pictures (all *p*<.001). This is visible in figure 3.

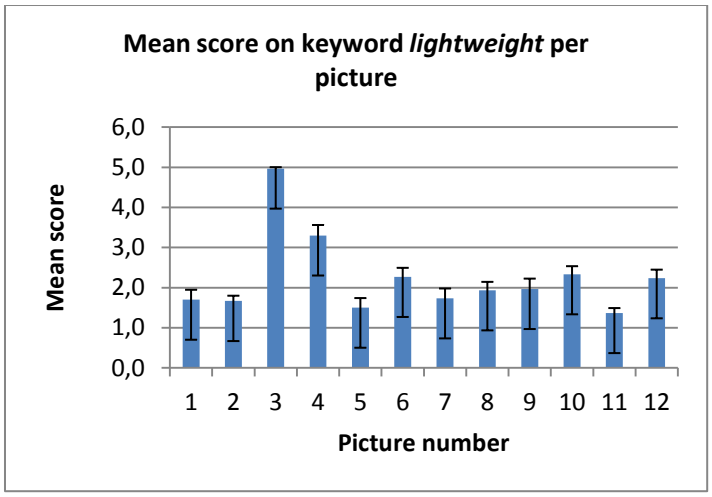

Figure 3: Mean score on keyword lightweight per picture

As can be seen in figure 4 (Appendix B), picture 7 can be selected as being significantly better (all *p*<.008) in associating with the word *big (M*=4.8, *SE*=.14) than the other pictures. Complementary, figure 5 (Appendix B) shows that picture 4 is capable of associating significantly better with the keyword *flat* (*M*=4.5, *SE*=.21) than the other pictures (all *p*<.001).

As for the non-haptic keywords, picture 8 fits significantly the best (all *p*<.008) at associating with the keyword *beautiful (M*=4.73 *, SE*=.09*)*, picture 10 (all *p*<.005) for the keyword *clear* (*M*=4.7, *SE*=.11), picture 11 (all *p*<.001) for the keyword *modern* (*M*=4.67, *SE*=.11), picture 9 (all *p*<.02) for the word *bright (M*=4.2, *SE*=.22) and picture 12 (all *p*<.001) for the keyword *fast (M*=4.97, *SE*=.03*).* The mean scores on these keywords per picture are shown in figure 6-10 (Appendix B).

The nine pictures mentioned above, that were significantly capable of associating with the correct keywords, were used in the main study (see Table 1). The pictures that were used to stimulate the haptic imagery were selected also keeping the concept of embodied experience in mind. This concept namely describes the reasoning that people have associations between location (for

example 'top' versus 'bottom') and specific affective qualities (such as *lightness* vs. *heaviness*) because of our daily embodied experiences (Rompay, Fransen & Borgelink, 2012).

3.2 Main study

3.2.1 Design

In the main experiment, pictures and words were used as a manipulation of the haptic imagery of consumers. All participants were shown two webshops, both selling electronic products (one tactile product and one non-tactile product). A mixture was made between showing treatment groups webshops with haptic pictures and haptic words, haptic pictures and non-haptic words, non-haptic pictures and haptic words and non-haptic pictures and non-haptic words. The control groups were shown no pictures, in combination with haptic words or non-haptic words (all the webshops are shown in Appendix C). This results in a (within subject) 2 (tactile vs. non-tactile product) by (between subjects) 2 (haptic pictures vs. non-haptic pictures) by 2 (haptic words vs. non-haptic words) research design. This design is displayed in the table below:

Smartphone (tactile) and TV (non-tactile)		**Text**	
		Haptic (STRONG, LIGHTWEIGHT, BIG, FLAT)	Non-haptic (FAST, MODERN, BEAUTIFUL, BRIGHT, CLEAR)
Pictures	Haptic    	*Haptic text vs. haptic pictures*	*Non-haptic text vs. haptic pictures*
	Non-haptic     	*Haptic text vs. non-haptic pictures*	*Non-haptic text vs. non-haptic pictures*
No pictures (control group)		*Haptic text vs. no pictures*	*Non-haptic text vs. no pictures*

Table 1: Research design main study (including selected words and pictures)

3.2.2 Stimulus materials

The products that were shown to both treatment groups in this study were selected keeping the research of Schifferstein (2006) in mind, in which the importance of sensory modalities per product was measured. For products in the Hi-tech category, both vision and touch are important. Within this category, touch is not very important for a TV, but very important for a computer mouse. Because these products differ too much in price, it is decided to use a smartphone instead of a computer mouse as a product which has a high importance for touch (tactile product). The smartphone and the TV used in the study were of the same brand and had the same price, in order to prevent brand or price preferences.

The pictures that were shown to the treatment groups were selected in the pre-study, either shown to be haptic or non-haptic (for example a feather representing lightweight, see Appendix A). The words used in both the treatment groups and control groups were also shown to be more haptic (*solid/strong, lightweight, big* and *flat)* or more non-haptic (*modern, fast, clear* and *beautiful*), according to the study of Fenko et al. (2010). Words that were used as non-haptic words in this current study scored higher on vision, audition, olfaction or taste modalities than for touch modalities in the study of Fenko et al.

In both groups, the metaphorical meaning of several words in the texts that have been shown to the participants have to be taken in consideration, because this metaphorical meaning may also influence the product experience. According to Lakoff and Johnson (1980), *"the essence of metaphor is understanding and experiencing one kind of thing in terms of another"*. As analysed by Forceville (2008), a verbal-, visual- or pictorial metaphor can positively influence a consumers' view of a product. This effect therefore has to be kept in mind when drawing conclusions in this study.

3.2.3 Procedure and participants

All participants saw two webshops with a mixture of haptic or non-haptic pictures, haptic or non-haptic words or no pictures at all. After seeing the products in the webshop (and the additional, manipulating pictures) and reading the text, participants were asked several questions measuring constructs such as the richness of the product experience, the purchase intention, the affective reactions and attitude towards the products (product liking). Participants were also asked about their need for touch and preference for consistency.

In answering the research question, an online questionnaire was used to collect data about the effects of manipulating haptic imagery on the richness of product experiences. The participants in this study (N=197) were randomly selected, had a mean age of 25,1 and 40.1% was male. In this research design, the main dependent variable was product experience, followed by product liking and purchase intention. The main independent variables in this study were need for touch (NFT) and preference for consistency (PFC). The model of the main study is displayed in figure 1.

3.2.4 Measures

Richness product experience – In this research, eight items were used to measure the richness of the product experience the treatment groups and the control groups had, which could indicate whether or not the manipulated haptic imagery resulted in better product experiences. An example of an item is "I obtained a good view of the smartphone in general" (1= *strongly disagree,* 5= *strongly agree).* These items form a reliable scale (α=.85).
Product liking – Also, seven items in this study aimed at measuring the affective reactions and attitude towards the product, combined in a product liking scale which was reliable (α=.87). An example of an item measuring product liking is "This smartphone would be important to me" (1= *strongly disagree,* 5= *strongly agree).*
Purchase intention – This study also included six items that measured the purchase intentions of participants, which formed a reliable scale (α=.91). For example, participants were given the statement "I would like to try this product" (1= *strongly disagree,* 5= *strongly agree*).
Need for touch – To be able to compare consumers with a high NFT with those with a low NFT, a 12 item scale, designed by Peck and Childers (2003), was used in this study. An example of an item is "I place more trust in products that can be touched before purchase" (1= *strongly disagree,* 5= *strongly agree*). These items form a reliable scale (α=.92).
Preference for consistency – Finally, nine items (α=.87) were used to measure whether or not participants had a preference for consistency (scale developed by Cialdini et al., 1995). This was measured by, for example, the statement "It is important to me that those who know me can predict what I will do" (1= *strongly disagree,* 5= *strongly agree*).

4. Results

4.1 Effects of haptic imagery on richness product experience (H1)

In describing the results of the current study regarding the first hypothesis, a distinction has been made between the results regarding the tactile product and the non-tactile product.

4.1.1 Effects of manipulation in case of a tactile product (a smartphone)

Firstly, a MANCOVA was used with regards to H1 to check whether or not there are differences in the richness of the product experience between the manipulation groups. The two factors in this MANCOVA were *text* (haptic/non-haptic) and *pictures* (haptic/non-haptic/no pictures), the covariates were *NFT* and *PFC* and the dependent variables were *product experience, product liking* and *purchase intention.* MANCOVA shows a significant main effect of text (F(3, 187)=8,4; p<.001), pictures (F(6, 376)= 2,4; p=.029), NFT (F(3, 187)=4,8; p=.003) and PFC (F(3, 187)= 3,1; p=.029) on the dependent variables product experience, product liking and purchase intention. The interaction between text and pictures is non-significant (F(6, 376)=0,7; p=.655).

Further analysis shows that in case of a tactile product (smartphone), text significantly affects the richness of product experiences (F(1, 189)= 23,2; p<.001) and product liking (F(1, 189)= 4,7; p=.031), but the effect of text on purchase intention is non-significant. Furthermore, also pictures significantly

affects richness of product experiences (F(2,189)= 5,1; p=.007) and product liking (F(2, 189)= 4,4; p=.013). Also in case of pictures, the effect on purchase intention is non-significant. In case of the tactile product, there is also an effect of both moderators (NFT and PFC), on richness of the product experience: F(1, 189)= 9,3; p=.003 and F(1, 189)= 5,7; p=.018, product liking: F(1, 189)= 5,3; p=.022 and F(1, 189)= 7,9; p=.005 and purchase intention F(1, 189)= 12,8; p<.001, F(1, 189)= 7,2; p=.008. Further analysis of the effects of PFC and NFT are discussed in section 4.2 and 4.4.

Pairwise comparisons were used to discover more specifically the differences in richness of product experiences, product liking and purchase intentions as a result of manipulation through haptic text or non-haptic text, haptic pictures, non-haptic pictures or no pictures. As a result, in case of the tactile product, in the haptic text and haptic pictures condition participants reported a significantly richer product experience (M=3.2, SD=.87) than those who saw haptic text and no pictures (M=2.7, SD= .56), p=.007. This effect is shown in figure 11 below (significant difference is indicated with stars). Also, respondents who were exposed to non-haptic text and haptic pictures had a higher purchase intention (M=2.8, SD=.74) than respondents who saw non-haptic pictures and non-haptic text (M=2.5, SD=.66), p=.047 (visible in figure 12 below). Complementary, the product liking of respondents who saw non-haptic text and haptic pictures was significantly higher (M=3.1, SD=.58) than the product liking of participants who saw non-haptic text and non-haptic pictures (M=2.7, SD=.47), p=.011. Product liking was also significantly higher within participants who saw non-haptic text and no pictures (M=2.8, SD=.92) than within the group who was exposed to non-haptic text and haptic pictures (M=3.1, SD=.58), p=.04, as shown in figure 13 below.

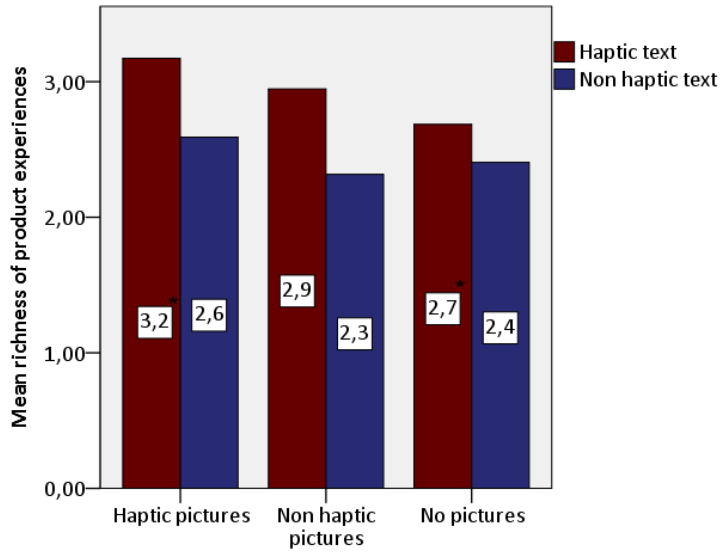

Figure 11: Differences in richness of product experience means for text and pictures

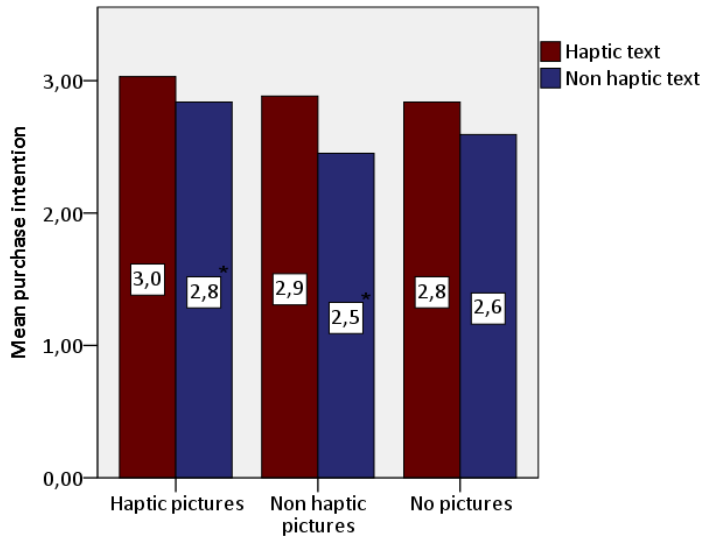

Figure 12: Differences in purchase intention means for text and pictures

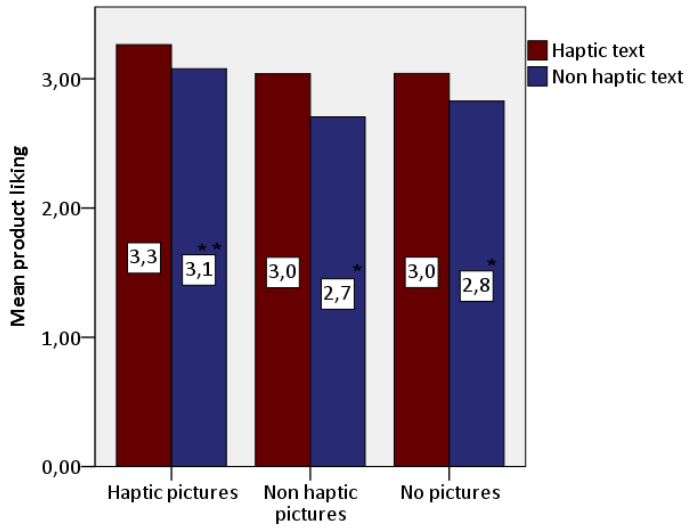

Figure 13: Differences in product liking means for text and pictures

4.1.2 Effects of manipulation in case of a non-tactile product (a TV)

Another MANCOVA was performed to check the effects of text and pictures on the richness of the product experiences for the non-tactile product (TV). In case of a this type of product, there only is a significant main effect of text on purchase intention ($F(1, 189)= 4,4$); $p=.037$). This indicates that people who saw haptic text describing the non-tactile product were more inclined to buy the product.

The effect of the moderator PFC is also significant for product experience (F(1, 189)= 9,5); p=.002), product liking (F(1, 189)= 10,2); p=.002) and purchase intention (F(1, 189)= 11,5); p=.001). The effects of PFC is further discussed in section 4.4. NFT shows no significant effect in case of a non-tactile product.

4.2 Differences in effects of manipulating haptic imagery for HFT and LFT consumers (H2)

As a result of the MANCOVA analysis mentioned above, it can be stated that the main effect of the need for touch (NFT) within consumers is significant for the tactile product: F(3, 187)= 4,8); p=.003 but not for the non-tactile product: F(3, 187)= 0,03); p=.991. As stated above, NFT has a significant effect in case of the tactile product in manipulating richness of the product experience, product liking and purchase intention.

A regression analysis was used to estimate whether there is a positive relationship between the dependent variable richness of the product experience and the independent variable NFT in case of the tactile product. As a result of this analysis, there seems to be a positive relationship (t(1, 195)= 4,6; p<.001) between NFT and richness of the product experience (see figure 14 below). This positive relationship also exists between NFT and purchase intention (t(1, 195)= 4,7; p<.001) and between NFT and product liking (t(1, 195)= 3,5; p=.001). Further regression analysis was done to discover whether or not the coherence between manipulating haptic imagery and richness of product experiences is moderated by NFT in case of the tactile product. NFT appears a significant moderator in case of richness of product experiences (t(1, 195)= 65,5; p<.001), product liking (t(1, 195)= 65,4; p<.001) and purchase intention (t(1, 195)= 65,3; p<.001).

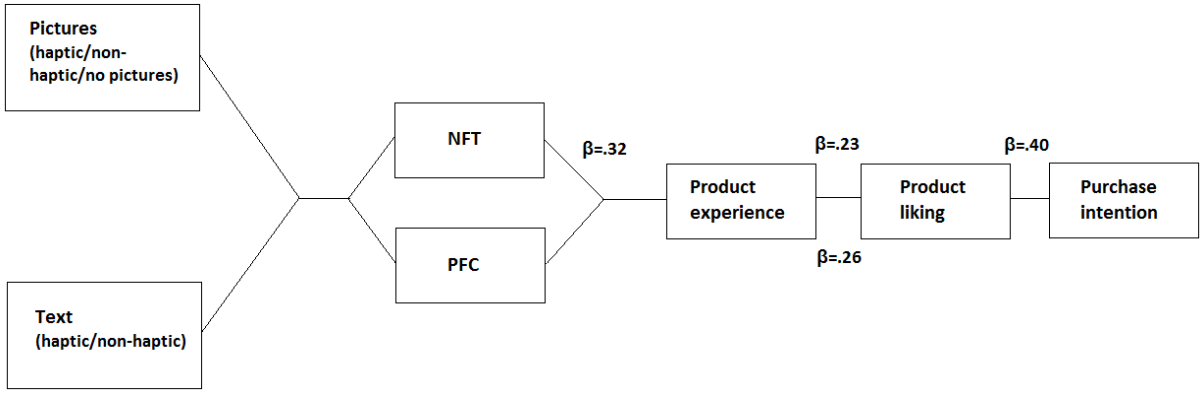

Figure 14: Effects of NFT and PFC on product experience, product liking and purchase intention in case of a tactile product (significant regression coefficients)

4.3 Differences in effect of manipulating haptic imagery between men and women (H3)

After conducting a MANCOVA test, the effect of gender on the richness of the product experience in case of a tactile product was found significant: F(1, 197)= 4,6; p=.034. As visible in figure 15 below, the effect of haptic text vs. haptic pictures is greater for women than for men. The figure also shows

that when women saw no pictures and a non-haptic text, the manipulation of the haptic imagery had less effect on them compared to men.

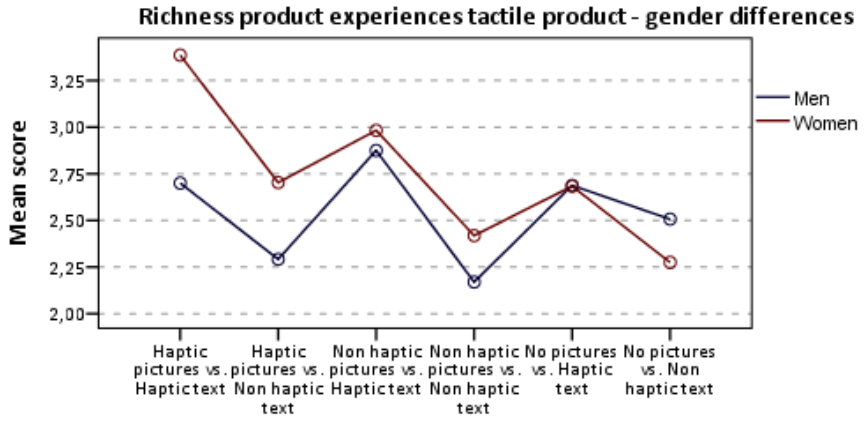

Figure 15: Richness of the product experiences for a tactile product – gender differences

Figure 15 also displays a general pattern spotted in the results of this study, namely that in case of a tactile product, a haptic text was more successful in manipulating the haptic imagery (F(3, 187)= 8,4; p<.001) than that haptic pictures were (F(3, 187)= 2,4; p=.029). As an example, in case of the tactile product, there was no significant difference (p=.497) in the richness of the product experience between the control group who saw a haptic text (but no pictures) and the group who saw both haptic text and haptic pictures.

4.4 Differences in effects of manipulating haptic imagery for HPFC and LPFC consumers (H4)

In the MANCOVA performed in the analysis, Preference for Consistency (PFC) showed to have a significant main effect on the manipulation in case of the tactile product (F(3, 187)= 3,1; p=.029) and non-tactile product (F(3, 187)= 4,4; p=.005). A regression analysis shows a positive relationship between PFC and the product liking of consumers towards the tactile product (see figure 12 above) (t(1, 195)= 3,5; p=.001) and the non-tactile product (t(1, 195)= 3,5; p=.001). Further regression analysis showed that PFC is a significant moderator of the coherence between manipulating haptic imagery and product liking in case of the tactile product (t(4, 196)= 72,0; p<.001) and the non-tactile product (t(4, 196)= 58,7; p<.001).

Contrary to expectations, no significant differences in product liking for high PFC-consumers or low PFC-consumers were found between manipulation conditions in which text and pictures were matching (both haptic or both non-haptic) and non-matching conditions.

4.5 Differences in effects of manipulating haptic imagery for tactile and non-tactile products (H5)

As another result of the MANCOVA analysis, it can be said that manipulation of haptic imagery through text and pictures has a better effect in case of a tactile product than for a non-tactile

product. As also mentioned above, text and pictures were able to significantly influence the richness of the product experience and the product liking of consumers in case of the tactile product (smartphone). Manipulation through pictures and text on the richness of the product experience and product liking in case of the non-tactile product (TV) was not successful, only manipulation through text was able to have a significant effect on the purchase intention in case of the non-tactile product.

5. Discussion

5.1 Conclusions

This study tried to get insight into the effects of haptic imagery on the richness of product experiences for different types of products (tactile and non-tactile products) and to what extent this increase leads to a higher purchase intention. Firstly, it can be concluded that manipulation of haptic imagery through text as well as through pictures is able to increase the richness of the product experience in case of a tactile product. So, manipulating the cognitive process (non-physical interaction) of haptic imagery, in which sensory information is presented in the working memory, through pictures and text results in a richer product experience. This enriched product experience means that participants experienced more variety and complexity in their thoughts, actions and perceptions (Roozendal et al., 2008).

In the case of the tactile product, manipulation through text and pictures is also able to increase the degree of product liking. Although a main effect of the manipulation on purchase intention was present, manipulation through text and/or pictures was not able to create a higher purchase intention in case of a tactile product in all of the manipulation combinations.

Because of the significant differences in richness of the product experiences in case of a tactile product between people who only saw haptic text (and no pictures) and people who saw haptic text and haptic pictures, it can be concluded that for tactile products, the combination of haptic text and haptic pictures is significantly better in increasing the richness of the product experiences than with text only (in combination with no pictures). This is in line with the study mentioned earlier by Cian et al. (2014), which showed that pictures can affect the attitude of consumers and can enhance ones dynamic imagery. Complementary, the combination of non-haptic text and haptic pictures resulted in a significantly higher purchase intention than non-haptic text combined with non-haptic pictures. Therefore, it can be stated that haptic pictures are also able to increase the purchase intention better than non-haptic pictures for tactile products. The difference between these two combinations were also significant for product liking, which therefore means that haptic pictures are able to increase the product liking better than non-haptic pictures. The degree of product liking also was significantly lower for people who saw non-haptic text and no pictures than for those who saw non-haptic text and haptic pictures, which again indicates the additional power of haptic pictures.

In case of a non-tactile product, only text was able to positively influence the purchase intention of consumers. This could be explained by the fact that this study used a TV as a non-tactile product, which could be considered as a major purchase for consumers. Therefore, they attach more value to words which describe the properties of a product. Furthermore, the effect of manipulating haptic imagery through text and pictures was less successful in enhancing product experiences and product

liking in case of a non-tactile product. This was in line with the expectations and with the research of Schifferstein (2006), which states that the importance of sensory modalities differs between different types of products.

Another relevant result of the current study is the effect visible of the need for touch of consumers on the degree of success in manipulating haptic imagery. Because of the positive relationship and the moderating effect discovered, it can be concluded that the higher the need for touch within consumers, the higher the effects of manipulating haptic imagery on the richness of the product experiences, product liking and purchase intention. In other words, for persons who have a high preference for using information obtained through touch, as defined by Peck and Childers (2003), stimulating imagery through haptic text and pictures results in better results in case of a tactile product. Therefore, using haptic text and pictures in an online environment selling products for which touch is important has a more positive influence on consumers that have a high need for touch than for consumers that have a low need for touch. This is in line with the research of Peck and Childers (2003), who claim that the effects of touch are higher for one person than for another. This effect was not visible in case of a non-tactile product.

Because of the positive relationship and the moderator effect discovered between PFC and product liking, it can also be stated that the higher the preference for consistency within consumers, the higher the effects of manipulating haptic imagery on product liking. This was the case in both the tactile and non-tactile product. This result confirms the research of Neuberg and Newsom (1993), in which it is stated that people are motivated to achieve consistency. Nevertheless, it appears not to matter whether the manipulation was both with haptic text and haptic pictures, or that haptic pictures were mixed with non-haptic text. So, PFC does not create significant differences between matching and non-matching manipulation combinations.

Because no interaction effect between pictures and text was present, it can be said that the effects of manipulation are not strengthened particularly by the combination of pictures and text. This is contrary to the dual coding theory, which states that pictures are able to enhance the memory of written information (Paivio, 2007). This leads to another relevant conclusion in the current study, because it was revealed that haptic text is more successful in manipulating haptic imagery than haptic pictures. Because no significant interaction effect was found between the manipulation through pictures and the manipulation through text, it can be concluded that if one wants to enrich the product experience in an online environment and has to choose between pictures and text, the most effective way to manipulate haptic imagery is through haptic text. Nevertheless, when a non-haptic text is applied, showing haptic pictures to consumers does result in a higher purchase intention and higher product liking than when non-haptic pictures or no pictures are used.

Although the effects of manipulating haptic imagery do not significantly differ between age categories, it does differ between men and women. In the current research, the effect of gender on the richness of product experiences in case of a tactile product was significant. This confirms the research of Citrin et al. (2003) mentioned earlier, who found that woman need a greater amount of tactual input for making product evaluations than men.

In short, it can be stated that manipulating haptic imagery through pictures and words certainly is able to enrich ones product experience in case of a tactile product. Thereby, the effect of manipulating haptic imagery is higher within consumers who have a high NFT. Though this enriched

product experience also leads to a higher degree of product liking in case of a tactile product, it appears not to necessarily lead to a higher purchase intention. A possible reason for this outcome is described in the limitations section.

5.2 Limitations

Following on the last conclusion stated above, it can be said that there is a limitation within the current study that may have caused respondents to state that they were not willing to buy the product based on the information they had seen. Because the aim of this study was to measure the effect of manipulating haptic imagery through pictures and words, there was a lot of other information missing, that would have been present in a normal situation in which a consumer buys a product online (see Appendix C in which it is displayed what the manipulation groups saw). As an example, respondents were not exposed to the prices of the products. The small amount of information respondents were exposed to might have caused them to fill in that they for example could not imagine themselves buying the product based on what they saw. This might have been the reason for the non-significant effect of the manipulation on purchase intention in case of the tactile product.

Another limitation is the number of respondents participated in the study. Because this study included a number of 197 people, it was for example not possible to split the data for men and women, because then there were too little people in the six manipulation groups. If the number of respondents was a lot bigger, it might have been possible to discover more significant effects.

The last limitation of this study is the question to what extent the results about the tactile product (smartphone) and non-tactile product (TV) can be generalized for the whole group of tactile products and non-tactile products. It is difficult to say that the same research done with another product that is tactile or non-tactile will certainly give the exact same results. Future research in the field of haptic imagery influencing online product experiences should include more participants and more different products to increase the generalizability of the results. Furthermore, a possible way to increase the credibility of the online environments used to enhance the haptic imagery has to be found in future research.

5.3 Practical implications

Although the results of this study are of relevance for the scientific domain of sensory marketing and can form a basis for further research, several conclusions can also be of importance for marketing managers who have the responsibility over for example an online webshop. Firstly, it can be said that in case of selling a tactile product, haptic imagery can be manipulated through pictures and text, resulting in richer product experiences and higher product liking. So, as an online marketer, one can use haptic pictures and haptic words to describe the tactile properties of the product to enhance the online product experiences. Additionally, if a decision has to be made between pictures and words in case not both can be used, the best option is to use (haptic) words. Furthermore, one has to take into account that the effects of using haptic pictures and words on the richness of product experiences are higher when consumers have a high need for touch. For products for which touch is less

important, using haptic pictures and words to enhance richness of product experiences is less efficient.

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Appendix A: pictures used in pre-study

Haptic pictures

Picture 1

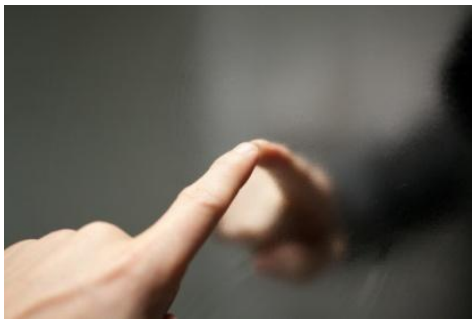
Picture 2

Picture 3

Picture 4

Picture 5

Picture 6



Picture 7

Non-haptic pictures

Picture 8

Picture 9

Picture 10

Picture 11

Picture 12

Appendix B: figures mean scores pre-study

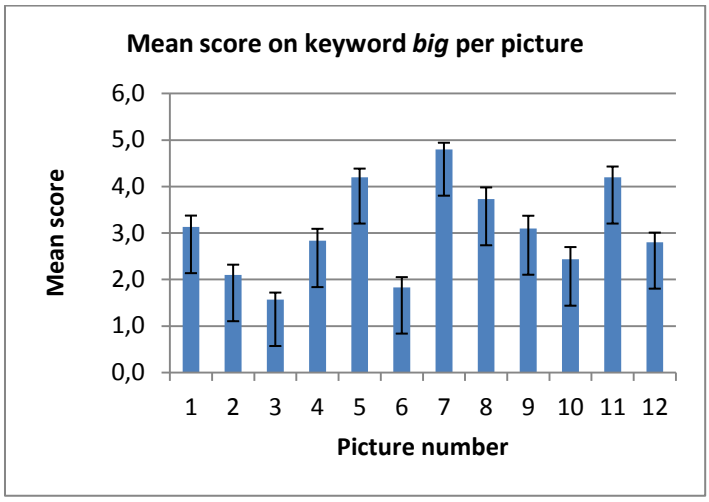


Figure 4: Mean score on keyword big per picture

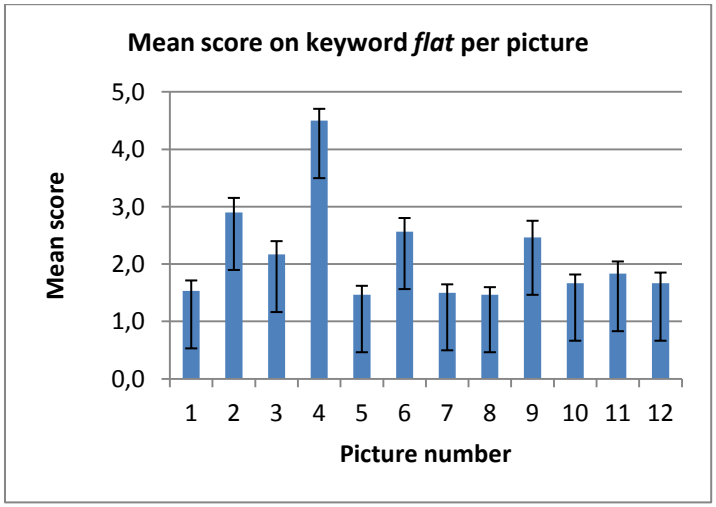


Figure 5: Mean score on keyword flat per picture

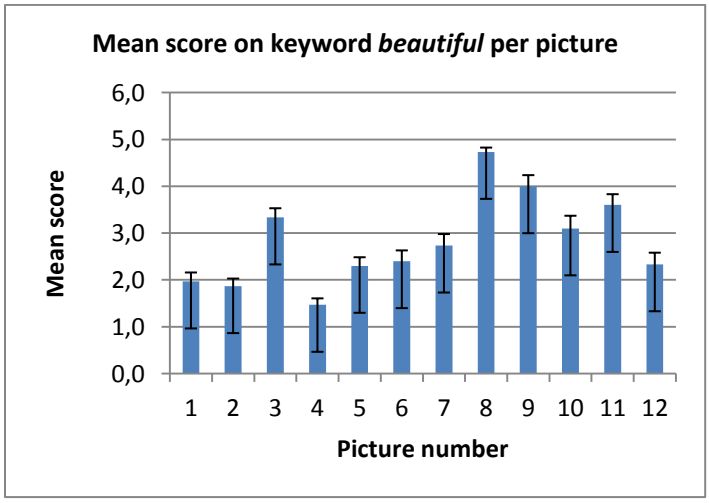


Figure 6: Mean score on keyword beautiful per picture

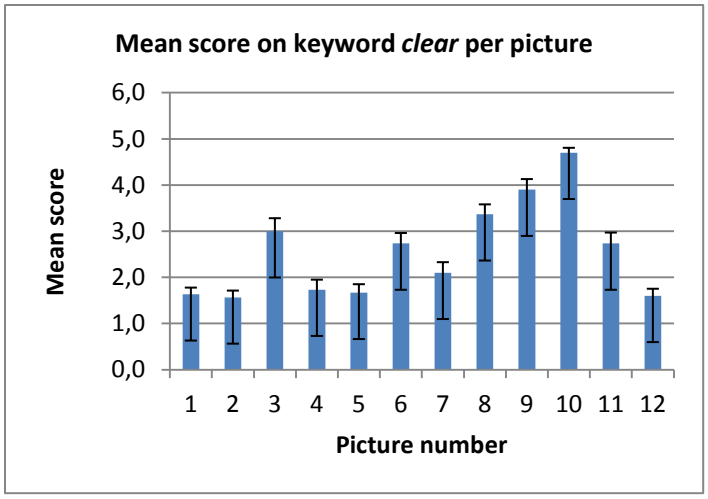


Figure 7: Mean score on keyword clear per picture

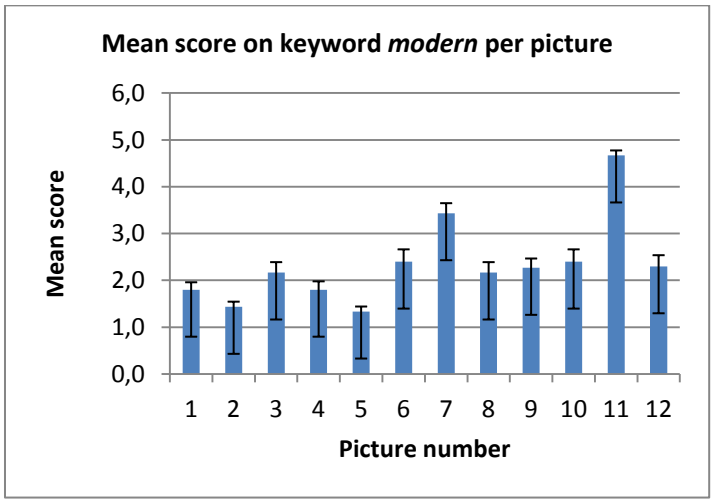


Figure 8: Mean score on keyword modern per picture

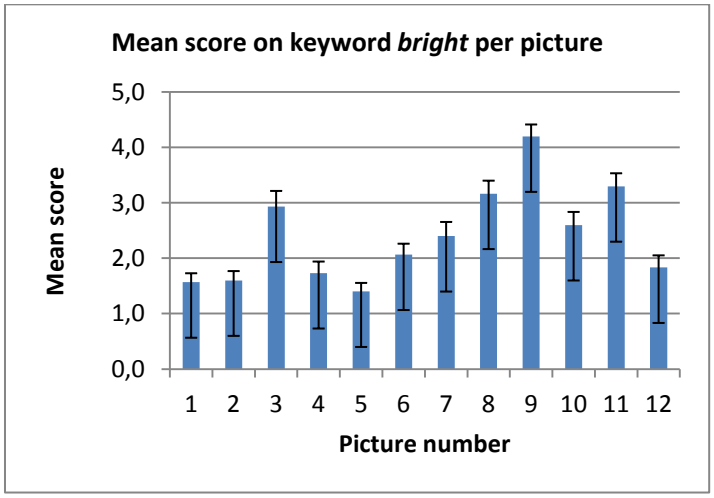


Figure 9: Mean score on keyword bright per picture

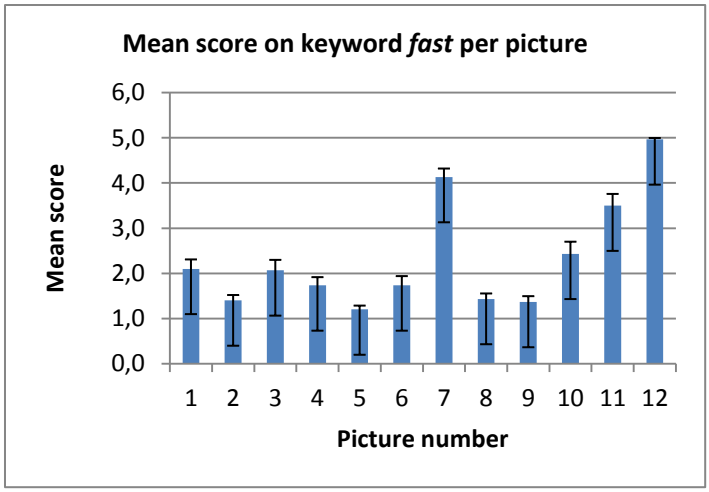
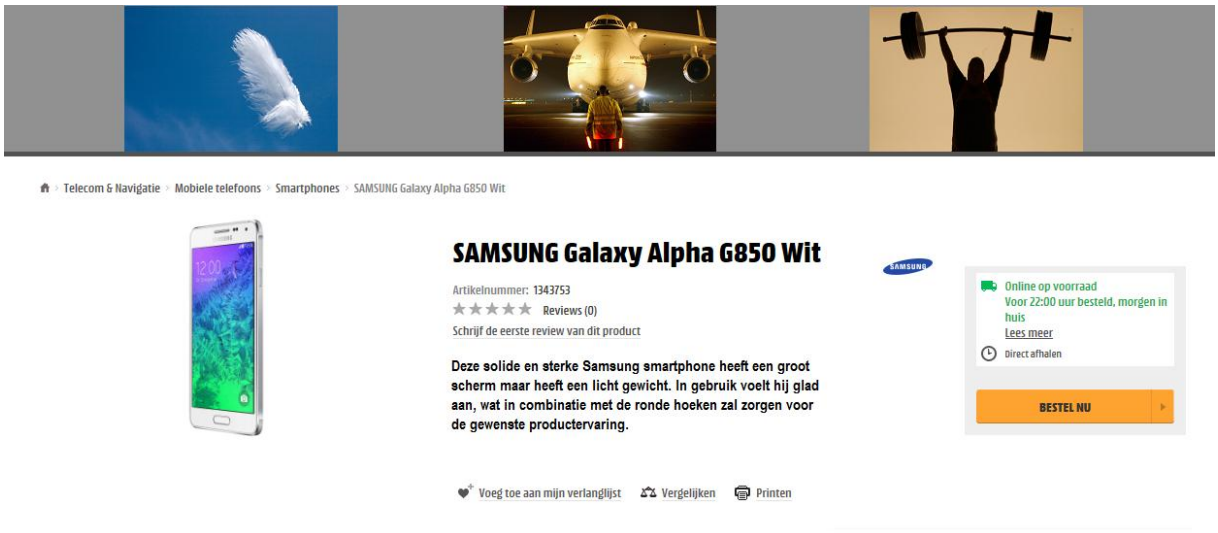


Figure 10: Mean score on keyword fast per picture

Appendix C: pictures of webshops used in main study

Webshop 1. Haptic pictures vs. haptic text (smartphone, tactile):



Webshop 2. Haptic pictures vs. non-haptic text (smartphone, tactile):

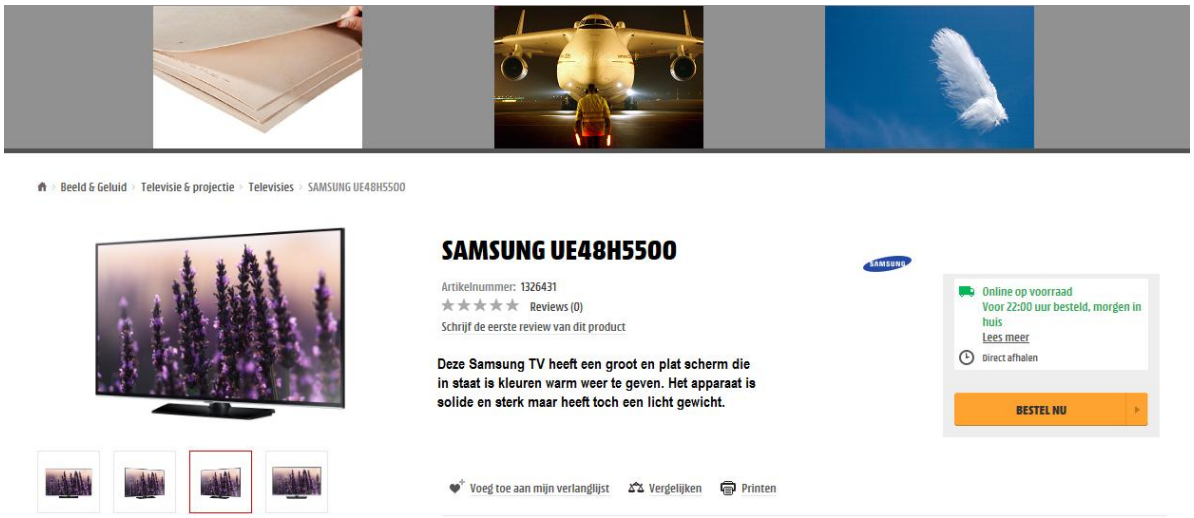
Webshop 3: Non-haptic pictures vs. haptic text (smartphone, tactile):

Webshop 4: Non-haptic pictures vs. non-haptic text (smartphone, tactile):

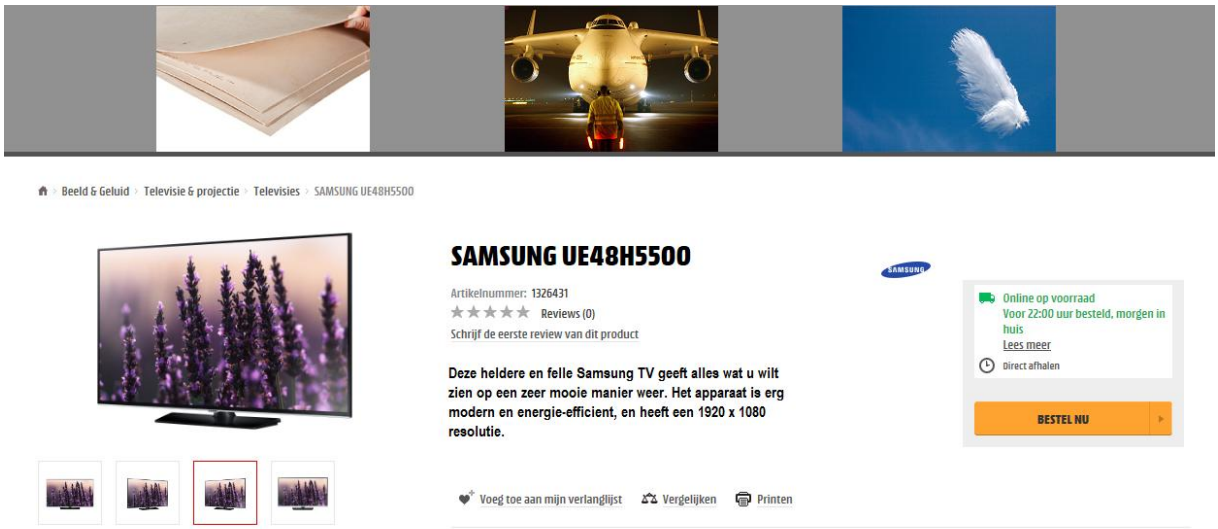
Webshop 5: No pictures vs. haptic text (control group, smartphone, tactile):

Webshop 6: No pictures vs. non-haptic text (control group, smartphone, tactile):

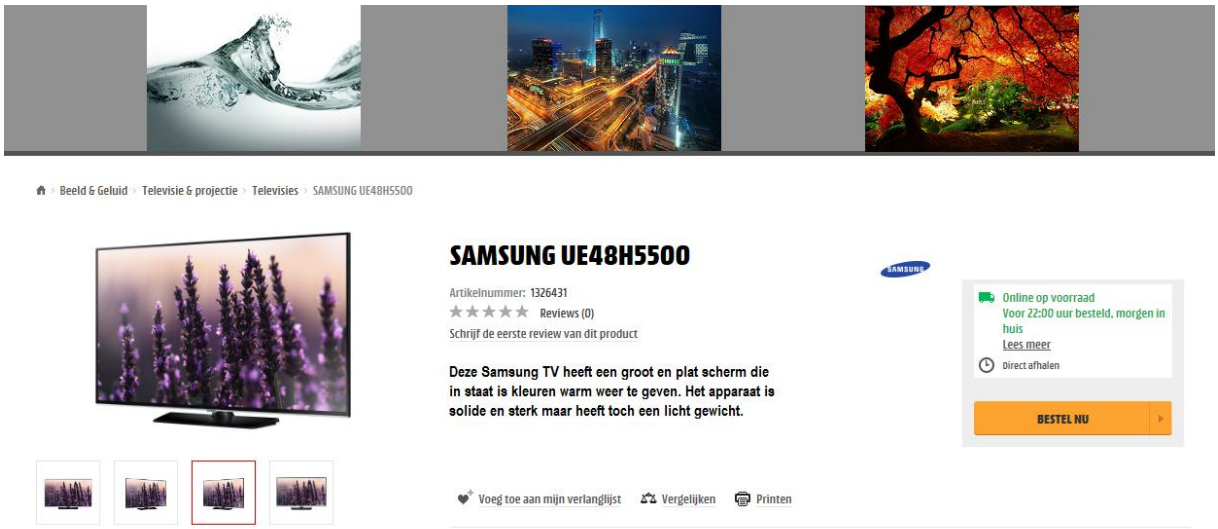
Webshop 7: Haptic pictures vs. haptic text (TV, non-tactile):



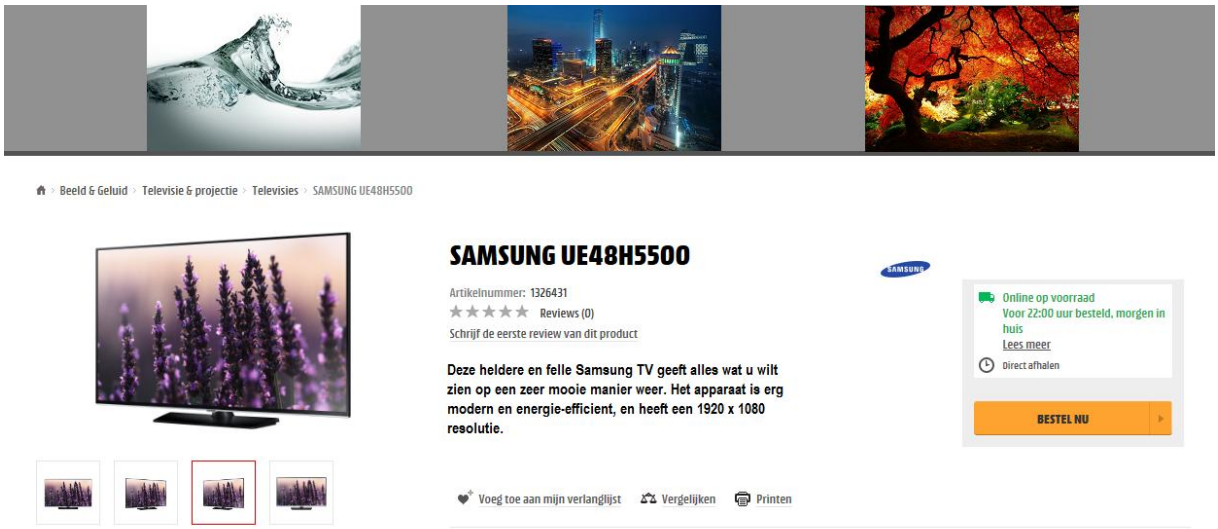
Webshop 8: Haptic pictures vs. non-haptic text (TV, non-tactile):



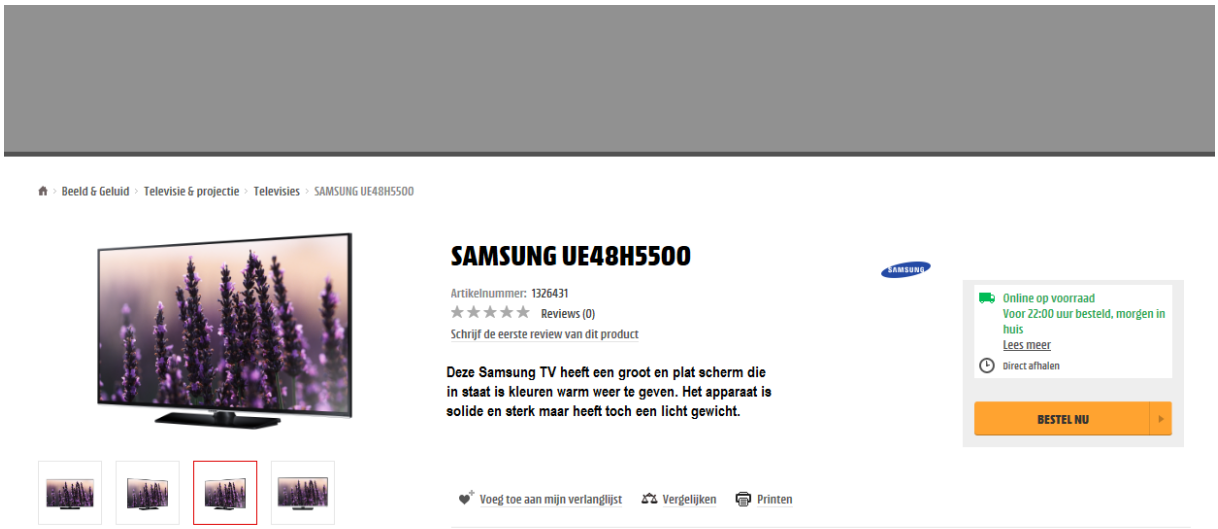
Webshop 9: Non-haptic pictures vs. haptic text (TV, non-tactile):



Webshop 10: Non-haptic pictures vs. non-haptic text (TV, non-tactile):



Webshop 11: No pictures vs. haptic text (control group, TV, non-tactile):



Webshop 12: No pictures vs. non-haptic text (control group, TV, non-tactile):