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# Integrating the sense of touch into apartment marketing strategy

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## Integrating the sense of touch into apartment marketing strategy

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### **Integrating the sense of touch into apartment marketing strategy**

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This thesis describes a quasi-experimental study which set out to investigate how the sense of touch can be integrated into apartment marketing strategies using a product called Active Paper as the subject of exploration.

Active Paper is a type of paper that incorporates technology which makes graphics appear on a seemingly blank sheet of paper after applying a drop of liquid to its surface.

The main goal of this study is to examine whether Active Paper can be used as a marketing tool to influence people's preferences and attract the attention of potential home buyers. This would be achieved by printing apartment layouts on Active Paper. The apartment layouts would include hidden graphics of furniture which would be uncovered by the touch of a finger dipped in a liquid.

As a theoretical framework, this thesis uses sensory marketing with special attention given to the sense of touch and its role in the consumer domain. It utilises a quasi-experimental research design with control and experimental group in order to gather empirical evidence for the research proposition, and to understand how people process and evaluate the apartment layouts printed on Active Paper.

In the marketing context, touch is regarded as an important factor in evaluating products and package design. However, the role of touch in marketing, outside of the direct physical contact with products, is a relatively unexplored area. Some studies have suggested that incorporating touch into apartment marketing messages would influence people's preferences and attract more attention in comparison with the marketing communication lacking the possibility of touch. To investigate this hypothesis, this study used convenience sample of 120 students of Laurea University of Applied Sciences. 60 students were assigned to the control group, and the other 60 to the experimental one. Participants of the control group were asked to visually observe apartment layouts on standard sheet of paper. Participants of the experimental group were asked to touch the surface of the apartment layouts on Active Paper with the finger dipped in water, and observe what will appear beneath. The hypothesis of this thesis predicted more favourable attitude towards the apartment associated with Active Paper and touch, than the one experienced only visually on standard paper.

However, the empirical findings of this study do not support the hypothesis that touching apartment layouts printed on Active Paper influence people's preferences toward apartments to a higher extent than mere visual observation.

Whilst the results do not confirm the hypothesis, this research builds the argument for conducting future research on the role of touch in marketing and its effect on people's perception outside of the direct physical contact with a product.

**Keywords**    Sensory marketing, Sense of touch, Quasi-experiment, Marketing strategy

Zvonarevic, Zrinka

### Tunneistin hyödyntäminen asuntokauppojen markkinointistrategiassa

Vuosi 2015 Sivumäärä 45

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Tämän opinnäytetyön tarkoituksena on tutkia, kuinka tuntoaistia voisi hyödyntää asuntokauppojen markkinointistrategiassa käyttämällä tuotetta nimeltä Active Paper.

Active Paper on paperipala, joka muistuttaa ulkoisesti normaalia paperia. Neste aktivoi paperissa ominaisuuden, joka saa tyhjän paperin pinnalle ilmestymään grafiikkaa.

Tutkimuksen päätavoite on selvittää, vaikuttaako Active Paper ihmisten mieltymyksiin, ja näin ollen, onko sillä potentiaalia osana markkinointistrategiaa. Markkinointimateriaalina olisi paperi, jossa on kuva asunnon pohjapiirroksista, ja jota kostuttamalla esiin ilmestyy kuvia huonekaluista.

Opinnäytetyön teoriaosuus käsittelee aistimarkkinoinnin teoriaa, painottaen tuntoaistia ja sen roolia kuluttajapiirissä. Tutkimusmenetelmänä on kokeellinen tutkimus, jonka tarkoitus on kerätä empiiristä todisteaineistoa ja ymmärtää, kuinka ihmiset reagoivat paperiin. Tutkimus sisältää kontrolli- sekä koeryhmät.

Markkinoinnissa tuntoaistia pidetään tärkeänä tekijänä tuotteiden ja pakkausmallien arvioinnissa. Siitä huolimatta, tuntoaistin rooli markkinoinnissa on pysynyt suhteellisen tukimattomana ilmiönä. Tietyt tutkimukset viittaavat siihen, että tuntoaistin sisällyttäminen markkinointiviestiin vaikuttaa positiivisesti ihmisten mieltymyksiin ja ostopäätöksen tekoon. Tämän testaamiseksi tutkimukseen valittiin 120 opiskelijaa Laurea-ammattikorkeakoulusta, joista 60 valittiin kontrolliryhmään ja 60 koeryhmään. Kontrolliryhmän tehtävä oli arvioida pohjapiirrosta vain visuaalisesti. Koeryhmän tehtävä oli koskettaa paperin pintaa vedellä kostutetuilla sormilla ja tarkkailla, mitä paperille ilmestyy. Tämän tutkimuksen hypoteesi oli, että koeryhmä tulisi antamaan paremmat arviot kuin kontrolliryhmä.

Tutkimuksen tulokset eivät kuitenkaan tukeneet hypoteesia, koska ryhmien antamissa arvioissa ei ollut merkittäviä eroja. Vaikka tulokset eivät tuekaan hypoteesia, tutkimus nosti esille huomioita ja jatkokysymyksiä mahdollisia uusia tutkimuksia varten.

Avainsanat Aistimarkkinointi, Tunneasti, Kokeellinen tutkimus, Markkinointistrategia

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## 1 Introduction

The Active Paper Company Ltd is trying to find a new application for their product known as Active Paper. The Active Paper technology makes graphics appear on a seemingly blank sheet of paper. This is achieved by touching its surface with a finger dipped in liquid, which activates a controlled colour change effect. The Active Paper Company is constantly looking for partners with whom to create new engaging applications based on their product. The goal of this thesis is to attempt to verify one of the possible applications, more precisely, whether the Active Paper is suitable for use as a new marketing tool for promoting apartments on the housing market.

This research was initiated by an anonymous real estate company as a tool for better understanding how sensorial cues, specifically touch, could be integrated into their corporate marketing strategy. Companies today mostly communicate their brand messages to consumers' eyes and ears (Lindstrom 2005, 16). Even though there is reason to believe that the sense of touch can have a significant influence on consumer experience, there are very few studies which have acknowledged the importance of touch within the marketing domain. Therefore, this paper sets out to explore the role of touch in the housing market context and, consequently, give a novel insight into the importance of the sense of touch in marketing and its impact on consumer experience.

This thesis is part of a NeuroService project of NeuroLab located at the campus of Laurea University of Applied Sciences, and it is funded by the Finnish Funding Agency for Technology and Innovation (Tekes). The NeuroService project is set up to investigate the effectiveness of advertisements and consumer preferences before the launch of new products and services. Researchers in the project use a variety of tools and techniques in order to understand the neural substrate of human decision-making, ranging from simple behavioural experiments to more complex neuromarketing procedures, such as functional magnetic resonance imaging (fMRI) and eye-tracking. The network of professionals working on the project comprises of researchers from Laurea University of Applied Sciences and Aalto University, international experts, and professionals from the partner companies. Project partners include Valio, MTV, SRV, Voitto, Taloustutkimus, Hurmex, The Active Paper Company and Intelligent Coaching Systems Finland (NeuroLab Laurea 2014).

Research on integrating the sense of touch into apartment marketing strategy will use behavioural studies and neuromarketing methods (fMRI) in order to investigate whether Active Paper can be used as a new marketing tool to promote apartment sales. This thesis exclusively concentrates on behavioural study (Figure 1).

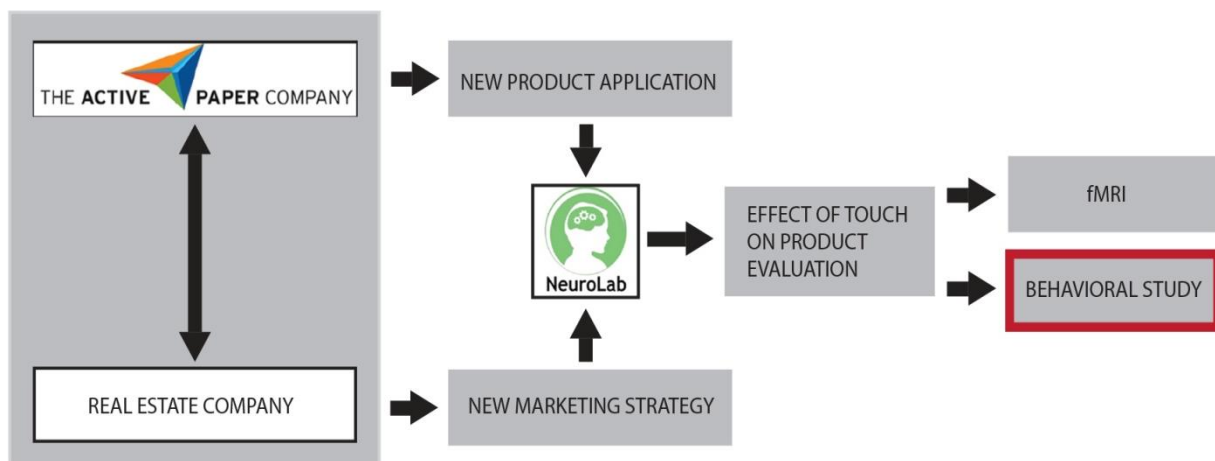


Figure 1. Relationship among involved parties. The focus of interest of this thesis is behavioural study

It incorporates a quasi-experimental research method with control and experimental group, using a convenience sample of 120 Finnish students of Laurea University of Applied Sciences. Experimental results will later be probed by the NeuroLab team for a neurological explanation. Results of neuromarketing research are excluded from this thesis.

### 1.1 Structure of thesis

This study consists of seven parts. The present chapter started with the general introduction of the thesis and it will be followed by an introduction of Active Paper and overall purpose of the research. The second chapter aims to broaden the knowledge on the subject and to bring focus to the research problem and hypothesis by gathering and analysing existing literature on the topic. It will start by explaining the concept of sensory marketing with special focus on the role of touch in general and in the consumer domain. Chapters 3 and 4 will introduce the hypothesis and explain the research process. Research design will be presented in detail, followed by the data analysis and presentation of results in chapters 5 and 6. The thesis will end with a conclusion and suggestions for further research.

### 1.2 What is Active Paper?

The Active Paper technology makes graphics appear on a seemingly blank sheet of paper by touching its surface with a finger dipped in liquid (Illustration 1). When dry, the paper surface looks as if it is complete, with a similar texture and reflectivity, but once the liquid is applied it activates a controlled colour change effect. This paper has been envisioned as much more than just a visual medium. Its purpose is to move beyond the visual properties of paper, engaging the sense of touch, and turning it into an interactive message channel.



Active Paper is slightly thicker than standard paper; indeed, its material and surface approximately resemble that of cardboard.



Illustration 1. Graphics appear on Active Paper after touching its surface with wet finger (The Active Paper Company 2013)

The technology is based on guiding fluids along defined channels within the paper network. Sensing chemicals are dispensed within these micro fluidic channels to turn paper into an “easy-to-use diagnostic sensor”. This specialty paper can be used, for instance, for making special beverage coasters, labels, greeting cards, stickers or tray papers. The technology can also be used in security solutions. Possible future applications are yet to be explored. This thesis aims to offer one possible alternative (The Active Paper Company 2013).

### 1.3 Purpose of the research

In today’s highly competitive global market place, companies are competing to discover new ways to position themselves ahead of their competitors. As a strategy of differentiation and positioning, modern marketing began to break traditional methods and started to make use of novel tools (Vinit & Vanishree 2013).

The Active Paper Company offers a unique tool for interactive consumer advertising through their new Active Paper technology. The main goal of this thesis will be to find out if Active Paper can be used as new marketing tool to make a lasting impression on people and inspire potential home-buyers. This would be achieved by means of printing apartment layouts on Active Paper, featuring hidden graphics of furniture which are to be uncovered by swiping a wet finger over its surface.

As this special paper needs to be touched in order to reveal its full potential, it is firstly important to explore the impact of touch on people's preferences. This will be crucial for answering the main research question.

Sense of touch has never been as important as today since people's daily activities are increasingly being moved into the digital world (Popp 2010). Nowadays, people spend so much time in the virtual environment of Internet that one can freely say: "We live in a tactile deprived society" (Underhill 2009, 168).

While substantial amount of research has focused on the importance of visual aspects in advertising, a surprisingly small number of studies addressed the role of other human senses, especially the sense of touch. The need for this research arises from the fact that the role of touch in consumers' domain is a relatively new concept. Even though much research has been done in the field of sensory marketing, the sense of touch and its impact on people's perception is inadequately investigated and often neglected.

Touch is often regarded as an important factor in evaluation of products and package design. However, the role of touch in marketing, outside of the direct physical contact with product, is relatively unexplored phenomenon. Purpose of this research is to address this gap and to lay down the foundation for the future research.

## 2 Theoretical framework

This chapter aims to broaden the knowledge on the subject and bring clarity and focus to research problem and hypothesis of this thesis. The chapter starts by presenting the concept of sensory marketing and highlights the importance of five human senses for consumers and organisations. Firstly, it refers to general research on each of the five senses independently, after which it exclusively focuses on the sense of touch in general and in the consumer context.

### 2.1 Sensory marketing

Purchasing and consumption are important parts of everyone's life. People buy things in order to meet their physical and mental needs. The foundation of all marketing is that businesses try to understand what it is that people need and desire, and ensure that it is available in the right place at the right time and at the right price (Blythe 2013, 1). Today consumers' world is filled with endless advertising, yet it seems that the consumer is somehow out of things to buy. "Consumer has what he needs, he wants really little, or does not even know what he wants" (Godin 2003, 4). It is becoming more evident that the old marketing approach does

not function anymore. The dynamics of marketing is changing; traditional approaches are outdated, while unconventional approaches, regardless of not being novelties, became a necessity not an alternative (Godin 2003, 5).

Given the amount of advertisements that consumers are exposed to on an everyday basis for thousands of different products and services, it appears that unconscious triggers, like those engaging the basic senses, may be a more efficient method to appeal to customers (Krishna 2011). "Marketing that engages the consumers' senses and effects their perception, judgment and behaviour" is known as sensory marketing (Krishna 2010, 2).

According to Underhill (2009, 172) shopping is much more than a simple obligatory acquisition of what is necessary for everyday life. Underhill (2009, 172) claims it is the sensory aspect of a decision-making process that is the most stimulating for consumers, since all unplanned purchases together with planned ones, are the result of "shoppers seeing, smelling, hearing, touching or tasting something which promises them pleasure".

#### 2.1.1 Sense of sight

The sense of sight is considered to be the most important and most seductive of the five human senses, and it is the sense marketers are mostly appeal to. It contributes easiest to creating brand awareness and brand image (Hulten, Broweus & Van Dijk, 89-91). Product experience is generally highly dependent on what people see, as visual information about the product is often immediately available and it provides a large amount of detail about different elements of the product (Schifferstein & Cleiren 2005, 3). That is why vision is the most important factor in designing product packaging, choosing the colour, light or theme, and as well in decorating retail exteriors and interiors, and creating graphics and logos (Hulten et al. 89-91). A substantial amount of research has examined effect of visual stimulus in marketing context. Visual aspects of advertising have almost exclusively been the focus of marketing, with 83% of all commercial communication appealing to the consumers' eyes (Lindstrom 2005, cited in Muller, Alt & Michelis 2011, 344).

However, when consumers interact with the product, a number of product properties stimulates their senses such as its colour, shape and texture, meaning that consumers are mostly exposed to more than one sensory stimulus at the same time (Schifferstein & Cleiren 2005, 3). Nevertheless, it is proven that visual images have much more impact when they are matched with a second sense (Lindstrom 2009, 143). One example which supports this claim is a recent study by Schonberg (2014) in which researchers combined visual sense with senses of sound and touch in order to influence people's preferences for junk food. Schonberg's' (2014) research shows how people's preferences regarding junk food snacks can be changed before

people are faced with a decision to choose between snacks. This was achieved by training participants' brains to pay more attention to certain food using sound and touch as a stimulus.

At the start of Schonberg's (2014) study, participants were asked to indicate price they are willing to pay for different kinds of snacks, such as M&M's and Fritos. Next, the participants went through timed computer training program that showed photos of foods which they had previously rated. Computer would play a short tone and signal the subject to press a button as fast as possible when certain snacks appeared on the screen. When other kind of snacks popped up on the screen, the computer remained silent and participants did not press the button.

After the training session, participants were given a new test, which asked them to choose between two snacks. Two-thirds of the time, the participants chose a snack that had been associated with a sound during training session. Additionally, they were willing to pay higher price for the items that had been accompanied by a sound and button-pressing than they have indicated at the beginning of the study. This effect was visible even two months after the study was conducted (Schonberg 2014).

This is just one example which demonstrates to marketers that the other human senses i.e. smell, hearing and touch are as important as the eyes, since they give access to less conscious decisions which are not always controlled by reason (Georges, Bayle & Badoc 2014, 91). Taking into account that 85 % of buying decisions are made unconsciously (Lindstrom 2009, 19), engaging basic human senses as a part of a marketing strategy stimulates consumers' emotions and their relationship with a brand, connects organisations with the consumer on a whole new level, and creates competitive advantage.

### 2.1.2 Sense of smell

The sense of smell or olfaction is experienced with the nose. The olfactory nerve in the nose is directly linked to the limbic lobe which is the pleasure and memory centre of the brain which enables very fast identification of a smell as pleasant or unpleasant. (Georges, Bayle & Badoc 2014, 91-92). Lindstrom claims that 75% of people's daily emotions are influenced by what they smell (Muller, Alt & Michelis 2011, 344). Smell is the sense that reason contradicts with the least. The vast majority of people associate a particular smell with specific memories and experiences. Humans can distinguish and remember more than 10 000 scents (Hulten et al. 2009, 42-43).

An increasing number of businesses recognise the impact of smell on customers' minds and moods, and therefore incorporate recognisable artificial or natural odours to their business premises. This is most evident in places such as stores, bakeries, hotels or wellness spaces where smells are used in order to improve the atmosphere and overall customer experience (Hulten et al. 2009, 51-55). In some cases, after applying scents, business profits have increased by up to 40%. (Hulten et al. 2009, 41).

Smell is also an important part of branding luxury cars such as Rolls-Royce. The Rolls-Royce company spent hundreds of thousands of dollars reproducing the distinct smell of an old version of Rolls-Royce for their new car models. Before each new Rolls-Royce leaves the factory, a distinctive smell of an old Royce-Roll is added in order to recreate the smell of a classic old model. Other car manufacturers, such as General Motors, Ford and Chrysler all use customised scents or branded aromas for their cars (Lindstrom 2005, 94), in order to "give them their own identity and improve the experience of driving and traveling" (Hulten et al. 2009, 45).

However, scents are not only valuable in car and customer service contexts; they can also increase brand awareness when used for advertising in print media. Many perfume brands have long used perfumed strips in newspapers and magazines to market the new smells to the readers (Hulten et al. 2009, 46).

### 2.1.3 Sense of taste

The sense of taste is closely linked with the sense of smell. Experiencing taste without smell is virtually impossible (Lindstrom 2005, 95-96). Taste is the weakest of all five senses. It is detected by around 10 000 taste buds mostly located on the tongue, and some at the back of the throat and on the palate. Apart from the food and beverage industry, taste is usually hard for firms to incorporate into their sensory marketing strategy. However, there are some successful cases. Good example of brand incorporating taste into their products is the company Colgate, which patented its distinct taste of toothpaste (Lindstrom 2005, 28-30).

There are firms which do not have any taste items among their product, yet indirectly use sense of taste to strengthen the overall experience of their brand and to persuade the customers to stay longer on their premises, and, consequently, spend more money. Restaurants in the Swedish home interior retail chain IKEA are a good example. For the same reason some bookstores sell coffee and clothing stores sell food (Hulten et al. 2009, 127).

#### 2.1.4 Sense of sound

The sound sense is experienced when sound waves reach the ear drum and make it vibrate. It is the sense that is impossible to switch off, thus it is constantly active. (Hulten et al. 2009, 68).

Sounds are linked with mood, feelings and memories; therefore different sounds awaken different psychological and physical reactions. Since the early twentieth century sound has been used in mass marketing to communicate firms' messages and create awareness about companies and their products, mostly through television and radio (Hulten et al. 2009, 67). Today sound is used in virtually all consumer domains and extended number of marketing channels. It is an important part of the product experience and retail atmospherics. Words, language, sounds, jingles, and music are all used to attract consumers' attention, impact their mood, or to help them associate a certain sound with a brand name (Krishna 2010, 138).

Music in the service landscape is the most commonly known use of sounds. It creates a comfortable atmosphere, makes consumers stay on the premises longer and influences their conscious and unconscious decisions. The tempo of the music affects people's perception of time. For instance, music with a slow tempo can make customers stay longer in the restaurant and order more; it can also reduce negative reactions toward long waiting times. Fashion stores often use music to create a stimulating atmosphere and positively affect customers' behaviour and make them spend more time and money in the store. (Hulten et al. 2009, 74-76).

Other firms have created signature sounds for their products or brands. A good example is Swedish company Hemglass owned by Nestle, which uses a recognisable signature melody in ice-cream trucks when trucks enter a new suburb or city. This sound is legally protected as a brand (Hulten et al. 2009, 79). Another example is the clear and simple sound of Windows startup, which became a recognisable and memorable representation of Microsoft brand for millions of users worldwide (Hulten et al. 2009, 67).

#### 2.2 Sense of touch

Touch is an important part of everything a person does during the day. Every task and every interaction involves touch, be it contact with other people (a handshake or a hug), with everyday objects (such as a smart phone or a laptop), or surfaces (such as a floor or a table).

The sense of touch helps people understand the physical interaction they have with the world around them, and to differentiate, when touching a surface, whether they are touching a

stuffed animal or a real cat. As people move through the world, they have an innate sense of how things around them feel, what sensation those things produce on their skin, and how their body orients to them (Kuchenbecker 2012).

The sense of touch is a primary sense. "It is the first sense to develop in the womb, and the last sense people lose with the age" (Krishna 2011, 333). It is the essential method for infants to learn about their environment and make bonds with other people. Loving and protecting touch during the first phases of life helps infants develop into healthy and warm human beings. Once infants are old enough to reach out and touch their surroundings, they learn to develop their physical skills by touching everything in their reach. All these early experiences are merged deeply into their brains and play a significant role in interpreting the surrounding environment and avoiding dangerous situations (Schifferstein & Hekkert 2007, 41-44).

In comparison with other senses, which are all located in one area of the head, the sensation of touch can be experienced anywhere on the body. However, in order for something to be perceived by touch, first it must come in contact with the skin (Khrishna 2010, 18). The skin is the largest organ of the human body. In adults it has the surface of 1.5 to 2m<sup>2</sup>, and it amounts to about 15% of total body weight (Schifferstein & Hekkert 2007, 53). It is covered with a number of different specialised sensory receptors which are unevenly distributed along the body. Different receptor systems are responsible for different touch sensations, i.e. warmth, cold, pressure or pain. Skin sensitivity is especially sharp in those parts of the body that are most relevant to exploring surroundings directly, such as hands and fingers (Gleitman 1995, 165-166).

Tactual sensitivity is not a static property of human beings. It degrades with age, but it can also be altered by training and experience (Schifferstein & Hekkert 2007, 56). A good example are blind people whose sense of touch is much more accurate than that of people with normal sight. The reason for this is that, in the absence of information from the eyes, the part of the brain normally responsible for vision is taken over by fingers (Jones 2009).

In their recent research, Peters, Hackeman and Goldreich (2009) argue that skin sensitivity of fingers could vary between people, i.e. women tend to be more sensitive to touch than men. Researchers hypothesise that gender differences are the result of the difference in size between woman's and man's fingers. Researchers correlated size of fingers and touch sensitivity and came to the conclusion that tactual perception improves with decreasing finger size. This can be explained by the dense amount of touch receptors and sweat pores concentrated in a small area. Since women on average have smaller fingers than men, research concludes that, therefore, women have better tactual perception (Peters et al. 2009).

In addition to the skin sensations, touch perception involves body senses of kinaesthetic and proprioception. Proprioception refers to body posture, whereas kinaesthetic relates to body movement. Both types of senses are perceived through information that comes from receptors in muscles, tendons and joints (Schifferstein & Hekkert 2007, 55).

Depending whether the object is being touched by the person or if the person is being touched by the object, the distinction between active and passive touch can be made. When actively reaching out to explore objects' properties attention is directed towards the object, whereas in being touched attention is directed towards the sensation caused by that object. The difference between touching and being touched is also related to the body part involved in the interaction. (Schifferstein & Hekkert 2007, 45).

The sense of touch is most useful when coming in direct contact with an object or a surface. This is especially notable when manually handling an object and actively examining it. Examining an object this way immediately gives information about its material properties, i.e. the size, weight, shape, hardness, temperature and texture (Bergmann 2007).

Manual exploration of objects is a key to understanding why humans are close to being 100% skilled at recognising familiar objects by using only their hands (Klatzky, Lederman & Metzger, 1985, 2009). This is discovered by Lederman and Klatzky, who are considered to be experts in studying how humans process the touch of surfaces, objects, and their properties. Lederman and Klatzky (1987, 2009) broadened their study and investigated typical hand movement patterns, or "exploratory procedures", which people commonly use to explore specific object properties. During the experiment they identified six exploratory procedures: lateral motion, pressure, static contact, unsupported holding, enclosure and contour following. These procedures are shown in Figure 2.

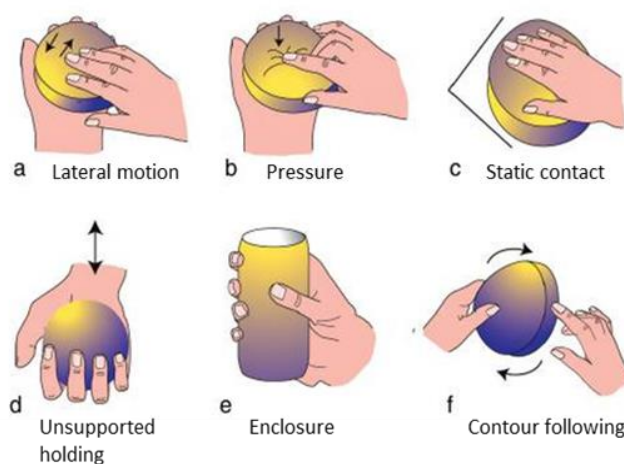


Figure 2. Exploratory procedures (Lederman & Klatzky 2009, 14; adapted from Lederman & Klatzky 1987)



Lateral motion is a procedure that involves sliding hands across object surfaces in order to obtain information about their texture. Pressure relates to the application of force to a surface, and provides information about objects' compliance. Static contact involves making simple contact with a surface in order to extract information about its thermal properties. Unsupported holding refers to lifting the object away from the surface to become familiar with its weight. Enclosure involves moving one's fingers around an object's contours to obtain information about its size and general shape. Lastly, contour following is related to moving fingers along an object's edges and provides details about an object's precise shape (Lederman & Klatzky 2009).

Klatzky and Lederman (1987) additionally discovered that humans are especially effective at recognising the materials of familiar surfaces and objects, i.e. texture, compliance, thermal qualities, and weight, while they are considerably less effective at tactually evaluating an object's geometric features, such as orientation, shape, and size.

In everyday situations, touching objects usually occurs in the presence of vision, i.e. people have the choice to use their hands or not to in order to explore objects' properties. Vision is commonly used to pre-assess whether and when touch should be initiated as it triggers recognition based on memory retrieval. The shape and size of an object tend to be more evaluated with the eyes than hands (Klatzky, Lederman & Matula 1993), since people can easily perceive common three-dimensional objects by only imagining them or looking at them (Hulten et al. 2009, 146).

The sense of touch is commonly used to obtain information about the dimensions of temperature, weight and consistency, whereby texture of surfaces and objects can be assessed both by seeing and touching. However these could contradict each other: an object might appear smooth but feel rough or other way around (Klatzky, Lederman & Matula 1993).

### 2.2.1 Technological applications

Scientific studies investigating human touch processing of surfaces, objects, and their properties have been applied in number of different fields, especially in the development of haptics technology (Lederman & Klatzky 2009). Haptics technology is a branch of engineering which studies human interaction with real and virtual objects through vibration, touch and motion. This technology is a couple of decades old but in modern days its popularity grew with the development of touch screen devices (Popp 2010). The most popular example of this technology today is the usage of common smart phones and touch screen tablets. However, that is just a fraction of what this technology can do.

Haptics technology focuses on studying human interaction with the physical world and recreating it through interactive haptic interfaces (Haptics 2012). Some examples include the design of tangible graphics displays for blind people such as maps, graphs and drawing, the design of haptic and multisensory interfaces for remote and virtual environments, and haptic art for the blind and sighted (Lederman & Klatzky 2009).

At TEDYouth 2012, Kuchenbecker (2012) shared one example of development in the field of haptics she was part of. Her team created hand-held tool which, when applied to the image of surface on touch screen, creates illusion of touching different surfaces of a real materials. Kuchenbeckers team as well built device which recreates what dentist feels when handling tooth with dental tool.

According to Kuchenbecker (2012) haptics technology will continue developing as it has a lot of potential for many different fields like dentistry, medicine, tool simulation, online shopping, interactive gaming, and many more.

### 2.3 Touch in marketing

Although touch studies might involve any tangible surface of the human body, marketing research primary concentrates on hands. Obtaining tactual information by an active movement of hands in a marketing context is often referred to as haptics (Krishna 2010, 18). Even if visual examination can collect enough information about how things are going to feel, nothing can substitute one's own hands. This is especially evident when studying consumers' behaviour in retail environments: people have a tendency to touch products in shops before buying them. The most obvious reason is that if the tactile qualities of a product are what matters the most, hence consumer want to know how they feel. For instance, people prefer to touch towels before purchasing them, as well as bed linens and clothing. Even non-textile products that come in contact with their bodies such as creams, lotions and make-up (Underhill 2009, 172). In a bookstore, people tend to touch or stroke book covers and experience physical properties of a book, even though the physical aspect has nothing to do with the overall satisfaction (Underhill 2009, 178). Evidently, products are touched for number of different reasons. The most important reason, however, is that shoppers desire to experience the product before paying for it (Underhill 2009, 179).

Touching the product works on a subconscious level as well, and can create a sense of ownership (Underhill 2009, 178-179; Peck & Shu 2009), as well as increasing the amount of money the person is willing to pay for a product (Peck & Shu 2009). Adding a tactile element on a brochure or letter can even persuade people to donate money and time to a non-profit organisation (Peck & Wiggins 2006).

Even though much harder, a two-dimensional environment, such as a web page or a brochure, can appeal to sense of touch through images and descriptions which explains how product feels against the skin (Peck & Childers 2003).

In contrary, insufficient visual description in retail environments increases the need to touch a product, thus a firm can intentionally leave out tactual description and encourage customers to touch the products instead (Hulten et al. 2009, 148), since the possibility to touch the merchandise in the store can increase the possibility of unplanned purchasing (Peck & Childers 2006).

#### 2.4 Touch in purchase behaviour

Based on her own observational study on consumer behaviour, an expert in the field of sensory marketing, Krishna (2010), distinguishes between four types of touch in a retail context (Figure 3):

1. Touch to purchase
2. Touch to obtain non-haptic product information
3. Touch to obtain haptic product information
4. Hedonic touch



Figure 3. Types of touch in consumer behaviour (Krishna 2010, 20)

Krishna (2010, 20-22) explains that in the first instance, a consumer is not interested in the haptic properties of a product but only in the purchase. An example is a consumer who is

shopping for the same item as many times before and is loyal to a certain brand of product, for instance milk. The purpose of a touch here is just to place milk in the cart for the purchase. At the next level, the consumer might touch a product in order to obtain some non-haptic information. For instance, a consumer may take a product in his hand in order to visually inspect the label. Later, the consumer may or may not decide to make the purchase. Finally, a consumer might want to touch the product in order to inspect relevant material properties, such as texture, temperature, hardness, or weight (Krishna 2010, 20-22).

In all three mentioned types of touch, actions of consumers are directed towards product evaluation and making purchase decisions. In contrast, the fourth type, hedonic touch, focuses only on the sensory experience of touch (fun, enjoyment) that may or may not end with purchase (Krishna 2010, 20-22). For example, touching the surface of a carpet only because it is sensory-pleasing.

## 2.5 Touch and individual preferences

When it comes to personal preferences, not everyone has an equal need to touch products. Peck and Childers (2003) studied individual differences in haptic information processing and consequently developed “Need for Touch” (NFT) scale. The NFT scale is defined as “preference for the extraction and information utilization of information obtained through the haptic system” (Peck & Childers 2003, 431). Based on NFT, researchers distinguish between two dimensions of touch: instrumental and autotelic touch. Instrumental touch is important for the evaluation of products that differ in terms of material properties, i.e. texture, temperature, hardness and weight. This dimension refers to individual motivation to touch with the goal to make a purchase decision. Conversely, the autotelic dimension is related to hedonistic aspects of touch, such as enjoyment or fun, without direct purchasing intention.

Peck and Childers (2003) claim that the importance of haptic information differs significantly between consumers as well as products, and situations. They used number of experiments to assess how these factors interact to weaken or boost the purchasing decision and use of haptic information. In one part of the study, half of the subjects were given the opportunity to touch a sweater and a telephone, while others could only observe these objects through plexiglass. They noticed that barriers to touch, such as a retail display case, can prevent consumers in obtaining haptic information and consequently decrease confidence in that product. Moreover, such barriers can increase the frustration level of consumers who are high in NFT, i.e. the ones who are more motivated to touch the products. Scientists noticed as well that adding written descriptions and illustrations of products, helped to reduce their frustration, to some degree. For low NFTs, touching or not made no difference.

In a separate experiment, Pack and Childers (2006) found that people high in autotelic NFT are additionally more prone to impulsive shopping behaviour than people low in autotelic NFT.

## 2.6 Touch and the subconscious mind

Touch has a strong link to the subconscious. People obtain implicit memories (memories without awareness) about interaction with objects through unconscious learning (Wippich & Wagner 1989; cited in Berger 2006, 3). It is evident that the result of touch is not only a physical reaction, but it is an interplay between a person's feelings, perceptions, memories and experiences. (Hulten et al. 2009, 146).

### 2.6.1 Touch and social judgments and decisions

Touch can unconsciously influence people's judgments and decisions, even when those judgments or decisions are made about completely unrelated events, situations, and objects (Ackerman, Nocera & Bargh 2010).

Ackerman (2010) claims that touching certain objects can activate feelings that people associate with them over the years. For example, physical sensation of warmth can make people feel psychologically warmer, and physical roughness can be associated with mental roughness. To prove his hypothesis, Ackerman and his team conducted a number of separate experiments where they investigated the effect of three dimensions of touch (weight, texture and hardness) on participants' unconscious behaviour. In one of them, Ackerman (2010) asked people to evaluate a fake job candidate while holding either a light or heavy clipboard in their hands. People who held the heavy clipboard viewed the potential employee as a more serious candidate for a job. Likewise, participants who sat in hard chairs during evaluation of the potential job candidate found him to be more stable than did the participants who were sitting in a softer chair. A similar effect was achieved by making product packaging heavier: participants who were given mineral water to drink from a solid cup rated water as being of better quality than did the participants who drank the same water from a thin cup. (Ackerman et al. 2010)

In another experiment, people were asked to hold either a warm or cold therapeutic pad while making investment decisions unrelated to the object they were holding. Results showed that people were willing to invest 43% more money after briefly holding the warm pad (Ackerman et al. 2010).

In other research, participants were given puzzle pieces to handle, whose surface were either covered in sandpaper or smooth. Volunteers responded more negatively after handling puzzle pieces covered in sandpaper than those who handled smooth ones (Ackerman et al., 2010). Ackerman (2010) claims that touch is certainly not the only factor which contributed to the results of these experiments, however this discovery of the effect of touch on peoples subconscious could be important for marketers and decision-makers to take into consideration and even for job seekers and employers.

### 2.6.2 Touch and the perception of volume

In one of her studies, Krishna (2006) examined the role of visual and haptic senses on consumers' judgment of volume. The study investigated the elongation effect, or common tendency of people to think that a tall, thin glass holds more than a short, bulky glass of equal volume.

For one part of Krishna's (2006) study, subjects were blindfolded and handed two glasses: a tall, thin glass and a shorter, wider one. Participants perceived shorter, wider glasses to be larger in volume compared to the taller glasses. This was repeated in the second part of the experiment, except this time subjects were not blindfolded but instead they were introduced to visual distractions involving a series of 30-second advertisements.

Results of Krishna's (2006) research showed that elongation effect is reversed when touch is used instead of sight to estimate how much a container actually holds. The study thereby proved that the perception of volume depends on what senses are being used to make the judgment.

According to Krishna (2006), this research could be applied in movie theatres where many visitors tend to hold popcorn while watching the movie. She argues that the popcorns sold in shorter, wider containers may bring grater satisfaction to consumers, than tall, thin ones.

### 2.6.3 Touch and perceived ownership

In their study, Peck and Shu (2009) tested the effect of touch to perceived ownership of the touched object. They used four experiments to assess how the use of touch information can boost the feeling of ownership of common objects such as a metal slinky, mug and a mechanical pencil. Half of participants were given the chance to touch these objects while the other half could only observe them. At the same time researchers measured differences in the amount the participants were willing to pay for these objects, depending on touch and no-touch condition.

Peck and Shu (2009) found that the possibility to touch an object will result in a greater feeling of psychological ownership in comparison with lone observing without touching involved. Touching also increased the amount a person is willing to pay for a product.

#### 2.6.4 Touch and persuasion

Peck and Wiggins (2006) used the NFT scale in their experiment concerning customers' response to touch and its influence on persuasion. Peck and Wiggins (2006) found that adding a tactile element to an ad, such as letter or a brochure, while requesting donations, increased both persuasion and the probability of donation. In one part of their study, fake brochures requesting donations for a children's museum were sent to a number of families with children. Brochure also included a questionnaire. The cover of the brochure showed a cartoon dinosaur with the child reaching out to touch it. Half of the brochures contained a soft tactile element on the picture of dinosaur, while the other half did not (Pecks & Wiggins 2006).

Peck and Wiggins' study (2006) showed that the brochure was rated positively by the participants if it contained a suitable touch element. At the same time, the participants were willing to make bigger donations. Just like in a study by Peck and Childers (2003), this was true only for subjects with high NFT, while for low NFTs there was no difference in willingness to donate, in spite of the touch element. However, they did rate the brochure more positively.

### 3 Research problems and hypothesis

Even though a significant amount of research on the effect of touch in marketing has been done, it is evident that there are many aspects of touch which are still to be investigated. After analysis of the literature and previous studies on impact of touch on consumer behaviour, one can loosely categorize the role of touch in marketing into two categories: studies examining touch in high-tech context, or studies examining the relationship between touching common product and its effect on consumer behaviour. Majority of studies in later category consider that touch has a persuasive impact only when consumer is coming in direct contact with the product, and when information about material properties of the product is available. Subjects in these studies are either touching or holding the three dimensional object (Peck & Childers 2003, 2006; Peck & Shu 2009; Krishna 2006, 2010) what effected their judgments and decisions, even about completely unrelated situations or events (Ackerman et.al 2010).

However, researches, such as the one from Peck and Wiggins (2006), point out that touch can have a persuasive effect in two dimensional setting as well, such as a brochure which is lacking useful product related information. The authors find that people who are motivated to touch just because it is fun and interesting (autotelic touch) will show affective response and increased persuasion after touching a pleasant element attached to an ad or a brochure. Even people who were not interested in hedonic touch rated their brochure as being more positive when it had a touch element attached to it (Peck & Wiggins 2006).

As mentioned earlier, main goal of this research is to find out if Active Paper can be used as a new tool to promote apartment sales. This would be achieved by means of printing apartment layouts on Active Paper, featuring hidden graphics of furniture which are to be uncovered by swiping its surface with a wet fingertip. According to Schifferstein and Hekkert (2007), this kind of touch is called 'active touch', and it consists of two components: tactual component, which is related to the skin sensations that detect material properties of Active Paper (texture) and kinaesthetic component, which is related to the sensation of movement in hands' muscles, tendons and joints. Obtaining tactual information by an active movement of hands in a marketing context is often referred to as haptics (Krishna 2010, 18).

Furthermore, this kind of touch can be roughly categorized as a 'lateral motion', according to an exploratory procedure classification (Lederman & Klatzky 1987), and as a 'hedonic touch', according to a classification of touch in consumer behaviour (Krishna 2010). However, NFT scale (Peck & Childers 2003), provides the most accurate categorization by classifying touch of Active Paper as an 'autotelic touch'. Purpose of touching the layouts on Active paper is not to obtain material related haptic information, but for fun and entertainment and to, consequently, influence people's attitude towards the apartment. And even though touching an apartment layout on Active Paper provides no haptic information about how the apartment actually 'feels', research by Pecks and Wiggins (2006) points out that it may nonetheless be persuasive.

As the main goal of this project is to find out if Active Paper can be used as a new marketing tool to promote apartment sales, it was important first to find the method to measure its effect on people's attitudes. It was discovered that the best way this can be achieved is to first establish the relationship between senses which play a significant role in evaluation of graphics on Active Paper: vision and touch. The relationship would explain how people process and evaluate a combination of touch and visual stimuli of graphics on Active Paper, in comparison to an evaluation done only visually.

Sub-goal of this research will therefore be to investigate how the touch affects people's attitudes, since touch is a variable which can be manipulated between experimental groups



(touch or no-touch) while visual stimuli would be kept as a constant in both conditions. In other words, this research will show:

- Does touch have a positive effect on people's attitude toward the apartment?
- Does touch affects people's attitude in some measurable scale?
- Is there a difference in attitude toward the apartment between the genders?

The hypothesis of this thesis predicts more favourable attitude towards apartments associated with Active Paper and touch, than the one experienced only visually.

#### 4 Methodology

In this chapter research methodology and experimental design will be explained in details, followed by the data analysis and communication of the results. Research methodology of this thesis is visualized in Figure 4.

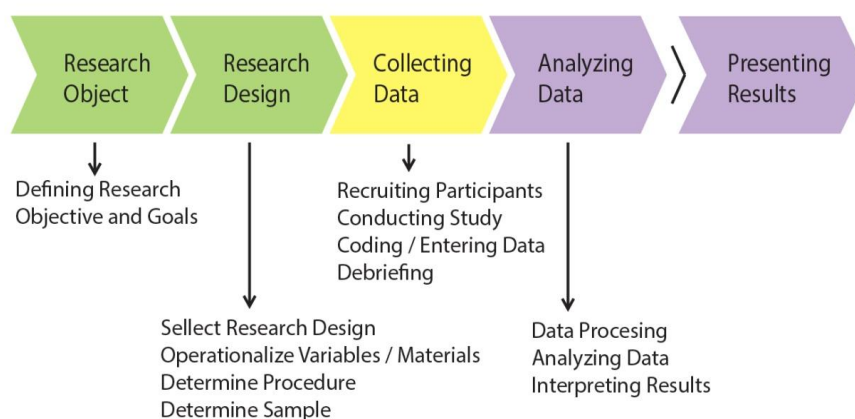


Figure 4. Research methodology

##### 4.1 Experimental design

There are various designs which are used in conducting marketing studies, and which one the researchers will select, depends what is the aim of the study (Kumar 2009, 74). As the aim of this study is to determine the causal relationship between the touch and people's attitudes, this research will use quantitative experimental design with a control and an experimental group, and convenience sample of 120 Finnish students of Laurea University of Applied Sciences in Espoo.

The decision about the type of research design is based on exploratory research and deep insight into the field of study. This type of research has been used in previous studies

examining the role of touch which have been mentioned in this paper earlier, such as Peck and Childers (2003), Peck and Wiggins (2006), Peck and Sue (2009).

According to Thyer , “a traditional research design is a blueprint or detailed plan for how a research study is to be completed-operationalizing variables so that they can be measured, selecting the sample of interest to study, collecting data to be used as a basis for testing hypothesis, and analysing the result.” (Kumar 1999, 74)

In that view, the first step of creating a research design is to identify the variables. Essentially, a variable is a factor in the experiment which can be controlled, changed, or measured. Scientific experiments, which are set to investigate causal relationships, usually have at least two types of variables: independent and dependent. The independent variable is a condition that is changed or manipulated in an experiment. It is also known as cause, stimulus, reason or manipulated variable. The dependent variable is an outcome brought by changes in the independent variable, also known as effect, result or responding variable. (Kumar 1996, 51-77).

Often in an experiment, the independent variable is not the only variable potentially responsible for changes that occur in the dependent variable. Many other possible variables, even the time of the day, the mood of the subject, or the weather, might also affect the outcome of the experiment. These are called extraneous variables, and they are often unnoticed and unmeasured, but they could be responsible for possible variations within the dependent variable (Otyang 2015).

An example of the relationship between smoking and cancer can be used to explain the connection between the variables (Figure 5). In this case the extent of smoking is the independent variable, cancer is the dependent variable, and all other variables that might affect this relationship, such as number of cigarettes smoked per day, the duration of smoking and the age of the smoker, are extraneous variables. All of these factors may affect the extent to which smoking causes cancer but one is not interested in studying their impact. (Kumar (1999, 53)

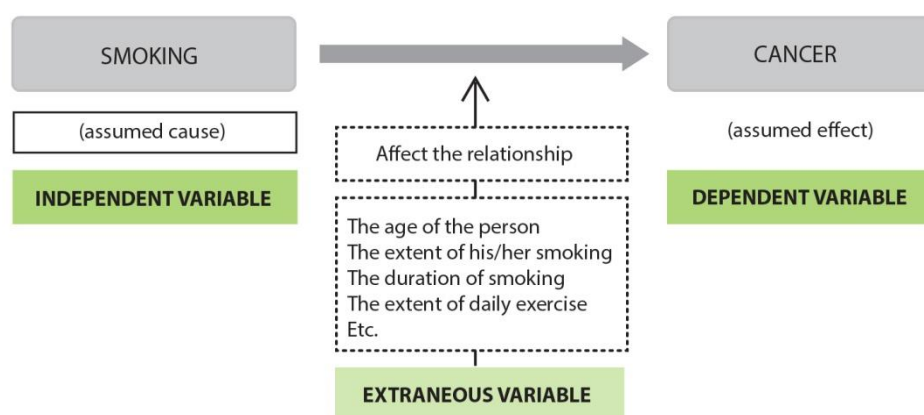


Figure 5: Variables in causal relationship between smoking and cancer (Kumar 1999)

Clearly, a major goal in research design is to decrease or control the influence of extraneous variables. This means trying to ensure that there are as few explanations for results as possible. One way to achieve this is to conduct the research in laboratory conditions. (Kumar 1999, 77). However, conducting research in laboratory is often an expensive and time consuming option.

In classic experimental design, it is common to have two study groups: experimental and control group. These groups are expected to be as similar as possible in every respect except for intervention. (Kumar 1999, 91). The purpose of a control group is to provide information about how participants behave in a certain setting without any intervention, and to use that information as a standard to compare the results (Shuttleworth 2010).

What differentiates the types of experiment is the method used to assign subjects to the conditions. The two most common experimental designs in which a large number of subjects is studied are true experimental design and quasi experimental design. In true experimental design, subjects have an equal chance of being assigned to either experimental or control group. Random assignment ensures that both experimental and control groups are truly comparable and that the observed differences in the outcomes are not the result of extraneous variables or pre-existing differences. Only differences in the groups would be due to chance (Gribbons & Herman 1997; Kumar 1999, 89). However, randomized experiments are often not possible and can even be unethical in real-world scenarios. In that case, quasi-experimental design is commonly employed instead (Trochim, Donnelly & Arora, 2015, 258).

A quasi-experiment is very similar to a true experiment except that in the quasi-experimental design, subjects are not randomly assigned to experimental groups and/or researcher lacks the control over external variables which might affect the implementation of the experiment.

Subject can be assigned to experimental groups according to certain similar characteristics or pre-existing conditions, such as weight, academic achievement, alcohol consumption, or smoking (Pedhazur & Schmelkin 1991, 277-280; Gribbons & Herman 1997). Due to the convenience, researchers often use naturally formed groups such as school classes, organisations or family units (Creswell 2014, 168).

For example, when studying the consequences of 10 years of smoking, individuals who are already smoking would be allocated to experimental group, and subject who do not smoke to the control one. That means that subjects are not randomly assigned to the groups. It would be time consuming and unethical to ask a random non-smoking subject to start smoking and measure the effect after 10 years.

As quasi experimental design lacks randomness, researchers can never be sure that the groups are truly comparable (Trochim 2006). Therefore, when it comes to internal validity, quasi-experimental design often appears to be inferior to randomized experiment (Trochim, Donnelly & Arora 2015, 258).

#### 4.2 Experimental design of Active Paper study

Due to the lack of resources and limited time, it was not possible to carry out the experiment in a laboratory setting, or conduct a pre-test before the real experiment. Therefore, quasi-experimental design with post-test only, was the most suitable research approach for this study (Figure 6). Convenience sampling was conducted among 120 students of Laurea University of Applied Sciences in Espoo. Half of the students (n=60) were assigned to the experimental group, and the other half to the control one. Participants of the control group were asked to visually inspect the image of apartment layout presented on a standard sheet of A4 paper, while the experimental group was asked to inspect the layout on Active Paper haptically as well.

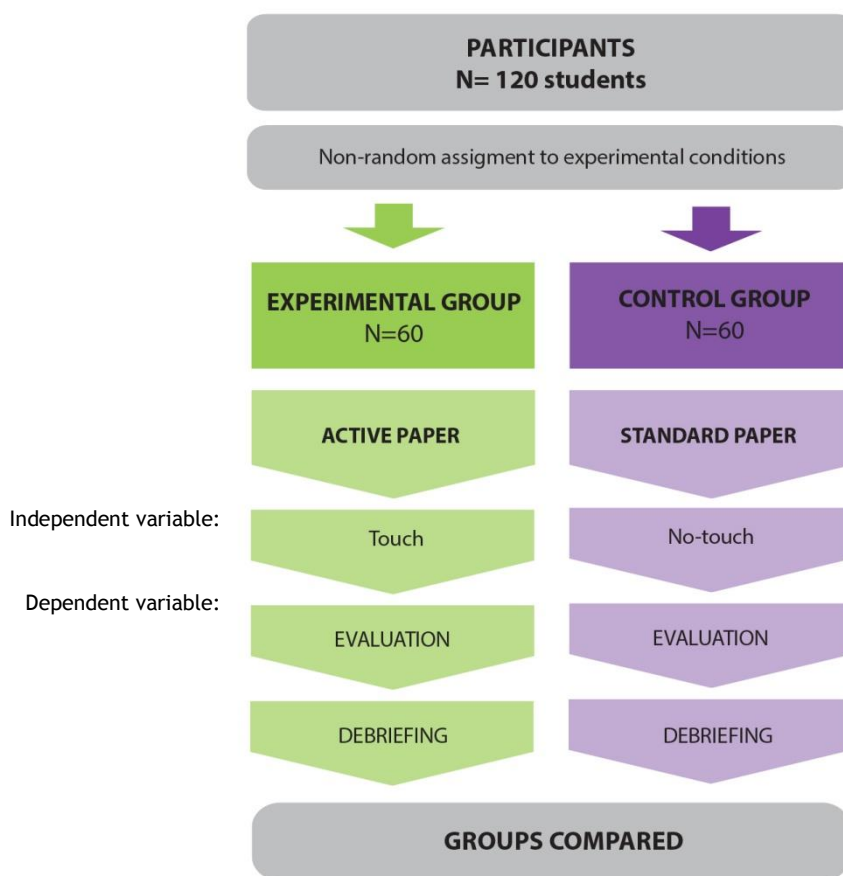


Figure 6. Experimental design of Active Paper study

Afterwards, subjects were requested to indicate their attitude towards the apartment on an 11-point numerical scale. Data was collected during a period of two weeks, starting November 18<sup>th</sup> and ending November 28<sup>th</sup>, and was processed in SPSS statistical program. SPSS analysis of the results is presented in chapter 5.

#### 4.2.1 Study sample

The participants of this study were 120 Finnish undergraduate students enrolled at Laurea University of Applied Sciences in Espoo. At this location, subjects (students) were readily available and it was easy to assign them to test groups. Recruitment of study participants continued until targeted sample size was completed and until available resources (test samples) were exhausted. The majority of recruited students (95%) were business students (70% Business Management students, and 25% Business IT students). The average age of participants was 22.

The sample of this study is defined as availability sampling by convenience. Daniel (2012, 82) defines availability sampling as no probability sampling method in which participants are selected based on their availability, convenience of the researcher or their self-selection. Results are, thus, limited to sample size, and it is not possible to generalize the results to the entire population.

#### 4.2.2 Study material

In preparation phase, three different apartment layouts were selected for the evaluation, precisely layouts of one room, two room and three room apartments. The reason for choosing different layouts is to have some control over individual preferences (for instance, some people prefer small apartments over the large ones). The layouts were provided by the real-estate company; therefore, the researcher had no control over the selection of images for the experiment. Example of apartment layout can be seen in Appendix 1.

Active Paper Company printed apartment layouts on Active Paper, and delivered them to the test location. These were to be used on the experimental group. This group had been provided with a cup of water, since liquid is required to activate the graphics change on an Active Paper and reveal the hidden furniture images.

Layouts for the control group were quite identical, except they were printed and presented on a standard sheet of A4 paper. Moreover, material for the control group included two equal apartment layouts: one containing furniture and the other one not.

#### 4.2.3 Variables

As this thesis aim is to study the correlation between touch and evaluation, it is assumed that touch will positively influence the participant's attitude. Hence, in the study of this relationship, touch (or no-touch) is independent variable or stimulus. Touch was manipulated by having one half of the participants being able to haptically explore the apartment layout on Active Paper, while the other half examined the layouts only visually. Visual evaluation was thus the control variable as it was present in both conditions. Evaluation of layout on attitudinal scale is the dependent variable, or the outcome brought by changes in an independent variable.

Convenience sampling at university campus provided a homogeneous environment where it was possible to have some control over the extraneous variables, such as subject nationality (only Finnish speaking classes were selected), age group (assumed age group of students is 19-25), their educational level, and time of the day when the experiment is being conducted.

This is how variances between experimental and control group were assumed to be reduced to minimal. However, the researcher had no control over schedule, gender distribution between groups, type of classes, students' willingness to participate, and other uncounted extraneous variables. During the preparation, number of random lecturers were contacted by email in order to request approval to visit their classes and carry out the research among the attending students. The selection of classes was made based on willingness of lecturers to participate in the study. As lecturers gave their approval, schedule was made accordingly. The goal to conduct the experiment always at the same time of the day, after the lunch time was achieved. Therefore, it was only possible to visit one class session per day. Set of variables of this research is illustrated in Figure 7.

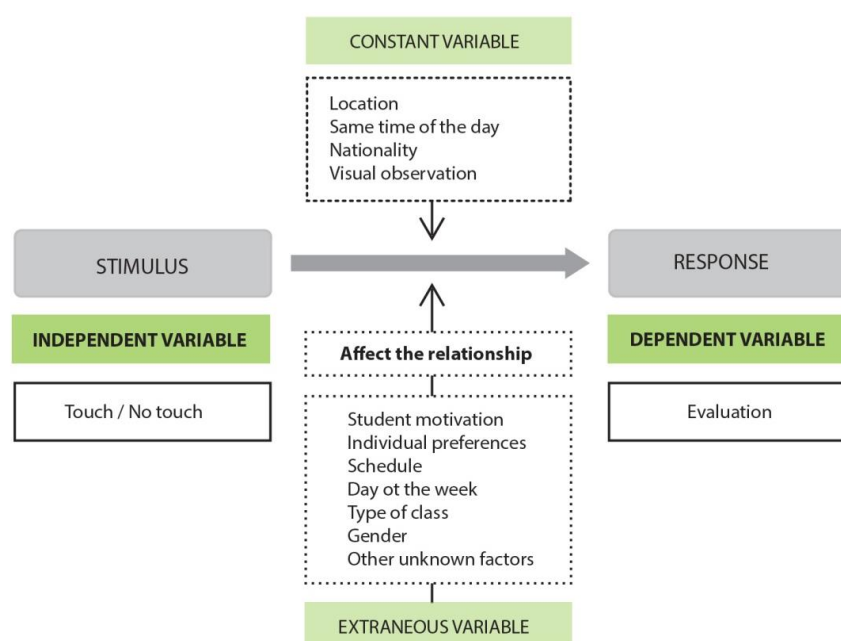


Figure 7. Sets of variables in Active Paper study

#### 4.2.4 The procedure

In order to keep sampling as random as possible, the experiment started by alternately assigning groups to classes on 'flip the coin' principle. As a result, the first class visited was assigned to the control group, following class to the experimental group, and so forth. As the goal was to conduct the experiment always at the same time of the day it was only possible to visit one class per day before the start of the scheduled lecture (Figure 8).

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8		
A= CONTROL GROUP B= TEST GROUP	A	B	A	B	A	B	B	A	60A	120
NUMBER OF SUBJECTS	12	20	17	15	14	9	16	17	60B	

Figure 8. Distribution of subjects in experimental and control group

Each class was given only one experimental task to complete: either visual evaluation, or both, visual plus haptic evaluation (Figure 9). All participants responded in small groups of on average 15 students, depending on a number of students attending the class in question that day. It took eight separate class sessions to complete the experiment.

The participants of the control group were asked to inspect the image of apartment layouts presented on a standard sheet of A4 paper. While this group assessed layouts only visually, the experimental group (Active Paper group) was asked to inspect the layouts haptically as well. In order to complete the task, a cup filled with water was provided to each participant in the experimental group. They were required to dip their finger in the supplied water, then swipe it over the layouts on Active Paper and observe what will appear beneath. On the area touched with the wet finger, previously hidden image of furniture would appear, such as bed, table and chairs. After the visual or the visual and haptic inspection, participants were asked to indicate their attitude toward apartments on an attitudinal scale.

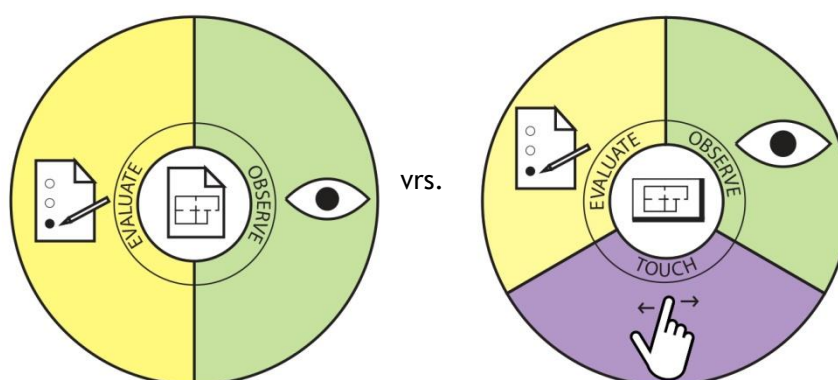


Figure 9. Research procedure: control group versus experimental group

After completing the rating of the stimuli, participants filled out a demographic questionnaire. They were also asked to state their attitudes toward the apartments which the anonymous retail company is selling, but those are not relevant for this evaluation, and were thus excluded from the analysis.



#### 4.2.5 Measurement

Even though this experiment is broadly based on a research by Peck and Wiggins (2006) it was not possible to implement a 12-item NFT instrument which researchers used in their study. Applying this instrument would require a larger number of participants, and it would also be expensive and time consuming to execute at this point.

In this research, one measure was implemented to indicate the participants' attitude towards the apartment, precisely an 11-point single item numerical scale.

The participants were asked to evaluate a single statement: "This layout pleases me" on 11 point scale, with end points 0 and 10 defined by labels 'entirely disagree' and 'entirely agree' (Appendix 1).

Eleven-point single-item scales are commonly used in marketing research, as they can be easily mapped to a 0 to 100% scale; they are simple to use and sensitive to small differences in attitude (Brudvig 2007, 38). Numerical scales suggest the idea of equal distance between the categories, and thus are considered to be a more accurate measure than verbally labelled scales. (Krosnick & Fabrigar 1997, cited in Lubian 2010, 6137). Other arguments in favour of the eleven-point scale are: minimization of categorization effects, improvement of data analysis and reliability of the data, i.e. less measurement error (Scherpenzeel 2002, 1).

The exact nature of the experiment was kept hidden from the participants of this research until the necessary data was collected; meaning that they did not know what exactly was being tested. There was a chance that participants would not respond as naturally and honestly if they knew what the real goal was. For example, subjects could have tried, either consciously or unconsciously, to prove the hypothesis correct or even false (Genco, Pohlman & Steidl 2013, 238).

#### 4.3 Data analysis

After the experiment was done, data was processed and analysed with IBM SPSS Statistics software. To test the hypothesis and compare touch and no-touch scores on the 11-point scale, data was analysed using independent samples T-test. In order to understand relationship between touch and gender, data was analysed using Two-Way ANOVA. All the test included descriptive statistic, group statistics and Leven's Test for Equality of Variances.

The independent T-test is commonly used statistical test which determines whether there is a statistically significant difference between the means in two groups on the same continuous,

dependent variable (Independent T-Test using SPSS 2013). The T-test is used for testing hypothesis using the T-test statistic to determine a p-value. P-value indicates how likely results could have occurred by chance. Usually, if there is less than 5% ( $p < 0.05$ ) possibility of getting the observed differences by chance, it can be said that there is a statistically significant difference between the two groups (Creech n.d.).

Two-way ANOVA is used to compare the mean differences between groups that have been split on two independent variables. The primary purpose of a two-way ANOVA is to clarify if there is an interaction between the two independent variables on the dependent variable (Two-way ANOVA in SPSS Statistics 2013).

Levene's Test for Equality of Variances is a test used to determine if variances of the two groups which are being measured are equal. This assumption of homogeneity of variance is commonly part of independent T-test analysis in SPSS. It provides an  $F$  statistic and a significance value ( $p$ -value) which is value researcher is interested in. If  $p > 0.05$ , group variances can be treated as equal. However, if the significance level is smaller than 0.05, variances are unequal and the assumption of homogeneity of variance is violated (Independent T-Test for Two Samples 2013).

## 5 Results of the analysis

### 5.1 Main effect of touch on apartment layout evaluation

The independent samples T-test was performed comparing the response means of touch condition with the response means of no-touch condition in order to analyse whether touch had significant effect on participants attitude towards the apartment, using the significance level of 0.05 (Appendix 2).

The Levene's Test for Equality of Variances shows that the assumption that the group variances are homogenous has not been violated ( $F(118) = 0.54$ ,  $p = 0.46$ ). However, there was no significant difference in response means between touch ( $M_{\text{touch}} = 6.22$ ,  $SD = 2.73$ ) and no-touch ( $M_{\text{notouch}} = 5.88$ ,  $SD = 2.40$ ) conditions;  $t(118) = 0.709$ ,  $p = 0.48$  (Figure 10).

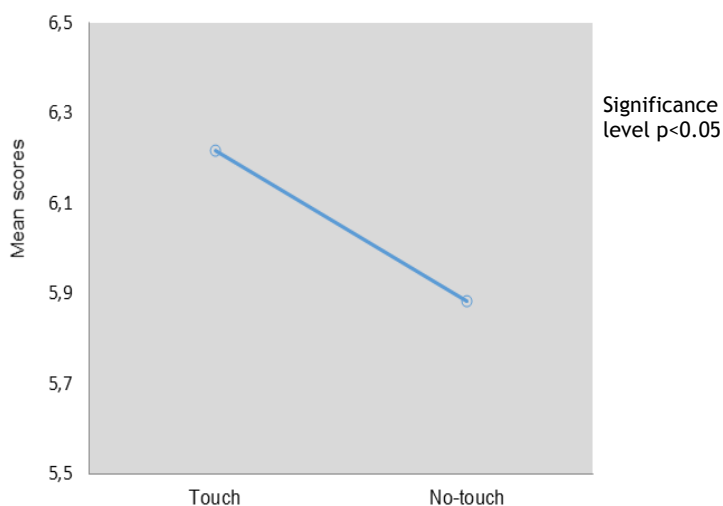


Figure 10. Difference between touch and no-touch condition is not statistically significant

This means that the touch has no significant effect on participant's attitude and the hypothesis of this thesis has to be rejected. Although mean score of touch group is slightly higher, it is not statistically significant.

## 5.2 Effect of touch on evaluation of three apartments independently

Since three different apartment layouts were used for evaluation in both touch and no-touch condition, independent samples T-test was performed for a second time to investigate difference in response means between individual apartment layouts regarding both conditions (Appendix 3). This would show if one of the apartments was scored higher or lower than the others in either of the conditions.

The Levene's Test for Equality of Variances shows that the assumption that the group variances are homogenous in all three cases ( $p > 0.05$ ).

One room and two room apartment layouts in touch condition ( $M_{1\text{touch}} = 6.30$ ,  $sd = 2.59$ ;  $M_{2\text{touch}} = 4.90$ ,  $sd = 2.86$ ) scored higher than one and two room apartment layouts in no-touch condition ( $M_{1\text{no-touch}} = 4.90$ ,  $sd = 2.86$ ;  $M_{2\text{no-touch}} = 6.85$ ,  $sd = 2.75$ ). Three room apartment in touch condition ( $M_{3\text{touch}} = 5.50$ ,  $sd = 2.81$ ) scored lower than three room apartment layout in no-touch condition ( $M_{3\text{notouch}} = 6.70$ ,  $sd = 2.81$ ), (Figure 11).

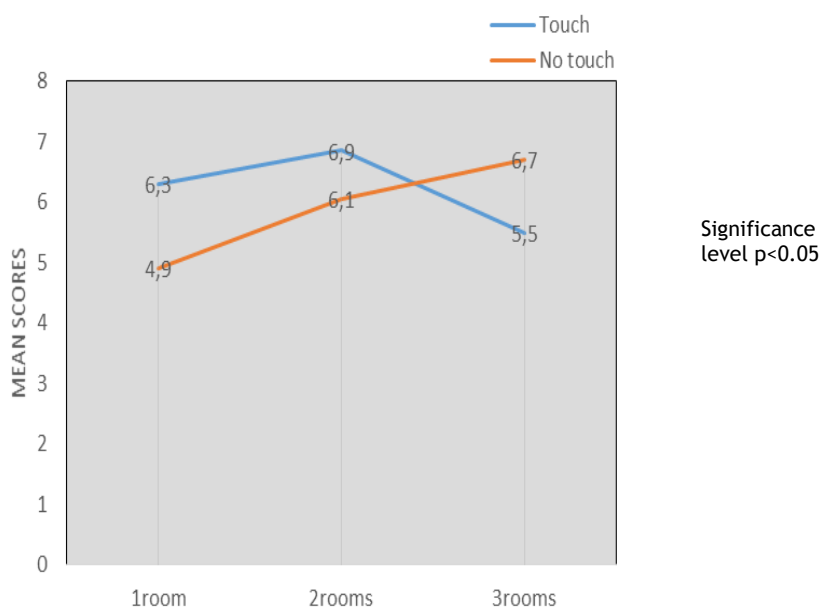


Figure 11. Difference between touch and no-touch condition for three apartments

This variation is most likely due to chance. However, difference in response means between touch and no-touch conditions for all three types of layouts has not been statistically significant;  $t_1(38) = 1.62$ ,  $p_1 = 0.11$ ;  $t_2(38) = 1.09$ ,  $p_2 = 0.28$ ;  $t_3(38) = -1.20$ ,  $p_3 = 0.14$

### 5.3 Main effect of touch between genders

In order to understand whether the evaluation score is influenced by gender, Two-Way ANOVA was performed using 0.05 as a level of significance (Appendix 4).

In this case, satisfaction score is dependent variable, whereby gender (female/male) and type of test (touch/no-touch) are independent variables both consisting of two levels.

First, the Levene's Test for Equality of Variances was performed. Test showed that the variances between groups are equal, ( $F(3, 116) = 1, 38$ ,  $p = 0.25$ ).

Results of Two-Way ANOVA demonstrate that females in both touch ( $M = 5, 95$ ,  $MSE = 0.41$ ) and no-touch ( $M = 5.71$ ,  $MSE = 0.44$ ) conditions scored just slightly lower than males in touch ( $M = 6.71$ ,  $MSE = 0.57$ ) and no-touch conditions ( $M = 6.12$ ,  $MSE = 0.51$ ). The plot of the mean score for each combination of groups of "Gender" and "Type of test" are plotted in a line graph, as shown in Figure 13. Lines on the plot are almost parallel which signifies that there is no interaction between genders and touch/no-touch conditions.

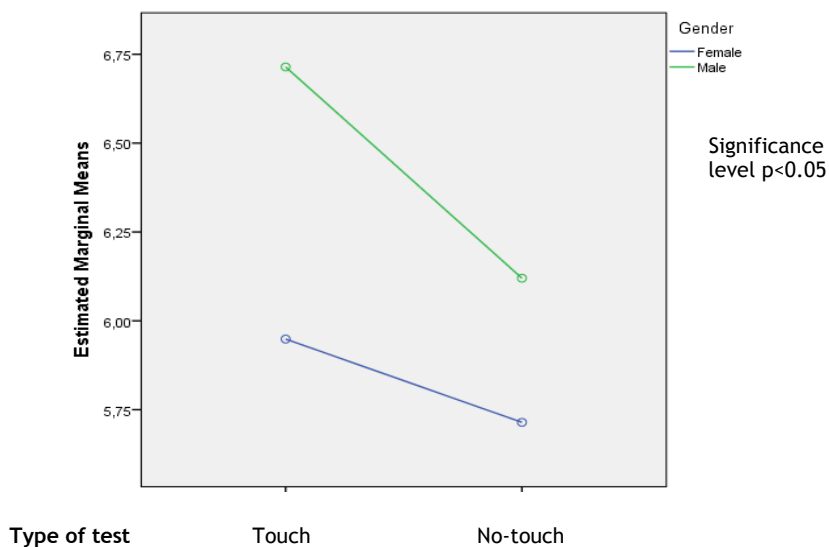


Figure 12. Interaction between gender and type of test

This is confirmed with data in Test of Between Subject Effect (Table 1).

Dependent Variable: Layout satisfaction score

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	13,734 <sup>a</sup>	3	4,578	,688	,561	,017
Intercept	4231,198	1	4231,198	635,804	,000	,846
Gender	9,673	1	9,673	1,453	,230	,012
TestType	4,842	1	4,842	,728	,395	,006
Gender * TestType	,913	1	,913	,137	,712	,001
Error	771,966	116	6,655			
Total	5178,000	120				
Corrected Total	785,700	119				

a. R Squared = ,017 (Adjusted R Squared = -,008)

Table 1. Tests of Between-Subjects Effects

When looking at the relations between gender and test it is evident that there is no significant interaction ( $F(1, 116) = 0.14, p = 0.71, \eta_p^2 = 0.001$ ), neither is there significant impact of gender on layout satisfaction score ( $F(1, 116) = 1.45, p = 0.23, \eta_p^2 = 0.12$ ).

## 6 Discussion of the results

In responding to the research question of this thesis, the findings do not support the basic assumption that the touch has a positive effect on people's attitudes toward the apartment. Apartment layouts in touch condition scored somewhat higher than the layouts in no-touch

condition, however this difference was not statistically significant, meaning that the hypothesis could not be confirmed.

There are couple of possible explanations for unconvincing results. One could be incorrect choice of the target group. Students are not a good representation of population as whole. 30% of students still lived with their parents; average age of students was 22 which implies that the study sample was really young. Students of that age are not the target group for apartment sales market, and most likely are less interested into buying an apartment. Ideal target group for this experiment would be people who are having a full time job and who are planning on purchasing an apartment in the near future, or/and people with a family. Ideal age group would be from 28 onwards, as 28 is the average age of first-time home buyers in Finland (Statistics Finland 2014).

Another explanation for the results could be the choice of research material itself. Apartments were presented as a two dimensional black and white technical layouts. While this is standard representation of apartment layouts in architectural or building environment, regular people could have difficulty interpreting two dimensional layouts and truly visualizing the space. Apartment layouts printed on Active Paper could have instead been portrayed in an interactive three dimensional render. This would be more visually pleasing, it would give a 'real life' feeling to the apartment, and also enable people to easy locate and distinguish between individual elements of the apartment, such as windows and rooms.

Next, choice of measurement instrument was possibly incorrect. Even though this study is broadly based on a research by Peck and Wiggins (2006) it was unpractical to implement 12-item NFT instrument which they adopted from Peck and Childers (2003) and applied in their research. For that reason, it was not possible to allocate participants who are high in autotelic touch and, thus, are more likely to be persuaded by touch.

Furthermore, the statement "This apartment pleases me", as a research instrument was insufficient for measuring participants satisfaction, and it did not communicate any message suggesting how the apartment 'feels'. Some studies suggest that adding appropriate written description next to the image of an object has a positive effect on participant's high in NFT in situations where touching is not possible. Written touch related descriptions can partially compensate for lack of material product properties (Peck & Childers 2003).

In this respect, current study could have incorporated persuasive descriptive message as a part of the study material or the measure instrument. This could have been achieved by using adjectives people associate with the apartment, such as 'cosy', 'warm' or 'comfortable'.

Maybe even incorporate humour, and add images of a cat or a dog along with hidden graphic to make apartment feel more like a home.

Other possible adjustment could be that instead of asking participants to self-report about how apartment pleases them, they could be asked about the attitude of some fictitious person. "Asking people about what others think is a good way to get them to express their own beliefs without having to feel accountable for them" (Brand 2013, 240). For example, single young person might find three room apartments to be too big for his needs or too expensive, and therefore rate it lower. But if the same person would be asked how some fictitious young couple feels about the same three room apartment, answer could potentially differ.

Finally, it would be challenging to prove that touch was solely responsible for the evaluation scores, since the visual impressions and the effect of a surprise also have a great impact on the evaluation of layouts on Active Paper.

It is evident that there is more than one explanation for the obtained results, and possibly some of them are not accounted for. Whilst the results do not confirm the hypothesis, this research builds the argument for conducting future research on the role of touch in marketing and its effect on people's perception outside of the direct physical contact with a product.

## 7 Conclusion

The main goal of this study was to examine whether Active Paper can be used as a marketing tool to influence people's preferences and attract the attention of potential home buyers. Using the available literature and quasi-experimental research, the focus was on addressing the role of touch in housing marketing context, using Active Paper as a subject of exploration. The hypothesis of this thesis predicted more favourable attitude towards the apartment associated with Active Paper and touch, than the one experienced only visually on standard paper. Previous studies emphasize positive effect of touch on people's attitudes across different areas. Importance of touch is especially emphasized in retail environment and product evaluation. However, the role of touch in marketing, outside of direct physical contact with the product, is a relatively unexplored area. This study tried to highlight this gap in research literature. The closest example to the present paper is research from Peck and Wiggins (2006) which provided a useful theoretical prototype for the formulation of the research question and expectations of the test outcomes. Research from Peck and Wiggins (2006) implies that touch could be incorporated into marketing message in a variety of contexts, even when it does not provide useful product related information. Their research

suggests that touch can be used along with pictures, colour, humour and other elements to increase the persuasiveness of print advertising (Peck and Wiggins 2006).

As applied to current study, Peck and Wiggin's hypothesis implies that incorporating touch into apartment marketing messages would influence people's preferences and attract more attention in comparison with the marketing communication lacking the possibility of touch. This means that the apartment layouts on Active Paper should be liked more than the layouts printed on standard paper, as haptic exploration is required to expose hidden graphics beneath its surface. However, the empirical findings of this study do not support the hypothesis that haptic exploration i.e. touching apartment layouts printed on Active Paper influence people's preferences toward apartments to a higher extent than mere visual observation.

Even though the results of this study do not answer the research question efficiently, this does not imply that Active Paper cannot be used for apartment promotions regardless. Active Paper certainly could be a creative new addition to already well established apartment marketing communication channels. Handing out layout of apartment on Active Paper to prospective new buyers after the apartment showings could be a nice little reminder of how the potential new home looks like and feels. "Move in with a simple touch of the finger!"



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Appendix 1. Example of evaluation sheet of the control group

Katso pohjapiirroksia ja arvioi alhaalla oleva väitelause. Arvioinnin jälkeen täytä seuraavalla paperilla oleva kysely.



Arvioi väitelausetta "*Pohjaratkaisu miellyttää minua*" ympyröimällä sopivin vaihtoehto:

---

*"Täysin eri mieltä"* 0 1 2 3 4 5 6 7 8 9 10 *"Täysin samaa mieltä"*

Appendix 2. Results of independent T-test 1

Group Statistics

	Type of test	N	Mean	Std. Deviation	Std. Error Mean
Layout satisfaction score	Active paper test	60	6.22	2.738	.353
	Visual test	60	5.88	2.401	.310

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	t
Layout satisfaction score	Equal variances assumed	3.812	.053	-1.149
	Equal variances not assumed			-1.189

Independent Samples Test

		t-test for Equality of Means		
		df	Sig. (2-tailed)	Mean Difference
Layout satisfaction score	Equal variances assumed	118	.253	-.553
	Equal variances not assumed	105.871	.237	-.553

Independent Samples Test

		t-test for Equality of Means	
		Std. Error Difference	95% Confidence Interval of the Difference
			Lower
Layout satisfaction score	Equal variances assumed	.482	-1.508
	Equal variances not assumed	.466	-1.477

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Upper	
Layout satisfaction score	Equal variances assumed	.401	

Appendix 3. Results of Independent samples T-test 2: comparing response means of three layouts in touch condition with the response means of three layouts in no-touch condition

**Group Statistics**

	Type of test	N	Mean	Std. Deviation	Std. Error Mean
Layout 1	Active paper test	20	6.30	2.598	.581
	Visual test	20	4.90	2.864	.640
Layout 2	Active paper test	20	6.85	2.758	.617
	Visual test	20	6.05	1.761	.394
Layout 3	Active paper test	20	5.50	2.819	.630
	Visual test	20	6.70	2.203	.493

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	t
Layout 1	Equal variances assumed	1.033	.316	1.619
	Equal variances not assumed			1.619
Layout 2	Equal variances assumed	.631	.432	1.093
	Equal variances not assumed			1.093
Layout 3	Equal variances assumed	3.324	.076	-1.500
	Equal variances not assumed			-1.500

**Independent Samples Test**

		t-test for Equality of Means		
		df	Sig. (2-tailed)	Mean Difference
Layout 1	Equal variances assumed	38	.114	1.400
	Equal variances not assumed	37.644	.114	1.400
Layout 2	Equal variances assumed	38	.281	.800
	Equal variances not assumed	32.287	.282	.800
Layout 3	Equal variances assumed	38	.142	-1.200
	Equal variances not assumed	35.901	.142	-1.200



**Independent Samples Test**

		t-test for Equality of Means	
		Std. Error Difference	95% Confidence Interval of the Difference
			Lower
Layout 1	Equal variances assumed	.865	- .350
	Equal variances not assumed	.865	- .351
Layout 2	Equal variances assumed	.732	- .681
	Equal variances not assumed	.732	- .690
Layout 3	Equal variances assumed	.800	-2.820
	Equal variances not assumed	.800	-2.823

**Independent Samples Test**

		t-test for Equality of Means	
			95% Confidence Interval of the Difference
			Upper
Layout 1	Equal variances assumed		3.150
	Equal variances not assumed		3.151
Layout 2	Equal variances assumed		2.281
	Equal variances not assumed		2.290
Layout 3	Equal variances assumed		.420
	Equal variances not assumed		.423

Appendix 4. Two Way ANOVA: Main effect of touch and gender

**Univariate Analysis of Variance**

**Between-Subjects Factors**

		Value Label	N
Gender	1,00	Female	74
	2,00	Male	46
Type of test	1	Active paper test	60
	2	Visual test	60

**Descriptive Statistics**

Dependent Variable: Layout satisfaction score

Gender	Type of test	Mean	Std. Deviation	N
Female	Active paper test	5,95	2,847	39
	Visual test	5,71	2,562	35
	Total	5,84	2,700	74
Male	Active paper test	6,71	2,513	21
	Visual test	6,12	2,186	25
	Total	6,39	2,333	46
Total	Active paper test	6,22	2,738	60
	Visual test	5,88	2,401	60
	Total	6,05	2,570	120

**Levene's Test of Equality of Error Variances<sup>a</sup>**

Dependent Variable: Layout satisfaction score

F	df1	df2	Sig.
1,376	3	116	,254

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Gender + TestType + Gender \* TestType

**Tests of Between-Subjects Effects**

Dependent Variable: Layout satisfaction score

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	13,734 <sup>a</sup>	3	4,578	,688	,561	,017
Intercept	4231,198	1	4231,198	635,804	,000	,846
Gender	9,673	1	9,673	1,453	,230	,012
TestType	4,842	1	4,842	,728	,395	,006
Gender * TestType	,913	1	,913	,137	,712	,001
Error	771,966	116	6,655			
Total	5178,000	120				
Corrected Total	785,700	119				

a. R Squared = ,017 (Adjusted R Squared = -,008)

**Estimated Marginal Means**

**1. Gender**

Dependent Variable: Layout satisfaction score

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Female	5,832	,300	5,237	6,426
Male	6,417	,382	5,661	7,173

**2. Type of test**

Dependent Variable: Layout satisfaction score

Type of test	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Active paper test	6,332	,349	5,640	7,023
Visual test	5,917	,338	5,248	6,586

**3. Gender \* Type of test**

Dependent Variable: Layout satisfaction score

Gender	Type of test	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Female	Active paper test	5,949	,413	5,131	6,767
	Visual test	5,714	,436	4,851	6,578
Male	Active paper test	6,714	,563	5,599	7,829
	Visual test	6,120	,516	5,098	7,142