A study on Danish female compulsive buyers

Investigating the cause to shop excessively is due to impulses or lack of self-control

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Executive summary

Forbrugeradfærden har ændret sig markant det seneste årti. Materielle værdier udgør hovedparten af det post-moderne samfund, hvor individualisme udspringer af. Dette har medført et tiltagende problem hos mange forbrugere, fordi stadig flere lider af købemani uden selv at være klar over det. Ifølge forbrugeradfærdsstudier, er det oftest kvinder, der lider af købemani, som typisk udvikles et sted mellem teenageårene og midt fyrrene. Litteraturen indenfor neuromarketing og forbrugeradfærd har endnu ikke kunne påvise årsagen til denne afhængighed af shopping. Endvidere diskuteres det i litteraturen, hvorvidt købemani skyldes mangel på eksekutiv kontrol og uhæmmede impulser.

Da købemani netop er et meget omdiskuteret problem, undersøger denne kandidatafhandling om danske kvinder, der lider af købemani, også kaldet ”shopaholics”, er drevet af impulser eller mangel på eksekutiv kontrol. For at undersøge dette nærmere, er der opstillet to hypoteser:

$H_{1:}$ Shopaholics er forbundet med en øget følelsesmæssig respons på shopping relateret stimuli end ikke shopaholics

$H_{2:}$ Shopaholics er forbundet med reduceret adfærdskontrol end ikke shopaholics

For at teste ovenstående hypoteser, blev kvinder i alderen 18-55 år, alle højrehåndede med korrigeret syn, rekrutteret til et forsøg bestående af to forskellige typer tests:

1. For at teste deres emotionelle reaktion, anvendtes eye-tracking, der måler pupil udvidelse ved shopping relaterede stimuli.
2. For at teste eksekutive funktioner, blev der anvendt en række validerede neuropsykologiske tests.

Test personerne blev yderligere opdelt i to kategorier bestående af ”raske” og ”ikke raske” ved hjælp af ” Compulsive Buying Scale” udviklet af Valence, d'Astous og Fortier (1988).

Resultaterne fra eye-trackingen viste, at selvom shopaholics, som kategoriseres som den ikke raske testgruppe, er villige til at betale mere for specifikke modevarer, reagerer de mindre emotionelt i forhold til raske personer. Dette understøttes endvidere af litteraturen om afhængighed, hvor det diskuteres at ” ikke raske” personer har behov for at gå til ekstremer for at opleve samme emotionelle reaktion som raske personer. Dog førte bestemte typer modevarer, såsom tasker, til større pupiludvidelse hos shopaholics med korrelation til højere betalingslyst. På baggrund af dette,

understøttes hypotesen om at shopaholics er forbundet med øget følelsesmæssig respons på shopping relateret stimuli (H_1).

Ikke desto mindre, viste resultaterne fra de kognitive tests, at der ikke er signifikant forskelle mellem shopaholics og raske personer, når det gælder eksekutiv kontrol. Det kan dog konkluderes, at shopaholics kan være ”hurtigere på aftrækkeren” end raske personer, men de har ikke dårligere kontrol.

Med andre ord, havde shopaholics en kortere reaktionstid på udførelsen af kognitive tests end raske personer. Dette test resultatet understøtter således ikke hypotesen om, at shopaholics er forbundet med reduceret adfærdskontrol (H_2), hvilket er et nyt fund indenfor forbrugeradfærden om købemani.

Samlet set kan det konkluderes ud fra forsøgene, at shopaholics primært er drevet af impulser og ikke af mangel på eksekutiv kontrol. Disse resultater giver en større indsigt i, hvad der sker i hjernen, når mennesker træffer beslutninger. Ved hjælp af neuromarketing metoder, belyses det desuden, hvilke faktorer, der ligger til grund for, hvad forbrugere overordnet vil betale for et produkt, baseret på emotionel reaktion.

På baggrund af testresultaterne, foreslås det, at den nuværende tilgang til forbrugeradfærden inddrager neurovidenskab i forståelsen af købemani. Det drejer sig om emotionel branding, som virker ubevidst på forbrugerens beslutningsgrundlag og brand præferencer. Dette understøttes endvidere af fundene fra dette studie samt af litteraturen indenfor neuromarketing. Testresultaterne fra dette studie lægger op til yderligere undersøgelser, hvori der ses på hvorvidt shopaholics begår flere fejl i neuropsykologiske tests end raske personer, på grund af at shopaholics har en kortere reaktionstid. Afslutningsvist ville det også være interessant at undersøge om dette studie´s test resultater fra eye-trackingen kan gengives i en rigtig shopping situation.

1. Introduction

Compulsive buying (CB) is a term that was almost unknown two decades ago but today´s consumer behavior has adopted the word. CB has become a growing phenomenon in western societies. Studies on the topic suggest that CB is a non-substance addiction, which is characterized by an obsessive-compulsive spectrum disorder that is caused by excessive shopping (Laurence et al., 2010). Shopping has become something that is associated with modernity and self-identity, which are some of the core values that define today´s postmodern consumer culture (Kragh & Dyrhauge, 2010). To be part of this consumer culture, it is inevitable to shop in order to feel self-fulfillment through owning material things that increase your social status. This is a culture in which individualism is expressed through material goods, and clothing and shoes represent part of one´s external image. In other words, excessive shopping is a norm, a lifestyle, an image, through which consumers express themselves by indulging in leisure (Neuner et al., 2005). This is an increasing problem in today´s society which encourages and affects people towards compulsive buying tendencies.

In Germany, for instance, 7 % of the total population are defined as compulsive buyers (CCs), whereas in the US, CCs consist of 5% of the population. This is an estimate based on a total number of compulsive buying studies by Laurence et al. (2010). However, according to another study in 2004 involving 2,513 adults aged over 18 years in the US, the results indicated that CB was affecting 1.8% to 16% of the adult population. The results from the study showed that women scored higher than men (Koran et al., 2006). This is not surprising as prominent marketing studies and research suggests that mostly women are vulnerable to compulsive buying behavior, also discussed as a “female addiction” in consumer behavior literature. Moreover, studies on CB also show that it is often females aged over 18 till approximately 34 years that have compulsive buying tendencies (Koran et al., 2006).

According to research on compulsive buying tendencies, impulsive shopping has become a more frequent tendency over the past decade due to excessive advertising through online and direct marketing strategies that personalize products for consumers.

For instance, Facebook, originally designed for interaction between friends and relatives, is now the world´s most visited site and hence a perfect place to promote products specialized to the users' profiles. Both marketers and consumers are gaining mutual advantage from user profiles as they can

benefit from the information by advertising products that are relevant to that specific consumer. Consumers are less likely to get annoyed by these commercials, like they usually would, if push strategy is used through sales letters, newsletters etc. To explain this further, brand equity plays a significant role in determining how consumers consciously or unconsciously choose between brands. Brand equity can be defined as the value of a brand linked to its products in form of quality, image and symbol, which influence the company's price and profits. Therefore, brand equity leads to differentiation among brands and is a powerful tool towards grasping the attention of the individual consumer (Mullins, Walker Jr., p.218, 2010). Brand equity takes place unconsciously due to the brand attraction, which turns into emotional responses later on in the process.

Moreover, there are also many brand communities, which are characterized by a common understanding of a shared identity. Connecting with the brand is a positive experience that leads to growing awareness and hence better return on investment (ROI) for the company. User interaction in form of our senses is basis for communicating product portfolio in the decision making process of a purchase situation.

In addition, online word of mouth has proved to be an extremely effective way of promoting products (Schumann & Thorson, chap. 4, 2007). Especially through social media like blogs, Facebook and Twitter, where people rate, like and share things with each other that are related to a brand, which leads to affiliation, a sense of belonging. In other words, consumers perceive a brand as belonging to a community or identity, where they can express thoughts and opinions. User interaction leads to more open communication between the company and its consumers that help to improve the company´s brand values. Reactions and expressing thoughts in online forums create buzz about the brand and has a pull effect on end users (Stout, Ball & Villegas pp. 367- 388, 2007). On the contrary, pull effect is user driven and leads to a more positive experience, and consumers hereby become more open towards direct marketing e.g. e-mails, newsletters etc. This marketing effectiveness through online and offline channels affects consumers' attention unconsciously which further affects their memory.

Using social media to interact with users and implementing the right marketing strategies has led to an increase of CB in spite of the global recession (Neuner et al., 2005). One of the main characteristics of CB is the constant need of owning new things and these needs are strongly motivated by advanced advertisements, repayment methods, availability of credit cards, and instant loans that make buying easily accessible in today´s society (Neuner et al., 2005). According to Danish Fashion Forum, the first quarter of 2012 for Danish retail showed a remarkable increase of

11% compared to the figures for 2011 along with an increase of consumer trust by 10,4% since 1996 (Fashion Forum, April, 19, 2012). These numbers illustrate that consumer behavior is growing in Denmark in spite of recession along with CB.

Researchers believe that CB is characterized by rapid decision-making due to a strong inclination of owning a specific product that leads to overall emotional satisfaction at the purchasing moment (Julie et al., 2007). More and more studies on CB suggest that impulse buying behavior may be motivated by strong emotions that are positive at the purchase state, but which turns into negative feelings afterwards. Negativity related to a purchase appears when it affects the buyer´s economy, other people's financial situations, or is a useless purchase that leads to the feeling of frustration and bitterness. However, researchers argue that for some people, CB is positive as it helps them to feel less sad, lonely or content with themselves. There is still an open discussion among marketers about whether CB is more negative than it is positive (Joël Billieux et al., 2008). However, most studies indicate that CB is mostly negative than it is positive, because many CCs experience punishment in terms of legal debts and bad conscience.

According to a study on emotional reactivity and self-regulation in relation to CB, the results showed that subjects with extreme forms of CB were happy during the process of shopping itself, but felt less contained after the purchase took place. Moreover, the study showed that materialism played a major role for CCs, but the desire to own things weighed more. On the contrary, another study on facets of impulsivity related to self-reported compulsive buying behavior, suggests that CB is positively related to three stages of impulsivity, namely urgency, lack of perseverance and lack of premeditation (Joël Billieux et al., 2008). However, the regression analysis of the study stated that the urgency to purchase something was the main indicator of impulse buying behavior.

Although CB is considered a serious condition and a growing phenomenon amongst adults, it has yet not been examined whether CB is driven by impulses or lack of self-control. However, consumer behavior and neuroscientific literature states that CB contains both symptoms, arguing that CCs lack self-control, which affects their impulses. An in dept-analysis of the problem would give the right diagnostic to the condition. CB is a growing problem in modern and post-modern societies and it is important to understand the severity of it as thousands of people, especially women, are affected by it.

The objective of this research is therefore to investigate whether Danish female compulsive buyers

are driven by impulses or lack of self-control? So far research has not been able to prove if the excessive shopping is due to a larger "drive" or the contrary, lower executive functions, or both that causes compulsiveness towards shopping.

1.1. Research question

Are Danish female compulsive buyers driven by impulses or lack of self-control?

To answer my research question, I have included two sub questions that need to be answered as well:

3. How do compulsive buyers differ from non- compulsive buyers on aspects of impulsivity, emotions and behavioral control?
4. What does the nature of compulsive buying tell us about consumer behavior in general?

To this end, the main research question alludes to the distinction between compulsive buying as a disorder caused by strong "bottom-up" impulses and emotional responses, or by alterations in "top-down" cognitive control functions.

Prominent marketing studies and research suggest that mostly women are vulnerable to compulsive buying behavior – often referred to as a "female addiction". Due to this factor, one may think that CCs respond more emotionally to cues of specific brands or products. One way of testing whether or not this is the case, is to measure how CCs respond, consciously and unconsciously, to specific brands or products. Another method is to examine the executive functions of CCs (impulse inhibition) and comparing them to those of non-compulsive consumers (non-CCs) by measuring emotion, cognition and purchase behavior. Hereby, different neurobiological and neurophysiological aspects of emotion and cognition will be examined.

1.2 Thesis structure

This thesis is divided into ten sections. Firstly, introduction and the research question are presented that form basis for this research paper. Secondly, delimitation consisting of relevant neuroscience

and consumer behavior theories are presented. Thirdly, the methodological considerations are elaborated. Fourthly, induction follows with theoretical background and previous research from consumer behavior and neuroscientific studies relevant to answer upon the research question. Fifthly, deduction follows, which deals with the hypotheses proposed and the experiment of this study. Sixthly, the experiment results are discussed related to the findings and in relation to existing theory on the topic. Seventhly, the experiment is evaluated based on validity and reliability. Eighthly, a general discussion will discuss the findings from the experiment related to the literature used in the thesis. Ninthly, future research perspectives will be proposed. Finally, the thesis will end with a conclusion summarizing the main points. Please see below for an illustration of the thesis structure.

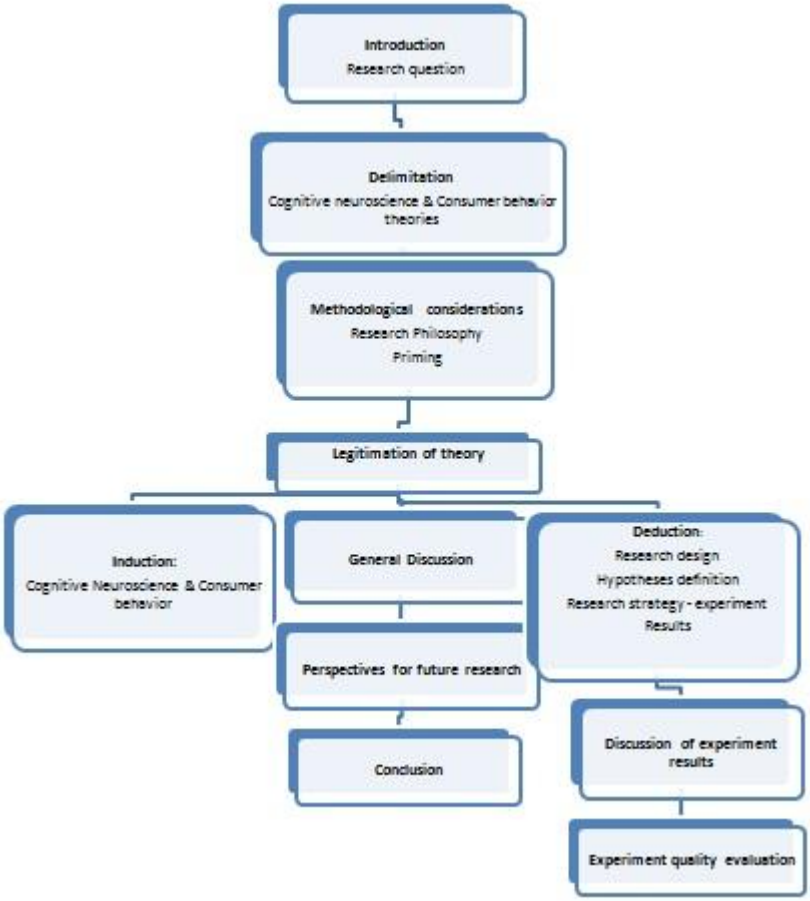


Figure 1. Thesis structure. Composed by the author of the thesis.

1.3 Delimitation

Due to the narrow scope of the study, the following section presents the theoretical and methodological delimitations. The disciplines that are discussed in the thesis span broadly and

therefore limiting the areas of interest will lead to identification of key elements.

The subsequent section presents theories used in the elaboration and discussion of the topic, which are relevant for answering the research question.

Cognitive neuroscience theories

Cognitive neuroscience is excessive and therefore the theories have been limited to focus on the subject of compulsive buying. The scope of the theoretical research thus includes the following:

- ***The reward system of the brain*** (liking, wanting and learning); in order to explain impulsive buying by looking at associations between conditioned stimuli and its consequences (Berridge, 2011, Baars & Gage,2010, Berridge & Kringelbach, 2008, McGuire, 1974 & Arnold & Reynolds, 2003).

- ***The bottom up and top down effect***; in order to understand how attention and awareness works concerning decision-making related to a potential purchase for consumers (Julie et al., 2007, Laurence et al., 2010, Neuner et al., 2005, Baars & Gage, 2010 & Knutson et al., 2007).

- ***Emotions;*** emphasizing on the role that emotions play in decision-making (Baars & Gage, 2010, Plessis, 2011, Berridge and Kringelbach, 2008 & Stock, 1999).

- ***Unconsciousness vs. consciousness;*** in order to explore the differences between compulsive and non-compulsive buyers (Chartrand et al., 2008, Baars & Gage, 2010, Krantz & Kunreuther, 2007, Plassmann et al., 2007, Plassmann, Ramsøy, and Milosavljevic, 2011 & Plassmann et al., 2012).

- ***Executive functions****;* is one of the most important parts of the brain as it controls one´s impulses and the need for voluntary control over actions. Thus it will be elaborated how executive functions are vital in predicting behavioral control (Baars & Gage, 2010, Davranche et al., 2009, Vakil et al., 1996, Müller & Krummenacher, 2006, Frederick, 2005, Kahneman and Frederick, 2002, Stanovich and West, 2000, J. Evans, 2003 and Tversky & Kahneman, 1981).

Consumer behavior theories

The key element to be investigated in order to answer the research question also requires an

understanding of consumer behavior theories. These include the following:

- ***Individualism;*** the understanding of self-identity in a post-modern society (Kragh & Dyrhauge, 2010 and Neuner et al., 2005).
- ***Heuristic value & hedonic shopping consumption;*** explaining the various motivations behind a potential purchase *(*McGuire, 1974, Arnold & Reynolds, 2003, Tauber, 1972, Westbrook & Black, 1985, S. Kim, 2011, Oatley and Jenkins, 1996 and Gobé, 2009)
- ***Brand perception;*** the importance of brands, hereunder brand equity, brand identification, & brand positioning for marketers and impulse shoppers with emphasize on decision-making, mood and memory cognition (Mullins, Walker Jr., 2010, Schumann and Thorson, 2007, Stout, Ball & Villegas, 2007, Joël Billieux et al., 2008, Julie et al., 2007, Dittmar, 2005, M. Kukar-Kinney et al., 2011, Arnold & Reynolds, 2003, Plessis, 2011, Krugman, 1972, T. Ramsoy, 2011, MCCsracken, 1986, and Allan et al., 2008).

2. Methodological considerations

The following chapter will explain the research design framework consisting of research philosophy, priming and pre-testing. Research philosophy is an inevitable part of the method structure and priming techniques help identify conscious cues related to the experiment conducted in the thesis.

2.1 Research Philosophy

This thesis works with the research philosophy of "positivism" that holds its view point in the natural scientist i.e. scientific methods are employed by observation (Saunders, M., Lewis, P., & Thornhill, A., 2009). Positivist approach deals with facts as opposed to impressions in the sense that the researcher does not influence the data collection in any possible way. The role of the researcher is therefore objective and emphasis is on quantitative approach resulting in statistical data analysis from an empirical point of view.

Guba and Lincoln (1994) argue that positivist approach has both quantitative and qualitative methods embedded. However, this thesis works only with quantitative data as it deals with social

science within consumer behavior, which is grounded in empirical view from a deductive method structure. The quantitative data is collected through the survey, the CB scale, followed by cognitive tests and eye tracking.
However, this thesis does use "the under determination of theory" which is manifested in inductive structure. In the first part of the paper, it is necessary to include former studies and existing theories that emphasize on CB in order to develop some hypotheses that will be tested by further research in the paper. Building upon existing research and conclusions, the deductive method structure takes place after completing the experiment supporting the hypotheses of the thesis (Guba & Lincoln, 1994 and Saunders, M., Lewis, P., & Thornhill, A., 2009). Furthermore, the research conducted on the topic is "value – free" i.e. the researcher is independent of the data collected as it is based on facts and the researcher stays objective to the hypotheses instead of being subjective. Based on these criteria, the researcher is thus "value-free" as the data collected is not influenced by the involvement of the researcher himself (Saunders, M., Lewis, P., & Thornhill, A., 2009).

Furthermore, the research philosophy also contributes to the constructivist view referring to the trustworthiness of validity, reliability and objectivity (Guba & Lincoln, (1994). This will be further elaborated in the "Experiment quality evaluation" part.

2.3 Priming

Priming techniques were applied in conducting data of experiment (1). This was done to detect automatic responses to cues of conscious awareness, when subjects were confronted with specific brands and products that would lead to memory associations (Chartrand et al., 2008 and Baars & Gage, 2010). Nevertheless, to test unconscious awareness during the experiment, priming was applied to explore feelings and emotions related to memory associations that are induced by brand identification. However, priming techniques include positive and negative priming, which are important to distinguish between. This thesis works with positive priming as compulsive buyers most likely would recognize some of the brands and products shown to them in the experiment. On the other hand, negative priming leads to the ignorance of a stimulus by ignoring information.

Hereafter, the mind tries to retrieve the information again when an internal conflict occurs leading to negative priming. Moreover, subliminal priming is closely related to positive priming as

subliminal stimuli means conscious perception which does not lead to behavioral changes unless the goal is primed.

Subliminal priming does influence subjects' feelings and behavior under certain circumstances. For instance, thirst and hunger might be evoked by pictures of food and beverages and thus affect the outcome by subliminal priming through persuasive appeals. However, it is important to note that only goal-directed motivations would lead to persuasion of a goal and hence lead to enhanced affection of a specific brand, add, or a product to direct behavioral changes. According to the results of three studies on subliminal priming and persuasion, subliminal priming does influence behavior when goal-directed cognitions are met under the right circumstances, e.g. pictures or commercials of beverages. These lead to subliminal manipulation when subjects are thirsty, which furthermore lead to persuasiveness towards achieving that specific goal (Stahan et al., 2002).

Moreover, the results of four studies on how thrift versus prestige goals can affect decisions in a primed subliminal hypothetical and situated choice task, demonstrated that subliminal primes led to the activation of goals without consumer awareness and hence affecting behavioral choices. Furthermore, the data analyses on non-conscious goals also showed that retail brands can lead to subliminal goal-directed behavior when primed accordingly (Chartrand et al., 2008).

3. How do compulsive buyers differ from non-compulsive buyers on aspects of impulsivity, emotions and behavioral control?

The subsequent section will present and go in depth with the main differences between compulsive buyers and non-compulsive buyers from a consumer behavior perspective and afterwards from a neuroscience point of view.

First of all, it is important to look at how compulsive buyers and non-compulsive buyers differentiate from one another when responding to senses and feeling in decision making situations. Secondly, it is important to look at how conscious and unconscious attention is perceived related to a purchase. Thirdly, it is important to go in depth with impulse inhibition compared to that of non-

compulsive buyers by measuring emotion, cognition and purchase behavior.

Marketers have been examining consumer behavior for decades in order to understand what captures the consumers' attention towards specific ads or products before a purchase takes place. So far, research and studies on this topic indicate that consumers are influenced by their senses in the way they perceive and feel things. Every human being has senses, where some are more significant than others in determining people´s mood, memory and behavior. Senses trigger emotions along with memory that affects the decision making process, when consumers are purchasing items.

However, research state that most decisions are made unconsciously by our senses, which capture the attention of a specific product that trigger emotions and memory association in the brain. But the purchase solely takes place in a full conscious state influenced by our senses, which determine how we feel when we are in contact with that specific product. To investigate this more thoroughly, it would be interesting to examine what drives compulsive buyers to purchase goods that they are not in need of, but yet still purchase.

Heuristic value & hedonic shopping consumption

Previous research on CB has shown that impulse inhibition has been related to some fundamental factors, which have a great impact on the motivation of a purchase. According to a study on hedonic shopping motivations by Arnold & Reynolds (2003), there are seven factors related to a purchase motivation; adventure shopping, social shopping, gratification shopping, idea shopping, role shopping and value shopping.

Hedonic consumption has been defined as shopping that fulfill one´s needs for sensory stimulation, for example experiencing fun and feeling happy whilst purchasing. Consumers relate such experiences to adventures, because one never knows what awaits in the shopping mall and hence excitement and surprise follows (Arnold & Reynolds, 2003). Therefore, shopping that mainly concerns stimulating experiences creates the feeling of "escaping to another world".

Social shopping, as the term implies, refers to shopping in social correlations, where it is equal to spending time with friends and relatives. This category has its origin in McGuire´s affiliation theories, which focuses on interpersonal relationships that are expressed through similar interests. Moreover, Westbrook and Black (1985) suggest that affiliation is a shopping motivation itself. These interests require the need for acceptance and affection, which are necessary for belonging to a

social community.

The third category, gratification shopping, could be labeled “reward shopping” as it involves shopping as a treat, stress-releasing, getting in a better mood etc. This category is grounded in tension-reduction theories by McGuire (1974), who states that people need a way to reduce tension and therefore act it out by internal equilibrium by listening to the physiological signals from the body (Arnold & Reynolds, 2003).

Idea shopping is very different from the above-mentioned shopping motivations, as it concerns keeping up with the latest movements in fashion and trends. According to McGuire (1974) idea shopping is a gratification of being informed, which manifests itself in the human need for knowledge, structure and having fun while browsing new information. This is also supported by Tauber´s (1972) personal shopping motive of keeping up with latest fashion trends.

However, what differentiates idea shopping from the other categories is that the end goal is not the purchase, but the thrill of gaining insight into the shopping industry. Eventually that would lead to a purchase due to the importance that the consumer attaches to keeping up with new fashion trends.

The fifth category, namely role shopping, also distinguishes itself from the other categories because it concerns shopping for others. This kind of shopping creates the feeling of giving and happiness due to finding a perfect gift which leads to satisfaction. Westbrook and Black (1985) suggest that role shopping is driven by cultural role fulfillments, which is an obligated act, but consumers enjoy it as they receive hedonic value from the experience. The value is the feeling of fulfillment of buying a gift that the receiver finds precious.

The last category, value shopping, refers to bargains, sales, promotions and discounts. McGuire (1974) defines value shopping through assertion theories, which are expressed by the ability to gain hedonic benefits by bargains that lead to overall self-esteem, excitement and sensory satisfaction (Arnold & Reynolds, 2003).

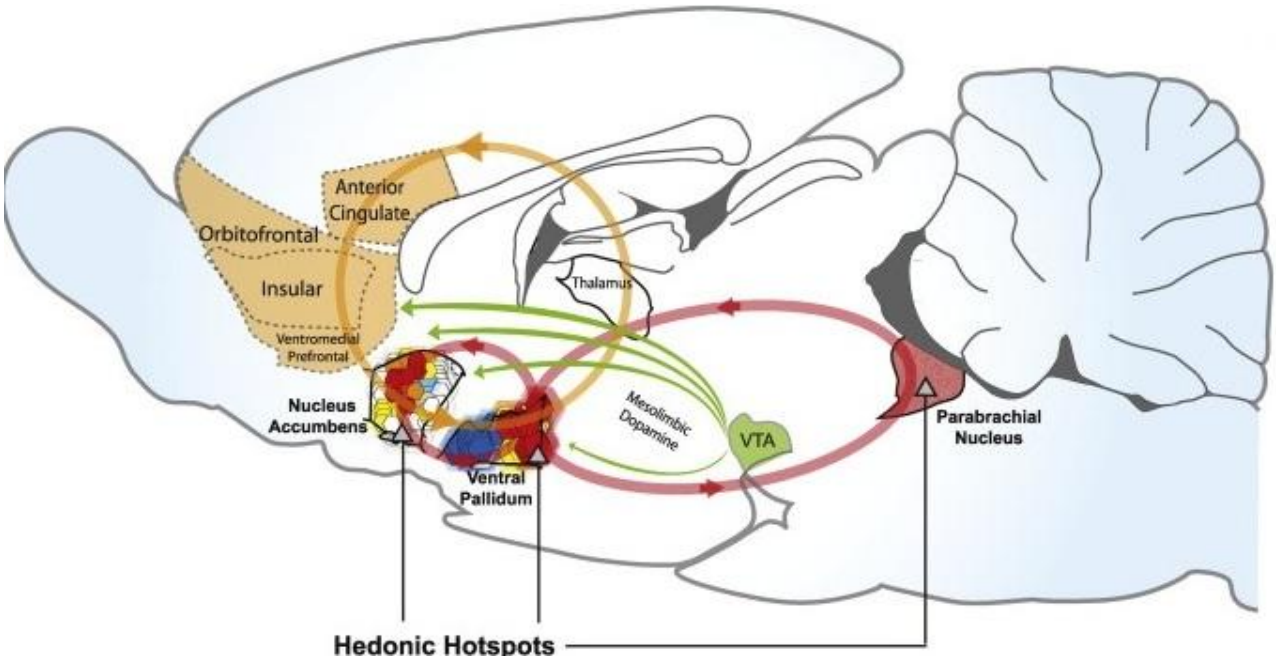
What the study by Arnold & Reynolds (2003) indicates is that there are several hedonic motivations behind a purchase. These motivations are based on positive experiences for the consumer and thus lead to repetitive behavior, where the specific shop or mall gains customer loyalty from the consumer. Marketers and retailers can use hedonic shopping motivations to segment each hedonic category by strategic marketing and hereby increase customer satisfaction and ROI. Hedonic consumption has already been connected to impulse buying, which is motivated by the shopping factors that contribute to excessive shopping for individual or social satisfaction purposes.

Research on consumer behavior shows that people are generally more sensitive towards sales and promotions, which motivate people to make instant decisions on the spot. Especially, promotions indicating "buy one, get one free" or campaigns promoting exclusive products, which are only available a limited time period, evoke shopping motivations (S. Kim, 2011). These motivations further create the positive feeling of "winning" in the *reward system* in the brain. CCs are therefore more likely to be price conscious than non-CCs. Some are bargain hunters, whereas some only want high end products. Studies on this topic suggest that there are different types of rewards, which the brain deciphers depending on the use of dopamine or not (Baars & Gage, p. 437, 2010).

The reward system of the brain

It is important to look in depth at the reward-system in the brain in order to explain consumer behavior and especially compulsive buying.

The reward system, consists of liking, wanting and learning, focuses on the learned aspects of rewards by studying associations between conditioned stimuli and its consequences. The liking aspect is seen through brain activity in the shell of nucleus accumbens[1] (NACCs), ventral pallidum[2] and brainstem parabrachial nucleus[3].



1 Collection of neurons within the striatum .It plays an important role in reward, pleasure, laughter, addiction,aggression, fear, and the placebo effect (encyclopedia.thefreedictionary.com, 2012)

2 Function in motor activities with strong motivational or emotional constructs in the brain (http://www.medilexicon.com, 2012).

3 The entire unpaired subdivision of the brain, where they serve as way stations in the pathways (http://www.medilexicon.com, 2012)

Figure 2. Illustrating the reward system in the brain (Berridge, 2011)

The above figure 2 illustrates the reward system in the brain, where liking and wanting is seen at the hedonic hotspots and hedonic circuits. Furthermore, the green arrows illustrate the wanting aspect, whereas the red circuit along with the orange circuit is the liking aspect (Berridge, 2011).

The reactions of liking can differ depending on the use of dopamine in the nucleus accumbens that can be hard to measure due to lack of pleasure, which only people without dopamine can enjoy. Furthermore, liking something can be connected to conscious subjective pleasure e.g. shopping that fulfill ones needs. Wanting, on the other hand, functions quite differently than liking as it is something our brain finds desirable. Wanting can be both cognitive and emotional i.e. a craving for something such as for example cigarettes.

Finally, the learning aspect can take place together with both liking and wanting, but also with one of them alone. Therefore learning can be understood as associations and predictions of a given situation that has a reward as an outcome. Moreover, the liking of a specific product makes the orbitofrontal cortex and hippocampus react, which trigger positive feedback in the brain that further leads to circuits causing stimulus and emotions. Reward systems can therefore influence higher decision making process under cognitive conditions (Baars & Gage, pp. 438-440, 2010).

Nonetheless for CCs, liking and wanting are closely correlated due to instant attraction towards a potential product, regardless of the usage and price. Compulsive buyers usually do not over-think any purchase, but what springs to mind is how much this new product would satisfy their needs, which are unconsciously undefined. Based on this, instant decisions are made on the spot and the product is purchased, which creates a feeling of excitement and fulfillment for a short period of time. After the purchase has taken place, the feeling of regret, bad conscience and remorse over a negative bank balance often occur, which lead to frustration in the long run (Neuner et al., 2005).

The bottom up and top down effect

In order to understand how attention and awareness work in relation to decision-making for consumers, it is important to explain the bottom up and top down effect.

There are two types of attention associated with our perseverance of awareness, namely the bottom up and top down effect, in which amygdala and cortex cooperate in adaptation of social threats in the brain (Baars & Gage, pp.427-433, 2010). The bottom up effect is most commonly used as the senses affect our decision making process. This is seen by the fast response of our senses when we

are encountered with something that grasps our attention or something that we can associate with (working memory) and feel. The fast response could be triggered by our inner or outer senses that would make our body react in form of a bad smell that makes one noxious or being surprised by someone, which makes our outer senses react in form of a body change e.g. faster heartbeat (Baars & Gage, p. 240, 2010). The stimulus reaction in the brain can be caused by these various inner and outer senses that form basis for our decisions. Contrary to the bottom up effect, the top down effect is will controlled. This effect could be compared to the reward system, where decisions are made on a basis of a determination that leads to an action e.g. purchasing (Baars & Gage, p. 240, 2010). Another example of the top down effect is people, who save up money in order to buy something specific in the future such as a new TV, and their will is therefore controlled and conscious. However, the decision on which TV to pick is made by the bottom up effect due to its sensory image and economic factors that include product, price, choice, and fixation (Knutson et al., 2007).

These economic factors play a significant role in determining the decision making process for the consumer. The subcategories of the economic factors are; the visual image, the need of the product, the quality and brand perception. These factors trigger positive feedback in the brain (amygdala), which then leads to circuits causing stimulus and emotions. On the basis of these criteria, a purchase finally takes place.

Nevertheless, attention can be lost after brain damage of the parietal lobe i.e. the brain cannot detect sensory information and is not connected to the body (Baars & Gage, chap. 8, 2010). According to research and studies on CB, it is clear that CCs make their decisions by the bottom-up effect due to the liking aspect of stimuli that seems attractive at the purchase moment (Julie et al., 2007, Laurence et al., 2010 & Neuner et al., 2005). In other words, this could also be described as irrational versus rational buying.

The experiment supporting the hypotheses of this thesis will examine the bottom up and top down effect of subjects' decision-making related to compulsive buying. This will be elaborated under the section, “Discussion of experiment results”.

Another study focusing primarily on price behavior and purchase decisions of compulsive consumers of an Internet clothing retailer, showed that CCs do possess a greater knowledge of store prices, brands and transaction value compared to that of non-CCs (M. Kukar-Kinney et al., 2011). This knowledge is achieved through frequent buying and browsing shopping items. Hence CCs can make their purchase decisions relatively faster than non-CCs as they have higher knowledge of the specific product and brand in terms of quality and price.

It is not the first time that a study has shown that CCs are more keen on price promotions and sales, resulting in a greater transaction value from that of non-CCs. This is also connected to hedonic benefits of shopping as low prices lead to a better shopping experience with less guilt and having a feeling of satisfaction of saving money. Especially brand verification and knowledge is something that most CCs have and something that is of high value to them. Many female CCs identify with specific brands because they reflect their self-image, which they express through clothing, shoes and accessories (M. Kukar-Kinney et al., 2011 & Arnold & Reynolds, 2003). Because of the positive effect it has on their self-esteem, these women keep themselves up to date with latest fashion trends. Thus, brands are one of the determinants to describe today´s post-modern society that is very much based on materialistic values. This was also supported by Dittmar (2005), who found materialistic values to determine CB in young people. On one hand, purchasing the latest fashion items to express one´s self-identity is believed to be a central definition of a happy lifestyle for many CCs. On the other hand, CCs are keen to develop mood disorders in the long run consisting of depression, loneliness and cravings depending on the type of CB involved (Laurence et al., 2010).

Emotions

We are now aware of the fact that senses influence our buying behavior, but emotions play just as big a role in decision making. Most humans are not rational beings in the classical neoclassical sense, and therefore many base their decisions on emotions, especially impulse shoppers (Baars & Gage, chap. 13, 2010). However, this was not supported by neoclassical theories beforehand, which were not able to explain the irrationality in human behavior. This has been brought into light by neuroeconomics, which became aware of the issue and came to the conclusion that decisions are dependent of emotions.

There are two types of emotional responses that our brain reacts to; classically conditioned responses and cognitive appraisals. Classically conditioned responses are responsible for evoking stimulus and creating conscious emotional feelings e.g. emotional association by scent or visual image. Cognitive appraisals are the feeling part of the brain that can control expressions of emotions and is the main controller of how we behave socially in the limbic system, whereas appraisal typically appears in the cortical system (Baars & Gage, p. 423, 2010). Nonetheless, the brain also

reacts upon instincts, which is an inhibited ability and hence predicts behavior. For instance, an explosion or a loud noise would automatically make one cover his ears and thus react on pure instinct.

Besides these two conditions, namely classically conditioned responses and cognitive appraisals, there are two dimensions associated with emotions; an arousal dimension and a valence dimension. The arousal dimension can either be high or low depending on the stimuli context e.g. visual image. The valence dimension is defined as either positive or negative emotions that arise from our feelings of joy and sadness and influence our mood and behavior.

Henceforth, mood plays a major part in emotions and decision making in purchase situations. Mood is correlated with arousal, which takes place at a low or a high level depending on the situation or context. Low, medium and high arousal affects everyone and more or less on a daily basis. For instance, sleeping involves low arousal, whereas shopping involves high arousal for subjects with CB. Therefore, mood affects emotions and thus predicts behavior (Plessis, 2011).

Furthermore, psychologist and neuroscientist Jaak Panksepp[4] (Stock, 1999), has developed an emotional system consisting of seven steps, which are based on brain functioning of mammalian that can be applied to humans as well. As the below figure illustrates, the brain follows at least 6 circuits, when it first responds to an unconditional sensory information, which could be triggered by an image, taste etc.

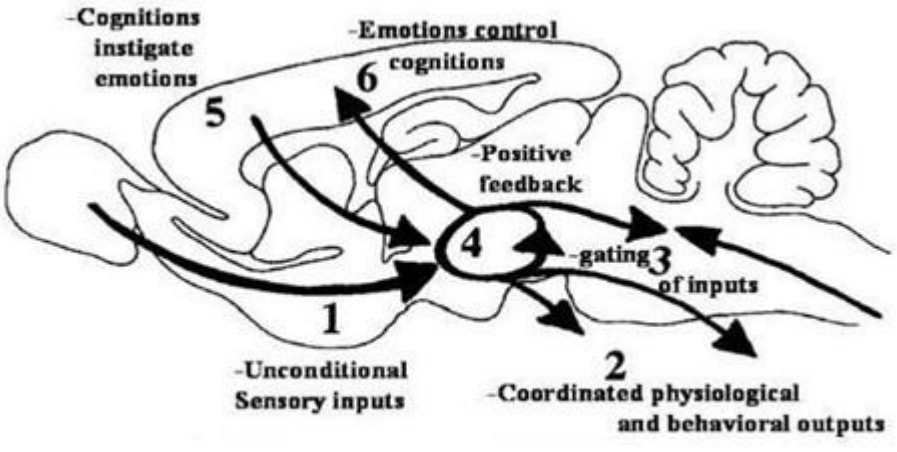


Figure 3. The functions of emotional systems (Baars & Gage, p. 423, 2010)

4 Jaak Panksepp (born June 5, 1943) is an American psychologist, a psycho biologist, a neuroscientist, the Baily Endowed Chair of Animal Well-Being Science for the Department of Veterinary and Comparative Anatomy, Pharmacology, and Physiology at Washington State University's College of Veterinary Medicine, and Emeritus Professor of the Department of Psychology at Bowling Green State University. (www.wikipedia.org, 2012)

This sensory information then leads to the hormonal changes by a physiological behavior in our body. Thirdly, emotions are evoked due to the interpretation of sensory systems that makes a relevant stimuli reaction. Fourthly, deduction of positive neural activity leads to initiation of cognitive emotions. At last, this leads to an emotional decision-making with full awareness and valuation at the time of purchase. The seventh step is not included in this figure, because it mainly represents the circuit being able to differentiate subjective feelings. Panksepp argues that this is due to emotional stimulus that affects the amygdala, which has a direct and indirect connections to our sensory areas in relation to positive feedback that always ends at Hippocampus, the memory area of the brain (Baars & Gage, p. 432, 2010).

However, Pankseepp´s model is based on a mere traditional neuroscience approach with focus on fear related behavior in mammals and thus lacks an in depth analysis of the decision-making process correlated with sensory stimuli that takes place in the brain. Therefore, it is important to look upon Berridge´s and Kringelbach´s theory (2008) on pleasure and reward in decision-making.

Berridge and Kringelbach (2008) argue that reward and pleasure are closely correlated. Pleasure consists of liking assembled from a reaction to a reward, which then leads to sensory stimuli in decision-making and goal-directed behavior. For instance, smell and taste are two main indicators controlling one´s basic need for food, which is one of the most hedonic pleasure elements followed by sex. Here, orbitofrontal cortex (OFC) is correlated to pleasure and sensory stimuli, where reward and hedonic value is considered to influence decisions and hence behavior in the anterior parts of the OFC along with the anterior cingulate cortex.

The below figure no. 4 illustrates how sensory information flows from bottom to top and how it interacts with hedonic systems in OFC. First, the primary sensory cortices are detected, where the sensory information arrives from the pheriphery, the surface of the brain, and a stimulus identity is thus decoded into the cortical. Second, the stimulus identity is further integrated in the posterior parts of the OFC representing multi-modal in the brain structures, which furthermore leads up to the reward value. The reward value influences behavior in two main areas; learning memory and hedonic experience that takes place in mid anterior parts of the OFC. These two areas influence internal states such as thirst and hunger (Berridge & Kringelbach, 2008).

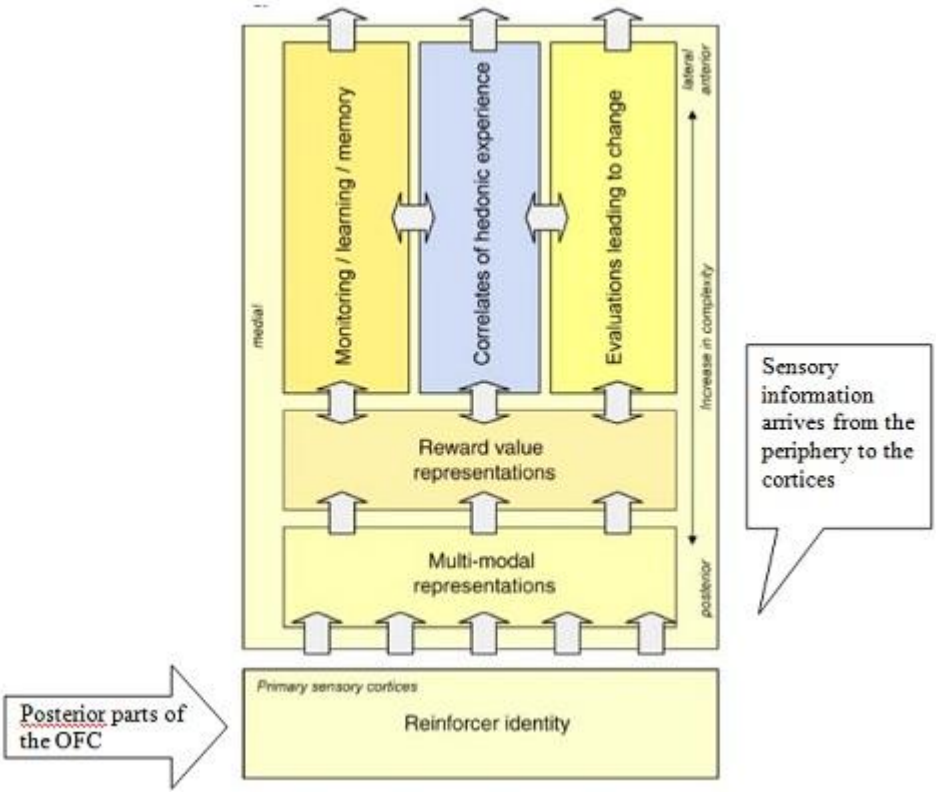


Figure 4. Illustrating the interaction between sensory and hedonic systems in OFC adapted and edited by the author of the thesis from Berridge & Kringelbach (2008).

In other words, emotions are created due to responses from the outside world, which our senses detect in form of an advertisement, smell etc. Basically, a specific situation that reminds us of something that we have experienced or that we can associate positively or negatively with.

It is also important to distinguish between emotions and feelings; feelings are an experience of being in a certain emotional state with awareness, whereas emotions are irrational and are caused unconsciously. Moreover, emotions are measurable, where a person's emotional reactions to different situations clearly show e.g. sweat caused by anxiety. This is due to amygdala that makes us understand other people in emotional expressions & responses, but if there are lesions in the amygdala, it deficits recognition of facial and emotional expressions (Baars & Gage, chap.13, 2010). Moreover, pleasure is related to the ”liking” aspect, which has reward as an outcome value that form basis for a hedonic experience. Thus influencing the decision-making process in a given situation.

Summing up, emotions play a tremendous role in decision-making, especially for CCs as they are controlled by their emotions and thus make their decisions using the bottom up effect. They are

motivated by various factors and influenced by their senses, which eventually result in a purchase. CCs are not rational beings and therefore it is even more important to explain how irrational their decisions are compared to those of non-CCs, which the above theory has tried to elaborate on.

Consumer buying behavior on a conscious versus unconscious level

As previously mentioned, it is important to examine how consumer buying behavior takes place on a conscious or an unconscious level in order to explore the differences between compulsive and non-compulsive buyers.

As we are already aware of, impulse buying is a spontaneous act that is carefree at the moment the purchase takes place. The length of time spent on the purchase is much less compared to that of a planned purchase e.g. saving up money for a specific thing. The information concerning the impulse purchase is thus limited due to immediate action on the spot i.e. in a shop (Julie et al., 2007).

Chartrand et al. (2008) have made four studies focusing on non-conscious goals and consumer choices. The results from the studies showed that there were four factors, which unconsciously influenced consumer choices in shopping situations. These factors were; social perception, memory, emotional assessment and causal attribution.

Social perception is activated in the beginning of the unconscious moment of a goal or choice of buying a specific product, which the consumer, at this stage, is not aware off. The social perception activates the consumer's sensory area, who is affected by this in form of a smell, a visual image etc. Afterwards, a memory association or a resemblance is activated in the brain, without the awareness of the consumer, but happens on the attention stage at this moment. During this stage emotional appraisal is activated in the brain, which then leads to goal oriented direction towards the product, which is unconsciously influenced by the first three factors (social perception, memory & emotional assessment), although consumers believe that they are aware of their choices. In other words, these studies showed that consumers are not fully aware of their goal pursuits, and that environmental perception, memory and emotions play a significant role in defining consumer behavior, and decision making when purchasing items. However, it does not exclude the fact that their actions are not conscious. It is the source of the purchase that is unconscious, whereas the outcome, the purchased product, is fully conscious (Chartrand et al., 2008). This can also be referred to as *controlled processes* that are conscious acts e.g. learning to ride a bike contrary to *automatic*

processes, which are unconscious, where one just rides the bike (Baars & Gage, chap. 8, 2010).

When looking at what additional factors decisions are based on in the light of neuroeconomics, it is important to look at the medial orbitofrontal cortex (OFC) and the dorsolateral prefrontal cortex (DLPC). The OFC and DLPC are areas of the brain that help people decide what to buy, also referred to as working memory (Plassmann et al., 2007). There are two types of decision-making, the one being conscious and goal oriented and the other being unconscious, irrational cognitions (Krantz & Kunreuther, 2007).

According to an experiment with nineteen "normal" subjects (subjects had a normal weight, no diseases, were mentally healthy and had a normal vision) had to value pricing of varied food for their right to eat it whilst looking at pictures of food. This study was only about bidding and not about reward-outcomes. The participants went through FMRI[5] in order to measure accurate brain activity, when subjects responded to the pictures containing food at cognitive conflict. This examination was only to investigate the value of decision making in neuroeconomics. The results showed that stimulus associations were highly triggered by the pictures of food, which means that a physical drive was affected. This is usually caused in situations like this, where hunger, thirst, cold, fear, heat and pain is affected by a psychical stimulus. Moreover, strong reactions towards decision making in neuroscience found activities in the MOFC[6] and DLPC[7], which is the area that value goal decision making and the emotional center in the brain (Plassmann et al., 2007).

For instance, a similar study on physical stimulus showed that birds were able to understand the meaning of the words stating" turn and pick" and "pick". The birds had learned by their liking and wanting incitement of the reward system that they had to pick, when that specific card appeared and "turn and pick",when that card appeared in order to receive a reward consisting of food. This example shows us that even animals can be motivated towards learning and decoding what a reward is. Reward systems can therefore influence higher decision making process under cognitive conditions (Baars & Gage, pp. 435-440, 2010).

5 Functional magnetic resonance imaging
6 Medial Orbitofrontal Cortex
7 The dorsolateral prefrontal cortex

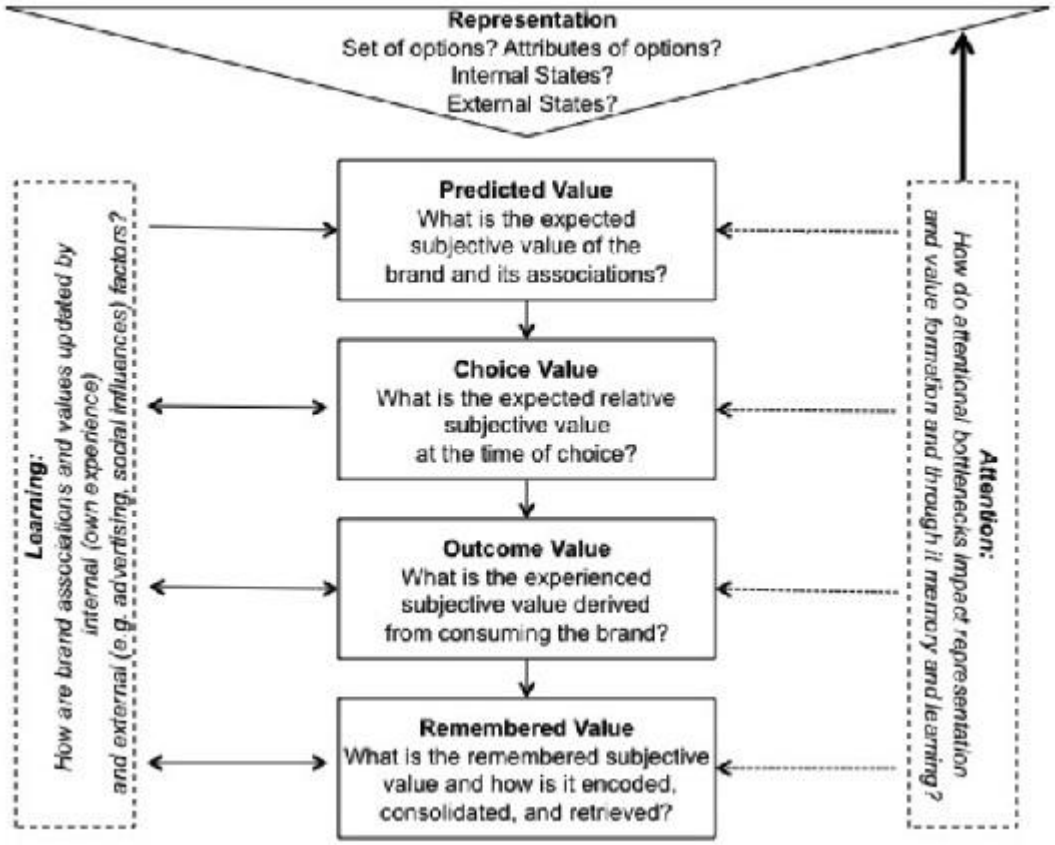


Figure 5. Directly applied from Plassmann, Ramsøy, and Milosavljevic (2011)

The above figure by Plassmann, Ramsøy, and Milosavljevic (2011) defines the aspects that are related to a potential purchase. The four values are each necessary to co-exist in order to achieve attention towards a specific product for the learning mechanism to take place. Brand differentiation takes place through value based decision-making as illustrated. The brain encodes these values and evaluates each in the respective context before any decisions are made.

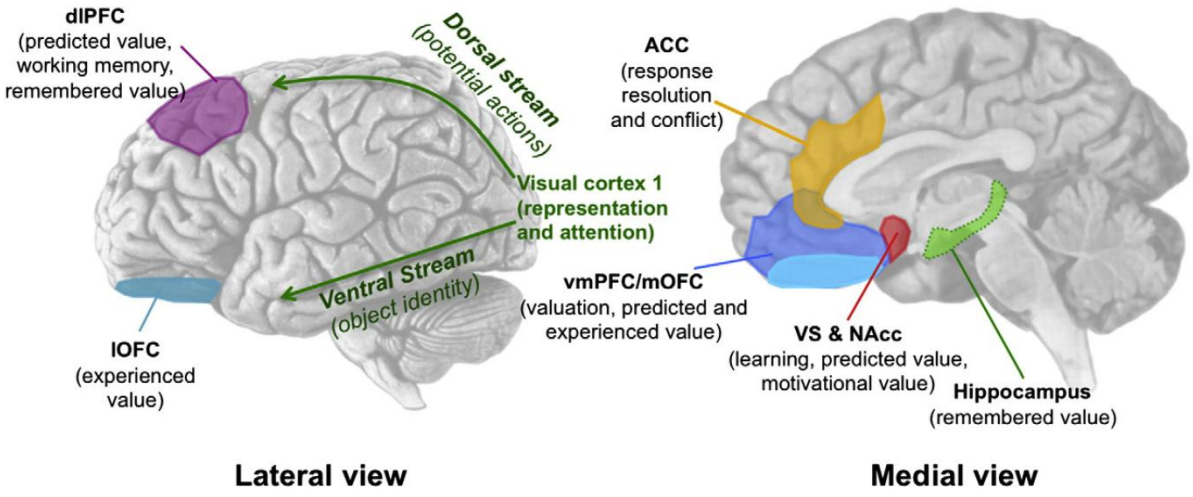


Figure 6. Overview of prominent brain areas involved in brand decisions (Plassmann et al., 2012)

It is worth noticing that the brain needs to encode both external and internal values in order to create the other values that are correlated. On one hand, external values are for example influenced by the environment, and social contexts that determine the level of attention. On the other hand, internal values are represented by inner states such as hunger or thirst, which determine certain decisions (Plassmann et al., 2012).

The above figure no. 6 shows how these values are incorporated in the brain and which value is linked to "what" and " which" effect of decisions. As previously established, compulsive buyers are especially prone to visual stimuli and this is reflected in the visual system consisting of two cortical routes. Moreover, the dorsal visual pathway functions as the "where and how" pathway along with attention via the occipital lobe through the posterior parietal cortex and to the dlPFC[8]. Finally, the "what" pathway is the ventral visual and consists of the visual recognition in form of an object, which runs to the IOFC[9] and to the VMPFC[10] (Plassmann et al., 2012).

To sum up, the above-mentioned theories on decision-making and the reward system can be linked to CB as they are both significant in determining the differences between CCs from non-CCs. According to researches, CB has been defined by marketers to be an unplanned purchase that is caused by fast decision-making as information about the purchase is limited due to its rapid ownership (Julie et al., 2007). As previously mentioned, goals direct consumers on a daily basis e.g. grocery shopping, cooking a meal etc., and CB is therefore goal-oriented, but with the distinction of

8 dorsolateral prefrontal cortex

9 Inferotemporal cortex

10 The ventrolateral PFC

being an impulse purchase in contrast to a planned purchase. Brand and price fixation are two high indicators for CCs due to the strong will of owning the product immediately. It is therefore interesting to measure how price on one hand activates the *insula,* and deactivates *executive function,* and the anterior part of the frontal lobes of the brain upon a purchase decision making.

To look further into cognitive tests measuring *executive functions,* it is necessary to explain the central executive system of the brain.

Executive functions of the brain

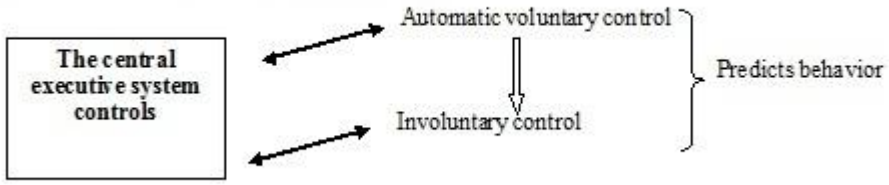


Figure 7. Illustrating the importance of the central executive system. Composed by the author of the thesis.

The executive functions are some of the most important parts of the brain as they control a person's impulses and the need for voluntary control over actions. Moreover, the prefrontal lobes not only lead to self-control, but are the crucial indicator of our behaviors by means of coordination in our brain i.e. strategic planning, projecting the goal, organized searching etc. In addition, automatic and voluntary control go hand in hand as they both play a significant part in our daily lives. For instance, habits consist of both automatic and voluntary control, where automatic control is the controlled behavior in opposition to voluntary control, which consists of unpredictable behavior (Baars & Gage, 50-52, 2010). Therefore, voluntary control and conscious state of mind are correlated as the brain and the body are aware of what it is doing.

The executive functions system was originally defined by psychologist Alexander Luria[11], who proposed the theory that all our processes of goals i.e. planning, verification of goals, goal-orientation etc. are connected to cognitive operations that are linked to the executive function in literature; namely the ability to guide one´s behavior by internal representations and mental flexibility in order to react to unanticipated environmental contingencies. However, according to

11 Soviet psychologist Alexander R. Luria (born 1902–1977) (www.wikipedia.org, 2012)

Professor of Psychiatry and Bio-behavioral Sciences, Joaquin Fuster, the executive functions are homogeneous because they control our internal and external actions i.e. self-control.

The frontal lobes also play a significant role in determining social skills. The frontal lobes contribute to social maturity, where morals, consciousness and social behavior are determined. Nonetheless, according to a report by professor and researcher Damasio[12], if damage is done to the frontal lobes, antisocial behaviors might occur in form of lying, absence, committing burglary and basically having no moral standards at all (Baars & Gage, 2010).

On one hand, spontaneous attention is connected to the visual "pop-out" effect, where stimuli springs to mind without being voluntarily controlled i.e. bottom-up attention. On the other hand, when this "pop-out" effect diminishes due to a similar stimulus, it requires the use of voluntary search i.e. executive attention (Baars & Gage, p.53, 2010).

The push and pull of voluntary and involuntary attentional processes are the key functions of the frontal lobes, working memory, executive function, motor control and decision-making. If the frontal lobe syndromes are damaged, they will produce distinct and different syndromes, where the most common ones are dorsolateral prefrontal syndromes that revolve around personality changes, field-dependent behavior, and preservative behavior. The personality change is seen through the lack of normal behavior and mood. For instance, the subject would not feel any mood changes and no control of behavior e.g. schizophrenia. Moreover, the subject will perform well on cognitive tests; however these skills do not apply for coherent, goal-directed processes due to damage to the frontal lobes (Baars & Gage 414, 2010).

Any damage to the PFC will result in attention infliction as attention is connected to other processes in the brain, and if there is a breakdown in one of the places, attention deficit order will likely occur.

Moreover, the brainstem consists of the nuclei, which is in charge of activation and arousal in the brain along with the frontal lobes, also known as a loop relationship. For instance, the arousal of the frontal lobes depends on this loop, where there are pathways projecting from the frontal lobes to the nuclei of the ventral brainstem. In other words, both parts play a significant role in determining executive functions as the frontal lobes and the nuclei are correlated and work together. For example, any decisions made by the frontal lobes will, with the help from the brainstem, communicate these decisions to the rest of the brain. However, if the loops i.e. the pathways are

12 Antonio Damasio (born February 25, 1944) is Professor of Neuroscience at the University of Southern California, where he heads USC's Brain and Creativity Institute and Adjunct Professor at the Salk Institute.

damaged, the frontal lobes may enable executive functions.

Furthermore, to get a better understanding of executive functions associated with CB, the following three factors have a significant importance in determining behavior: initiation, inhibition and modulation. Initiation is self-explanatory as behavior is initiated by something, whereas inhibition takes place by an impulse, and modulation refers to change or adaptation.

To sum up, executive functions are key determinants for a person's behavior as they are responsible for the decision-making processes (Baars & Gage, 416 - 418, 2010). This theory will be incorporated in the discussion under test results.

4. What does the nature of compulsive buying tell us about consumer behavior in general?

The following chapter will elaborate on how subjects with CB can help marketers understand new trends in consumer behavior. Therefore, the following theories consist of a combination of marketing and neuroscience with emphasis on consumer behavior.

Consumer behavior is perceived as goal-oriented, meaning that goals guide consumers in choosing between various brands of for example food, beverages, clothing, shoes in daily situations. Goals motivate consumers to move in a specific direction of the item that has caught their attention, which has either been on a conscious or unconscious level. It would be natural to presume that value and goal directed decision making takes place in a conscious state, but research on this topic has shown the contrary, namely that attention is unconsciously aroused by our senses (Chartrand et al., 2008).

Brand perception

Brand perception is vital in determining trends in consumer behavior for both consumers and marketers. For instance, research and studies on CB has shown that, after an advertisement enters the mind (memory and emotion association), its effect increases each time it is seen, but at a decreasing rate. According to Krugman (1972), once the brain has been exposed to an advertisement, the brain deciphers it by re-cognition. Re-cognition means memory association of a specific commercial, which has been seen before. Bearing this in mind, re-cognition takes place

when consumers are exposed to a full length of a commercial e.g. 30 seconds out of a 30 second long commercial. Hence, the visual image triggers the memory association on a conscious level in the brain (Plessis, p.192, 2011). Nevertheless, the senses are triggered by these commercials by unconscious cues, which turn into a conscious state when exposed to the same visual stimuli.

Furthermore, Krugman (1972) argues that there are only three factors to consider when consumers are exposed to an advertisement:

1. What is this?
2. What of it?
3. I have seen this?

These factors make an impact on the consumer unconsciously in the mind and most likely leave an expression. It is therefore important for marketers to understand how to create a positive feeling when consumers are exposed to commercials online, on television, or on print e.g. in a magazine, on a billboard etc. An external environment, e.g. a shop, sets the stimulus of neurons, which affect the brain and the body.
For instance, a specific scent could lead to a memory association of a holiday. The neurons would thus be context dependent (Plessis, 2011 & T. Ramsoy, 2011). Marketers need to understand what it takes to evoke these positive feelings for the consumer. The hard part here is not creating the positive feelings but to incorporate these to a conscious state for the consumer. Marketers thus need to create brand awareness by implementing emotional marketing strategies.

On the other hand, it is noteworthy to keep in mind that decision-making involves heuristics, which help consumers to choose between various brands with the same outcome or purpose. The brand choice is a set of external and internal rules that form the basis for choosing a specific brand. Therefore, there are some fundamental heuristics to a brand choice via the dopamine system that marketers should consider (Plessis, 2011);

1. Price is an indicator of quality and one´s financial situation in society
2. Feelings and associations to a specific brand e.g. I like how my hair smells when I use that specific shampoo (attention and awareness on a conscious level)

What marketers can learn from CB is that impulse buyers are easily influenced by their external environment, which triggers their outer senses to react and form basis for their attention towards specific products, commercials or campaigns. As research has shown on CB so far, price and

quality are two main indicators of a brand choice. “Knock outs”, sales and “buy one get one free” campaigns are successful components for drawing the attention of CCs, who base their purchases on heuristic value and emotions. Henceforth, trends in consumer behavior have changed. And as Oatley and Jenkins (1996) has stated in their book:

“Another way to put this is that only very seldom can human beings act completely rationally – seldom can we know enough to predict the best course of action. Moreover, we often have goals that are incompatible with each other, so there is no course of action that would satisfy them all. But this complexity does not remove the necessity for acting. What evolution has equipped us with, therefore, is a set of emotional states that organize ready repertoires of action. Although not perfect, emotions are better than doing nothing, or than acting randomly, or than becoming lost in thought. Emotions are heuristics”.

In other words, what Oatley and Jenkins (1996) are saying is that most human beings have difficulties being completely rational and thus give in to their lust sometimes. This behavior is typical for subjects with CB, who are very affected by their emotions and make decisions from a heuristic point of view. As we already know, goals motivate consumers to take action related to a purchase and these motivations are stronger for CCs than for non-CCs. Hence, incorporating human senses would eventually lead to emotional cues for compulsive buyers and marketers would gain attention and awareness from doing so resulting in a potential purchase.

Moreover, as earlier stated in the thesis, mood plays an important role when predicting emotions and behavior. CCs are more influenced by their external environment than non-CCs, and this is to the marketers’ advantage. Marketers need to have brands that create a certain level of arousal in order to make it stand out from other similar brands to create awareness.

Research has shown that brands work through the brains neurotransmitters to create consciousness. Brands play a vital part as they create a feeling of belonging and a certain mood for the consumers by their associations, the environment setting and the message they signal to the world. Bearing this in mind, it is important that marketers learn from these types of mood effects. For instance, one segment perceives the brand value to be of high maintenance and thus create a satisfactory arousal level, whereas another segment would perceive the same brand value to be low maintenance. Therefore, it is important that marketers position their brand to a segment that understands the purpose and message of the brand (Plessis, 2011).

One of the other things that marketers can learn from compulsive buyers is the significant influence of television shopping channels and online shopping options.

According to a study on order cancelation behavior in connection with impulse purchases from television home shopping channels in Korea, the data analyses showed that the overall cancel rate is 26.7 % i.e. the product has not been sent yet and therefore the buyer can cancel it right after having ordered it by phone or e-mail (S. Kim, 2011). Furthermore, the percentage of returns after receiving the product is 12.5 %, which stems from either hedonic product categories or utilitarian products. Data on order cancelation behavior shows that people are more likely to cancel or return products, which are easily returned. On the contrary, products that require money and effort to return are usually not returned. The reasons for canceling or returning the products are mainly that one is not in need of it and that the purchase was solely influenced by the media, and the ease of ordering the product from home (S. Kim, 2011).

In other words, this study shows that people are easily influenced by marketing effectiveness through various media channels, although they are not in need of the specific products. People feel regret after having purchased the product (S. Kim, 2011). Especially, the ease of ordering the products from home, online or on the phone, leads to even more impulse purchases as it does not involve immediate payment. The psychological factor, such as money, is not directly involved, because consumers are not paying cash but by credit card, and the money is only withdrawn, when the item has been shipped (usually after 1-3 days). This does not lead to immediate regret, compared to a purchase, which physically takes place in a shop, as it does not involve physical money.

Moreover, many CCs are prone to return products after purchasing due to the impulsivity of the buy, which leads to a bad conscious and a negative bank balance.

What marketers can learn from this is that online shopping is booming, and most purchases are based on prior knowledge about the brand, but new brands are also emerging from excessive advertisements on online and offline channels. Statistics on online shopping show that it will only increase with time (Kelkoo pressecenter, 2011). This means that marketers will have less stimulus options than in a psychical environment in terms of a shop. For instance, the online book world has already taken over the second biggest chain of book stores in the US, which has been forced to close due to the success of e-books (Politiken.dk, 2011). Moreover, Denmark is at front, when it comes to online shopping compared to other European countries. In average, Danes used DKK 12.310, - in 2010 on online shopping, which is an amount that is forecast to increase and thus

overtake much revenue from physical shops in the future (Kelkoo pressecenter, 2011).

With online shopping, it is not possible to be hands on with products like touch and smell, which diminishes the external values for the consumer. Nevertheless, many marketers have both physical and online shops in order to use all stimulus options, and for those who only have web shops it is worth investing in visual attraction by usability guidelines. A good example would be a web shop that is easy to browse in and that contains relevant information about the products, and search engine options. Research on online search has shown that people in average do not want to spend more than 33 seconds on a web page or a web shop if it does not find the wanted product (CBSNEWS, 2010).

Therefore, it is very important to optimize one´s website and use SEO (search engine optimization) along with an embedded analytics tool, which measures new vs. returning visitors, visits, transaction values etc. (Schumann & Thorson, 2007).

At the same time the web shop should be attractive and create an atmosphere of delivering its main message (Schumann & Thorson, 2007). For instance, it is relevant to consider if the site signals luxury, main stream or low budget products? It is important that the web shop has a message to deliver, and that the visual stimulus is implemented correct. Music and streaming of videos also give the consumer an impression of the web shop. If it is a new brand being launched, it would be wise to introduce it properly and make use of storytelling or a case study that involves the potential consumer along with other strategic stimulus options (Gobé, 2009).

Individualism

CB is only increasing, and various interest free loan options make it even more attractive and accessible to shop in today´s post-modern society. As earlier stated, postmodernism is a rise of new values and lifestyles, where individual choices dominate and self-expression is at its highest peak. Self-expression is perceived in many ways according to marketers (Kragh & Dyrhauge, 2010). Some forms of self-expression are perceived to be external appearances, human diversity, individual achievement, materialism etc. Emphasis on economic achievement is a social norm, which is believed to increase quality of life. This is perceived to be a shift in culture from a modernist view point and a hallmark of a successful society (Kragh & Dyrhauge, 2010).

Rationality is less attractive and focus is on impulsivity, which has become a trend in today´s

society despite recession (Neuner et al., 2005). Brands have become a self-identity, and in that connection, marketers have named this era to be "the golden age of brands" (Allan et al., 2008).

Therefore, it is no surprise that consumer behavior trends have changed through the last decade as consumers have so many options to choose between regarding brands and payment methods.

Furthermore, consumers are encouraged to live in the present as opposed to saving up for the future, which was the former traditional and modernist view. As McCracken (1986) outlined in his model of meaning transfer, it is the shared understanding of a group that constitutes the meaning of a particular culture. This shared understanding further leads to a personalized significance to the individual.

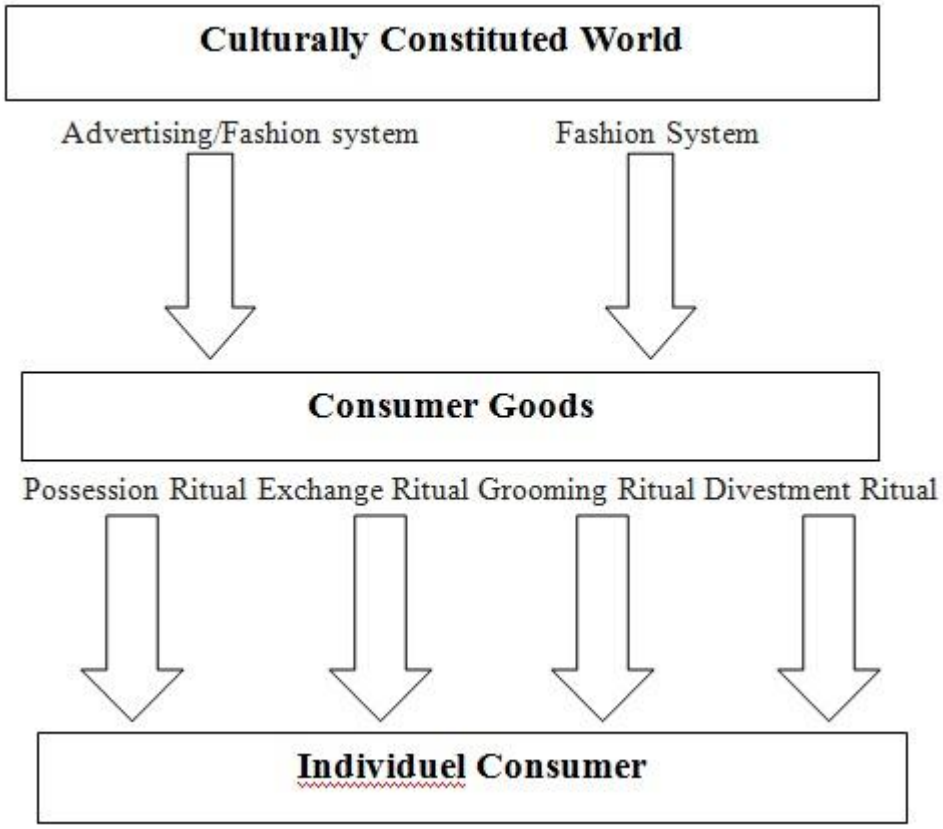


Figure 8. McCracken's model of meaning transfer (1986). Composed by the author of the thesis

The boxes (figure 8) illustrate the location of meaning, whereas the arrows illustrate the meaning transfer instrument. In other words, the individual is affected by the cultural and social norms of the society. The fashion system is thus derived from this society, which consists of brands. Moreover, these brands are interpreted according to the understanding of the individual, who's understanding of the brands are based on the individual's knowledge and value systems. This is also known as *"Consumer co-creation".* Hence, the consumer interprets the brand through its own socio-

demographic situation and sub-cultural members involved with the brand (Allan et al., 2008).

This indicates that marketers are applying the right marketing strategies through online and offline channels. Especially discoveries in neuroscience make marketers more proactive and stronger in targeting potential consumers, where compulsive buyers are easier to reach compared to non-compulsive buyers, as they are more driven by their impulses.

One other thing that marketers can learn from compulsive buyers is that it is mostly women, who have these tendencies. Therefore it is worth investing in products directed towards women (Koran et al., 2006 & Gobé, 2009). Alone in the US, women constitute 50.7 % of the population and contribute with 80 % of all purchases. Moreover, women´s consumption has also taken a shift in the last couple of years as they are buying more electronic goods and cars, which used to be a male domain (Gobé, 2009).

To sum up, marketers need to implement emotional branding strategies, which has its root in neuroeconomics. Neuroeconomics contains a mixture of marketing and neuroscience, which can help marketers increase their revenues. It is important that marketers understand that trends in consumer behavior has taken a drastic turn over the last couple of years, and online shopping is gradually taking over the motor-brick shops (Schumann & Thorson, 2007). Therefore, it is important to invest in online marketing e.g. website, SEO, usability etc. in order to be at front with all the other competitors with similar brands (Schumann & Thorson, 2007). At last but not least, marketers can learn a lot from CCs, mostly women, about using the right stimulus strategies, when promoting products. Research shows that most impulse shoppers are sensory-driven (Gobé, 2009, Plessis, 2011, Oatley & Jenkins, 1996, S. Kim, 2011 & Chartrand et al., 2008).

5. Research design framework

The following presents the research design framework consisting of a definition of the hypotheses of this thesis and pre-testing of the experiment.

5.1 Hypotheses definition

The objective of the experiment supporting the hypotheses is (1) to measure compulsive buyers conscious and unconscious response to specific brands or products through eye-tracking.

Another aspect (2) is exploring what their executive functions (impulse inhibition) are compared to those of non-compulsive buyers by measuring emotion, cognition and purchase behavior through executive functions tests.
Hypothesis (1) of this thesis is thus the following:

H_1: CCs are related to a stronger emotional response to shopping situations than observed in non-CCs.

- H_0 : *There is no positive relationship between emotional arousal and fashion items for CCs than non-CCs*

- H_{1a}:*There is a positive relationship between willingness to pay (WTP) and compulsive buying score (CB score)*

- H_{1a0}: *There is no positive relationship between willingness to pay (WTP) and CB score*

Hypothesis (2) of this thesis is thus the following:

H_2: CCs are associated with lower performance on cognitive tests of executive functions, when compared to non-CCs.

- H_{20}:*There is no positive relationship between lower performance on cognitive tests for CCs compared to non-CCs*

In order to measure the above hypotheses, subjects were recruited in the Copenhagen area (please see the section "Sample" for further elaboration) and presented with two different types of tests:

- In order to measure emotional reaction in shopping related stimuli (H1), pupil dilation was measured through Eye-tracking.
- In order to measure executive functions (H2), validated neuropsychological tests were included (Please see section 5 under "measurements" for further information).

5.2 Pre - testing

The experiment of hypotheses (1) took place in the Decision Neuroscience Research Group (DNRG) Senselab at CBS[13].

Hypotheses (2) included cognitive tests, which took place in an office next to Senselab. Pre-tests were done in order to verify the procedure and to see if there were any complications or errors which could be rectified before the actual experiment. Four CBS students participated in the pre–tests which were a success, and the experiments were therefore initiated.

Furthermore, the research philosophy also contributes to the constructivist view referring to the trustworthiness of validity, reliability and objectivity (Guba & Lincoln, 1994). This will be further elaborated in the section" experiment quality evaluation part".

6. Research strategy – experiment

The following section elaborates on the conduct of the experiment in order to answer H1 and H2 of this thesis.

6.1 Sample

3 women, the age of 18 to 55 years, took part in the experiment, in addition, they were all right handed and with a clear sight. The age group was specifically chosen as various studies show that compulsiveness is developed in between late teen age years and mid forties (Reish et al., 2010). However, women over 40 were also included in the experiment in order to verify that CB does not take place, when a person reaches the fifties, as research and studies on this topic suggest (Koran et al., 2006 & Laurence et al., 2010).

The participants were all Danish citizens with different cultural backgrounds and from the Copenhagen area. To find these women, an article was written in Danish on CB in cooperation with Videnskab.dk, a scientific website, and the department of marketing at CBS (Fogsgaard,

13 DNRG runs SenseLab, a test laboratory at CBS with facilities for Computer Assisted Personal Interviewing (CAPI), Galvanic Skin Response (GSR) and response time measurements. As well, DNRG group is working with neuroimaging methods such as fMRI and other measures such as eye-tracking, electroencephalography (EEG) and galvanic skin response (GSR)

Videnskab.dk, 2011). To test the females for their shopping habits, the CB scale by Valence. D Astous & Fortier (1988) was translated into Danish and published online in the article with a separate link to the data collection tool (surveyxact, which CBS uses), which collected the data in November 2011 (www.surveyxact.dk). Although the survey was targeted only towards women, responses from men counted half of the collected data indicating that not only women are interested in excessive shopping.

After the subjects got their scores from the scale, they were kindly asked about their age and if they would have an interest in participating in neuropsychological tests taking place at CBS for one hour. The subjects were told that if they participated in the tests, they would have the opportunity of winning a 1,500 Danish kroner gift certificate to the local shopping centre.

During recruitment, we strived to achieve a broad range of scores on the CB scale. The scores were divided into three categories because 20 women in each category were needed, which made a total of 60 women, in order to measure the hypotheses of this thesis (appendix – CB scale). Moreover, a comparison was needed because of the subsequent analysis of a group consisting of compulsive buyers versus a group of non-compulsive buyers, and a group of women with compensatory buying behavior, which is categorized as being in between (will be further elaborated).

The CB scale (1988) is widely used in studies on compulsive buyers and is well known for its usage that consists of three dimensions; tendency to spend, reactive aspect and post-purchase guilt (Association for Consumer Research, 2012).

The scale consists of 13 questions on the above-mentioned dimensions, and two more questions on bargains and high fashion brands were added in order to measure if CCs are more keen towards high or low end brands (see appendix – CB scale in Danish). Subjects had five options to choose from when answering each question, going from “strongly agree” to “strongly disagree” (appendix - CB scale & CB scale in Danish).

The choices were each marked with numbers that constituted a total scale score that finally divided the answers into three categories based on Faber and O’Guinn (1992):

0 - 33	Normal purchase behavior
34 - 41	Compensatory buying behavior
42 - 64	Compulsive buying behavior

Figure no. 9.CB scale scores composed by the author of the thesis

The first category is self explanatory as subjects in this state are “normal” i.e. non-compulsive buyers with inconspicuous buying behavior. Whereas state two is problematic as subjects have difficulties controlling their shopping urges, and the final category defines the test subject as a compulsive buyers.

6.2 Procedures

To test the effects of the drive or lack of compulsive buying (hypothesis 1), cognitive and executive tests were proposed to the female respondents. First of all, all subjects had to fill in a registration form with their name, age, e-mail address, and occupation. Afterwards, they had to take the CB scale online again in order to be placed in one of the three categories to verify scores. Each subject participated individually in the experiment consisting of 30 to 45 minutes. Secondly, participants needed to take the eye-tracking test that lasted for approximately 15 - 20 minutes. Thirdly, executive tests measuring time, attention and IQ were proposed to subjects. This will be further elaborated in the following section.

6.3 Measurements

Measurements are a necessity for predicting any hypotheses as they provide empirical observations, which support the quantitative research. Thus, measurements are an essential element to quantitative research in science. The following chapter will take a closer look at these measurements by describing and elaborating on the set-up process of the conducted experiment.

Eye-tracking set - up

Eye-tracking is another term for visual stimulus that is registered through eye movement. After subjects had completed the CB scale, they were individually placed in front of an eye tracking computer that captures each pupil dilation, when subjects find certain products of interest.

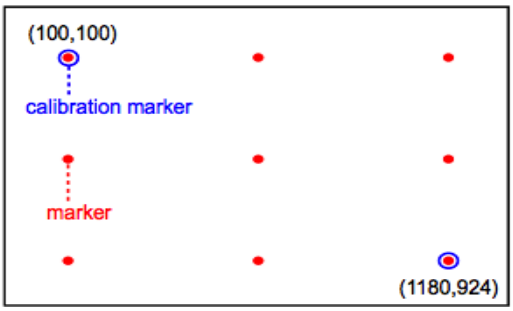


Figure 10. Calibration gaze (Ohno & Mukawa, 2004)

To begin with, the subjects were instructed to focus on the middle of the screen, where a fixation cross appeared in order to detect the position of the eyes.

The computer has an integrated eye-tracking system, which registers the eye gaze through a test consisting of calibration gaze (see figure 10). Infrared technique and pattern detection appears on the screen. It is necessary that subjects have their eyes focused on the red dots i.e. infrared and pattern detection in order to obtain a good calibration gaze. The dots appears from left to right and continues on to the next line in order to detect information regarding the eyes in which stimulus are sampled (Ohno & Mukawa, 2004). Subjects were told not to move their heads as this would affect the calibration gaze and could cause poor data quality.

However, subjects who wore contact lenses were a bit difficult for the eye-tracking computer to register. It required several pre-tests because the eye-tracking system needed data quality of minimum 90 % in order for the testing to be successful.

The eye tracker test is an attentional test that measures pupil dilation when subjects are aroused by specific items. The eye-tracking device detects arousal immediately and can analyze exactly what subjects were looking at by first glance. The below figure on eye and gaze detection illustrates how the positioning of the eyes is detected and how the flow is further incorporated in the gaze tracking unit. The gaze tracking unit makes sure that the eye calibration is successful in order to obtain valid and useful data for testing.

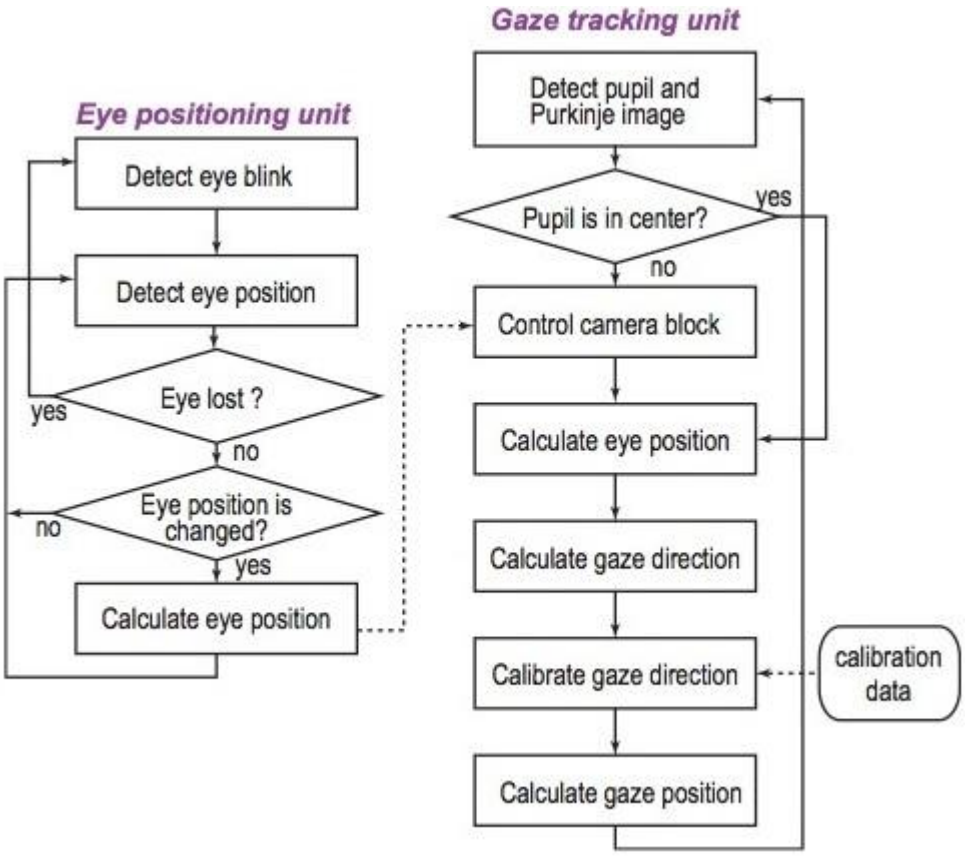


Figure 11.The flow of eye and gaze detection (Ohno & Mukawa, 2004)

The purpose of this test was not only to see when the pupil dilates, but rather to measure how subjects reacted emotionally and cognitively when they were presented with pictures of high fashion items, including shoes, clothes, bags and low end brands including fast moving consumer goods (FMCG) such as coffee within a specific time frame. The attention towards each product was thus limited to only three seconds per slide. The three seconds were valued as sufficient time for the eyes to have a good look at the product and hence create a reaction, which was registered by the eye-tracking system.

The eye-tracking experiment

There were only three steps in the eye-tracking experiment. First and second slide had a time limit of three seconds. The final slide did not have a time limit because it was a continuous price scale rating from 0 – 2000 DKK, which needed to be thought about before taking any action contrary to the fixation cross and the picture of a product.

Three categories consisting of high fashion products and a fourth category containing FMCG were

included in the experiment. The high end products were randomly chosen but with the criteria of being well known brands to Danish women and in the price range of 1000 – 2000 DKK (see appendix on eye tracking categories). The subjects were introduced to 40 pictures in total in the eye-tracking test. The pictures were randomized in the Attention tool (Imotions, 2012) in order to be varied. When the actual eye-tracking test took place, subjects were first presented with the fixation cross, then a product e.g. Zara dress, which appeared on the screen. The third step consisted of rating the value of an item on the continuous price scale running from 0 – 2000 DKK.

Furthermore, the eye-tracking set-up of the thesis was very similar to the one applied by Knutson et al. (2007), who measured product, price and choice by looking at brain activation through FMRI.

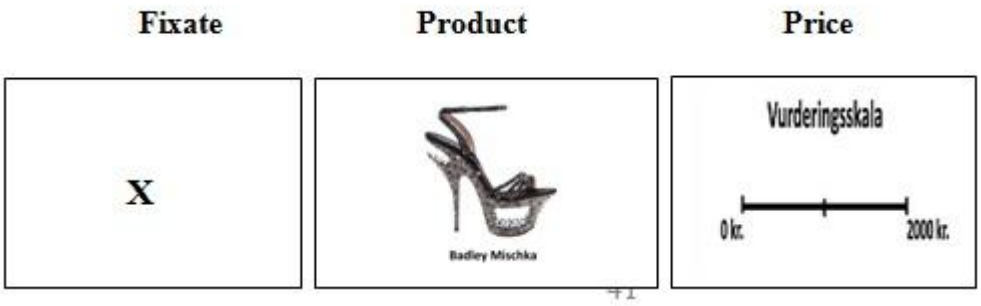


Figure 12. Eye tracking structure composed by the author of the thesis

It is important to emphasize that the subjects were introduced to the eye – tracking system before the experiment was initiated (see appendix- Velkommen). They were given virtual money of the amount of 1.500 DKK to purchase any desired item either below or over the amount. This was done to measure participants´ WTP for specific items. Theories on CB suggest that CCs would be willing to pay more for items even though their amount of money are smaller than the required sum, and therefore ending in a negative balance.

Results from the Knutson (2007) study indicated that people weigh factors such as product, price, choice, and fixation as important in decision making processes in relation to purchasing items. When people feel gain and loss from buying a specific product, it is mostly price related and what value it has to the consumer. This leads to the activation of the *nucleus accumbens* (inferior to the olfactory tubercle) in the brain. Prices, on the other hand, activate the *insula (part of the frontal temporal lobes)* and deactivate the mesial prefrontal cortex (executive function & anterior part of the frontal lobes of the brain) upon purchase decision making. In other words, people only want to

pay for what they perceive as a value to a given product. These theories will be further elaborated.

Cognitive tests

The subjects were introduced to the following four cognitive tests, which measure reaction time of a task including attention and executive functions. The tests were conducted from http://cognitivefun.net in March 2012 in the below order.

7. Eriksen flanker test
8. Color reading Interference (Stroop)
9. Go/No-go Visual Reaction Time
10. Visual Reaction Time
11. Cognitive Reflection test (CRT)

Participants received an introduction to the online cognitive tests (see appendix - Introduction to cognitive tests). Furthermore, I personally instructed them in the completion of each test and briefly informed them about its main purpose. The subjects were placed in front of a computer in an office located next to Senselab at CBS where participants were tested individually by me. Whilst the subjects were completing the tests, I sat with my back to the computer screen in order not to influence their results.

The Flanker test

The test subjects started with the flanker test, which consists of five arrows that point either left or right.

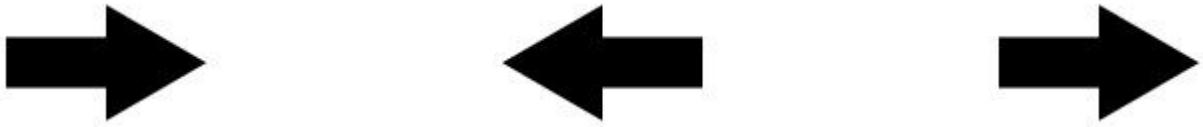


Figure 13. Eriksen Flanker Test (Cognitivefun, 2012)

The goal is to click on the arrow key that matches the arrow in the center as quickly as possible, most likely within one minute per session (typically, the test has about 20 sessions). The duration

has been chosen to measure different input variables that compete with the response speed. For instance, if the subject's response time is slow, it is equivalent to incongruent stimuli, and if the reaction time is fast, it means congruent impulse inhibition (Davranche et al., 2009). i.e. Eriksen Flanker test measures reaction time by cognitive attention and executive functions through response speed.

The Stroop test

The Stroop test is a demonstration of a reaction time of a task.

The test consists of words, written in different colors (e.g. the word "green" written in red). The main target is to name the color that the word is written in, rather than reading the color that the word spells (there are 20 sessions in total). Since we are proficient readers, reading is automatic, and in the Stroop task it needs to be hindered when there is incongruence between the color that the word spells and the color it is written in. Such incongruent situations have been shown to produce longer reaction time, compared to congruent situations (i.e., when the word "red" is written in red). Also, studies have shown that subjects with reduced executive functions, such as schizophrenia and prefrontal lesions, perform significantly worse on the incongruent task. This indicates the ability of the task in measuring the performance of the executive system of the brain (please see the below illustration).

Figure 14. Stroop Effect test (Cognitivefun, 2012)

The Stroop test leads to activation of the anterior cingulate cortex in the brain that wants to solve the puzzle by answering correctly. According to the online encyclopedia dictionary, the anterior cingulate cortex has been defined as; *"the rational cognitive functions such as reward anticipation, decision-making, empathy and emotion"* (encyclopedia.thefreedictionary.com).

The test requires cognitive thinking instead of going with immediate impulses by naming the written color instead of the actual color of the letters. Furthermore, the Stroop task is commonly used in physiological contexts as it measures selective attention together with processing speed and

cognitive flexibility (Vakil et al., 1996). Therefore, it is an important assessment to my hypothesis to include it.

The Go/No-go Visual Reaction Time

Thirdly, the participants completed the Go/No-go Visual Reaction Time test, which registers impulse reaction by measuring attention and reaction time by visual stimulus. The Go/No-go Visual Reaction Time consists of a plain green dot and a patterned dot and all one has to do is to click on the green dot, when it appears, and ignore the patterned dot (Cognitivefun, 2012). In other words, the goal is to react as fast as possible, when the target appears, and try not be distracted by the patterned dot when that appears.

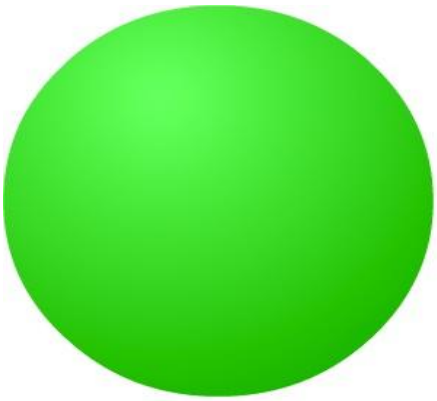


*Figure 15. Green dot from t*he Go/No-go Visual Reaction Time (Cognitivefun, 2012)

It is the accuracy of time and the registration of visual processes that lead to 12 out of 12 sessions correctly. It requires *bottom-up attention* in order to focus on non-expected targets, which is the case for the Go/No-go Visual Reaction Time test (Müller & Krummenacher, 2006). On the contrary, it requires *top-down attention* in stimuli that are already target defined e.g. a memory task.

The fourth cognitive test that the subjects needed to complete was the Visual Reaction Time test that only measures reaction time by attentional processes. The aim of the test is to click on the green dot (see the figure above) when it appears, as fast as possible, as it disappears just as fast again. There are no distraction points to this task and the test consists of only five sessions. As previously mentioned, visual stimulus requires both *bottom up and top down attentional processes* depending on the task. As the subjects already have completed the Go/No-go Visual Reaction Time, this task only requires using top-down attention due to the repetition of the task of clicking on the green dot,

when it appears. Therefore, the subjects should be able to score higher completing the Visual Reaction Time test as oppose to the former task, the Go/No-go Visual Reaction Time.

The Cognitive Reflection test

The final test that participants needed to complete was the Cognitive Reflection test (CRT) by Frederick, Shane (2005). It is not a regular IQ test, but a test that solely measures *time preference and risk preference* through cognitive reflection with fast decision-making.

The test consists only of three questions, which are based on associative and algorithmically processes and must be solved within three minutes. These types of questions are specifically designed for tests in decision-making, which is supported by expected utility theory and prospect theory, i.e. decision-making based on losses and gains by taking risks (BusinessDictionary, 2012). Expected utility theory is concerned with the probabilities of outcomes for the decision-maker. For instance, a rational person would go for the highest expected utility outcome. On the other hand, prospect theory is concerned with gains and losses based on values associated with outcomes and decisions (weight) based on probabilities (Tversky & Kahneman, 1981).

Time preference and risk preference are both main factors in decision-making and thus makes this test interesting. The first question (See figure 16 below) seems intuitively to be easily solved, but after logical and reflective effort, the answer is changed from its intuitive and initial response. However, the second and the third question do not seem as easy as the first one and need more rational thinking than just intuitive responses.

(1) A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost? _____ cents

(2) If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets? _____ minutes

(3) In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? _____ days

Figure 16. The CRT by Frederick (2005)

There are two types of cognitive processes in the brain (System one and two), which define our mechanism to act and which inhabits from the dual process theory (Kahneman and Frederick, 2002 & Stanovich and West, 2000). System one does not require much attention, because it occurs effortlessly. It deals with the instant thought that springs to mind. As for instance, when one is encountered with a task that seems easy to solve. This is the case with question one in the CRT by S. Frederick (2005) that seems easy and where the intuitive answer of "10 cents" appears in ones mind, whereas the actual answer is "5 cents". On the other hand, System two require effort and attention and the cognitive ability to perform well on SAT scores such as the CRT (Stanovich and West, 2000).

Moreover, System one represents prior knowledge, which manifests itself in an automatic and fast reactive process such as recognition of something, believes and rapid answers. As System one operates automatically and unconsciously, it is only the final outcome e.g. a fast answer to a question, which takes place on a conscious level. Therefore, System one has been termed "the heuristics system" and the implicit system. On the contrary, System two could be termed "the rational and the explicit system" as it operates within the central working memory and consists of logical reasoning i.e. the exact opposite of System one (J. Evans, 2003). For instance, consider figure 17, containing the Wason selection task consisting of four cards, which have a letter on one side and a number on the other side. The purpose of this task is to figure out whether the statement is true or false by flipping two cards that match the proposed statement.

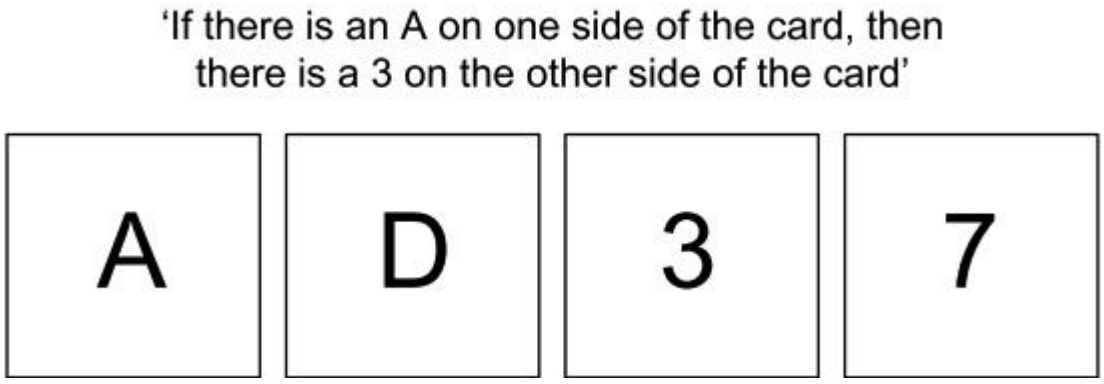


Figure 17. The Wason selection task (J. Evans, 2003)

Most people chose the A card or the A and 3 card, which strongly manifests itself in System one, also known as "matching bias" consisting of heuristic processes in this context. Furthermore, matching bias excludes prior knowledge and belief, which are key components of System one, but

instead focuses on abstract contents that interfere with these in determining choices, and challenges System two. However, the correct answers to the task are the A and the 7 card, which falsifies the statement by the use of System two based on logical reasoning excluding all other options (J. Evans, 2003). This has also been supported by Stanovich and West (2000), who define the Wason selection task as being difficult and only solvable by the use of System two.

System one and two can be correlated to the theory behind the CRT, which is the outcome of much research and data. Hence, Frederick (2005) conducted data from over 3.000 US students to measure the correlation between time and risk preference. 33% out of 100% of Frederick´s test subjects answered all questions incorrectly, 28% got one correct, 23% had two right answers and 17% got three out of three correct. This indicates that the associative and algorithmically questions were not as easy as one might presume at first glance but in fact quite challenging due to the time limit consisting of three minutes. These questions required cognitive considerations (System two) and not intuitive responses (S. Frederick, 2005).

Moreover, the CRT also included different risk taking options, which tested cognitive ability and patience. Cognitive reflection differs from impulse reaction, but what is interesting is the correlation between time preference and risk preference in decision-making.

The conclusions on the risk preference factor showed that the CRT-high-Group (from Frederick´s test group) took the risk of gambling with a higher expected value and procrastinated any reward with better outcomes, whereas the CRT-low-group wanted the immediate reward with lower value. However, the high-scoring group did consider future outcomes as a basic factor weighing their responses to monetary rewards and thus chose rewards that matched those criteria (S.Frederick, 2005). For example, they would not choose to have the probability of winning a slightly higher amount ten years from now compared to that of 5 years due to inflation possibilities and the uncertainty of the future. The results showed that CRT is correlated with patience more than any other cognitive measures. However, the most interesting result was the urge for monetary outcomes with an immediate option. In other words, the low-CRT group, who wanted the immediate reward, was cognitively impulsive and thus willing to pay more or lose money in order to avoid the feeling of waiting, which is one of the characteristics in the behavior of compulsive buyers.

Furthermore, Frederick also tested four year old school children in the US to measure their time and risk preference abilities. The children could either choose to get one marshmallow straight away or wait two minutes in order to get two marshmallows. The children, who waited patiently, turned out to score higher on their IQ tests 14 years later compared to their impatient fellow students. In other

words, time and patience was examined, and it turned out that cognitive ability is correlated with patience due to higher value of a reward. Similar studies on time and risk preference have shown similar results, indicating that people with high SAT scores (standardized test for college admissions in the US) have certain cognitive skills and that they choose risks and higher values. On the contrary, people with lower SAT scores opt for immediate reward and thus eliminate chances of getting a higher value (S.Frederick, 2005 & Tversky & Kahneman, 1981).

This behavior is seen in compulsive buyers, which is the main reason that the CRT test was included.

The subsequent section presents results conducted in this study.

7. Results

The aim of this experiment was to test if Danish female compulsive buyers, also known as "shopaholics" is due to lack of executive control, changed emotional reactions or a combination of both. The goal was to test H_1 and H_2 through eye-tracking and tests consisting of executive functions.

7.1 H_1 - Eye-tracking Results

H_1: CCs are related to a stronger emotional response to shopping situations than observed in non-CCs.

The goal was to test Danish compulsive and non-compulsive consumers´ conscious and unconscious attention towards more or less well-known brands. The products in the eye-tracking experiment represented both fashion items and low end consumer goods (FMCG). On one hand, it was interesting to see whether CCs only had an emotional reaction, when high end brands were presented or if they had a strong reaction with FMCG´s or both. On the other hand, it was also interesting to examine non-CCs reactions towards the different categories and measure their reactions.

In order to test the main hypotheses along with alternative hypotheses (H_1 & H_{1a14}), it was important to measure if there were any increased pupil dilation related to consumer situations for CCs. To this end, all subjects with a range of different CB scores looked at different products and responded how much they would be willing to pay for each product with a range from 0 to 2000 DKK. They were giving virtual money in the amount of 1.500 DKK, but could pay lower or higher for the different products. After the experiment ended, one of the participants won a gift card to the local mall, which was equivalent to the virtual amount (for further information, please look at the section, experiment strategy).

To analyze the main effect, testing began with what extent WTP scores could be explained by CB scores and pupil dilation.
Thus, the subjects were tested to see whether CB score is associated with changes in pupil dilation to specific product types. One possibility is that fashion items, but not FMCG, lead to stronger pupil dilation (arousal) in CC subjects compared to that of non-CC subjects.

To test this effect, pupil dilation was used as the dependent measure and with product type, CB score and their interaction as independent variables, and subject as random factor. Hence, a multiple regression analysis[15] was applied in conducting these results.
The overall model was found to be significant:
$R^2 = 0.548$, i.e. explaining 54.8 of the variation in pupil dilation response.

Variable	DF	F- Value	P-Value
CB score	1	0.0026	0.9597
Product	3	482.1033	<.0001*
CB * Product	3	11.4751	<.0001*

Table 1. Test results from the eye-tracking experiment containing CB score, product and their interaction

As test results show, there is no main effect of CB score on pupil dilation, which was as expected.

14 H1a: There is a positive relationship between willingness to pay (WTP) and CB score
15 Multiple regression measures the relationship between multiple independent variables (i.e. predictors) that act around a single dependent variable (Agresti & Franklin, 2009).

However, there is a significance related to product types and CB score, which induces different pupil dilation responses.

This is further illustrated in the below figure, where especially purses lead to slightly larger pupil dilation responses in both test groups.

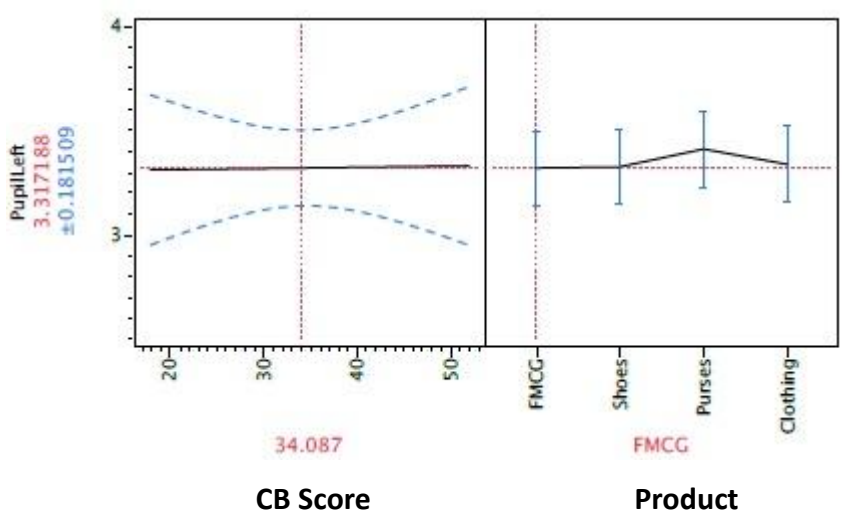


Figure 18. Illustration of pupil dilation, CB score and product types

Moreover, the results from the above figure also show that the effect of CB score on arousal (pupil size) is different for different product types. This is further illustrated in the figure below:

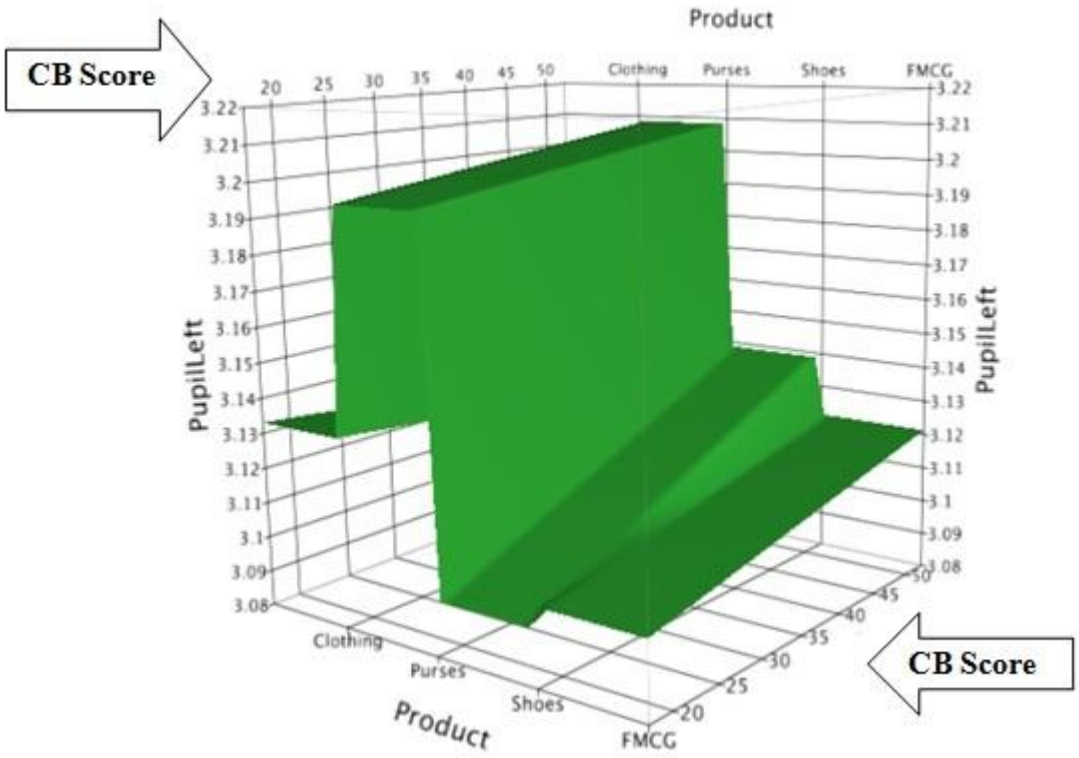


Figure 19. Illustration of pupil size for different product categories along with CB score

The above figure shows that different product types are associated with differences in pupil size. It is also important to notice that CB score has different values depending on the different product categories. To exemplify this, the figure shows how pupil response becomes larger when purses are involved along with a higher CB score. Nonetheless, this effect is somewhat smaller for FMCGs (less steep slope of the curve).

In other words, figure 19 suggests that emotional arousal is affected by CB score, which is only related to specific product types that are relevant for compulsive buyers behavior. Moreover, purses lead to higher pupil dilation for all subjects.

Following this, a second analysis looks at the effect of CB score and pupil size on WTP measures. I.e. measuring pupil dilation effects on WTP is modulated by CCs severity. In order to do this, logWTP is applied as the dependent variable and pupil dilation, CB score, and their interactions as independent variables with subject as a random factor of no interest. The log transformed WTP measures to correct for nonparametric distribution, i.e.to estimate a response based on one or more

predictors.

Here, the overall model explains 23.5% of the variance in WTP score $R^2 = 0.235$ and with the following parameters:

Variable	DF	F-Value	P-Value
CB score	1	4.3379	0.0497*
Pupil left	1	55.0527	<.0001*
CB * Pupil left	1	14.2231	0.0002*

Table 2. Test results of CB score, pupil left and combined score

The results demonstrate that there is a significant effect of CB score on WTP. For instance, the p-value of 0.0497* (please see table 2) shows that high scoring on CB leads to higher WTP.

As the F-value is quite large and the p-value relatively small, it leads to the rejection of the null hypotheses and instead supports H_{1a}[16].

Moreover, the second effect is found in pupil dilation, which is positively correlated with WTP. This is best illustrated with the following figure:

16 H1a:There is a positive relationship between willingness to pay and CB score

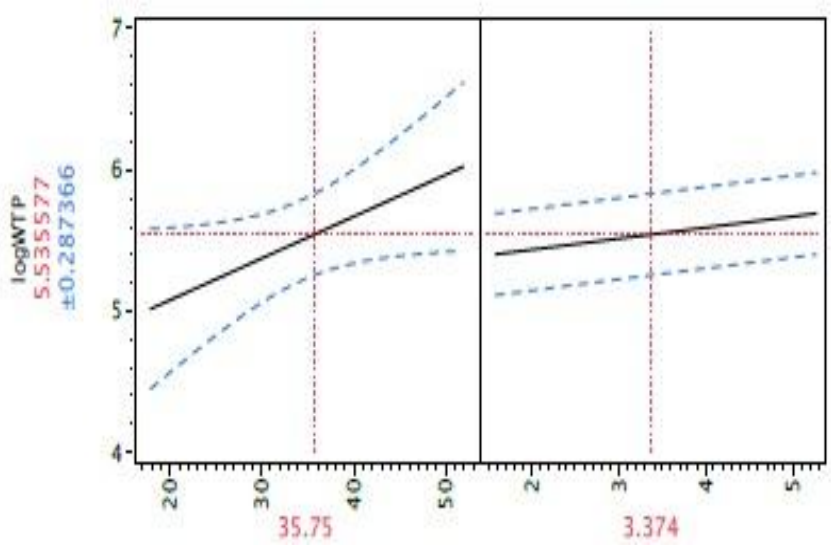


Figure 20. Illustration of CB score, WTP and pupil dilation

As figure 20 demonstrates, higher CB score is associated with a general increased willingness to pay for the products viewed.
An additional test was run to see whether this effect was different for the various product categories.

As can be seen, the figure shows that the effect of CB score on WTP is stronger for clothing, shoes and purses than FMCGs. The figure clearly shows that the effect of CB score on WTP for FMCGs is much lower compared to other product types as the curve is not as steep.
This is best illustrated in the following figure below:

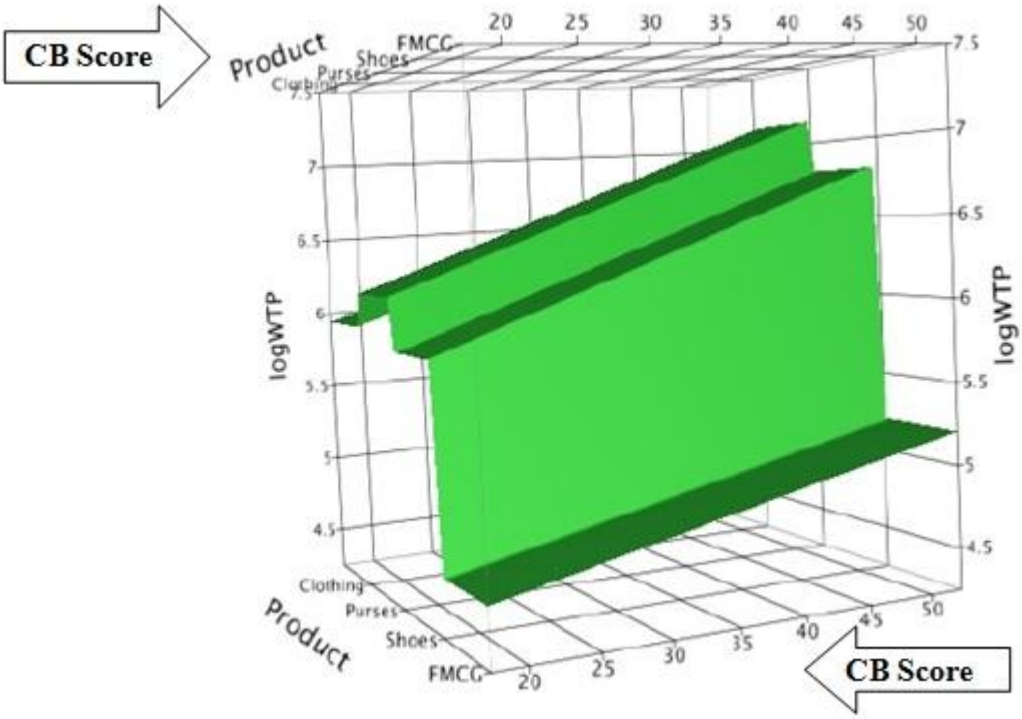


Figure 21. Illustration of CB score on WTP

To take a look back at the effect of CB score and pupil dilation on WTP, the data shows that there is also an interaction effect. The below figure demonstrates this:

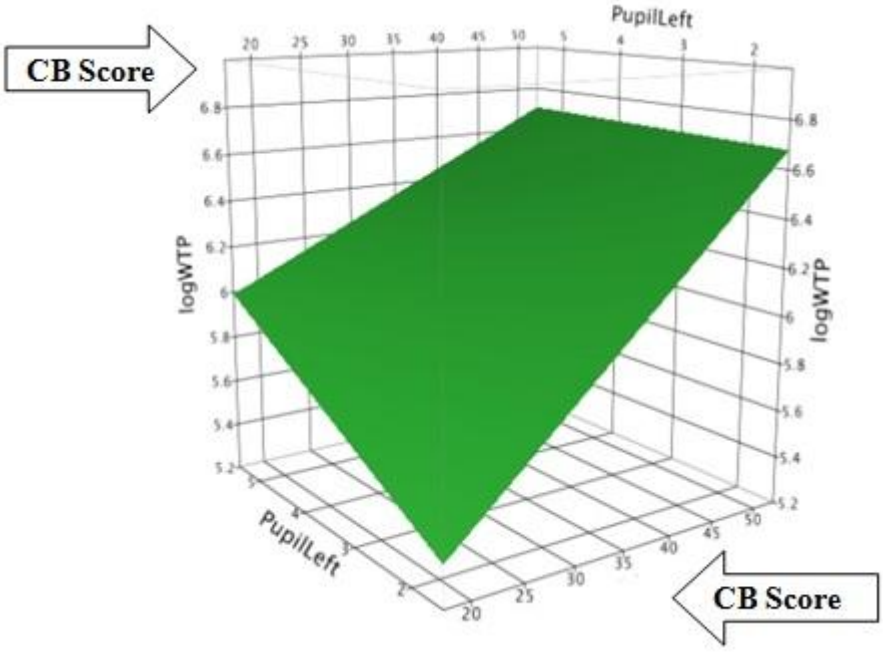


Figure no. 22. Illustration of CB score and pupil dilation on WTP

The interaction effect is seen through high scoring on CB, but with less effect of pupil size on WTP. Furthermore, the figure also shows that higher CB scores are related to an overall increase in WTP and that stronger pupil dilation is also positively related to higher WTP.

To sum up, the results suggest that although CCs are willing to offer more money for a specific product, these effects are not driven by alterations in arousal. This is in contrary to the assumption (at least in part), and suggests that CCs are less affected by arousal than non-CCs.

However, CCs are more emotionally affected by specific products such as purses, but these responses do not seem to have any influence in their WTP decision making process. This is in contrary to non-CCs, who are willing to pay more as they are more aroused by the different product types besides FMCGs, which applies for both test groups. H_1[17] is thus partly true as compulsive buyers are willing to pay more for specific products than non-compulsive buyers, but are less aroused by them.

7.2 H2 - Executive functions tests results

The following section will present results conducted from tests consisting of executive functions (analysis 3) based on the following hypotheses (2).

H_2: CCs are associated with lower performance on cognitive tests of executive functions, when compared to non-CCs

First, the subjects were divided into two groups according to the classification of the CB scale score. Here, CCs are compared to non-CCs with significant different CB scale score: $t=15.1$, $p<0.0001$).

Second, the data distribution is both parametric and non-parametric for the executive tests. Only the Stroop test is parametric and thus a two-sample t-test[18] (T) is applied, whereas the Kolmogorov-

17 H_1: CCs are related to a stronger emotional response to shopping situations than observed in non-CC subjects.

18The two-sample t-test is used to compare if there is a significant average or a random difference between two groups. In other words, it measures if the variance is equal for both test groups by either rejecting or accepting the null hypotheses (Agresti & Franklin, 2009). This inclines for a parametric two-sample t-test due to the Stroop test, which measures reaction time of a task (Please see p. 38 for more information).

Smirnov test[19] (KS) is used for the non-parametric tests. The K-S test is applied to compare if there is any significant difference between compulsive and non-compulsive buyers. The T-test indicates the direction of the stated hypotheses. The T-test either appears on the right or on the left side of a bell curve as it is parametric (Agresti & Franklin, 2009).

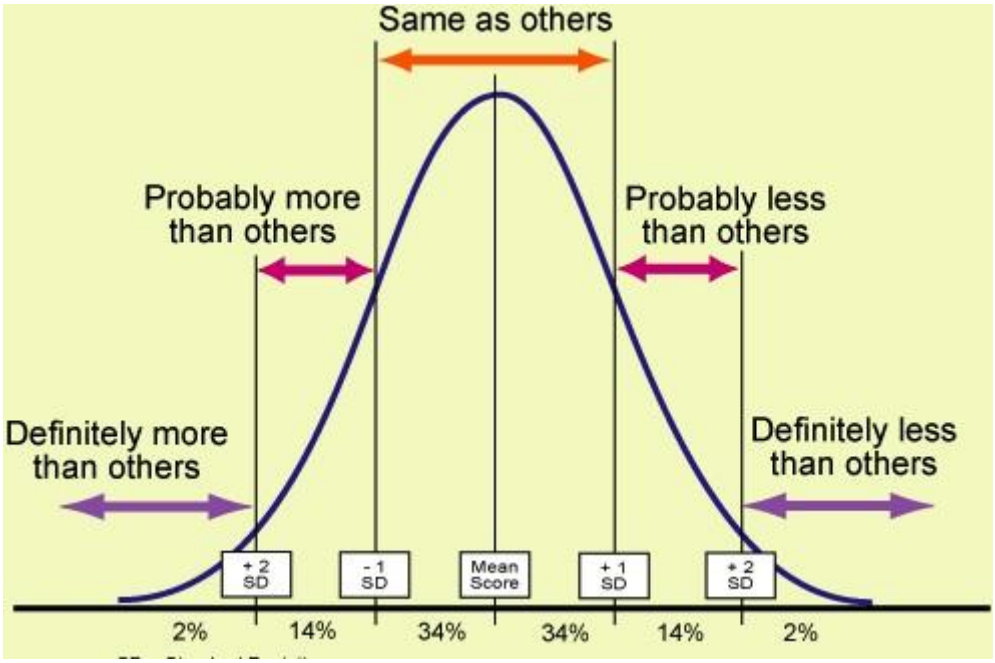


Figure 23. Illustration of a bell curve

Test results show that the t-distribution seems to be more towards the left side with a higher p-value.

Third, after subjects completed the four cognitive tests (Eriksen Flanker test, Stroop test, Visual reaction test & the Go/No –go test), the following results appeared:

19 The Kolmogorov-Smirnov test is a non-parametric comparative test, which tries to determine the significant probability distribution between two data sets through empirical data distribution or through a comparison of empirical and theoretical distribution(http://www.statsref.com/HTML/index.html?komogorov_smirnov.html)

TEST	T	KS	p
Eriksen Flanker Test		0.12	0.731
Stroop Test			
- normal	-2.59		0.0078*
- interferens	-1.33		0.0965(*)
- difference	0.28		0.389
Visual reaction		0.17	0.348
Go/No-go			
- result		0.12	0.771
- time		0.17	0.289
- combined		0.12	0.71

** =significant with a p level of <0.05; (*)=significant with a p level of <0.1, which is acceptable due to the directional hypotheses.*

Table 3. Executive functions test results

The above results show that there are only some significant differences between CCs and non-CCs based on the Stroop test. As the P-value indicates, it has a significance level of <0.05, also termed the cutoff point, which rejects H_{20}[20] (Agresti & Franklin, 2009) and thus accepts H_2[21]. This is also supported by the T-values, which do not meet or exceed the critical value of 1.997 for a two sample T-test.

However, the other non-parametric tests have D- values of 0.12 and 0.17, where most p-values are > 0.05 identifying that there are not significant differences between compulsive and non-compulsive

20 H_{20}:There is no positive relationship between lower performance on cognitive tests for CCs compared to non CCs

21 H_2: There is a positive relationship between lower performance on cognitive tests for CCs compared to non-CCs

buyers performance on executive tests. Hence, H_{20} is accepted and H_2 is thus rejected. However, as results show for H_2 both the null and the alternative hypotheses are supported here as CCs have faster reaction time compared to non-CCs (healthy subjects) implying that they are more controlled by their impulses, but do not lack executive control.

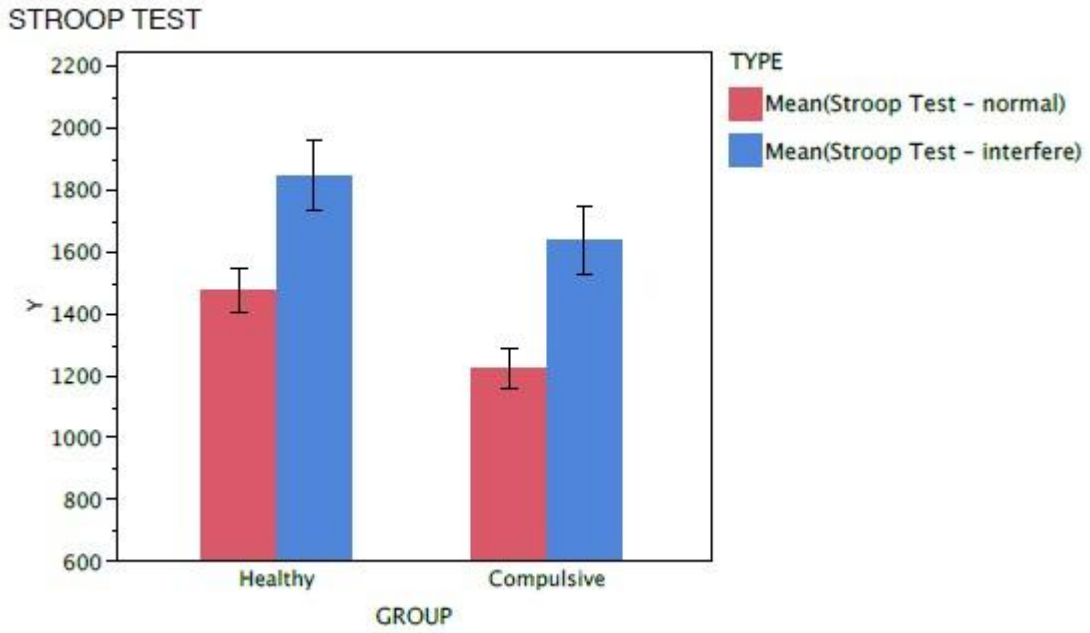


Figure 24. Comparison of CCs and non-CCs scores from the Stroop test

Figure 24 shows a comparison between compulsive and healthy subjects score based on their performance on the Stroop effect.
The normal and interfere mean score is higher for CCs, which indicates that they have slower reaction times compared to the scores of non-CCs. The y-axis shows the completion time in seconds. CCs are much faster, which could imply that they are more impulsive, but on the same level as non-CCs, when it comes to executive control.
This is further supported by the other executive tests; however the Visual Reaction Test does not support higher impulsivity for CCs.

To sum up, CCs do not perform significantly worse than healthy subjects on different tests of executive function. However, they do show signs of significantly faster response times. This will be further elaborated and discussed in the subsequent section.

8. Discussion of experiment results

This section presents a discussion of the results of the experiments, which have been analyzed by incorporation of existing literature and research.

The aim of the study was to investigate if Danish female compulsive consumers are driven by stronger impulses or poorer self-control than healthy test subjects. Three analyses were carried out in order to answer the research question:

1) An eye-tacking study to measure emotional reaction through pupil dilation related to shopping stimuli (Analysis 1 & 2)
2) A validated neuropsychological test battery was run to measure executive function (Analysis 3)

A multiple regression analysis was applied in conducting the results from the eye tracking experiment (analyses 1 & 2). Here, analysis 1 showed that higher scores on the CB Scale are associated with stronger pupil responses to fashion products but not FMCGs. Moreover, increased arousal is associated with higher WTP in non-CCs compared to CCs, where arousal does not have an effect as was initially hypothesized (H_1[22]). However, CCs did have higher emotional reactions towards specific products and were thus willing to pay more, but were less aroused by them.

This is supported by the theoretical viewpoint of the substance addiction literature, explaining that "shopaholics" need much more than healthy subjects in order to get a "kick" out of something. This partly explains their uncontrolled shopping behavior that could result in an addiction. This behavior is found in drug addicts, gamblers, sky drivers etc., who need to go to extremes in order to get a "kick" out of the ordinary (Bechara, 2005).

Furthermore, the eye-tacking experiment also indicated that CCs place their decisions by the bottom-up effect due to the liking aspect of stimuli that seems attractive at the purchase moment (Julie et al., 2007, Laurence et al., 2010 & Neuner et al., 2005). CCs did have an affection towards certain stimuli e.g. purses, but not as expected (H1) compared to that of non-CCs. The bottom up

22 H_1: CCs are related to a stronger emotional response to shopping situations than observed in non-CC subjects.

effect is the most commonly used as the senses affect the decision making process. This is seen by the fast response one´s senses have when encountered with something that grasps the attention or something that can be associated with (working memory) and feel (Baars & Gage, 2010).

The theory on the bottom up affect also supports the findings of analysis 3, which involved neurophysiological tests. This analysis demonstrated that CCs do not lack-self control as stated in most literature on this topic (Joël Billieux et al., 2008, Julie et al., 2007 & Arnold & Reynolds, 2003). Nevertheless, analysis 3 showed that CCs were faster at completing cognitive tests than non-CCs. In other words, CCs do not have lower executive functions than non-CCs, but they do react faster, which is an indication of insensitivity to stimuli.

That CCs do not have lower executive functions than non-CCs, but react faster, is rather an unexpected finding as it contradicts existing literature on compulsive buying and thus leads to the rejection of H_2[23]. Hence, data from analyses 1 & 2 suggests that "shopaholics" are less emotionally aroused and have no significant change in executive function. These results indicate that CCs do not have an impulse control disorder, but merely react faster in solving cognitive tests and have strong affection towards certain stimuli. These results are also supported by consumer behavior and neuroscientific literature, which conclude that compulsive buyers have stronger affection towards stimulus compared to healthy subjects (Chartrand et al., 2008, Baars & Gage, 2010, Plassmann et al., 2012, Laurence et al., 2010 & Neuner et al., 2005).

Nevertheless, the data from analysis 3 does not reveal anything about CCs making more mistakes on the executive tests compared to that of non-CCs due to the fast completion time. This is therefore worth discussing, but due to limited data from the experiment, it is not possible to present factual percentage. It is definitely something that should be further examined as the theoretical viewpoint suggests that CCs are prone to lack self-control and thus act impulsively in most situations without much over-thinking to certain matters such as shopping and monetary outcomes.

The result findings from the eye-tracking experiment (analyses 1&2) leads to the discussion of the gratification of immediate reward outcomes, where CCs fail to make use of arousal as a guide, when making monetary decisions and thus fail to have an " error" signal that make them pay more

23H_2: CCs is associated with lower performance on cognitive tests of executive functions, when compared to non-CCs

money. Thus, the data from analysis 1 suggests that CCs may end up in depression and financial difficulties because their emotional system is out of order, when making these decisions.

Bechara ´s (2005) study on decision making, impulse control and loss of willpower to resist drugs, showed that the will to control one´s decisions is weakened when the VMPC[24] is damaged. Hence, it leads to automatic sensory-driven behavior, which results in preference of immediate reward at the cost of negative future outcomes. This is exactly what the test results from the eye-tacking experiment show, in which case CCs are willing to pay more for products than healthy subjects although their arousal level is lower.

Moreover, Bechara´s study (2005) emphasized on the neural systems that need to cooperate in order to have self-control and not be affected by everything that pleases the sensory-driven area of the brain. Brain regions involved in voluntary action include the VMPC, which also links closely to the insula and somatosensory cortices i.e. emotions and feelings, as well as the dorsolateral area of the prefrontal cortex together with hippocampus, memory area of the brain. These brain regions are needed for any decisions to take place and if there is damage to the VMPC, which links these areas together, it leads to poor decision making and social functioning along with higher automatic stimulus.

CB is a perfect example to manifest the gravity of poor decision making. However, this does not apply to the experiment test group (CCs), but it does imply that CCs have sensory-driven behavior, which leads to future negative cost outcomes, as the results from analysis 1 & 2 have demonstrated.

Addiction is one of the terms that describes the condition of CB and usually CCs are not aware of the addiction themselves or are in denial about it. However, damage in the more posterior region of the VMPC, including the anterior cingulate and the basal forebrain, leads to lower control of the impulse inhibition compared to that of healthy subjects. Not only does it relate to poor impulse control, but it also affects the lateral orbitofrontal and dorsolateral areas of the prefrontal cortex that signifies strong urge to experience immediate impulsivity. This immediate need to experience something gives one the feeling of adrenalin, pleasure, a happy state etc., which usually occurs in a negative correlation as it turns out to be an addiction. It also affects executive attention as the ability to focus on something diminishes. Nonetheless, there is a distinction between damage in the VMPC and hence being addicted to something, and being a compulsive buyer without any damage to that

24 Ventromedial prefrontal cortex

region.

When relating the findings from Becahara´s study to the results of the experiment of this study (analyses 1, 2 & 3), it shows that none of the subjects had damaged their VMPC. However, the arousal level was low at CCs, which indicates that they need to experience something more intense to get to the same level as non-CCs.

On one hand, analysis 1 indicated that subjects were sensory-driven and had poor impulse control, which resulted in poor decision-making in shopping correlations, but on the other hand, it indicated that they were aware of their shopping addiction. Nonetheless, the subjects did not consider CB a severe problem to themselves as long as it did not involve huge debt payments to the bank (see appendix on executive functions result score in excel).

Moreover, the subjects did not lack self-control, which was evident through the completion of the executive functions tests, of which the scores were either average or high. CCs would have lacked self-control if their scores had been low(see appendix on executive functions result score in excel).

When incorporating the theory on executive functions with the performance of cognitive tests of this study, it was clear from analysis 3 and thus the rejection of hypotheses 2[25] that CCs did not lack self-control or had any damage to the PFC along with the frontal lobes. As stated above, if there would have been any damage to these regions, the test results would have revealed this.

To sum up, the results from the experiment have shown that Danish female compulsive buyers have sensory-driven behavior and that they are mainly driven by impulses.

The findings of the experiment results are highly interesting as they contradict current theory and research on the topic, that claim compulsive buyers either lack self-control or are driven by impulses. It is obvious from analysis 3 that CCs do not have lower executive functions as hypothesized ($H_{2)}$ and that their level of arousal is much lower compared to that of non-CCs. Moreover, CCs were willing to pay more for certain products such as for example purses although the emotional involvement was not as high as expected. Due to this, H_{126} was somehow supported.

25 $H_{2:}$ CCs is associated with lower performance on cognitive tests of executive functions, when compared to non-CC subjects

26 H_1: CCs are related to a stronger emotional response to shopping situations than observed in non-CC subjects.

The results from this experiment lead to higher insight on the decision-making process when consumers make a choice. Furthermore, it enhances the knowledge on what consumers would prefer to pay for specific brands induced by emotional reaction by the use of neuromarketing methods. This will be further elaborated under future research perspectives.

9. Experiment quality evaluation

When an experiment is conducted, it requires a quality evaluation in order to verify test results. The following section will evaluate on the experiment applied from a validity and reliability viewpoint.

9.1 Validity

"The only relevant test of the validity of a hypothesis is comparison of prediction with experience ".

Quote from Milton Friedman (brainyquote, 2012).

Validity refers to the quality of the measurement conducted in the experiment. It deals with guidelines and requirements for a successful testing. It is important that some guidelines are followed, when the experiment is conducted as disturbance and noise can lead to different results (Zikmund et al., 2010). Validity determines how the research question is truly approached by the measurement tool and its results. Measurement validity is linked to construct validity, which emphasizes on the actual realization of the hypotheses.

Factors such as internal and external validity are considerations, which this thesis has incorporated (Bryman & Bell, 2007). Internal validity refers to the "truth" of the study sample focusing on cause and effect, whereas external validity concerns the extent to which the measurement and results can be generalized in terms of using another sample group and gaining the same results in a foreign country (Bryman & Bell, 2007 & Hollesen, 2004).
As stated in "delimitation", this thesis only focuses on Danish females and therefore internal and external validity could be applied for Denmark, but not to other countries due to national, cultural and language indifferences (Trompenaars & Hampden – Turner, 2006).

Measurement validity in the eye-tracking experiment

The Eye-tracking experiment took place in an artificial environment in Senselab at CBS. The environment required specific rules in order to have a successful testing (Imotions, 2012). In other words, controlling the experiment environment led to minor disturbances in form of background noise.

The following conditions were followed: dimmed light behind the eye-tracking computer screen, otherwise there were total darkness, and the subjects were seated on a regular chair containing no wheels on a mobile table. These conditions were necessary to sharpen the quality of the pictures and to capture eye detection. The below picture illustrates the seating position.

Figure 25. Attention Tool – demonstrating seating position (Imotions, 2012)

The wide screen was facing away from the participant (not like in the picture) and towards the researcher, who controlled the eye-tracking quality from the screen. The screen showed the exact same picture as the eye-tracking computer, so that the researcher could follow and see where subjects were looking. Furthermore, in the left window of the screen, the researcher could control the eyes position i.e. the screen showed if subjects' eyes should move closer or away from the eye-tracking computer to ensure better quality. However, subjects were told not to move their head as this could affect the overall quality of the test.

When conducting the eye-tracking experiment in an artificial environment, subjects are of course aware of the fact that they are being tested in contrary to real life situations. Further, the eye-tracking computer also required concentration of the head, which would, for instance, not take place in a purchasing situation in a shop. Moreover, rating each product on the continuous scale required fast decision-making on the spot, which most likely would have been approached differently in an authentic setting. Bearing these circumstances in mind, there would also be elements such as

background noise in the form of music, people, and cashier etc. when shopping takes place (Percy & Elliott, 2009). As previously stated, disturbances as background noise would lead to different hypotheses and hence different results. This would also affect the validity of the measurement (Zikmund et al., 2010).

Nevertheless, this require future research as it would be interesting to measure if compulsive and non-compulsive buyers are driven by impulses or lack of self-control in an authentic shopping situation by the use of both eye-tracking and Electroencephalogram[27] (EEG) (see appendix on EEG).

Validity of selected products for eye-tracking

The products containing clothing, shoes and bags were all fashion items with more or less well-known brands. These products were randomized in the attention tool along with a category containing fast moving consumer goods in order to frame the outcome.

"Decision- frame" is associated with a particular choice. The framing is controlled by the choice at hand (problem) and influenced by cultural norms, habits etc. However, it is possible to frame a decision in more than one way to help the subject (decision-maker) to make a decision (Tversky & Kahneman, 1981). When decisions are framed, there are basic factors that need consideration such as gains and losses. Gains and losses can be related to many factors, but usually deals with risk taking in monetary correlations, where utility and prospect theory play a major role for the decision-maker. Each decision has a consequence that the risk-taker needs to consider, and is based on either a rational or an irrational point of view (Tversky & Kahneman, 1981).

It is interesting to see what happens in the brain when framing takes place in a decision-making scenario. For instance, activation in the Amygdala was seen in a FMRI study by De Martino et al. (2006) concerning simple effects of decisions in a framing effect regarding risk and gamble options. Consequently, activation in the anterior cingulate cortex and in the bilateral dorsolateral prefrontal cortex was seen when subjects chose the gain option when facing the "loss" frame. On the other hand, subjects who were more rational in their decisions, showed activity in the OMPFC with the frame effect (De Martino et al., 2006).

27 EEG: A record of the tiny electrical impulses produced by the brain's activity. By measuring characteristic wave patterns, the EEG can help diagnose certain conditions of the brain (http://medical-dictionary.thefreedictionary.com/EEG)

As previously stated, the subjects needed to rate each item on a continuous rating scale ranging from 0-2.000 DKK before moving on to the next picture in the eye-tracking study. This inclined for much thinking as subjects were not facing multiple framings, which contribute to different decisions or choices, but instead required price rating based on their liking. They were given virtual money and could thus "purchase" any given product which was valued as WTP according to their preferences on the scale. In some continuous rating scales there are scale points consisting of a series of numbers indicating a mere precise rating. Further, continuous rating scales are subjective as they consist of individual preferences.
Nevertheless, it is important to distinguish between liking scales and continuous rating scales. Liking scales do not have any price rating involved and subjects are asked to indicate the amount of agreement or disagreement. Scales lead to the support of meaningful measurements and support the validity of data collection (DeVellis, Robert F, 2003 and McIver & Carmines, 1981).

Validity of Cognitive tests

The cognitive tests took place in an artificial environment as earlier described under "procedures". The validity of these tests was evident through objectivity that focused on the interplay of constructive data collection and positivist approach.

Experiment effects

It is important to highlight that the *"Hawthorne effect"* by Elton Mayo and his colleagues was taken into consideration when conducting the experiment. The main characteristics of the Hawthorne effect are behavioral modifying effects of participating in a social study. For instance, subjects are aware that they are participating in a study and therefore they could change their behavioral attitudes by acting differently than usual when not being observed (Zikmund et al., 2010 & Bryman & Bell, 2007). This is also reflected by the *"Experimenter effect"*which could lead to result manipulation, as subjects are aware of the situation, and hence can affect the outcome. Furthermore, another effect was also considered in the experiment, the "*demand effect*", which leads to behavioral changes whilst conducting the experiment due to the fact that subjects are conscious about the appropriate behavior. This could result in falsification of results if subjects "manipulate" their answers if they are aware of what is expected in the experiment (D. Zizzo, 2008 & Zikmund et al., 2010).

However, when conducting the experiment of the thesis, these effects were taken into consideration.

It was therefore important to run a pre-test and not to inform subjects about the purpose of the study as this could lead to falsification of results. The sample was legitimate as subjects were chosen randomly and thus ensured validity of test persons.
Hence, all subjects were treated equally in the experiment and were briefed in the exact same way by oral and written information.

9.2 Reliability

" The extent to which results are consistent over time and an accurate representation of the total population under study is referred to as reliability and if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable " quote taking directly from Golafshani (2003).

In other words, reliability refers to consistency related to a measurement that can be counted as reliable considering methodology and its results (Zikmund et al., 2010).

Moreover, Kirk and Miller (1986) relate reliability to three definitions in quantitative research:

1. Repeatability in order to achieve same results and to ensure the quality of the measurement. For instance, if the measurement varies, the experiment is not consistent and would lead to different results.
2. Measurement stability over time e.g. there is no difference in measurement and thus it is stabile.
3. Measurement similarity within a time frame, i.e. measurements would not differ when conducting the experiment.

It is important to emphasize that validity and reliability are closely connected as they go hand in hand. If the measurement instrument is not valid, then test results cannot be reliable either. However, when conducting results from eye-tracking and cognitive tests, the measurement instruments was the same and could be replicated by using the same test group, but the data would most likely vary. This is due to the test outcome that includes physiological conditions such as mood and feelings. Time conducting the experiment is also of value due to emotional state of the

time the experiment was conducted.
If the experiment was replicated by the same sample it would lead to higher test scores concerning the cognitive tests due to memory storage. This also applies for eye-tracking because it measures unconscious attention and willingness to pay, which would differ if conducted again. Bearing this in mind, it does not indicate that test results are not reliable or valid as the measurement has been stabile and similar throughout the experiment and conducted according to the requirements under validity.
In other words, measurement has been consistent following the requirements under (2) and (3).

The subsequent section presents a general discussion based on the experiment of this study with support of elaborated theoretical viewpoint.

10. General discussion

The present research is the first study to explore if Danish female compulsive buyers are driven by impulses or lack of self-control. Research has so far examined CB tendencies by different measurements. Studies have been focusing on compulsive buying motivations and neuroeconomic factors determining a purchase process based on product, price and fixation. Nonetheless, impulse inhibition and executive control have been the main focus of these studies, hereby to attempt to understand the cognitive and consumer behavior tendencies of CCs. Results from prior studies have shown that CCs are sensory-driven and that they most likely would lack self-control, implying the possibility for further, future repercussions.

Input in the eye-tracking experiment – H_1[28]

According to literature on pupil dilation, stronger pupil dilation is related to positive or negative emotional reaction towards stimuli (Bradley et al., 2008). This theoretical viewpoint is supported by test results from analysis 1 & 2 (Eye-tracking), which showed that all the test subjects' pupils were more dilated as a reaction to the fashion items consisting of bags and purses than when confronted with FMCGs. Furthermore, the level of arousal was positive as both test groups were willing to pay

28 H_1: CCs are related to a stronger emotional response to shopping situations than observed in non-CCs

for the different product types.

The findings suggest that fashion items may affect "liking" unconsciously (attention), which turns into conscious awareness as both compulsive buyers and healthy subjects were willing to pay more for fashion products (Please see figure 18 under results). Unconscious liking of fashion items was obvious through stronger pupil dilation and WTP.

According to Chartrand et al. (2008) when emotional appraisal is activated in the brain, it leads to goal oriented direction towards the product, which is unconsciously influenced by social perception, memory & emotional assessment. These factors play a significant role in the purchase process that takes places unconsciously in contrary to when the product is purchased, which takes place on a conscious state. This is supported by results from analysis 1 & 2.

The reward system

The reward system (Berridge, 2011, Baars & Gage, 2010 & Neuner et al., 2005) also played a significant role in the eye-tracking experiment (analyses 1 &2). Thus, the test subjects were told that they had a chance of winning one of the products they were willing to pay for virtually. This created a motivational factor and a potential reward as an outcome for the participants. These motivations moreover created the positive feeling of "winning" in the reward system of the brain. As already stated in the thesis, the reward system consists of liking, wanting and learning, which focuses on the learned aspects of rewards by studying associations between conditioned stimuli and its consequences.

However, there is a distinction between compulsive and non-compulsive buyers perception of a reward as an outcome, as CCs have stronger emotional attraction towards products regardless of the usage and price involved. In other words, for CCs, liking and wanting are closely correlated due to an instant attraction towards a potential product, which is unconsciously undefined. Based on this, instant decisions are made, and the product is purchased on the spot, which creates a feeling of excitement and fulfillment for a short period of time.

This theoretical view is supported by test results from the eye-tracking experiment, where CCs were willing to pay much more for fashion items than non-CCs. Hence, indicating a higher affection (liking & wanting) and lack of monetary understanding due to higher WTP.

Decision-making and WTP

Moreover, data from the eye-tacking experiment resembles the results conducted from the study outlined by Plassmann et al. (2007), which showed that stimulus associations were triggered by the pictures shown to the subjects. The subjects were thus measured on their WTP, where the results demonstrated that goal-directed decision-making and the emotional center in the brain were strongly activated during the experiment. The resemblance of results is found in the emotional stimuli and goal-directed decision-making. This was measurable through the effect of CB score and pupil dilation related to specific product types (Please see figure 22 under results for further information).

As previously stated in the thesis, there are two types of decision-making, the one being conscious and goal oriented, and the other being unconscious, irrational cognitions (Krantz & Kunreuther, 2007). Correlating this theoretical view to the results concluded from this study, it is clear that it applies for both test groups. Non-CCs did not overspend their money and were mostly realistic about the amount they wanted to spend on a given fashion product, which indicated goal-orientation and less cognitive irrationality in their decision-making. This was in contrary to CCs, who were strongly affected by the visual stimuli and therefore also more irrational in their decision-making.

In addition to that, this study also supports the value based decision-making model proposed by Plassmann et al. (2012). Here, external and internal values are correlated and fundamental in determining decisions related to a brand choice. This is done through the attention mechanism on an unconscious level, which is influenced by external values such as the social environment. This knowledge is thus transferred to the internal values that represent an inner state such as hunger or thirst. It is worth noticing that the brain needs to encode both external and internal values in order to create the other values that are correlated for a decision to take place, which happens on a conscious level (Plassmann et al., 2012).

As results from the eye-tracking experiment have demonstrated, subjects with high scoring on the CB scale also had higher WTP on fashion items than non-CC.s This indicates that external values have a stronger effect on CCs as their decisions are strongly influenced by the social context and visual stimuli, which together with internal values, form the basis for their decision-making. However, the arousal level was average and not higher for CCs than was the case for non-CCs throughout the experiment, but it did rise when certain fashion items were presented.

This is also supported by McCracken's model of meaning transfer (1986), which explains how the individuals are influenced and affected by their social surroundings. He emphasizes on the shared understanding of a group that constitutes the meaning of a particular culture that makes sense of the world. The fashion system is thus derived from this society, which consists of brands. Henceforth, these brands or fashion products are interpreted according to the understanding of the individuals, who derive their own personal meaning from the fashion products based on knowledge deducted from the value system, also referred to as *"Consumer co-creation"* (McCracken, 1986 and Allan et al., 2008).

Incorporating the above theory in the findings of this study, it is clear that both compulsive and non-compulsive buyers are affected by the society they live in. This was concluded from the dilation of the test subject's left pupils (eye-tracking), when certain fashion brands appeared on the screen. Moreover, the arousal by certain brands also led to higher WTP for test groups on certain products (purses), supporting the theoretical view on how the post-modern society works. Self-identity is expressed through various brands that lead to the understanding of the shared culture and society they live in (Kragh & Dyrhauge, 2010 & Neuner et al., 2005). Materialism is at its highest peak and the societal view enhances this through self-images of perfection, which is only achieved through brand verification (Dittmar, 2005).

Executive functions – H_2[29]

Moving on to the results of the executive functions tests; it became clear that compulsive buyers do not lack self-control as hypothesized (H_2). As previously stated in the thesis, the executive functions are some of the most important parts of the brain as they controls a person's impulses and the need for voluntary control of actions. Moreover, the prefrontal lobes not only lead to self-control, but are the crucial indicator of our behavior by coordination in our brain i.e. strategic planning, projecting the goal, organized searching etc (Baars & Gage, 2010).

Moreover, automatic and voluntary control is correlated as they both play a significant part in our daily lives. For instance, habits consist of both automatic and voluntary control, where automatic is the controlled behavior as opposed to voluntary control, which is unpredictable behavior (Baars & Gage, 50-52, 2010). Therefore, voluntary control and a conscious state of mind are correlated as the

29 H_2: CCs is associated with lower performance on cognitive tests of executive functions, when compared to non-CC subjects

brain and the body is aware of what it is doing.

Incorporating the theory on executive functions to the experiment of this study, CCs did not score any differently from healthy subjects on the cognitive tests, but did have a faster completion time. Indicating that CCs do poses cognitive and social skills, which are controlled by internal and external representation.

So far, consumer behavior and cognitive neuroscience research have defined CB as a disorder caused by strong "bottom-up" impulses and emotional responses, or by alterations in "top-down" cognitive control functions. However, this study is the first to explore and demonstrate that Danish female compulsive buyers have a rapid inhibition but no changes are found in the modulation. Thus supporting "bottom-up impulses ($H_{1)}$ and rejecting "top-down" cognitive control functions (H_2).

To sum up, the findings from the experiment (analyses 1, 2 & 3) are valuable to marketers as well as for cognitive neuroscience academic disciplines because the study reveals new information on how compulsive buyers react emotionally to certain stimuli related to purchase decisions. Moreover, the study also enlightens the question of executive control, which suggests that CCs are mainly driven by impulses. Finally, the study also supports the theoretical view on compulsive buying leading to distress due to lack of monetary understanding and control.

11. Future research perspectives

The following section discusses some perspectives for future research as this study was limited due to the experiment set-up and the scope of the research.

More investigation of executive functions

Bearing the results from the executive functions in mind, compulsive buyers had a faster completion time than non-compulsive buyers. Nonetheless, the findings did not suggest if a faster completion time was correlated to more or fewer mistakes on the cognitive tests. This is worth investigating in future research by adding another measurement parameter to the existing study. This specific angle on the research would enhance current knowledge on impulse inhibition in CCs

is related to correct or incorrect completion of tests consisting of executive functions.

Real-life experiment in a shopping environment

If the experiment had taken place in an authentic setting such as a mall with portable eye-tracking, the results would have been of more value to the marketer and have given a better understanding of the emotional stimuli associations involved. Combining eye-tracking with EEG would further enhance research and give a thorough understanding of unconscious and conscious decisions made by CCs and non-CCs related to various fashion items and FMCGs. Not only would this lead to an understanding of brand perception, but it would also lead to improved knowledge on effective neuropsychological methods, involving emotional branding strategies. These factors involve everything from shelf placement of products to the music being played in a shopping environment. This can be done by using advanced neuroscience technology (Eye-tacking & EEG) that give better results than a traditional marketing approach e.g. focus groups.

Brand prime effect

Brands unconsciously affect consumers' decision-making on a daily basis. It would therefore be interesting to investigate if the brands that caused stronger pupil dilation would lead to the same emotional cues in an authentic environment. This could be done by replicating the study. In order to do this, both CCs and non-CCs could be given virtual money (like in the eye-tracking experiment) to measure their arousal level, preference of brands, and WTP. This would give a better insight in the liking and wanting components of the reward system and induce knowledge on brand preferences.

Monetary outcome for compulsive buyers

The results from the eye-tracking tests showed that compulsive buyers were willing to pay more for fashion items than non-compulsive buyers. This indicates poor decision-making related to WTP, which could lead to bank deficit and frustration on the long run if continued. Therefore, it would be interesting to examine compulsive buyers shopping habits for a limited period of 1- 3 months in order to measure WTP by their shopping habits. This would give a more thorough insight into their addiction involving payment and thus improve the opportunities for treatment and help.

Market and segment analysis

Cultural differences affect brand perceptions and therefore it is vital to do a segment and a market analysis before introducing any new product. In future research, this could be done by paying attention to research and studies on CB in order to increase sales. This could be done by implementing neuromarketing strategies that would lead to affective responses towards marketing stimuli. For instance, adding scent to specific products would lead to brand differentiation and evoke memory association.

12. Conclusion

Compulsive buying has been defined as a non-substance addiction, which is characterized by an obsessive-compulsive spectrum disorder caused by excessive shopping (Laurence et al., 2010). Although CB is considered a serious condition and a growing phenomenon amongst adults, it has yet not been examined whether or not CB is driven by impulses or lack of self-control. However, current literature on cognitive neuroscience and consumer behavior state that CB contains symptoms of both, arguing that compulsive buyers lack self-control, which affects their impulses.

This study is the first to explore if female, Danish compulsive buyers are driven by impulses or lack of self-control. In order to answer the research question, two sub questions were outlined along with two supporting hypotheses and an alternative hypothesis:

- ***H_1: CCs are related to a stronger emotional response to shopping situations than observed in non-CCs.***
- ***H_1a: There is a positive relationship between willingness to pay (WTP) and CB score.***
- **H_2: CCs are associated with lower performance on cognitive tests of executive functions, when compared to non-CCs.**

The methodological considerations included research philosophy of "positivism" in conducting the

eye-tracking experiment along with priming techniques (Saunders, M., Lewis, P., & Thornhill, A. (2009). This led to the measurement of emotional cues and memory association induced by brand recognition along with validity and reliability of the study.

However, the knowledge deducted from the theoretical literature and relevant consumer behavior and neuroscience studies on compulsive buying, outlined the empirical research proposition of the thesis. The particular areas of research in presenting this study involved emotions, decision making processes, the reward system of the brain, the bottom up and top-down effect, conscious versus unconscious attention related to compulsive buying incorporated with consumer behavior theories.

The first part of the thesis investigated areas involving impulsivity, cognitive emotions and behavioral control in CCs and non-CCs to enlighten their differences. Therefore, the empirical theories were based on inductive method structure, consisting mainly of neuroscientific literature. Hence, it was argued that emotions play a vital part in decision-making caused by external stimuli that affect consumers unconsciously (Baars & Gage, 2010, Plessis, 2011, Berridge and Kringelbach, 2008 & Stock, 1999). Attention happens at an unconscious level, whereas awareness happens fully consciously (Chartrand et al., 2008, Baars & Gage, 2010, Krantz & Kunreuther, 2007, Plassmann et al., 2007, Plassmann et al., 2011 & Plassmann et al., 2012). This leads to the bottom up effect, which is strong for CCs, who are affected by the liking and the wanting aspect of the reward system of the brain (Berridge, 2011, Baars & Gage, 2010, Berridge & Kringelbach, 2008, McGuire, 1974 & Arnold & Reynolds, 2003). Moreover, executive functions are the main predictor of behavioral control as they control one´s impulses and the need for voluntary control over actions ((Baars & Gage, 2010, Davranche et al., 2009, Vakil et al., 1996, Müller & Krummenacher, 2006, Frederick, 2005, Kahneman and Frederick, 2002, Stanovich and West, 2000, J. Evans, 2003 and Tversky & Kahneman, 1981).

The second part of the thesis examined what compulsive buying tells us about consumer behavior in general using a mixture of neuroscientific and marketing literature by induction. Here, it was argued that brands are a key determent in defining self-identity based on the materialistic values that exist in today´s post-modern society (Kragh & Dyrhauge, 2010 and Neuner et al., 2005). Hedonic and heuristic shopping motivations are induced by brands that lead to differentiation by creating conscious awareness through memory association through unconscious attention (Mullins,Walker Jr., 2010, Schumann and Thorson, 2007, Stout, Ball & Villegas, 2007, Joël Billieux et al., 2008,

Julie et al., 2007, Dittmar, 2005, M. Kukar-Kinney et al., 2011, Arnold & Reynolds, 2003, Plessis, 2011, Krugman,1972, T. Ramsoy, 2011, McCracken, 1986, and Allan et al., 2008).

The theoretical viewpoint, presented in the first and second part of the thesis, was further incorporated by the deductive method structure, which was investigated by the experiment of this study.

To test hypotheses (H_1 & H_2) two types of measurement tests were employed. The one being, eye-tracking in an artificial setting in a laboratory, which measured emotional affection towards different product categories (fashion items and FMCGs) through pupil dilation. The subjects were told to rate each product on a continuous rating scale in order to measure their WTP. The other part of the study consisted of cognitive tests that measured subjects' executive functions. Prior to the eye-tracking and cognitive tests, using the score from the Compulsive Buying Scale, the test subjects were classified either as compulsive or non-compulsive buyers.

H_1[30] and H_{1a}[31] were both supported due to the findings from the eye-tracking experiment (analysis 1 & 2). The data showed that CB score was related to a higher level of arousal when specific fashion items appeared. The multiple regression analysis was applied in conducting the results. Henceforth, H_1 was supported as CCs did have stronger emotional reactions towards specific fashion items compared to non-CCs. Moreover, the results also demonstrated that there was a significant effect of CB score on WTP. For instance, the p- value was 0.0497* (please see figure 21 under results), which showed that high scoring on CB led to higher WTP. Thus, H_{1a} was supported. However, the results suggested that although compulsive buyers are willing to offer more money for a specific product, the effect is less driven by arousal.

H_2[32] was accepted only in the Stroop test, but rejected on a general basis.
The data distribution from the executive functions tests was both parametric and non-parametric. A two-sample t-test was applied for the Stroop test because it was parametric in opposition to the other tests that were non-parametric. Hence, the Kolmogorov-Smirnov test was applied.

30
H_1: CC is related to a stronger emotional response to shopping situations than observed in non-CC subjects.
31
H_1a: There is a positive relationship between willingness to pay (WTP) and CB score.
32 H_2 :CCs is associated with lower performance on cognitive tests of executive functions, when compared to non-CCs

The results from the Stroop test showed that there were only some significant difference between CCs and non-CCs. This was supported by the P-value with a significance level of <0.05.
The results were further supported by the T-values, which did not exceed the critical value of 1.997, which led to the acceptance of H_2 concerning the Stroop test. Nonetheless, the other non-parametric tests had D- values consisting of 0.12 and 0.17, where most p-values were > 0.05 leading to the conclusion that there were no significant differences between CCs and non-CCs performance on the executive functions tests. Henceforth, H_2 was rejected on a general basis.

Overall it was discussed from the experiment findings that compulsive buyers react emotionally towards certain stimuli related to purchase decisions, which is also correlated with higher WTP. Finally, the study also enlightened the question of executive control, which suggests that CCs are mainly driven by their impulses and thus do not lack self-control.

Furthermore, as it was the purpose of the thesis to enlighten marketers with new knowledge, it was discussed how findings from the experimental research could be incorporated in real life. Thus, it was suggested in future research perspectives that marketers need to implement neuroscience technology along with marketing approaches to increase revenue. For example, this could be done by the use of eye-tracking and EEG in an authentic shopping environment. Further, it was proposed to duplicate the study in a real shopping environment to measure if the level of arousal and WTP were induced by similar product brands or not for both test groups. Moreover, it was suggested to add another measurement parameter to the executive functions tests in order to see a correlation between fast completion time and errors for both CCs and non-CCs. This would enhance this study and thus lead to more insight on compulsive buyers' behavior in purchase situations compared to that of healthy subjects.

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Appendix - Article in Videnskab.dk

Shopaholic eller ej? Test dig selv

Kommer du ofte tomhændet hjem fra en shoppetur, eller kan man ikke se dig for bare indkøbsposer? Test din købelyst og meld dig til et nyt forskningsprojekt, hvis du vil vide endnu mere om dig selv og din købetrang.

Kan du levende identificere dig med denne kvinde? Eller er du manden, der kommer hjem med firkantede pakker fyldt med elektronisk isenkram? Test, hvor du selv ligger på shoppeskalaen, via link i eller under artiklen. (Foto: Colourbox)

Det er sidst på måneden. Pengepungen er flad, og din løn er ikke tikket ind på kontoen. Og pludselig står de der:

De knaldrøde stiletter, der vil få dig til at ligne million til fredagens fest. Eller den splinternye iPad2, som ville gøre togturen til Aarhus meget mere underholdende.

Hvad gør du? Lader du impulsiviteten råde, stikker dankortet i maskinen og mærker suset, når du trykker på ”godkend-knappen”? Eller omvendt: Kan du modstå fristelsen til at flå butiksdøren op og i stedet lade fornuften råde?

Test din egen lyst til at shoppe

Hvis du gerne vil vide, hvor du selv ligger på købelystskalaen, tilbyder Videnskab.dk her en test, som er lavet i samarbejde med hjerneforsker Thomas Zoëga Ramsøy fra Copenhagen Business School (CBS) og Hvidovre Hospital.

Thomas Zoëga Ramsøy har lavet testen i forbindelse med et nyt storstilet forskningsprojekt, hvor han og hans forskerkolleger vil forsøge at blive klogere på, hvad der sker i vores hjerner, når vi handler mere eller mindre impulsivt.

»Vi kender alle situationen, hvor man har handlet impulsivt og købt noget uden at tænke sig om. Men det kan også kamme over og blive til en afhængighed i stil med ludomani og kleptomani, hvor man ganske enkelt ikke kan modstå fristelsen og går shop amok. Man er populært sagt blevet en shopaholic,« siger Thomas Zoëga Ramsøy.

Selvom man godt kan finde på at kalde sin kæreste for shopaholic, når hun kommer hjem

med støvler, taske og et par nye bukser fra en enkelt indkøbstur, så er det ikke et ord, som man spøger med i psykiatrien.

»Det er i mine øjne en psykisk lidelse, og selvom den har fået et navn, så ved man meget lidt om, hvad der præcist sker i vores hjerner, når købelysten bliver for stor. Det vil vi nu forsøge at råde bod på,« siger Thomas Zoëga Ramsøy.

Vil teste kvinder med forskellige indstilliger til shopping

I forskningsprojektets første fase vil forskerholdet gerne undersøge nogle frivillige kvindelige forsøgsdeltagere, som befinder sig på forskellige stadier af købelystskalaen. Altså lige fra dem, som er meget tilbageholdende, når de shopper, til dem, som nemt lader sig friste til at købe hvad som helst.

At forskerne har valgt at fokusere på kvindelige deltagere til undersøgelsen, skyldes ikke, at kvinder er mere tilbøjelige til at blive shopaholics. For det er lige så udbredt blandt mænd. Bevæggrunden for kun at fokusere på et køn er, at der er forskelle på, hvordan mænd og kvinders hjerner reagerer.

Se også »På den måde kan vi udelukke, at de forskelle vi observerer i vores undersøgelse ikke blot skyldes kønsforskelle mellem mænd og kvinder,« forklarer Thomas Zoëga Ramsøy.

Fremkalder sko og tøj sved i håndfladerne?

Thomas Zoëga Ramsøy håber, at nogle af de kvindelige læsere fra Videnskab.dk, som har prøvet den uforpligtende test, kunne tænke sig at tage skridtet videre og deltage i forskningsprojektet.

I forskningsprojektet vil du som deltager blive præsenteret for et lidt mere udvidet spørgeskema. Derudover vil det blive målt, hvordan du fysisk reagerer, når du på en skærm bliver præsenteret for en række tiltrækkende produkter som sko, tasker og tøj.

For eksempel vil det blive testet, hvor meget dine pupiller vil udvide sig, når du bliver præsenteret for forskellige produkter som et mål for din impulsivitet. Og det vil blive målt i hvor høj grad produkterne fremkalder sved i dine håndflader.

»Man kender det fra eksamener, hvor man har været nervøs, hvor munden tørrer ud og man begynder at svede i håndfladerne. Det viser, at du var følelsesmæssigt involveret. Det er præcis det, vi vil undersøge: Om i hvor høj grad præsentationen af lækre produkter fremkalder en følelsesmæssig reaktion hos den enkelte deltager,« fortæller Thomas Zoëga Ramsøy.

Derudover skal deltageren igennem forskellige former for kognitive test som eksempelvis en IQ-test.

»Vi er på jagt efter den eller de parametre, som beskriver shopaholics bedst. Så vi kan få en sikker fornemmelse af det fysiske og psykiske reaktionsmønster hos henholdsvis en normal forbruger og en shopaholic,« siger Thomas Zoëga Ramsøy.

Shopaholics er måske for impulsive

Fra den hidtidige hjerneforskning tyder det på, at der groft sagt er to parallelle systemer i

hjernen, der er i spil, når man taler forbrugeradfærd.

Der er et område på undersiden af hjernens frontallapper – lige bag ved øjnene – som i overvejende grad styrer vores lyst og dermed vores impulsivitet. Og så er der et område midt i hjernen – helt præcist de basale ganglier og striatum – som er dybt involveret i at styre vores motivation og motiveret adfærd

»Populært kan man sige, at det er disse to systemer, som battler med hinanden og bestemmer vores forbrugeradfærd. Så man kan forestille sig, at hvis motivationssystemet kan tøjle impulssystemet i hjernen, forbruger vi fornuftigt og normalt. Omvendt, hvis impulssystemet er hyperaktivt og ikke kan bremses af motivationssystemet, kan det måske fremkalde en afvigende forbrugeradfærd. Det er ren spekulation lige nu, men det er denne proces i hjernen, som vi på lang sigt gerne vil blive klogere på,« siger Thomas Zoëga Ramsøy.

Hvad sker der i hjernen på en shopaholic?

> Vi kender alle situationen, hvor man har handlet impulsivt og købt noget uden at tænke sig om. Men det kan også kamme over og blive til en afhængighed i stil med ludomani og kleptomani. Hvor man ganske enkelt ikke kan modstå fristelsen og går shop amok. Man er populært sagt blevet en shopaholic
> - Thomas Zoëga Ramsøy

Det ultimative forsøg vil være at sende shopaholics ind i butikker forsynet med små elektroder, som kan måle hjernens aktivitet i form af EEG under shoppeturen.

»Det vil blandt andet kunne gøre os klogere på, om det kun er på selve købstidspunktet, eller om det er under hele jagten på nye ting, at hjernen reagerer uhensigtsmæssigt hos shopaholics,« siger Thomas Zoëga Ramsøy.

Summa summarum vil forskerne gerne vide, hvad det er for en ubalance, som opstår i hjernen, hvis man lider af afvigende forbrugeradsfærd. Det kan på sigt også blive vejen til at udvikle terapeutiske tilbud, så shopaholics kan blive bedre til at tøjle deres følelsesmæssige overreaktion.

Men forskningen vil også have en vigtig sidegevinst.

»Studiet af folks forbrugeradfærd kan give os en større indsigt i, hvad der sker i hjernen, når mennesker træffer et valg,« siger Thomas Zoëga Ramsøy.

Vil du være med i videnskabeligt forsøg?

Til forsøget søges der kvinder i alderen 18-35 år, som fortrinsvis kommer fra københavnsområdet.

For at tilmelde dig forsøget, så skriv venligst til Thomas Zoëga Ramsøy på tzr.marktg@cbs.dk.

Du vil herefter modtage information om forsøget og vil blive kontaktet med henblik på at finde en tid, hvor du kan komme til undersøgelsen.

Selve undersøgelsen forventes at tage under en time, og du vil modtage godtgørelse for din deltagelse, lyder det.

Appendix – Compulsive Buying Scale (CB Scale)

Compulsive Buying Scale © Valence. D'Astous & Fortier

Please express the extent to which you agree or disagree with each of the following statements. Please place an X on the line that best indicates how you feel about each statement.

	Strongly agree (5)	Somewhat agree (4)	Neither agree nor disagree (3)	Somewhat disagree (2)	Strongly disagree (1)
When I have money, I cannot help but spend part or all of it.	_____	_____	_____	_____	_____
I am often impulsive in my buying behavior.	_____	_____	_____	_____	_____
For me, shopping is a way of facing the stress of my daily life and relaxing.	_____	_____	_____	_____	_____
I sometimes feel that something inside pushed me to go shopping.	_____	_____	_____	_____	_____
There are times when I have a strong urge to buy.	_____	_____	_____	_____	_____
At times, I have felt somewhat guilty after buying a product, because it seemed unreasonable.	_____	_____	_____	_____	_____
There are some things I buy that I do not show to anybody for fear of being perceived as irrational in my buying behavior.	_____	_____	_____	_____	_____
I often have an unexplainable urge, a sudden and spontaneous desire, to go and buy something.	_____	_____	_____	_____	_____
As soon as I enter a shopping center or mall, I have an irresistible urge to go into a shop and buy something.	_____	_____	_____	_____	_____
I am one of those people who often respond to direct mail offers.	_____	_____	_____	_____	_____
I have often bought a product that I did not need, while knowing that I have very little money left.	_____	_____	_____	_____	_____
I am a spendthrift.	_____	_____	_____	_____	_____
I have sometimes thought "If I had to do it over again, I would…" and felt sorry for something I have done or said.	_____	_____	_____	_____	_____

Calculating your score:

- Each X that you placed corresponds to a number: 5 for “strongly agree”, 4 for “somewhat agree”, 3 for “neither agree nor disagree”, 2 for “somewhat disagree, and 1 for “strongly disagree.
- Add together the 13 numbers for your Xs to get your total scale score.
- Compulsive buyers tend to score 42.2 or higher.

Appendix - Compulsive buying scale translated into Danish (CB scale in Danish)

Compulsive Buying Scale © Valence. D'Astous & Fortier

Venligst udtryk i hvor høj grad du er enig eller uenig i hvert af de følgende udsagn.

Placere venligst et X på linien, der bedst viser, hvad du synes om hvert enkelt udsagn.

	Meget enig (5)	Nogenlunde enig (4)	Hverken enig eller uenig (3)	Nogenlunde uenig (2)	Meget uenig (1)
Når jeg har penge, kan jeg ikke lade vær med at bruge dem alle sammen.	____	____	____	____	____
Jeg er ofte impulsiv i min købsadfærd	____	____	____	____	____
For mig er shopping en måde at takle daglig dagens stress og afslapning på.	____	____	____	____	____
Jeg føler nogle gange, at noget inde i mig, presser mig til at shoppe.	____	____	____	____	____
Der er tidspunkter, hvor jeg har en stærk trang til at købe noget.	____	____	____	____	____
Til tider har jeg følt skyldfølelse efter at have købt et produkt, fordi det var ligegyldigt.	____	____	____	____	____
Der er nogle ting jeg køber, som jeg ikke viser til nogen i frygt for at blive opfattet som irrationel i min købsadfærd.	____	____	____	____	____
Jeg har ofte en uforklarlig trang, en pludselig og spontan lyst til at gå ud og købe noget.	____	____	____	____	____
Så snart jeg træder ind i et indkøbscenter, har jeg en uimodståelig trang til at gå ind i en butik og købe noget.	____	____	____	____	____
Jeg går mest efter tilbud.	____	____	____	____	____
Jeg kan bedst lide at finde lavprisprodukter.	____	____	____	____	____
Jeg er en af de mennesker, der ofte reagerer på direkte mail-tilbud.	____	____	____	____	____
Jeg har ofte købt et produkt, som jeg ikke har brug for, vel vidende at jeg har meget få penge tilbage.	____	____	____	____	____

Appendix – Experiment order

1. Register ark med navn, alder, e-mail og ansvarsfraskrivelser etc.
2. Online survey (Compulsive Buying Scale) – kategorisering via score
3. Eye tracking test med EEG
4. Branding test
5. Online tests via cognitivefun.net:

5.a Eriksen Flanker test

5.b Stroop test

5.c Visual Reaction time

5.d Go/No-go Visual Reaction time

6. Cognitive Reflection test (S. Frederick) på papir med 3 minutters varighed
7. Debriefing

APPENDIX - REGISTER FORM

DECISION NEUROSCIENCE RESEARCH GROUP

Copenhagen Business SchooL

Log. nr.	
Tidspunkt og dato	

Deltagelse i eye-tracking forsøg i SenseLab, DNRG, på CBS

5. Du har som forsøgsperson i denne test fuld ret til at afmelde din deltagelse og trække dig ud inden eller under selve testen. Testen vil tage mellem 40 og 50 minutter.
6. Det vil ikke få nogen konsekvenser for dig som forsøgsperson, hvis du ikke vil deltage alligevel.
7. Testen vil ikke medføre nogen gener, herunder risici, ubehag eller bivirkninger, der skulle påvirke din lyst til at deltage i forsøget.
8. Din deltagelse er anonym.
9. Hvis du efterfølgende skulle have nogen spørgsmål angående testen, så bedes du venligst kontakte forskningsansvarlige Thomas Ramsøy; tzr.marktg@cbs.dk.

Jeg har læst og er indforstået med ovenstående punkter; jeg har modtaget tilfredsstillende information om forsøget og omfanget af min deltagelse. Jeg indvilliger i at deltage i dette forsøg.

Navn:

Alder:

Beskæftigelse:

E-mail adresse:

Underskrift:

Appendix - Instruction paper regarding eye-tracking

Velkommen

Som en del af dette forsøg, kan du blive den heldige vinder af et gavekort til Frederiksberg Centret på 1.500 kr.

Du bliver præsenteret for en række produkter, hvor du derefter skal vælge hvilken pris du ønsker at give for produktet.

10. Du kan angive din pris på en skala som går fra 0 kr. til 2.000 kr.
11. Hvis du ikke vil købe produktet, skal du blot trykke på pilen nederst i billedet.

Du vil for hvert produkt have 1.500 kr. at handle med, men mulighed for at give op til 2.000 kr. De produkter som du vil blive præsenteret for vil du få mulighed for at købe, hvis du vinder lodtrækningen. Et evt. resterende beløb vil blive udbetalt.

Gennem forsøget er det vigtigt at du ikke stiller spørgsmål eller på anden vis tager kontakt til den observerende person.

Du vil til hver en tid kunne afbryde forsøget, da denne er frivillig.

Tak for din deltagelse.

Appendix - Instructions on cognitive tests

I det følgende skal du igennem fire online kognitive tests som måler på din reaktionsevne samt din evne til at fastholde opmærksomhed.

Hver test har en varighed af tre minutter og instruktionerne fremgår på engelsk for de enkelte tests online.

Du vil blive guidet til udførelsen af hver test af forskningsholdet og vi vil bistå ved din side, såfremt der måtte opstå spørgsmål før, under og efter udførelsen af testene.

Efter hver endt test vil der fremgå et resultat, som enten du eller forskningsholdet noterer på vedlagte resultat ark.

Appendix- form regarding CB Scale & cognitive tests score

Score på forbrugertest **Resultat:**

Eriksen Flanker Test **Resultat:**

StroopTest **Resultat:**

Visual Reaction time **Resultat:**

Go/No-go Visual **Resultat:**

Reaction time

Appendix – Debriefing

The following presents three questions in Danish, which subjects had to fulfill after the experiment ended:

1. Hvad synes du om undersøgelsen?

2. Hvordan synes du det gik?

3. Hvad tror du det handlede om?

Appendix – Overview of cognitive tests scores

The following presents an overview of cognitive tests scores:

Eriksen Flanker Test

	⇉	⇄
fastest	663 ms	926 ms
slowest	2399 ms	2153 ms
average	1144 ms	1402 ms
deviation	441 ms	465 ms
% correct	100.00	100.00
combined	1144 ms	1402 ms

Stroop effect time duration score

	normal	interfere
fastest	840 ms	854 ms
slowest	1089 ms	2210 ms
average	935 ms	1235 ms
deviation	NaN ms	365 ms
% correct	100.00	100.00
combined	935 ms	1235 ms

The Go/No-go Visual Reaction Time

fastest	267.59 ms
slowest	450.43 ms
average	347.21 ms
deviation	NaN.00 ms

The Visual Reaction Time

fastest	357.94 ms
slowest	503.48 ms
average	431.75 ms
deviation	51.48 ms
% correct	90.00
combined	479.72 ms

Appendix – Eye-tracking categories

Bags	1
French connection bag	1
Gucci pung	1
Karen Millen bag	1
Louis Vuitton pung	1
Love Moschino Shopper	1
Malene Birger taske	1
Marc by Marc Jacobs pung	1
Marc by Marc Jacobs taske	1
Ted Baker taske	1
Tiger of Sweden Taske	1

Clothing	2
Baum und Pherdgaten bluse	2
Bruuns Bazar kjole	2
Colors of Benetton kjole	2
G-star Kjole	2
Inwear kjole	2
Karen Millen kjole	2
Malene Birger skjorte	2
Tiger of Sweden kjole	2
Versace for H&M kjole	2
Zara Kjole	2

Consumer goods	3
Aarstiderne	3
Delikatesse oste	3
Iifornaio olie	3
Kusmi te	3
Rose Poultry	3
Lagkagehuset	3
Letz Sushi	3
St. Clements	3
Sv.Michelsen	3
Urtekram	3

Shoes	4
Badley Miscka stiletter	4
Dr. Martins støvler	4
Dune stiletter	4
French Connection stiletter	4
Guess ballerina	4
Hunter støvler	4
Karen Millen stiletter	4
Sorel støvler	4
Tony Burch stiletter	4
Versace for H&M stiletter	4

Appendix – Description of EEG

Electroencephalography EEG measures brain activity while recording neural activity in the right and left hemisphere along the surface of the cortex or the scalp.
EEG has been used in neurology to examine behavioral attributes by measuring personality traits e.g. epilepsy, brain death, tumor etc. (Baars & Gage, 2010 & Plasmann et al. 2011)
Former picture of EEG:

(http://psyphz.psych.wisc.edu/web/research.html)

However, in consumer research EEG has taken a turn as it has been developed to be more user friendly and thus does not require any wires and is easy portable and therefore lead to many new possibilities within this research area. For instance, it is now possible to record brain activity whilst shopping in a motor-brick shop in contrary to just one year ago, where this was only possible through a fixed setting in a laboratory, where only pictures were shown to the subject.
EEG nowadays (Imotions, 2012): Please see the below picture.

Illustration of EEG tools (CBS laboratory):