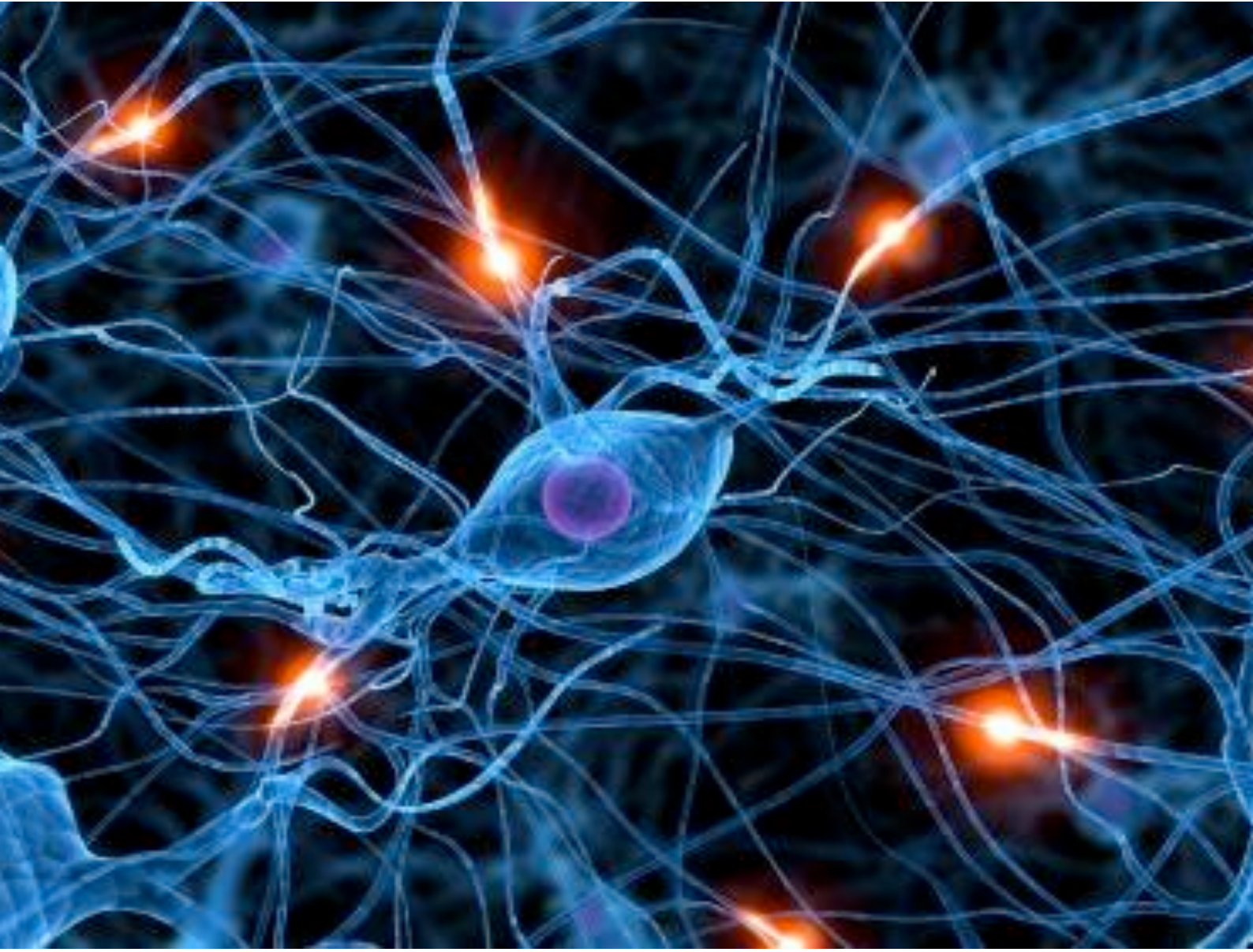


Influence of women's cognitive and emotional responses across the ovarian cycle in regards to sex in advertisement

By Pi Nanna Loving
Thesis advisor: Thomas Z. Ramsøy- Decision Neuroscience Research Group
May 23.th 2011
Scope of the thesis: 169684 strokes
Copenhagen Business School
Cand.merc. - Master Thesis
Marketing Communications Management (MCM)

Executive summary

This master thesis seeks an answer to whether women´s ovarian cycle influences their cognitive and emotional responses towards sex in advertisement.

The thesis takes the starting point with a discussion of what researchers before have been investigating in regards to sex in advertisement. Hereafter, the research angle is emphasized to investigate women as the abstraction level increases.

The second part discusses how research within the field of neuroscience is able to contribute with new knowledge in order to enhance marketing communications and consumer behavior. This part of the thesis gives a description from a neuroscientific perspective of why the different phases across the ovarian cycle might have an effect on women's cognitive and emotional processes. The interplay of attention, emotion and memory will be discussed in this context and a model created for the purpose is presented.

Limited research if any before have been investigating the effect of women´s ovarian cycle in regards to sexual content in advertisement. Therefore an experimental research is presented in part 3 in order to collect primary data to seek an answer to three hypotheses that have been outlined;

H1 is supported; women in the pre-ovulation stage, compared to women in the post ovulation stage will demonstrate more visual attention to sexual appeal in advertisement.

H2 is rejected; Women in the pre-ovulation stage will demonstrate stronger subjective preference rating for adverts containing sexual appeal than those from the post-ovulation group.

H3 is rejected; Women in the pre-ovulation group will demonstrate increased memory for images and image content, compared to the post-ovulation group and this effect will be stronger for adverts with sexual contents.

Overall it was argued that, biological and individual differences should be accounted for when applying sexual appeal in advertisement for women. As it is the purpose of the thesis to enlighten marketers with new knowledge part 4 addresses this with some examples of how to apply findings from the study in real life cases. Furthermore, it is suggested that future research will be investigating the impact of hormonal fluctuations in men in regards to marketing communications and consumer behavior.

TABLE OF CONTENTS

Introduction

Sexual content in advertising has been suggested to have an effect on consumer attention (Reichert, Heckler, Jackson, 2001) and memory (Putrevu, 2008). Other studies reveal that sexual appeal in advertisement improves consumer recall and recognition (Jones, Stanaland, and Gelb, 1998). However, most studies within this area of research have focused on either the use versus no use of sexual content in advertising, or gender differences to sexual adverts (Taflinger, 1996).

The study of sexual content in advertising either implicitly or explicitly acknowledge that there is a biological component that may affect information processing, including perception, cognition and affective responses (Taflinger, 1996). Sexual information is, outside marketing, information related to human reproduction. It is therefore interesting to expand the focus to a more biologically salient feature. As part of recent developments in marketing and consumer behavior research, often referred to as "neuromarketing" and "consumer neuroscience", there is now an increasing interest in biological phenomena and their effect on consumer related behaviors.

As part of this focus, recent studies in biology and biological psychology have demonstrated that besides gender differences in cognition and emotion, women's mental processes and behaviors tend to vary across the natural ovarian cycle. Studies have demonstrated that women in the pre-ovulation phase, compared to the post-ovulation phase, demonstrate significant improvements in conceptual implicit memory performance (Maki, Rich, Rosenbaum, 2002), in preference for male faces (Peters, Simmons, Rhodes, 2009) and in male voice attractiveness (Pipitone, Gallup, 2008) as well as social perception and preference (DeBruine, Jones, Perrett, Little, Feinberg, Smith, 2007). Moreover women´s desire to outdo attractive rival women has also been found to be increased in the pre-ovulation phase of the ovarian cycle (Durante et al., 2011).

Attesting to that this effect is based on hormonal changes; these periodic effects are not present in women using contraceptives such as p-pills and hormonal spirals (Pipitone, Gallup 2008; Peters, Simmons, Rhodes 2009; DeBruine, Jones, Perrett, Little, Feinberg, Smith, 2007; Durante et al., 2011).

Methodology

Throughout the years it has been a very popular subject to discuss whether or not sex in advertisement is actually selling. As part of recent developments in marketing and consumer behavior research, often referred to as "neuromarketing" and "consumer neuroscience", an increasing interest is found in biological phenomena and their effect on consumer related behaviors. Thus, building on this new trend the following research question has been outlined below;

Research question

Do women´s ovarian cycle influence their cognitive and emotional responses towards adverts with a sexual content?

A) Which theoretical foundation can be found in order to outline above stated research question?

B) Is it possible that an experimental research is able to demonstrate coherence between the ovarian cycle and attention towards sexual content in advertisement?

C) How can marketers enhance future marketing communications and consumer behavior with knowledge from the experimental research and how can this be applied in real life cases?

Problem identification and purpose of the thesis

Contrary to this line of research in biological and psychological sciences, little is known about how these natural cyclical effects may influence women's cognitive and emotional aspects towards advertising containing sexual contents. The thesis will therefore seek to close this gab in marketing communications and consumer behavior by introducing primary data in order to address the neglected area of interest. The purpose of the thesis will therefore be to collect primary data by using eye-tracking and a behavioral study. Furthermore it will be possible to enlighten marketeers with new knowledge within composition of focus groups. Assuming that

primary data provides the knowledge that women's cognitive and emotional responses change across the ovarian cycle, it will be important to know the ovulation of all women participating in focus group interviews. Hence, the making of a more representative picture of reality will be possible.

However, with primary research in hand the thesis will seek to enlighten marketers with new knowledge in order to enhance marketing communications and consumer behavior for the future.

Theory of science

Research and primary data of the master thesis is discussed in the perspective of positivism. Taking this perspective the thesis has adopted and combined three approaches: inductive, hypothetico-deductive and explorative method in order to answer the research question.

Positivism originates in the natural sciences which is the science of natural phenomena. The study of biological life and social science which includes studies of human behavior and societies belongs within the positivistic perspective. It is based on empirical science. Knowledge must be based on observable phenomena and capable of being tested for in order to argue for its validity. Other researchers should be able to produce the same result while working under the same conditions (Popper, 2002).

Following the positivistic perspective human beings have two sources for true knowledge which are based on what can be observed by the senses and what can be calculated as logic (Thurén, 2008). Statements which are found to be logic should include mathematical calculations in order to quantify knowledge. Statistics are applied in order to verify it and thereby support or reject what has been found. Within the Positivistic perspective the researcher is known to investigating a phenomenon whereas all circumstances in regards to the observations are critically addressed (Thurén, 2008).

The essence of positivism is found by combining an inductive and deductive method which is referred to as hypothetico-deductive method (Thurén, 2008).

The inductive approach is an attempt to use data to develop theories. This is done by using observations to detect patterns. On behalf of these patterns, hypotheses are laid out which are then tested and the results are generalized into theory. The inductive method could be called a

bottom up approach. (http://www.socialresearchmethods.net/kb/dedind.php , May 17th 2011)

The deductive approach is somewhat the opposite. Deduction is about applying general theory to a specific topic in which specific hypotheses are laid out. Data is then collected on the grounds of these specific hypotheses to either reject or support them. The deductive method could be called a top down approach (http://www.socialresearchmethods.net/kb/dedind.php , May 17th 2011).

However, by combining the deductive and inductive approaches, a hypothetico-deductive method is outlined in order to answer on sub-question B of the research question. By using a hypothetico-deductive method, it is the purpose to first gather and employ studies by others, with the aim to generate specific hypotheses that are subjective to further testing. Taking this approach in the third part of the thesis, three hypotheses have been outlined in an experimental research. First all the data will be collected, thereafter it will be analyzed and it will in the end be possible to support or reject the stated hypotheses. To answer upon sub-question C of the research question an explorative approach will be applied in order to explore future possibilities of marketing communications and consumer behavior.

Structure of the thesis

The structure of the thesis can be viewed in figure 1. The first part of the thesis will subject the discussion of "sex in advertisement" whereas a definition of this term will be outlined. Thereafter the role of sex in advertisement will be addressed. It will be considered whether applied sexual content in advertisement actually sells products, thus, if it works as intentional. Moving upwards in the pyramid the research angle is emphasized and the abstraction level increases.

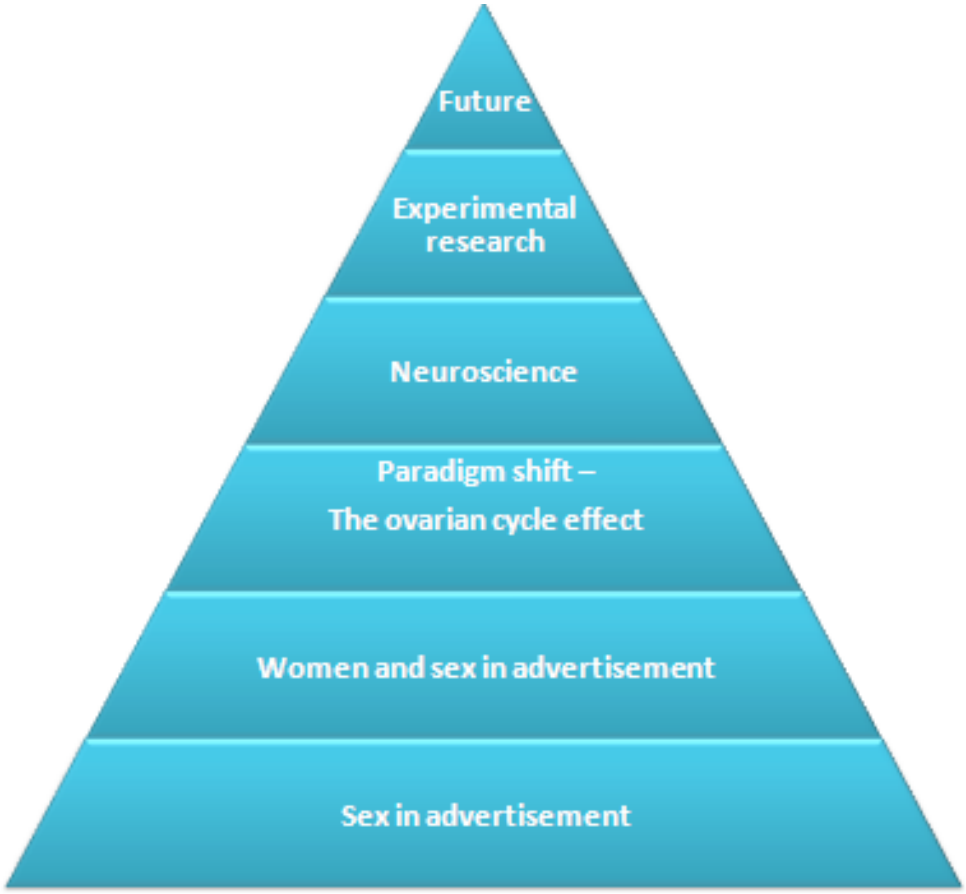


Figure 1- the structure model

Research by Putreu is discussed when debating sexual appeal in advertisement in regards to high- and low-involvement consumers. Putreu built his research on the Elaboration Likelihood Model (ELM model) created by Petty and Cacioppo (1986). Being critical to the theory applied it is discussed that The ELM model is not up to date with newer research. On the other hand research carried out by Damasio (1994) and his theory on the subject of emotional vs. rational could be more illuminating instead of questioning the central- or

peripheral route to persuasion. The neurotransmitter, dopamine, is further discussed in regards to sex in advertisement. Research by Kuszewski (2010), points out that after making the acquaintance of sexually arousing stimuli, it is evident that some neuro-chemical changes take place in the brain. Dopamine and its hormonal effect on consumer behavior is therefore discussed in this context.

The general debate of "sex in advertisement" will round off with a presentation of a table to sum up on the different studies presented in this section. At this point the different views on applying "sex in advertisement" will have been stated.

Step two of the structure model narrows down the debate on how women perceive sex in advertisement. Research by Du Plessis, (2011) addresses how men and women differ in their biological mark-ups. Also research by Talfinger (1996) critically examines how women should be exposed to sex in advertisement. Anthropological studies into primitive survival strategies will be discussed in this context.

In step 3 of the structure model the need for a paradigm shift in regards to market segmentation will be considered. After knowing how women and men differ from each other, research by Schmolze, Hedger and Morris (2004) will be discussed. The question of whether traditional segmentation is no longer sufficient enough will be debated. This section will discuss if traditional marketing segmentation approaches a paradigm shift in order to enhance marketing communications and consumer behavior.

The foundation for a paradigm shift is due to the fact that women´s mental processes and behaviors tend to vary across the ovarian cycle. In regards to this theory most of the studies discussed in this context have been based on the Ovulatory Shift Hypothesis (Gangestad, Garver-Apgar and Thornhill, 2005). Gangestad an evolutionary psychologist[1] and Thornhill a biologist (1998, 2008) proposed this theory after noting that nonhuman mammalian females showed specific behavioral changes during ovulation (estrus). The Ovulatory Shift Hypothesis outline that natural selection may have shaped aspects of women´s psychology to shift during the short phases when contraception is possible. The theory propose especially that women at peak fertility should have more distinct preferences for potential sex partners

[1] *Evolutionary psychology (EP) is modern adaptationism applied to the mind. An adaptation is a phenotypic feature that is functionally designed by past Darwinian selection.* (Thornhill and Gangestad, 1996, page 99)

who show classical biological indicators of male genetic fitness (e.g. men who can contribute to healthy offspring). This section guides the way back to the research question.

Considering the research question, it is the purpose to investigate how women's ovarian cycle influences their cognitive and emotional responses towards adverts with sexual appeal. Modern research in the field of neuroscience investigates the role of cognition and emotion as interactive systems. Therefore step four in the structure model will seek to throw light on this perspective. Cognition will first be presented in order to investigate attention, emotion and memory. First Attention is presented where in theory of bottom-up attention and top-down attention is described. Hereafter emotions are presented considering that attention is paid to an advert due to the emotional properties that are associated with all incoming stimuli that the brain has to process. When addressing the role of attention, it is as well debated in the light of brand management theory. The Customer Based Brand Equity Pyramid by Keller (2008) is presented. The fact that attention has been undervalued in this model is discussed whereas theory of brand management is presented in regards to attention. The second part will be rounded off with a presentation of a model that seeks to address how the integrative operation between attention, emotion and memory is formed.

After reading this part of the thesis it should be clear for the reader why the different phases of their ovarian cycle might have an effect on the process of emotions and cognition when it comes to "sex in advertisement". Hereafter sub-question A of the research question is answered.

Moving further up in the structure model and reaching step five, an experimental research will be presented. Little research if any has been done investigating this area of interest. Therefore, three hypotheses have been outlined for the purpose. For this study eye-tracking will be applied and a behavioral study will be carried out. Three analyses will be outlined in the study where as the method and statistical calculations for this can be found in part three of the thesis. The experimental research will round off by supporting or rejecting the below stated hypotheses. Hereafter sub-question B of the research question is answered.

Hypotheses

Main hypothesis 1: *women in the pre-ovulation phase, compared to women in the post ovulation phase will demonstrate more visual attention to sexual appeal in advertisement.*

Building on the Ovulatory Shift Hypothesis (Gangestad, Garver-Apgar and Thornhill, 2005), anthropological studies into primitive survival strategies (Cunningham and Roberts, 2007) and women´s desire to outdo attractive rival women (Durante et al., 2011) this hypothesis has been laid out, where as eye-tracking will be applied in order to support or reject the hypothesis. It is the purpose to create fictitious adverts and logos for this test.

Main hypothesis 2: *Women in the pre-ovulation phase will demonstrate stronger subjective preference rating for adverts containing sexual appeal than those in the post-ovulation group.*

Assuming that the pre-ovulation group has an increase in visual attention for sexual ascribed stimuli could indicate an increase in preference for sexual appeal as well. A study by Durante et. al. (2011) found that women tend to dress sexier in the pre-ovulation phase of the ovarian cycle. An interpretation of this finding could point in the direction of an increase in preference for sexual objects at this phase of the ovarian cycle. A behavioral study will be applied in order to support or reject the hypothesis.

Additional exploratory hypotheses will be tested;

Hypothesis 3: *Women in the pre-ovulation group will demonstrate increased memory for images and image content, compared to the post-ovulation group, and this effect will be stronger for adverts with sexual contents.*

A study by Solís-Ortiz and Corsi-Cabrera, (2008) has shown that visuo-spatial memory covaries across the ovarian cycle and that an increase in memory is found when women are in their pre-ovulation phase. Therefore, it can be assumed that memory performance for women could increase before ovulation in regards to adverts containing sexual appeal. It is therefore the purpose to present logos from adverts outlined previous (e.g.H1) in order to see whether participants are able to remember them.

The experimental research will round off with a discussion of findings from the study.

The fourth part of the thesis will seek an answer to sub-question C of the research question. It

will address how to apply findings from the experimental research in real life cases. This will be discussed in regards to how marketing communications and consumer behavior can be enhanced in the future. Hereafter, the thesis is rounded off with future perspectives and a conclusion.

Delimitation of the thesis

The disciplines that are discussed in the thesis span broadly. It is therefore crucial to limit the discussion within each discipline. Limiting the areas of interest will benefit the reader in order to identify key elements.

In regards to sex in advertisement or the use of sexual appeal it is the purpose to limit the discussions to studies investigating visual stimuli or what is referred to as print advertisement. Researchers investigating sexual appeal have applied different definitions of *sex in advertisement.* Therefore the definition that is applied here is very large in scope. The definition is applied in order to critically examine most of the research carried out within this field of interest and in regards to visual stimuli. However, sexism will not be considered. Therefore, it will not be discussed what is perceived as sexy and what is perceived as sexist. Neither will ethical restraints in regards to sex in advertisement" be discussed.

The key element to be investigated in order to answer upon the research question is immediate visual attention. Therefore theory within neuroscience, consumer behavior and marketing communications is limited around investigating attention. As attention and memory are closely linked the process of storing memories will briefly be discussed. However, as it is not the purpose of the thesis to address memory and learning, the thesis does not debate long- and short term memory.

It has not been possible to find any secondary research for the area of interest. However, the research question can be considered original and therefore it has been a necessity to conduct primary data. A whole section called *limitation of the experimental research* discusses this critically. Lastly it should be noted that interpretations and studies of brain activity are evolving every day. Thus, new research is being published continuously and therefore it might be that certain examples of future perspectives are already or will soon be outdated.

Part 1 - Sex in advertisement

When discussing sexual content in advertisements, there is first of all a need to make a definition of the term *sexual content*. The thesis will consider sexual information as stimuli with ascribed sexual content. Furthermore, the studies presented will be discussed and analyzed by considering how sexual information evokes reactions within consumers and how those reactions influence consumer behavior and marketing communications.

Defining sex in advertisement

Authors within this area of research have different opinions on how to define the term sexual content; therefore it would be wise to move from individual-level interpretations to conceptions. As a starting point it can be beneficial to argue that there are types of stimuli that groups of people predictably recognize and consider as "sex in advertisement". First, it can be argued as a basic working definition, that an instance of "sex in advertisement" can be thought of as a sexual appeal. The definition by Harris (1994) will be the definition that should be referred to when "sex in advertisement" is mentioned later on. The definition is as following;

"*Any representation that portrays or implies sexual interest, behavior, or motivation, which is often integrated within the advertisement as an image, verbal elements, or both"*.

By Harris (1994, page 206)

It can be discussed that this definition is very broad. On the other hand it captures all in regards to how other researchers has defined the term. (Reichert, Lambiase, 2003).

It is argued by Reichert and Lambiase (2003) that sex in advertisement can be grouped into the following five categories; Nudity/dress, sexual behavior, physical attractiveness, sexual referents and sexual embeds. These categories will all be elaborated on in the following sections.

Nudity/Dress: The term refers to the amount of clothes worn by the models and therefore not to be understood as completely unclothed. This term is often used in regards to female models wearing open blouses with partially exposed cleavage, tight-fitting clothing as well as mini-

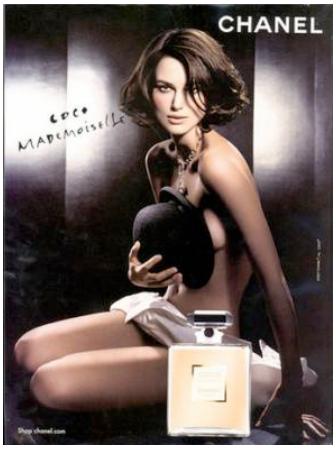
skirts.

Experimental studies have tested the effects of nudity levels on advertising processes and outcomes where in the common dependent variables have been attention, attention-toward-the-ad, cognitions about the advert and/or brand, and advert/brand recognition and recall (Alexander & Judd, 1979; Belch, Holgerson, Belch, & Koppman, 1981; Jones et al.,1998; Judd & Alexander, 1983; La Tour, 1990; La Tour & Henthorne, 1993; Peterson & Kerin 1977; Sciglimpaglia, Belch, & Cain 1978; Servern, Belch & Belch 1990; Steadman 1969). An assumption that can be drawn from these studies described above is that sex is synonymous with nudity and that risqué clothing or lack thereof is the primary determinant of sexual response. When seeking to determine what "sex in advertisement" is, an important aspect is that revealing displays of the body are visible (Reichert, Lambiase, 2003). It is arguable that most of what is known about "sex in advertisement" has been learned through studies in which nudity has been a pivotal point. However, nudity cannot be mentioned as the only aspect when defining what sex in advertisement is.

Sexual behavior: In regards to advertisement, the term sexual behavior can be introduced as an individual behavior or as an interaction between persons (Reichert, Lambiase, 2003). It refers to models that pose in sexual behavior, a sexual interaction between two or more people which can be expressed with hugging, kissing, voyeurism, and other intimate forms of kissing (Reichert, Lambiase, 2003). The term expands to advertisement that expresses flirting, eye contact, verbal communication as well as non verbal body language (Reichert, Lambiase, 2003).

In a study by Reichert & Ramirez (2000), aimed at identifying certain characteristics of advertisement with a sexual content, the respondents were asked to think about an advertisement that they thought of as having a sexual content and afterward explain why they thought of it as having a sexual content. The study pointed out that 40% of all the respondents mentioned sexual behavior in their explanations (pose, walk, hip move, tone of voice etc.). A four-level ordinal scale was created by Soley and Kurzbard (1986) to analyze physical contact

between the models. The scale included non physical contact (not touching, displaying etc.), simple contact (holding hands etc.), more intimate contact (e.g., kissing, playful wrestling, embracing) and last depictions of intercourse (e.g., implied, suggestions of).



Physical attractiveness: This term is often used in regards to facial features. Other studies by (Brumbaugh, 1993; Englis, Solomon, Ashmore, 1994) find that it refers to the model´s hair, face complexion, eye contact, dress, physique, and behavior when respondents rate attractiveness. Physical attractiveness is one of the five categories in defining sex in advertisement. However, it is further classified in a study by Solomon, Ashmore, and Longo (1992), to include classic beauty, cuteness, sex kitten, sensuality, girl-next-door, and trendiness.

Sexual referents: In the context of advertisement the term refers to visual or verbal elements that serve to elicit or educe sexual thoughts (Reichert, Lambiase, 2003). Researchers before (Bello et al., 1983) have argued that sexual referents are implicit.

In the study by Reichert and Ramirez (2000) the participants thought that 20% of the commercials included sexual referents, considering camera effects, music, lighting and bedroom as the setting etc. (Reichert , Lambiase, 2003)

Sexual embeds: Is the last category in defining sex in advertisement and the term is used as referents or forms of sexual representation designed to be perceived non-consciously (Teus, 1994). As an example sexual embeds could be a commercial for Coca Cola where as the Coca Cola bottle implies a non-conscious connection to a woman's body.

After going through different subcategories of the term "sex in advertisement" it should be clear that the definition of the term is fluid. Therefore, after considering common types of sexual stimuli it should be pointed out that the definition by Harris (1994) presented in the beginning of this section will be used as the definition of "sex in advertisement" in the rest of the thesis.

In the following section the thesis will throw light on the role of sex in advertisement; that is why it is commonly used in advertisement and what research has already been working on.

The role of sex in advertisement

Sex in advertising have been a part of marketing communications for many years and is popular in the Western World in order to break through the noisy channel of advertisements that consumers are exposed to every day. Marketers have relied heavily on the fact that sex in advertisement sells (Putrevu 2008, Horowitz 1987; Sullivan 1988, Trachtenberg 1986; Dolliver, 1999). Studies done in 1977 conclude that sexual content in advertisement reduces consumer recall and recognition (Alexander and Judd 1979; Chestnut, La Chance, Lubitz 1977; Richmond and Hartman 1998; Reid and Soley 1981; Servan, Belch, Belch 1990). Evidence provides knowledge of the fact that perceptual and processing resources are directed towards the sexual information in the advert instead of towards the brand (Reichert, Heckler, Jackson, 2001). Whereas other studies reveal that sexual appeal in advertisement improves consumer recall and recognition (Jones, Stanaland, and Gelb, 1998). Moreover, studies measuring effect results of advertisement applying sexual appeal has proven to be effective in regards to emotional response and consumer processing (Rossiter and Percy, 1997). Other researchers conclude that when sexuality is related to the product or cause, the brand attitude and corporate image will benefit from using sexual appeal. If it on the other hand seems disconnected to use sexual appeal to brand the product it will favor neither the brand attitude nor the corporate image (Pope, Voges, and Brown 2004; Simpson, Horton and Brown 1996). It has also been investigated that sexual appeal attracts attention to the advertisement but is often not advantageous for the brand information processing (Reichert, Heckler, and Jackson 2001). However, Thorson (1990) on the other hand discusses the fact that messages which attract attention have an increased opportunity to affect persuasion. Adverts are supposed to catch consumer´s attention while they are busy handling other issues. Thus, it should be

considered that adverts are placed in environments typified by passive viewing exposure (Du Plessis, 2011). Therefore it is a necessity for an advert to be very good at catching attention in order to be encoded.

When considering academic research on the topic it is therefore notable that various results have been found in regards to sex in advertisement and whether or not sex appeal has a positive or negative impact on the brand or consumer behavior (Putrevu, 2008). The reason for these contradicting results might be that the general definition of "sex in advertisement" varies a lot. Hence, the material in each study will also vary and thus give inconsistent results across studies.

Investigating whether or not sex in advertisement works, Dr. Tom Reichert[2] a professor in the area of interest has stated the following:

"The question is not, does it work? But "How does it work and in what situations?"(Reichert, www.sexinadvertising.com, 27 of January 2011).

The term "sex" is often used as a selling message or sexual referents as Reichert and Lambiase (2003) defines it in the book "Sex in advertisement: Perspectives on the Erotic Appeal".

Arguing against Reichert´s findings another survey revealed that only 11% of women and 7% of men expressed that sex in advertising frequently or always directly affects their purchase decisions (Ford, Bennett, Greenwood, 2008). This survey can be criticized due to the fact that most buying decisions are made non-consciously. Hence, the consumer has limited knowledge of why they buy one brand over another. Most of the time, shopping is based on consumer needs and demands but the question of what product or brand out of many is not decided beforehand (De Balanzó, Serrano and Siemon, 2010; Ambler 2010). Considering the fact that research has discovered that most consumption is done with little or no awareness it is questionable whether the survey collected by (Ford, Bennett, Greenwood, 2008) is of much illumination. Therefore Ford, Bennett, Greenwood, (2008) can be criticized for considering consumers as being rational and logical decision-makers at the moment of purchase.

[2]The author of *The Erotic History of Advertising*, and co-editor and contributor to *Sex in Advertising: Perspectives on the Erotic Appeal* and *Sex in Consumer Culture: The Erotic Content of Media and Marketing.* Dr. Reichert's research interests include media and politics, social marketing, and the content and effects of sex in advertising and the media.

Another researcher of sex in advertisement, Putreu (2008), has investigated the question of consumer involvement with regards to sex in advertisement. Putreu (2008) collected a study where consumer involvement was analyzed as one out of three key factors when considering how consumers are motivated to process information. Putreu discusses the effect of sexual appeal in advertisement when creating advertisement for high-involvement consumers rather than when creating advertisement for low-involvement consumer (Putreu, 2008). In the article *"consumer response towards sexual and nonsexual appeals: Influence of involvement, Need for cognition (NFC), and Gender"* Putreu lays out an interesting hypotheses about sexual appeals in advertisement in regards to high- and low-involvement consumers. Research by Petty and Cacioppo (1986) addresses the Elaboration Likelihood Model (ELM model) and Putreu takes advantage of their former research. He investigates how high-involvement consumers are likely to follow the central route to persuasion as well as how they pay more attention to the core message in adverts as opposed to less relevant peripheral information (Petty and Cacioppo, 1986). It is argued by Putreu that the core message is a pivotal point for high-involvement consumers and it can be discussed that strong sexual content in advertisement could compete for attention and reduce focus on key message elements. On the other hand Putreu (2008) argues that low-involvement consumers pay less attention to the core message and therefore sexual appeal in advertisement could enhance attention to the advert and create persuasion through the peripheral route. Putreu´s results reveal that sexual appeal leads to better memory and increased purchase among low-involvement consumers. On the other hand high-involvement consumers process both sexual and nonsexual adverts more thoroughly and exhibit increased purchase intent toward nonsexual appeal (Putreu, 2008).

Research carried out by Reichert, Heckler and Jackson (2001) has provided evidence of how sexual appeals are effective for socially relevant topics as art museums, disease prevention and health products. The study shows that if sexual appeal is relevant in regards to the product, it becomes likely to stimulate more positive thoughts about the layout/design of the advertisement than advertisement with non-sexual appeals (Reichert, Heckler and Jackson 2001). The same study also supports evidence that advertisement with sexual appeal would stimulate less elaboration contrary to advertisement with non-sexual appeal. The survey showed that advertisement containing sexual appeal stimulates less counterarguments, support arguments and connecting thoughts than in advertisement without sexual appeal. Further the

survey found that in regards to effects of sexual appeal on the persuasion process following knowledge was collected (Reichert, Heckler and Jackson 2001);

1. That sexual appeal attracts more attention
2. That sexual appeal is evaluated more favorable
3. That sexual appeal is more emotionally embracing
4. That sexual appeal stimulates more interest in the topic

The role of the neurotransmitter dopamine

In search of the answer to whether or not sexual appeal in advertisement is working, it is interesting to consider the article*:"Youre Brain On Sexual Imagery"* by Andrea Kuszewski[3]. It is evidential that advertisement with a sexual content triggers chemical reactions in the brain which make the human act in specific ways. Hence, being drawn to certain things, or motivated to engage in a particular behavior (Kuszewski, 2010). Research has shown that if the human brain is engaged by a stimulus which is perceived as intriguing, the human moves from a passive state to an active state of engagement. As curiosity increases the rational brain is engaged, thus, compelling the human to examine and study the source of the stimulus (e.g. this could be an advert) more thoroughly (Cesarkas, Rivas, 2008).

After making the acquaintance of sexually arousing stimuli for the first time, it is evident that some neurochemical changes take place in the brain. To thoroughly understand the neurochemical change when exposed to sexual appeal, focus should be on the releases of dopamine (DO). DO is known as a neurotransmitter that is involved in a plethora of functions among others pleasure, arousal, desire, and attraction can be mentioned. Furthermore DO is also known to play a role in addiction, motivation and drive (Kuszewski, 2010). Research has also shown that DO makes us feel good, so good that the human body begins to crave the potential situation which released dopamine in the beginning (Cesarkas, Rivas, 2008). Thus neurons in the DO system are more responsible for anticipation of reward than the actual fact

[3]Andrea Kuszewski, an Affiliate Scholar of Institute for Ethics and Emerging Technologies (IEET), is a researcher investigating the neurocognitive factors behind human behavior.

of having the reward already (Baars and Gage, 2007, Du. Plessis, 2011). In regards to sex in advertisement the DO system would make us feel more excited about the reward of sex than the actual receipt of sex. Further, DO is as well known as the hormone which provides a feedback signal to the parts of the brain responsible for acquiring new behavior (Cesarkas, Rivas, 2008). Kuszewski (2010) argues that after the brain has released DO, the natural behavior of a human is to feel attracted to the object of attention. Compelled to the object the human will seek to fully experience it. If the object is stimulating enough to reach the point of arousal then the brain will release the hormone oxytocin, which is described in the section "women and sex in advertisement". The combination of oxytocin and DO is known to be the reason why humans feel more bonded to each other after having sexual intercourse (Kuszewski, 2010). Further it is arguable that this DO combination is possible even though sexual intercourse does not take place. The human brain is able to release DO just by fantasizing about sexual activity. Hence, as long as a consumer is exposed to an advert containing sexual appeals (e.g. stimuli-response cued reaction) DO is released. Due to the bonding and attachment effect which occur when DO is released it can be argued that this "cocktail" is a real love-potion for consumers (Kuszewski 2010). Research has shown that the physiological and psychological processes which take place when a human becomes attached to another human are the same processes which occur when becoming attached to a brand (Cesarkas, Rivas, 2008). The effect of dopamine has an interesting extra effect when discussing its role in choice of brand.

Summing up the role of sex in advertisement

When summing up on the studies discussed, it is clear that various results have been found in regards to whether or not "sex in advertisement" enhances marketing communications and consumer behavior. Therefore, the table below is created to sum up on the question of whether "sex in advertisement" works.

	Before 1990	After 1990	Natural link between sexual appeal and the advert	High involvement	Low involvement	Biology & brain science
Brand recall	↓	↑	↑			
brand recognition	↓	↑	↑			
Attention		↑	↑			↑
Memory			↑	↓	↑	
Does it work	↓	↑	↑	↓	↑	↑
References	•Alexander et al. •Chestnut et al. •Richmond et al. •Reid et al. •Servenet et al. •Reichert et al.	Jones et al. Larry et al. Keesling et al.	Popes et al. Simpson et. Al. Reichert et al.	Putreau	Putreau	Kuszewski

Figure 2 – Table of sex in advertisement

The table should be considered as an overview of the different studies that are previously discussed in this section. If the arrows point downwards then most studies within the category are not in favor of sexual appeal in advertisement. On the other hand, if the arrows point upwards, most studies in the category are perceived as being in favor of using sexual appeal in advertisement. When summing up on these previously discussed studies it is conspicuous that studies gathered before 1990 judge "sex in advertisement" as not being in favor for

marketing communications and consumer behavior. On the other hand most studies collected after 1990 are in favor of using sexual appeal. A reason for this tendency towards applying sexual appeal after 1990 might be due to progress within science. Better equipment for measuring the emotional reactions in consumers is available. Furthermore, using sex in advertisement has become more of an everyday occurrence. It should therefore be considered that less people might be offended by the use of sexual appeal.

Interestingly, previously discussed studies within "sex in advertisement" do not use the same term as a definition of "sex in advertisement", nor do they consider how the genders might differ from a biological point of view.

It is as well broadly accepted and science has pinpointed and quantified that a difference resides between men and women. Hence, they are different in their mark-ups. They approach the World differently. Particularly due to generic and neurological differences that have been found. Therefore, it can be argued that advertisement with sexual appeal might be perceived differently depending on the genders in regards to cognition and emotional responses. Research provides evidence of the fact that the female brain is predominantly hard-wired for empathy where as the male brain is predominantly hard-wired for understanding and building systems (Dunkley 2009; Cunningham, Roberts 2007; Ford, Bennett, Greenwood, 2008; Miller 2005).

The neurotransmitter dopamine is further discussed in regard to sex in advertisement. Research by Kuszewski (2010), has pointed out that after making the acquaintance of sexually arousing stimuli, it is evident that some neurochemical changes take place in the brain. Dopamine and its hormonal effect on consumer behavior is therefore discussed in this context. It is interesting to consider other biological responses and whether they would have an impact on "sex in advertisement". Therefore, the thesis will later on focus on how biological research can enhance marketing communications and consumer behavior further. First it is wise to consider how the genders differ from nature.

Women and sex in advertisement

In order to obtain knowledge of how women are affected by "sex in advertisement" there is unfortunately a lack of literature in this field of research. Many articles provide knowledge of women as sexual objects in regards to advertisement. However, limited research is collected in regards to women as decoders of adverts with sexual appeal (Reichert, Lambiase, 2003). It can therefore be discussed that women and their purchase behavior is still not considered as important as those of men.

A survey carried out in 2006 threw light on the fact that 85% of art directors, 79% of copy-writers and 85% of agency top management were male. Hence much thinking and work carried out by agencies is constructed along masculine lines (Cunningham, Roberts 2007).

Another survey in 2006 stresses that 67% of women as receivers of advertisement are not able to identify themselves with women featuring in the advertisement (Cunningham, Roberts 2007; Ford, Bennett, Greenwood, 2008). Research provides information that women favor advertisements which paints a representative picture of their own age, size and background (Field 2009; Miller 2005; Reichert, http://sexinadvertising.com). Having this in mind it is given that it is interesting to consider that advertisement tends to reflect male perceptions of the female ideal, and that this reflection diverges from women's perceptions (Field, 2009). In regards to this some ethical perspectives could have been interesting to further investigate. However, due to limitations this is not the purpose of the thesis.

Even though research within this area of interest is limited, the section to come will seek to discuss what researchers before have discussed.

In the article *"Marketing to Women"* by Cunningham and Roberts (2007), it is debated how women is the most important target audience on earth. Evidently, women in the West are responsible for 80 % of purchase decisions (Ford, Bennett, Greenwood, 2008) where as some of these decisions are taken in male dominated sectors as automobiles and electronics (Cunningham, Roberts, 2007). Even though women and their purchase behavior are still not considered as important as those of men, women are increasingly approaching the market. A growing economic influence by women is well documented (Dunkley, 2009).

It is known for a fact that a difference resides between men and women considering what hormones do to the brain (Du Plessis, 2011). It is therefore interesting to consider that another

influence on behavior and response is hormonal. This can further be explained as being the system of the body that catalyzes and regulates behavior. In regards to whether or not sexual content in advertisement actually appeals to women, the hormonal level should be further investigated. As the hormonal system can affect or maybe provoke the genders differently, the following section will consider this further. The hormone testosterone would be beneficial to further investigate. Testosterone is the hormone that drives domination and creates physical behavior. Research has shown that men have more than twenty times more testosterone in their body than women do. On the other hand, research says that women have significantly higher levels of oxytocin than men. Oxytocin is known as the hormone that encourages bonding, nurturing and affiliation in mammals. It is interesting to consider that male hormones appear to override and cancel out the effect of oxytocin (Cunningham, Roberts, 2007).

Anthropological studies into primitive survival strategies also pinpoints that a difference resides between the genders. It is evidential that in ensuring the survival of the genes, a male primate needs to create mating opportunities. On the other hand the female will focus on the survival of the genes of the offspring (Cunningham, Roberts 2007; Taflinger www.wsu.edu:8080/~taflinge/sex.html, February 02-2011). Within this perspective Professor Richard Taflinger[4] examines how advertising takes advantage of human biological and social evolution to use sex to sell products. He discusses from a biological point of view the complexity of using sexual appeal when creating advertisement for women. He argues that the mind of a woman allows her to examine possible criteria to a much greater extent than men and that the woman often subordinate her sexual desire due to a range of other factors that her partner should posses to contribute to healthy offspring. The use of healthy, fit men is therefore attention grabbing for women in regards to advertisement with a sexual appeal. Thus, as women´s sexual desire is a complex mixture of factors that can contribute to a healthy offspring it can become extremely difficult to inject all those factors into an advert in the time and space available. Taflinger (www.wsu.edu:8080/~taflinge/sex.html, February 02-2011) therefore argues that using sex appeal in adverts for women is not at all as giving as for men. He argues that women are interested in sex for what it can provide for the future.

[4] An associate clinical professor in the field of research. He teaches amongst others: advertising, broadcasting, media criticism, and speech communication. The area of interest is psycho physiological responses to communication messages, especially those in advertising and television.

However, Taflinger (www.wsu.edu:8080/~taflinge/sex.html, February 02-2011) also discusses the fact that women might enjoy sex just as much as men but for women, sex has a far greater significance. Furthermore he argues that advertising cannot take advantage of women's instinctive sexual desire due to the reason that advertising is not created to build the future but to sell the product right away. However, new research by Durante et al. (2011) indicates otherwise and this will be discussed later on in the thesis.

Taflinger (www.wsu.edu:8080/~taflinge/sex.html, Feb.02-2011) states that instead of sexual appeal, romance can be used in order to attract women's attention. He outlines that romance fits into the women´s intellectual view of a relationship. He pinpoints that women consider the romantic side of a man as a starting point to examine whether the man can satisfy her societal criteria for a suitable sexual partner (Taflinger, 1996).

As stated earlier, the male and female brain is due to hormones controlled differently to accomplish evolutionary tasks related to the gender.

There are many gender-specific hormones but to simplify matters, only testosterone and estrogen will be of importance in the part to come. As explained in a previous part of the thesis, dopamine is connected to the reward system of the brain. Therefore, it is produced in different amounts based on the reward which the brain receives through the senses. When dopamine is produced in the ventral tegmental area, (VTA), it is transported to the nucleus accumbens, (NAc), which is the center for anticipation of pleasure and reward. On the way to the NAc, the dopamine is mixed with, for women, mainly estrogen and for men, mainly testosterone(Du Plessis, 2011). This contributes to entirely different end-results when the brain is stimulated with visual content that gives rise to additional dopamine production. In "The Branded Mind" by Du Plessis (2011), this above process is described in a context of a couple falling in love but the context can be transferred into how genders react differently to visual stimuli from adverts with sexual content just based on their genders.

In the attempt to understand how women perceive sex in advertisement it should from above stated be clear that the female hormones play a role in this context. Summing up on above section it can be concluded so far that marketing to women should be handled differently than marketing to men. This invites the question of whether individual biological factors beside gender difference could have an impact on cognition and emotion. Therefore, the next section

of the thesis will debate the reason for doing a biological segmentation process in order to get closer to an answer of whether or not "sex in marketing" enhances marketing communications management and consumer beahvior.

Segmentation – a paradigm shift

In order to create an effective marketing communications strategy for a product it has been a procedure to carry out a segmentation process. Marketers have for years been dividing the market into identifiable groups of similar consumers, because of the simple fact that not everyone has the same needs (Belch and Belch, 2009). Schmolze, Hedger and Morris (2004) argue in their article *"Forever Jung. Identifying consumer archetypes to help guide communications strategy*", that the market is about to enter a third age of segmentation. In the article they discuss how the first age of segmentation was centered on categorizing factual data relating to occupation, location, and behavior. In the second age of segmentation marketers were looking beyond the facts of motivation which meant that the focus was on attitudes, consumers' need and life values in regards to different groups.

The fact of the matter is that people's lifestyle and behavior are constantly changing in this modern society and therefore values based on age or life are no longer stable.

Schmolze, Hedger and Morris (2004) argue that it is about attaching a type to a behavior that in turn is suggestive of an attitude. Hence, when doing this the market enters the third age of segmentation where in archetypes are presented as a new way of enhancing segmentation. Schmolze, Hedger and Morris (2004) argue that two or more archetypes may be unique representations of the same segment. However, they discuss that entering the third age is to go beyond segments to identify individuals within a segment who personify the diversity within it.

Considering Schmolze, Hedger and Morris (2004) approach to segmentation it is arguable that there is a need for a new way of segmenting the market. However, it would be more appropriate to call it a paradigm shift. It can be discussed to a critical point that there is a need to bring oneness to the many or finding the many in the one. Populations are mutable and fluid. Hence, making it difficult for market research to capture and define a stable segment on behalf of geographic, demographic, behavioral or psychological segmentation. However, a paradigm shift would be in coherence with new research of evolutionary consumer behavior

and biology when debating an approach to enhance segmentation. The paradigm shift which is referred to consists of a classical segmentation approach but where biological factors have been accounted for and included in the segmentation process. The reason for considering this paradigm shift is due to the fact that recent studies in biology and biological psychology have demonstrated that besides gender differences in cognition and emotion, women´s mental processes and behaviors tend to vary across the natural ovarian cycle.

Variations of consumer behavior across the ovarian cycle

Evidence support the fact that women´s preference for symmetrical and masculine faces (Peneton-Voak & Perrett, 2000; Thornhill & Gangestad,2003; Thornhill et al., 2003), apparent health, self-resemblance in face and vocal masculinity changes systematically across the ovarian cycle (Jones, DeBruine, Perrett, Little, Feinberg and Smith 2007; Feinberg et al 2006; Puts, 2005). Research has further proven that women near ovulation prefer men who display greater social dominance (Gangestad et al., 2004) as well as men who possess creative intelligence rather than inherited wealth (Haselton and Miller, 2006). Evidential support has also been found for the fact that ovulating women are motivated to be more social and appear more attractive at social events (Durante, Li and Haselton, 2008; Haselton and Gangestad, 2006; Haselton et. al., 2007). Recently, evidence also supports the fact that women´s product choices are influenced by their current phase of the monthly ovulatory cycle (Durante et. al. 2011). Moreover, another study has shown that visuo-spatial memory and verbal fluency tests covary across the ovarian cycle (Solís-Ortiz and Corsi-Cabrera, 2008).

The main part of studies stated above has been based on the Ovulatory Shift Hypothesis (Gangestad, Garver-Apgar and Thornhill, 2005). Gangestad an evolutionary psychologist[5] and Thornhill a biologist (1998, 2008) proposed this theory after noting that nonhuman mammalian females showed specific behavioral changes during ovulation (estrus). The Ovulatory Shift Hypothesis outline that natural selection may have shaped aspects of women´s psychology to shift during the short phases when contraception is possible. The theory propose especially that women at peak fertility should have more distinct preferences for potential sex partners who show classical biological indicators of male genetic fitness, men who can contribute to healthy offspring.

[5] *Evolutionary psychology (EP) is modern adaptationism applied to the mind. An adaptation is a phenotypic feature that is functionally designed by past Darwinian selection*. (Thornhill and Gangestad, 1996, page 99)

New research in biology and evolutionary psychology examines whether women´s product choices are influenced by the ovarian cycle (Durante et al., 2011). Based on the Ovulatory Shift Hypothesis Durante et al. (2011) outlined a study and proved that women at peak fertility without being conscious about it, choose products that enhance their appearance. Women were shopping clothes which appear to be more sexy than conservative. At the point of ovulation the hormonally regulated effect in women seems to be driven by a desire to outdo attractive rival women. The study found that women are more likely to choose sexier products when women are primed to compare themselves to attractive female rivals. However, this was not the case when women were primed with ordinary or unattractive women, where no difference in product choice was found (Durante et al., 2011).

Other theories have been outlined when debating how women might vary their preference across the ovarian cycle (Jones et al. 2008; Feinberg et al. 2006; Puts 2005). One theory stresses that women are attracted towards healthy looking men during ovulation, which is argued to be an indirect benefit. From a purely natural instinct, women in this phase of the ovarian cycle are searching to maximize offspring health. They are non-consciously looking for healthy men because healthiness contributes when maximizing offspring health (Miller and Todd, 1998; Thornhill and Gangestad, 1999). However, when women are in the post-ovulation phase of the ovarian cycle their focus in men changes. It is interesting to consider that at this phase of the ovarian cycle they have a hormonal profile similar to the one during pregnancy. Their focus may be more drawn towards men who could have the characteristics of a partner, who could give social and material support. (Jones et al., 2008; Feinberg et al., 2006; Puts et al., 2005). This theory is not mutually exclusive from the previous theories and it considers the fact that the effect of the ovarian cycle on preference is a by-product of changes in hormone levels (Jones et al., 2005a). Progesterone level is raised during pregnancy and raised progesterone level during the post ovarian phase of the ovarian cycle makes the body ready for pregnancy. Therefore the effect of the ovarian cycle on preference may reflect mechanisms that increase the odds of pregnancy. Hence, strategies designed to protect the health of mother and fetus (Jones et al., 2005a; Jones et al.,2005b) or strategies designed to collect social support for the mother and child (DeBruine et al., 2005; Jones et al. 2005b) could be beneficial to enhance marketing communication and consumer behavior during this phase of the ovarian cycle.

The ovarian cycle and hormonal changes

In regards to theories mentioned above it has been outlined that different phases of the ovarian cycle affect women depending on their point of ovulation. It is therefore important to keep in mind that the average female ovulatory cycle spans over 28 days. Within those 28 days, in about 10-15 % of these days, women have the possibility to become pregnant. Hence, women are only fertile in the few days where ovulation occurs which is around day 14 (Durante et. al.2011). For a visual presentation of the ovarian cycle and the associated hormones please view figure 3

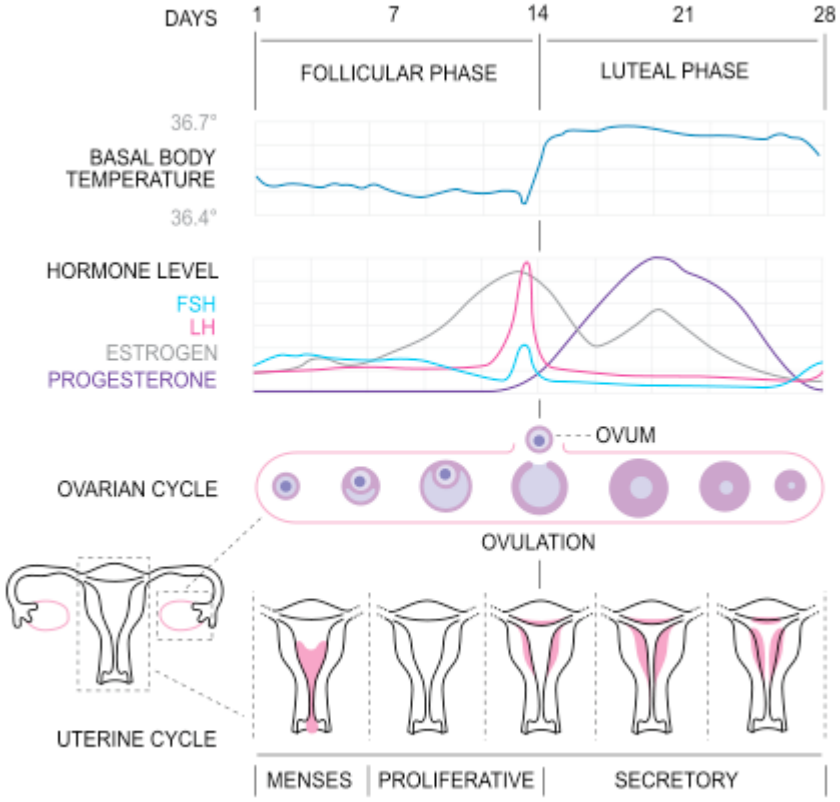


Figure 3 the menstrual cycle and hormonal fluctuation (www.en.wikipedia.org/wiki/Luteal_phase, January 4th)

Due to the fact that women do not exhibit any overt bodily markers as other mammals do during ovulation, it can be difficult to tell when women are ovulating. As a matter of fact only few obvious signals indicate a woman´s fertility (Thornhill and Gangestad, 2008). The ovarian cycle of a woman is associated with a specific pattern of hormonal changes. At the time before ovulation it is found that women experience an increase in the hormone estrogen[6]

[6] An ovarian hormone

and luteinizing hormone (LH)[7]. These two hormones fluctuate together and peak at the same time within each ovarian cycle (Lipson and Ellison, 1996). When Estrogen and LH rises the ovulation will happen within 24-36 hours. As a result of this the greatest chance for fecundity is in a 48 hour period surrounding ovulation (Eichner and Timpe, 2004; Wilcox et. al.2001). In case women do not become pregnant the hormone level (LH and estrogen) will drop significantly (Venners et. al.2006; Graver-Apgar, 2006; Gangestad and Thornhill, 2008). However, from this knowledge it can be argued that due to the rise of LH and Estrogen, women might change their behavior in the days surrounding ovulation.

When women use hormonal contraception all ovulatory shift effects are "turned off". When using hormonal contraception a disruption of the normal fluctuation of hormones across the ovarian cycle takes place. Due to this disruption of hormones the effect of contraception is that it predictably erases the shifts associated with normal ovulation (Fleischman, Navarette, and Flessler, 2010).

Thus, it can be argued in the light of these studies discussing periodic changes in women that biological responses might have an important impact on consumer behavior. However, this call for further investigation in regards to marketing communications and consumer behavior. To further investigate how to manage the periodic changes of hormones in marketing segmentation, it is needed to take a look at the science of the brain, namely neuroscience. For that reason, the following section will be about this aforementioned neuroscience.

[7]LH a pituitary hormone

Part 2 - Neuroscience

Neuroscience is a field of research where in the main interest is to study the brain and its functions and further, how this is related to cognition, emotion and behavior (Du Plessis, 2008). Neurons are the basic building blocks of the brain and therefore it is the interest of neuroscientists, who investigate brain functions, to discover what the neurons are doing. To give a broader neurological picture of the brain following can be argued for; the brain is the core part of what is called the central nervous system which both includes the spinal cord and the peripheral nervous system. The brain receives sensory input from the rest of the body via the nervous system. The central nervous system connects to the cells that receive the sensory inputs and ultimately the brain. The brain then processes this information and thereafter it sends out signals through the central nervous system (Du Plessis, 2008). What is just previously described can also simply be described with "due to the brain we react on the environment". Meaning that due to consciousness the human is not only functioning as a stimuli-response, but as a matter of fact reversed. That is, due to the brain, the response on the environment is turned into, at least the important response, consciousness.

It can be complicated to understand every cornerstone of the brain thus the brain is therefore often described as having centers with different functions. It can be argued that this is not entirely correct; there are many pitfalls in suggesting that any area of the brain deals with specific functions (Du Plessis, 2008; Baars and Cage, 2007). Most activity taking place in the brain seems to involve activity across many centers or sections of the brain. Thus, there is evidence of science which supports that the different lobes in the brain are primarily involved in different types of activity and thus, making the brain more tangible to understand (Baars and Cage, 2007). This is also known as neural correlates. It is possible to measure this on a given subject with a given task and then observe which parts of the brain are active. Thus, it is not necessarily possible to explain why these certain areas of the brain are active but only demonstrate or point out that they are in fact active.

It should be noted that in coherence with the commercial industry, brain studies cause some bias, due to weaknesses stated above. In the commercial industry, businesses take advantage of results that are not thoroughly described in regards to a reason-effect factor (www.drdavidlewis.co.uk/assets/NeuroMarket1.pdf, May 12th, 2011)

Within the field of neuroscience an increasing interest has been shown in biological

phenomena and their effect on consumer related behavior. In coherence with this is the interest to investigate consumer related behavior in regards to marketing. Therefore, the thesis will consider primary research collected for the purpose in order to know whether "sex in advertisement" is enhancing marketing communications and consumer behavior or not. Primary research shall be collected within the field of research where brain science and marketing join. This is a field called neuromarketing. However, it should be noted that there is a difference between commercial neuromarketing which was before criticized and the academic research field neuromarketing. Thus, the commercial neuromarketing can be argued to be piggybacking on the others' shoulder. Areas of research within the field of neuromarketing include studies of cognitive and effective responses to marketing stimuli. Primary data will be collected in the experimental research. By applying eye-tracking and a behavioral study the experimental research will seek to get closer to answering sub-question B of the research question.

Marketing analytics use neuromarketing to better measure consumers' attention to a given stimuli. In the experimental research this method will help analyze on immediate attention in regards to "sex in marketing" and whether biological phenomena, as the ovarian cycle can influence cognitive and emotional responses in women.

However, before turning focus to the experimental research a thorough understanding of the interplay between attention, emotion and memory should be addressed in regards to advertisement. As the effect of an advertisement is dependent on how consumers process information, the before stated interplay will be introduced with a definition of cognition. It will furthermore be addressed why it is interesting to consider the interplay between cognition and emotion in regards to the ovarian cycle.

Cognition - a definition

Due to the reason that the research is questioning whether women´s ovarian cycle influences their cognitive and emotional responses towards sex in advertisement it is first appropriate to define the word cognition.

The term cognition has its roots in Latin where it is known as *cognoscere.* Translating that into English it means "to know", "to conceptualize" or "to recognize". It refers to how humans processes information (Solís-Ortiz & Corsi-Cabrera, 2008). This definition is really broad and

thus, digging deeper, cognition includes functions such as the process of attention, memory, language processing, planning, inference, problem solving, abstract reasoning and visual processes (Solís-Ortiz & Corsi-Cabrera, 2008).

It should be noted that the use of the term *processing information* varies in different disciplines and can be analyzed from different perspectives with different context (e.g. psychology, anthropology and philosophy). The one that will be discussed in this thesis is cognition from a neuroscientific perspective. It is an academic field concerned with the scientific study of biological substrates underlying cognition with a specific focus on the neural substrates of mental processes. It is a term which combines psychology, biology, medicine, biochemistry and physics (Baars and Gage, 2007).

Within the field of neuroscience it is of interest to further investigate attention, emotions and how memories are stored in the brain. This will be done in order to discuss how these processes might have an effect on women across the ovarian cycle when it comes to "sex in advertisement". When discussing the role of emotion and cognition it is important to note that they should not be considered apart but related to each other. Therefore, when drawing a definition of cognition the pivotal point to master is that emotion and cognition are interlinked in the sense that they affect each other (De Lemos, 2007; Damassio, 1994).

Attention

Breaking through the noisy channel of increased marketing exposure it can be argued that a pivotal point in advertisement is to create attention and even more important being able to sustain that attention (Percy and Elliott 2009; Milosavljevic and Cerf 2008). Thus, a cornerstone in advertisement is to be able to increase the probability of storing advertisement in the brain, making it more likely that consumers can recall and or recognize advert stimuli.

Before actually talking about how memories are stored in the brain, it is important to realize how it is possible for memories to be obtained. For this there are several angles. One important factor is attention. Roughly speaking there are two different ways to obtain attention. One is consciously which will be referred to as "top down attention" and the other one is non-conscious attention which will be referred to as "bottom up attention" (Peiters and Wedel, 2004; Baars and Gage, 2007).

Top down attention is part of what is also called voluntary attention (Baars and Gage,

2007).When you are reading this paper you are consciously turning attention on the contents of the paper. It is a choice you have made yourself; therefore it is referred to as voluntary attention. When conscious attention is used you have in principle turned on your mind to focus on a specific task and it will automatically use the experience of what you already know to form gestalts[8] with what you are doing at this specific moment; that is reading this paper. The information reaches the brain and memories are formed of the contents in the paper. If an advertisement reaches the point of conscious attention, then memories will form in the brain. How the advertisement reaches the point of conscious attention is somewhat of a big question but one that advertisement agencies continuously try to answer.

The other angle to attention is non-conscious attention or what is referred to as bottom up attention. Considering the term non-conscious, it should be perceived as, a state of mind where the person is not yet conscious about a given task.

The question is how we are able to direct attention to something without being conscious about it and how this can result in memories. It is therefore of interest to consider bottom up and top down attention in regards to the experimental research. Having the theory of bottom-up and top-down attention in mind it can be argued to consider the following; due to hormonal responses of the ovarian cycle a woman can be more inclined to observe a given stimuli. The woman is not consciously aware that she is being motivated to act by hormonal responses. From this perspective bottom up attention is in focus. On the other hand, top-down attention would be in focus when the following is considered; a woman is actively looking for something and is motivated due to a hormonal response of the ovarian cycle. It can be argued that either or both can be in the focus when processing information of sexual appeal in advertisement. The experimental research will later on address this issue.

However, the conscious mind uses only little of the information that the brain actually attains (Barrs and Gage, 2007). That is, millions of signals are directed into the brain using the five senses but it is only very little of this information that is actually accessible to the conscious self (Baars and Gage, 2007; Du Plesiss, 2008). This does not mean that the mind has not used attention in absorbing these millions of signals. It just means that we as human beings are not conscious about it. All sensory systems do a great deal of non-conscious processing or

[8] A pattern of neuronal activity for a certain brand is able to trigger other associations for the same brand. This neuronal behavior is called a gestalt (Du Plessis, 2008).

interpretations of the sensory input which in the end leads to conscious reportable sights, sounds and feelings (Baars & Gage, 2007). When breaking through the noisy channel of marketing exposure it is the *attentional selection*[9] that marketers are constantly competing about. The interest of the thesis is to investigate whether there is an increased possibility that sexual appeal in advertisement can catch women´s attentional selection and whether the attention increases depending on biological responses as the ovarian cycle. Therefore, the experimental research in part 3 will provide knowledge of how "sex in advertisement" affects attention driven by sexual- and non sexual appeal stimuli.

However, it should be noted that above stated is a theoretical description of attention and in reality advertisement is built on bottom-up attention as well as top-down attention.

Du Plessis (2008) argues that advertising cannot work without attention, since without it there would be no memory. This will be elaborated further in the part of the thesis which discusses emotions and how memories are biologically stored in the brain.

It is the purpose of this thesis to enlighten marketers with new knowledge of neuroscience in order to build and measure strong brands in the future. It is therefore of interest to first consider already existing marketing communications theory in order to add new knowledge to the area of interest. Hence, the next section will consider brand management theory in regards to the role of attention.

The customer based brand equity pyramid

Before discussing brand theory it would be best to introduce a definition of what a brand is. According to the American Marketing Association (AMA), the term is defined as;

"a name, term, sign, symbol, or design, or a combination of them, intended to identify the goods and services of one seller or group of sellers and to differentiate them from those of competition. (Keller, 2008, page 2)

Theory by Keller (2008) suggests that in order to build a strong brand, six brand building blocks must be managed to reach the point of brand equity. Du Plessis (2008) argues that brand equity is the sum of all feelings, associations and memories related to a brand.

[9]Attentional selection can be thought of as a way which one part of the brain can highlight another, to bring out selective visual attention (Baars & Gage, 2007).

In order to discuss attention in regards to brand management theory the original Customer Based Brand Equity (CBBE Pyramid) can be viewed in appendix A. Thereafter the following section will consider how attention is incorporated in this model.

The CBBE model has 6 building blocks. The brand will only reach brand equity if it reaches the top of the pyramid (Keller, 2008).

In order to achieve brand equity, marketers must manage all six brand building blocks which are dependent of each other. However, when discussing this model the debate will concentrate on the brand building block called “Salience”.

It is arguable that in order to manage the first brand building block “Salience” a solid understanding of the target group is needed. Based on the previous debate going from a classical segmentation to a paradigm shift it could be of high interest to know if women’s cognition and emotions might change across the ovarian cycle.

The brand building block “Salience” measures awareness of the brand, thus providing information about the brand and its basic functions. It can be discussed that attention must first be drawn to the brand in order for the consumers to get curious and start learning about the brand. Therefore, emphasizing the value of attention in advertisement Keller (2008) can be criticized for leaving out a brand building block. It can be discussed to add a brand building block to the CBBE Pyramid and call it “Attention” (“what is this?”).

Achieving the right brand identity means creating “brand salience” with customers. It is the part of the CBBE Pyramid that seeks to explain “who are you” (Keller 2008). On the other hand it can be discussed to a further extent that Keller (2008) has incorporated attention in the salience building block. Thus, not leaving attention out of the model but not emphasize it enough to give attention a full building block.

However, when looking further into the building block “Salience” it measures the awareness as mentioned which is further subdivided into depth of brand awareness and breath of brand awareness. Depth of the brand awareness measures how likely it is for a brand element to come to mind, and the ease with which it does so. Breath of brand awareness measures the range of purchase and usage situations in which the brand element comes in mind and depends to a large extent on the organization controlling the brand. The depth of brand

awareness will influence the likelihood that the brand comes to mind, where as the breath of brand awareness describes the different types of situations in which the brand might come to mind. The key question when creating brand salience is not whether the customer can recall the brand but where they think of it and when they think of it and how easy and how often they think of it (Keller, 2008). This is actually what marketers seek to find an answer to when measuring brand effectiveness. Brand recall and brand recognition are the most applied measurement technique in order to evaluate memory for traces of awareness of an advertisement or brand (Du Plessis, 2008). Adding to Keller´s key questions, it seems important to ask whether the hormonal response of the ovarian cycle has a say in the matter.

From this definition of brand awareness it can be argued that attention must first be drawn to the brand before the consumer can even be able to think of it. It is therefore discussable that attention has been undervalued in this model and should have had its own building block in the bottom of the CBBE Pyramid and not only be incorporated in the "salience building block". It can therefore be discussed how a new brand building block could be attached to the CBBE Pyramid. The modified model can be viewed in figure 4.

First of all it is suggested that the building block should be called "Attention". On each side of the CBBE model is a helping tool attached in order to explain each building block. On the left side of the CBBE model it is called "Stage of Brand Development*"* which helps the marketer to understand the relationship between the brand and the consumer. When using this helping tool the suggested "attention building block" should be categorized as "*What is this".* On the right side of the CBBE model the other helping tool is called "Brand Objective*"* and it helps the marketer to know what should be obtained at each specific stage of the CBBE model. When using the helping tool at the right side of the suggested "attention building block" it should be to *create curiosity, interest, focus and activating neuronal groups in the brain.*

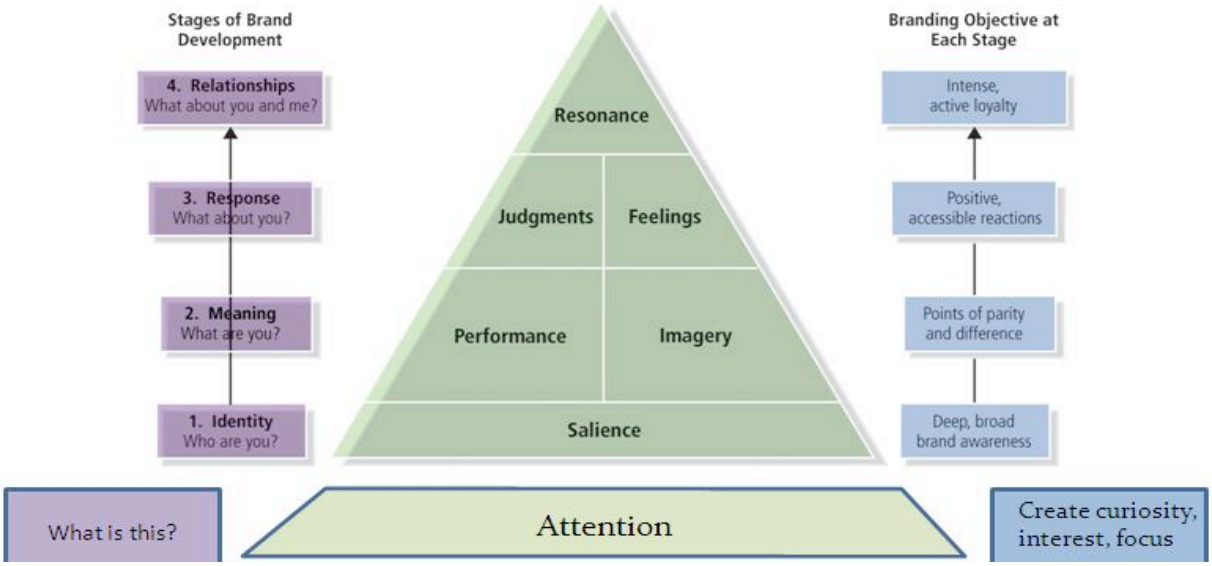


Figure 4 – Renewal edition of Keller (2008) Customer Based Brand Equity Pyramid

In the book "Strategic Brand Management" by Keller (2008) he presents the CBBE pyramid. Keller advances the theory of customer-based brand equity. However, it can be discussed that in the attempt to critique his model, the CBBE Pyramid could be discussed as a "catch-all tool" and that each brand element should be considered a part of each other.

Discussing the important role of attention, when branding a product, it is as well convenient to consider additional marketing communications management theory.

In order to create attention marketers use different creative units such as the size of a print advert. Studies have shown that it is the print adverts' length, size and pattern layout that are the driving forces in creating attention and not so much the message content in an advert (Percy and Elliott, 2009). However, the exact attention effects of brands, pictorial and text size have been enthusiastically debated (Aitchinson 1999; Rossiter and Percy 1997, Du Plessis 2008). Another incentive used by marketers to gain attention is the use of unexpected letters as q, x or z. In print advertisement much work is done in order to find patterns of language which are remarkable and memorable. Stressing out a word in a sentence or using letters in an unexpected way could be one way of drawing attention to an advert (Percy and Elliott, 2009).

Du Plessis (2008) argues in his book "The advertised mind, groundbreaking insights into how

our brains respond to adverting," that what we pay attention to, we remember; thus attention and memory are interlinked. However, emotions are part of this interplay which will be discussed in the section *emotions* hereafter. When considering neurological science it is evidential that the longer a set of neurons are activated in the brain, the lower the limens of the synapses between these neurons become, and thus, the ability to create memory becomes stronger (Du Plessis 2008). All senses that are captured in a human being during the day passes through the brain for interpretation which causes neural recruitment to occur. In the interpretation process the brain considers whether to draw attention or not. If the decision is not to give the object attention the developing neural cloud diminishes away. However,*" good emotionally driven advertisement attracts attention, and this will create memories of the advert, and probably the brand"* (Du Plessis 2008, page 140). It is therefore interesting to investigate the role of emotions in advertisement.

Emotions

After stressing the importance of attention it is as well needed to highlight emotions as a salient point in advertisement. Attention is paid to an advert due to the emotional properties that are associated with all the incoming stimuli that the brain processes in order to select what should have conscious attention (Du Plessis, 2008).

As a starting point it can be argued that emotions are multifaceted and a complex phenomena with many different conceptualizations and theories (Scherer, 2000). One group of theories considers emotions as biologically determined responses that are attained through evolutionary challenges (Cosmides & Tooby, 2000). When studying emotions other theories could also be considered, taking the viewpoint that emotions are based more on learning and cognitive evaluation (Scherer et al, 2001). However, despite theoretical differences, most emotion researchers agree that emotions are manifested and can be assessed in relation to a subjective (e.g. experiential), a physiological (e.g. bodily) and a behavioral (e.g. acting) dimension (Lang, 1988). Research indicates that emotions play an important role in adjusting advantageously to the environment, and are critical for decision making, problem solving and rational behavior in everyday life (Damasio, 1994). It can be argued that emotions affect decision making and behavior indirectly (Damasio, 1994). Strong emotional response to an advertisement can be the prevailing factor in the decision making moment when buying one product over another. People are often not conscious about their emotional response, thus, it is

better accessible through psychophysiological measurements rather than self report or questionnaires. Results from these methods also have an innate tendency to make the respondents reflect about the answer instead of giving an immediate response.

Attempting to introduce the role of emotion it is relevant to consider what an emotion is and how it can be measured in order to enhance Marketing Communications and consumer behavior.

What is an emotion

Emotions play a pivotal point in advertisement due to the fact that they help stimulate and guide attention and further, emotions help to reinforce the associations created by advertisement (Du Plessis, 2008). Thus, when observing an advert associations come to mind and they are reinforced and triggered by emotions. It can therefore be argued that emotions and associations are interlinked whereas the same observation was found between attention and memory. The SAAB memory model will be presented later on in order to address this interlinked system.

Highlighting the value of emotions in advertisement and having this interplay between emotions and associations in mind it is appealing to reflect on the function of associations in advertisement. The non-conscious is governed by emotions and thereby advertisements can trigger the emotional sides of the consumer and through that way create gestalts. This is one of the questions that this thesis seeks to cover:

"Do some women emotionally change their attention towards advertisements with sexual content and how does this affect the memories created by the advertisement?!"

Before moving on, the sub-question stated above should be given a reasonable answer based on the theory that has been discussed so far. In order to do this a thorough understanding of the question is needed. To get this, the question is split into parts. The first part is regarding women and more exact, women who are in the pre-ovulation phase of the ovarian cycle. During this phase women are under the influence of high levels of estrogen. The part of the question stating "emotionally" refers to women's response to the environment which in this case is advertisements with sexual content. The pivotal point to understand is if a mix of high level of estrogen and strong emotional stimuli will create a memorable response. This should

be interpreted as a response that affects the creation of memories of the advertisement.

To answer the last part of the question regarding memory the creation of memories must be addressed first.

Even though the brain can be simplified to containing areas which are largely responsible for specific tasks it has been scientifically shown that memory is stored throughout the brain and not in specific centers. (Baars and Cage, 2007; Du Plessis, 2008). Donald Hebb was one of the first to describe a mechanism for how neurons can store memories. Today his theory is referred to as Hebbian learning (Baars and Cage, 2007). The cornerstone of his theory is when two connected neurons are repeatedly used their connections strengthen (Baars and Cage, 2007). There is scientific proof that the theory is valid in regards to learning and memory. However, it should be pointed out that there are a number of ways in which synaptic transmission could become efficient besides this theory, but due to limitations this will not be discussed further (Baars and Cage, 2007). A saying has been created on behalf of Donald Hebb which reads as following;

"Neurons that fire together, wire together", (Baars and Cage, 2007, page 76).

This slogan seeks to describe the correlated activity between neurons. As described earlier neurons are passing on information from one neuron to another or several others. Thus, the matter of fact is to acknowledge that the power of the nervous system lies in the high degree of interrelation between neurons.

Considering the interrelation between neurons from an advertising point of view it should be stressed that on behalf of theory by Donald Hebb repeated brand exposure has become a salient point in advertisement (Keller, 2008). However, there is no specific research pointing to the fact that the brain contains specific neurons which are associated with certain brands. Science has pinpointed that there are specific patterns of neuronal activity, which might be spread widely across the brain, which are associated with certain brands (Du Plessis, 2008). A pattern of neuronal activity for a certain brand is able to trigger other associations for the same brand. This neuronal behavior is called a gestalt (Du Plessis, 2008). This can be explained with an example of the brand Apple. When a person is exposed to the brand Apple a pattern of neuronal activity can be found in the brain and this pattern of neuronal activity will in turn trigger other associations which are bound to the brand Apple. This could for

instance be the logo of Apple, innovation, computer, smooth design, expensive and user friendliness. This is, however, a user specific gestalt. The brand Apple might also trigger patterns in the brain connected to the apple fruit. This is highly likely and thus another smaller gestalt will arise from this association and ultimately a macroscopic gestalt will have arisen containing everything from computers to a mid-day snack. Thus having the knowledge of neuroscience, marketers are able to enhance the chance that a brand comes to mind by creating and increasing the number of associations which are linked to the brand.

It can be argued that creating strong brand associations are considered to be an important factor when manifesting a product in the mind of consumers; that is creating a memory of the product. Advertising theory states that the more thoroughly a person thinks about product information and relates to existing brand knowledge the more powerful the resulting brand associations will be (Keller, 2008). Thus, neurons that *fire together wire together* is a known term in the adverting world as well. The advertising theory refers to this as "retrieval cues" (Keller, 2008). It is important to acknowledge that whenever memories are formed they are stored with the feelings that are present at that specific time (Percy, 2003). Therefore the emotions that are associated with a specific memory will be recalled whenever the memory is recalled whether or not the person is conscious about those feeling or not. The matter of fact is that this goes for all of the perceptual cues in an advert. Therefore the emotions associated with a brand and how it is presented are already present. However, they are not generated when a person think about a brand, the associations come with our thoughts about a brand out of memory that is previously stored (Percy, 2003; Du Plessis, 2008).

When discussing emotions and feelings it should be mentioned that within the field of cognitive neuroscience emotions and feelings are considered differently. "Emotion" is defined as an inner non-conscious state and can best be explained with the fact that "several emotions cause a mood" hence emotions should be perceived as non-conscious, deeper and stronger than feelings. A person is not responsible for an emotional reaction (e.g. fear, tears) and is argued to be a right away response (Du. Plessis, 2011). On the other hand "feelings" can be argued to be more conscious, hence, it is possible to hide feelings and that is not the case when it comes to emotions. Humans often think about how they feel which makes it more tangible than intangible and they easily describe how they feel (e.g. I feel happy, that is a known fact for the conscious self). Feelings can also be described as how people experience

their emotions and this is always conscious.

In the field of neuroscience it is believed that emotional reactions increase attention to an object which in the end makes it easier to remember (Du Plessis, 2008). In regards to advertising Keller (2008) outlines that two factors are in play when strengthening brand associations;

1. Personal relevance; the consumer must have some relevance in regards to the product that they buy. There is a need for developing the brand soma[10].

2. Consistency with which it is presented over time. This is in coherence with theory by Donald Hebb, which is described previously.

Now, it is obvious from the above that memory and emotions are highly correlated, however, this connection is yet to be explained and it has its roots in the biology of the brain.

Earlier it was explained that several gestalts are formed when observing the environment. However, only one of these gestalts becomes conscious and thereby able to attract further attention (Du Plessis 2011). This means that a non-conscious process of elimination of gestalts has been carried out before reaching consciousness. In The Branded Mind (Du Plessis, 2011) this process is described via biological factors and most importantly the production of dopamine which was described early. Du Plessis states that it is the gestalt which causes the highest dopamine production that becomes conscious. That is the gestalt that results in the highest expectation of reward for the person. This production of dopamine is directly connected to the emotions associated with the visual stimuli. For now, it should be known to the reader that memories are relative to the amount of gestalts associated to the object. The main gestalt that attracts attention is driven by the dopamine production. The dopamine production is then dependent on the hormone levels of, in women, estrogen. This creates a connection to the sexual content of the advertisement. If the female viewing the advertisement is in a phase of pre-ovulation then the estrogen level is peaking. The internal feedback system resulting from the mixture of dopamine and estrogen, explained earlier, should theoretically create a bond. This biological process will further lead to a strong gestalt and thereby memories of the advertisement.

[10] Brand soma is how a person feel about a brand or how they think they would feel about a brand (Du Plessis, 2011)

Considering branding theory the reason for creating strong brand associations are due to the reason that it is part of the process when enhancing brand recall or and brand recognition (Keller, 2008). Percy (2003) argues that the key for effective advertising is to identify visual images that are associated with a brand's strongest benefit and the emotions that the benefit triggers.

The question of whether or not sex in advertisement actually has a positive impact on memory thus brand recall or brand recognition will be discussed in part 3 of the thesis whereas results of the experimental research will be discussed for the purpose.

In the attempt to understand the role of emotions in advertisement as well as decision making process the work of professor of neurology Antonio Damasio (1994) is highly relevant in this context. In 1994 a new point of view was proposed by Damasio. His paradigm suggests that emotions causes decision making and also determine the outcome of the rational decision making (Du Plessis, 2008; Damasio, 1994). Damasio believes that when human beings are faced with a decision they use only one criterion which is;

"How would I feel if I do that"? (Du Plessis, 2008, page 88, Damasio, 1994)

It can be argued that this quote by Damasio is exactly what the level of dopamine production is about. Nobody knows how they will feel after a purchase considering that it will take place in the future. However, we can rely on similar purchases (e.g. past experiences) to give us a clue of what our feelings will be like.

Damasio (1999) refers to this as a somatic marker. Shortly described this is a special instance of feelings generated from secondary emotions. From past experiences these feelings and emotions have been connected by learning to predict future outcome of different scenarios. In marketing, Damasio´s soma can be perceived as "how I feel" in regards to a brand. The somatic marker comes out either as positive or negative dependent on past experiences. In the field of neuroscience this is referred to a reaction of memory from the limbic system which sends out a signal as plus or minus (Baars & Gage, 2007; Du Plessis, 2008).

This means that the gestalts that form when receiving a visual stimulus of a brand or advertisement each are associated with a somatic marker which is positive or negative in regards to the brand. If the overall soma of the brand is more positive than that of the

competition, there is a high likelihood that the consumer will choose this brand.

How to measure emotions

Considering previous sections discussing the role of emotions in marketing communications and consumer behavior, it should be clear how important it is for a marketer to create an advert that causes an emotional response. A managerial rule of thumb is *what you cannot measure you cannot manage;* hence, this section will consider how emotions can be measured.

In the field of neuroscience it is bodily responses to emotional stimuli that are being measured. These bodily reactions are reflected by skin conductance and pupil response, amongst other peripheral markers. The sections below will seek to give a brief presentation of the most common methods applied in order to measure emotions;

fMRI; This is a neuroimaging technique and a method that can be applied to observe which areas of the brain are active at any given time (e.g. functional imaging). However it is argued that with this method it is not possible to make accurate measures in time with an fMRI(Du. Plessis, 2011) and therefore the usual emotional recording is done by the next technology on the list.

EEG; Is a method that measures electric fields produced by the brain. When recording these it is based on electrodes placed on the scalp of a person. The method causes some implications due to the fact that other electrical signals in the body can interrupt the recording. This could for instance be a muscular activity.

GSR; is recorded from the surface of the fingers (Hugdahl, 1995). It is sensitive to rapid change in hydration of the skin. This is somewhat biased due to the fact that the GSR signal is highly sensitive to body movements, making it quite difficult to use in a natural experimental setup. The respondent is required not to move any part of the body during the recording and cannot either perform deep respirations.

PET; Is an imaging technique. The method works with small amounts of radioactive substances injected in the blood stream. The blood stream can be traced by a scanner as the blood stream activity in one area increases according to brain activity. PET also has the

disadvantage of performing accurate measures in time. Images are not real time like the EEG measurements are (Du. Plessis, 2011).

After considering the most common emotional measurement tools which can be found on the market today it should be noted that most of these tools besides the GSR equipment are very costly. It is therefore only a minority of companies that can take advantage of using above stated equipment. The future calls for a development of emotional measurement equipment to make it more affordable and easy assessable for companies to apply.

Considering future development of emotional response equipment it should be noted that some companies are working on developing eye-tracking equipment in order to include an indicator of emotional responses (www.imotionsglobal.com). Eye tracking is a measurement tool used in order to analyze on immediate attention (Duchowski, 2003). It can also measure the pupil size and blinks with high precision (www.imotions.com, 2011). It has been debated that these parameters reflect, among others, the immediate emotional response and may indicate interest towards the stimuli for the subject (Hess, Eckhard and Polt, 1960; Partala and Surakka, 2003; Imotions.com, 2011). Eye blink rate and pupil dilation have been found to be indicators of cognitive processing as well as the level of emotional arousal (Cramon, 1977).

Memory

As before stated, attention, emotion and memory are interlinked. In order to elaborate on this, below stated will seek to explain how memories are formed in the brain taking the view of cognitive neuroscience. Due to limitations of the thesis it has not been possible to discuss or elaborate on memory in regards to long term and short term memory. However, it should be noted that it is the interest of a marketer to establish a long-term memory of an advertisement or brand. The following section will briefly present how memories are formed. This approach should be sufficient enough in this context in order to discuss memory in regards to emotion and attention.

Within the field of neuroscience it is suggested that the entire hippocampal neighborhood, what will be referred to as the medial temporal lobes (MTL), is believed to be partially responsible for transferring experiences into memory. Neuroscientists have studied the subject of remembering and it is found that during the day a flow of experiences takes place and are

stored and retrieved due to a constant dialogue between the Neo-cortex and the MTL. Due to the multiple functions of the MTL, it interacts with among others the visual area, called the inferior temporal lobe, thus neurons firing in this region of the brain correlates with conscious visual perception. Also auditory information can be fed to MTL and a major hub of emotional information is gathered when interactions take place with the part of the brain called the amygdalae. However, neuroscientists argue that MTL is an interactive crossroad, well placed for handling multiple brain inputs and for connecting learning and retrieval in many parts of the Neo-cortex. Because most of the human cortex is the neo-cortex and the MTL is considered to be an interactive crossroad in dialogue with multiple brain regions, neuroscientists believe that the neo-cortex encodes long term memories.

This theory can be considered with an example of an Apple computer. To begin with, the object (in this case the Apple computer) is observed due to the visual cortex, which firstly take in the sight of a computer where as cortical activity corresponds to the perceived computer and then spreads to the MTL. The interactive crossroad in dialog, the MTL, activates and binds widespread memory traces in both the visual cortex and other regions described above. Thus visual cortex identifies the computer and MTL is triggered to connect with many regions of the neo-cortex in order to make memory traces.

The interplay of attention, emotions and memory

In order to sum up on previous sections in regards to attention, emotion and memory and how women´s ovarian cycle might play a role in this context, it is convenient to create a model for the purpose. The model can be viewed below in figure 5 and is called SAAB memory model (Sense impression – Attention – Association - Brand memory).

The model has been developed on behalf of theory by Baars and Cage, (2007); Du Plessis, (2008, 2011); Damasio, (1994, 1999); and Keller, (2008).

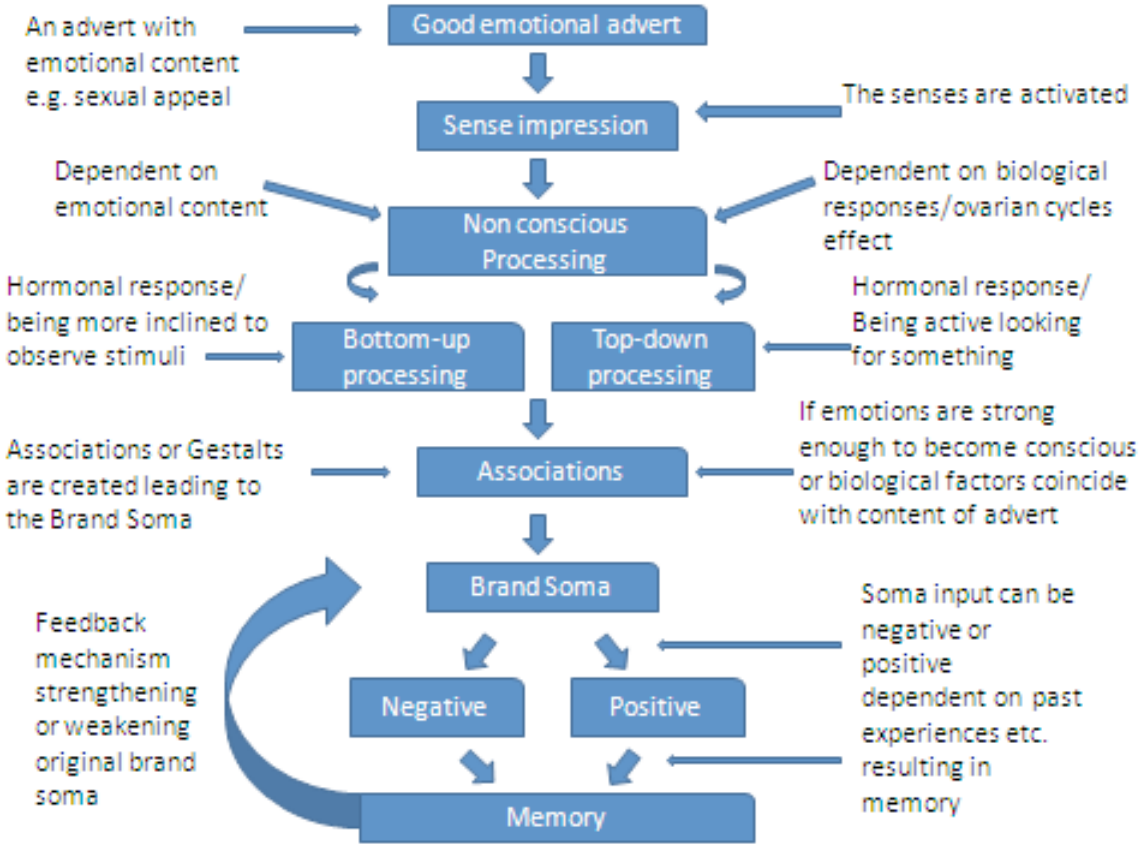


Figure 5 – SAAB memory model (Sense impression – Attention – Association - Brand memory)

Earlier in the thesis it was described that emotional context in advertisement increases the chance that the advert will be remembered (Du Plessis, 2008). The model will seek to visualize how this process takes place. Thus considering figure 5 the SAAB memory model will start with creating a sense impression. This could, as an example, be an advert containing sexual appeal. As a person is exposed to stimuli (e.g. an advert) the senses are activated and a non-conscious process takes place. This process is earlier referred to as bottom-up attention.

Millions of bits of information are directed into the brain using the five senses but it is only very little of this information that is actually accessible to the conscious self (Baars and Gage, 2007; Du Plesiss, 2008). The brain is already using attention at this point of time. However, the person being exposed to the stimuli is not yet conscious about it. All sensory systems do a great deal of non-conscious processing or interpretations of the sensory inputs which in the end leads to conscious reportable sights, sounds and feelings (Baars & Gage, 2007).

Following up on how the brain processes stimuli, emotions from the advert guide and stimulate the brain in order for it to consider whether attentional selection should be paid. It is the interest to consider that biological factors could play a role in this context. If emotions are strong enough, attentional selection is paid. Putting this in other words, emotions help the brain to determine which of the rising gestalts should become conscious (Du Plessis, 2011).

Having in mind that research has pinpointed that women change their behavior across the ovarian cycle, the hormonal changes might influence how the brain process stimuli. As a matter of fact the researcher Jean-Claude Dreher[11] collected a study in order to find out how women process information. Women participating in the study were presented with a virtual slot machine showing different probabilities of winning. Using MRI It was found that when women were presented to uncertain rewards the information process was not the same across the ovarian cycle. Brain regions involved in processing emotions were activated to a greater extent during pre-ovulation phase than during the post-ovulation phase. This study could indicate that the ovarian cycle might have an impact on processing information. Thus, biological factors could be one of the driving forces for reaching the point of attentional selection. This topic was previously addressed in the section of attention. The question is whether the response to sexual appeal in advertisement is affected by bottom-up or top-down attention or perhaps a mix of both. It will be possible to close in on an answer after outlining the experimental research.

If attention is paid to an advert, associations will come to mind. A pattern of neuronal activity for a certain advert is able to trigger other neuronal activity with associations for the same advert. This neuronal behavior was previously referred to as the rise of gestalts (Du Plessis 2008). Considering this from an advertisement point of view the more thoroughly a person thinks about product information and relates to existing brand knowledge, the more powerful

[11]A researcher at the Cognitive Neuroscience Center CNRS/ Université Lyon 1.

the resulting brand associations will be (Keller, 2008). This was earlier referred to as retrieval cues.

The associations which are formed can be argued to be what Damasio (1994) refers to as a somatic markers or the *brand soma* as Du Plessis (2008) has defined it. It was earlier described in the thesis that a somatic marker is a special instance of feelings generated from secondary emotions. From past experiences these feelings and emotions have been connected by learning to predict future outcome of different scenarios. Our limbic system reacts on memories that are formed in crudely analogous situations and sends a message out as basic plus or minus (Du Plessis, 2008; Baars & Gage, 2007). Thereby, assign an emotional bias to the associations, memory or sensory input. This can in turn affect the behavior of a person. In the SAAB memory model this is visualized where the brand soma can result in negative or positive outcome which will lead to a memory. This memory will reinforce the original brand soma and either strengthens it in a positive or negative way.

Part 3 - The Experimental Research

It was debated in the previous part that taking a new approach to segmentation is part of keeping up with time in order to enhance marketing communications and consumer behavior. Therefore, this part of the thesis will now present an experimental research. It will seek to discover whether there is an increased possibility that sexual appeal in advertisement increases women´s attention and whether this is caused by a hormonal response of the ovarian cycle. If this can be supported it is further interesting to consider the hormonal response in regards to a bottom-up- or a top-down-attention. It has previously been mentioned that the internal feedback system resulting from the mixture of dopamine and estrogen should theoretically create a bond. However, knowing that the level of estrogen fluctuates across the ovarian cycle could indicate that the "bond" is not stable at all phases of the ovarian cycle. Research has shown that fluctuations of the ovarian hormones might influence some aspects of women's cognitive functions (Richardson, 1992; McEwen et al., 2002) and their product choices (Durante et. al. 2011). It is therefore interesting to expand this knowledge and investigate it further by testing the hypotheses experimentally.

Previous studies have largely focused on larger behavioural changes, but little is known about the minute changes that may be influenced by the ovarian changes. This present study sought to identify the changes the ovarian cycle may produce in immediate visual attention, memory and preference for advertisements containing sexual appeal.

Research question and hypothesis

Below stated research question and sub-question have been outlined in order to expand the knowledge of biological responses in regards to the ovarian cycle.

Do women´s ovarian cycles influence their cognitive and emotional responses towards adverts with a sexual content?

B) Is it possible that an experimental research is able to demonstrate coherence between the ovarian cycle and attention towards sexual content in advertisement?

In order to answer upon the research question two main hypotheses and one additional

hypotheses have be outlined whereas three analyses have been carried out in order to support or reject the hypotheses.

Main hypothesis 1: *women in the pre-ovulation phase will demonstrate more visual attention to sexual appeal in advertisement.*

Previous mentioned studies have outlined research in regards to the Ovulatory Shift Hypothesis (Gangestad, Garver-Apgar and Thornhill, 2005) and anthropological studies into primitive survival strategies (Cunningham and Roberts, 2007). It was found that women´s desire to outdo attractive rival women is increasing in the pre-ovulation phase (Durante et al., 2011). Therefore, it can be argued that there is a reason to hypothesize that women before ovulation will show more visual attention to visual elements communicating sexual appeal in advertisement.

Main hypothesis 2: *Women in the pre-ovulation phase will demonstrate stronger preference for adverts containing sexual appeal than those from the post-ovulation group (behavioral study)*

Building on the same research as in hypothesis 1 it can moreover be hypothesized that women will show more preference for advertisement with a sexual appeal before ovulation than after ovulation.

Additional exploratory hypotheses will be tested;

Hypothesis 3: *Women in the pre-ovulation group will outdo women in the post-ovulation group in regards to memory performance on advertisement containing sexual appeal.*

A previously mentioned research has shown that visuo-spatial memory covaries across the ovarian cycle and that an increase in memory is found when women are in their pre-ovulation phase of the ovarian cycle (Solís-Ortiz and Corsi-Cabrera, 2008). Hence, memory performance in general should increase before ovulation. Assuming that women´s attention is dragged to adverts containing sexual appeal, there is a solid reason to hypothesize that women will also in particular increase their memory in regards to adverts containing sexual appeal before ovulation.

Primary data

In order to support or reject above stated hypothesis the experimental research is divided into three analyses. The first analysis considers whether there is an increase in visual attention for women who are in the pre-ovulation phase of the ovarian cycle when they view adverts containing sexual appeal. The second analysis will explore whether there is an increase in preference for women who are in the pre-ovulation phase of their ovarian cycle when viewing adverts with a sexual appeal. The third analysis will consider how memory is affected across the ovarian cycle when doing a recognition test in regards to adverts containing sexual appeal.

All primary data in regards to study 1, 2 and 3 were collected at the same test which took approximately 45 minutes for each participant. Different methods were applied at the test in order to identify the changes in visual attention, memory and preference for advertisement containing sexual appeal. A protocol of the experimental research in regards to the procedure of one participant can be found in appendix B. The next section of the thesis will elaborate on the recruiting process which took place in order to conduct all primary data in regards to analysis 1, 2 and 3.

Recruiting participants for the eye-tracking test

The study was collected with 46 healthy women all participating as volunteers for the experimental research. Only female participants were suitable for testing and they were all in the age of 18-36 years-old and of different cultural backgrounds. 1/3 of the women were using oral contraceptives or other hormonal treatments where as 2/3 had not taken oral contraceptives or other hormonal contraceptives (e.g., coil or any contraceptives with hormonal effect). Most participants subscribed for testing at Copenhagen Business School, thus giving a sample of primarily Danish young business student.

In order to find suitable respondents a screening procedure is the first activity in the experimental research. The purpose of the screening is to recruit respondents that belong to the defined segments as well as remove respondents that for any reason may bias results.

All respondents were asked to take a screening test in order to evaluate if they were suitable for the test. In the screening test, women were asked to answer on different topics such as

whether they were smokers, user of medicine or when they had last had a headache. Due to the fact these factors can influence results. Furthermore, it was important that the participants did not know what they were tested for (e.g. accounting for blindness). The questions in the screening test were meant to distract or to "blind" the participant for raising a query to the key question of when they had last had their menstruation and whether they thought of it as being regular. The screening tests were also carried out in order to enhance the recruiting process of women at different phases of their ovarian cycle. Thus, after the participants had taken the screening test, the first day of their last menstruation was a known factor which enhanced the further process in booking participants for the test. The screening test also gave the opportunity to evenly distribute the women among different phases of their ovarian cycle. After the screening test was carried out, participants for the tests were divided into three groups.

1. First group called the *pre-group* which consisted of women at day 1-10 in their ovarian cycle.

2. Second group called the *post-group* consisted of women at day 15-35 in their ovarian cycle.

3. Third group called *contraceptive-group* consisting of women using hormonal contraceptives such as birth control pill, coil or any contraceptives that control the hormonal cycle.

The participants were all matched in one of the above groups before doing the test by Majken L. Møller[12]. Matching each participant in the above groups before they showed up for testing enhanced the fact of "double blindness". Hence, the person guiding participants through the test did not know what group the participant belonged to.

The following sections of the thesis will describe each analysis that was carried out in the test.

[12] Majken L. Møller, Academic Officer, Decision Neuroscience Research Group, Department of Marketing | Institut for Afsætningsøkonomi, Copenhagen Business School

Analysis 1 – increase in visual attention

In order to answer upon Hypothesis 1 the first analysis was carried out using high-resolution eye-tracking to measure whether an increase in visual attention could be found for women in the pre-group (e.g. pre-ovulation phase of the ovarian cycle, day 1-10).

Analysis 1 - Method

When participants showed up for the test they were asked to take off their mascara (e.g. make-up) due to the fact that infra-red light of the eye-tracker seeks for round black objects in the face and the mascara could possibly interfere in this process. Furthermore, participants were told to sit as still as possible during the test, in order to avoid loss of data, thus movements could also interfere with the recordings.

Eye-tracking has been applied as a measurement tool due to the benefits that it provides. Eye-tracking gives the opportunity to measure eye movements which indicates the focus of visual attention with more detail and accuracy than self reported answers. It can be argued that eye-tracking provides complete objective measures. Moreover, eye-tracking is used in order to see what people are likely to look at which makes it a neat measurement tool in evaluating advertising creativity and efficiency. In practice, the eye-tracker sends out infra-red light in order to find the participant´s pupil in the eye. The eye-tracker searches for two round objects which are the blackest in the facial region when viewed in the infrared spectrum.

The eye-tracking test consisted of 30 IAPS[13] (The International Affective Picture System) pictures which were selected and thereafter converted to the eye-tracker software called E-prime. IAPS pictures were applied in order to make the pictures look like real advertisement (e.g. with product and band) which none of the participants had seen before. Thus, making sure that none of the participants had any impression (e.g. no brand soma) in advance in regards to the brand being advertised for.

The pictures were divided in four groups also referred to as 2x2 factorial design;

1. Pictures including sexual appeal and eye-contact
2. Pictures not including sexual appeal and eye-contact

[13]The International Affective Picture System (IAPS) have been developed to provide a set of normative emotional stimuli for experimental investigations of emotion and attention. The goal was to develop a large set of standardized, emotionally-evocative, internationally accessible, color photographs that includes contents across a wide range of semantic categories.

3. Pictures including sexual appeal and no eye-contact.

4. Pictures not including sexual appeal with no eye-contact.

Pictures in group four were applied as fillers to distract the participant from what the test was about. Unknown logos from the Internet were attached to the IAPS pictures and thereafter a pre-test was carried out in which 12 people were asked whether they had seen or knew the logos from elsewhere. The pre-test showed that the logos were not familiar to any of the pre-tested people. Thus, using IAPS and unknown logos from the Internet, fictitious adverts were created for the experimental research. After implementing the adverts in Iview X[14], the next step was to frame areas of interest (AOI) in order to do an analysis after testing all the participants. When the participants showed up for the eye-tracking test they were told a falsehood. They were told that they were about to see some adverts from the 80´s that had never been shown before for several reasons. After each picture the participant was asked to answer on a closed scaled survey whether they liked the advert or not (1 =dislike and 5 = like very much). Thus, the participants thought that they were participating in a liking survey for advertisements from the 80´s, making them "blind" to the real reason of the test.

Unfortunately it is not possible to show an example of the fictitious adverts due to legal restrictions when applying IAPS pictures.

[14] The control software for the eye-tracking equipment. It operates in connection with E-Prime software in order to facilitate precise exposure of images and data storage of eye-tracking data.

Analysis 1 - Results

After finishing the eye-tracking test the data of interest was grouped into three eye movement measures. The table below describes each measure and the reason for using exactly these measures.

Eye movement measures	What is it	What does it measure	References
Fixation Duration (FD)	How much time is spend viewing AOI in total for each stimuli/advert	A long fixation duration could indicate that it might be difficult to get the essence of information displayed or that stimuli is more engaging in some way	Just and Carpenter (1976) Thomas Ramsøy (2011)
Fixation Count (FC)	Number of fixations for each AOI	A high number of fixation counts could indicate a great interest in the displayed or that the advert is complex, thus difficult to encode.	Jacob & Karn, (2003); Just & Carpenter, (1976)
First fixation duration (FFD)	How much time is spend viewing AOI, the first time a participant views the AOI	If FFD is long on an AOI it indicates that the AOI attains attention well or that it is complex.	Byrne et al. (1999)

Data of interest from the eye-tracking test, that is fixation duration, fixation count and first fixation duration had a skewed (exponential) distribution, leading the analysis to employ a generalized linear model with correction for the nonparametric distribution.

Areas of Interest (AOI) were drawn for social relevant items such as sexual objects, hands, eyes, hair, mouth, and socially irrelevant information such as brands, objects, food and nature items. Thus, the design allowed for further explorative analyses of ovarian cycle effects and contraception in regards to other effects on visual attention.

Analysis one was concerned with the effects of the ovarian cycle on immediate visual attention towards scenes with sexual content. A generalized linear model (GLM) was used with Fixation Duration (FD) as the dependent variable, and group as independent variable.

Here, it is found that for sexual objects, there was a significant difference between groups (chi^2=8.05, p=0.0179). Pre-group subjects spent significantly more overall time looking at the sexual content compared to the post-group (chi^2=4.85, p=0.028) and the contraception group (chi^2=7.21, p=0.007) and this is in accordance with hypothesis 1.

A similar analysis was done using the number of fixations (e.g. Fixation Count, FC) as the dependent variable and group as independent variable, also demonstrating a significant group effect (chi^2=8.06, p=0.0178). The pre-group demonstrated significantly higher FC score compared to the post-ovarian group (chi^2=6.27, p=0.012) and the contraception group (chi^2=6.0, p=0.014). This was also in accordance to hypothesis 1.

Finally, the GLM was carried out using First Fixation Duration (FFD) as the independent variable, but no significant effect was found here (chi^2=2.63, p=0.268).

Seeking to support or reject hypothesis one the test suggest that when comparing the post-group, contraception-group and pre-group, women do not demonstrate an initially higher visual attention towards sexual contents in visual displays (FFD). However, the pre-group data shows that this group does in fact return more often to the sexual items (FC) and in the end they spend longer time viewing the sexual items (FD) than the post-group and the contraception group. Thus, there is a significant difference between groups. On behalf of above measures and observations the results showed to be consistent with hypothesis 1 and therefore this hypothesis is supported.

After having supported that the pre-ovulation group in fact does use more time viewing the sexual content of the advert, a key question to ask would be if this extra attention comes at the cost of brand attention. To answer upon this, another test was carried out. For the fixation duration the test showed that there was no difference across groups on the total time observing the brand (chi^2 = 0.8610, p=0.6502). This means that even though more time is used viewing the sexual content, the time is not taken from viewing the brand logo.
Same test was made for the fixation count which also showed no difference between groups for the brand fixation count (chi^2 = 1.9456, p=0.378).

Analysis 2 – change in preference across the ovarian cycle

In order to seek an answer to Hypothesis 2, whether women in the pre-ovulation phase demonstrate stronger preference for adverts containing sexual appeal than those from the post-ovulation group, a behavioral study was carried out.

As a consequence of hypothesis 1 the question arises of whether this increase in focus also causes an increase in preference for adverts containing sexual appeal or if the focus is not consciously known, hence, not having an effect on their perceived preferences.

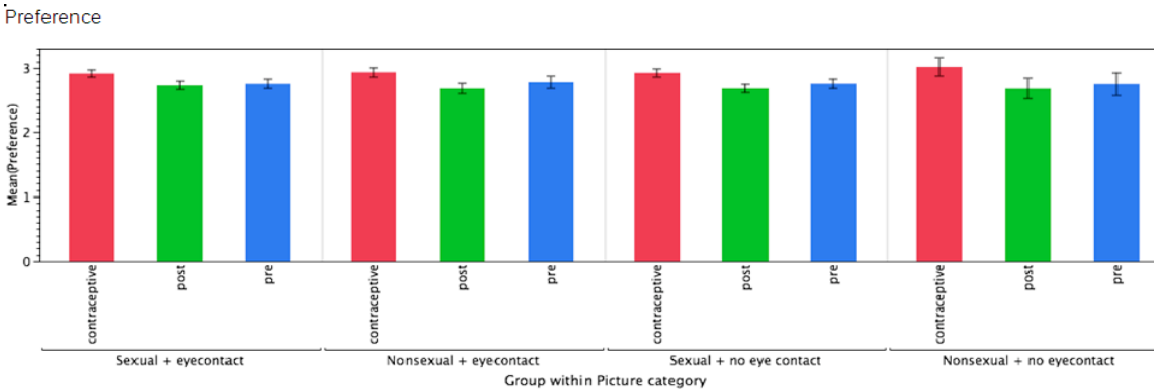
Previously mentioned studies have explored the fact that women seek to outdo attractive rival women by wearing sexy clothing close to or when they are ovulating. Thus, considering the fact that they seek to look sexier at this point of the ovarian cycle, it is conceivable that this might point in the direction of an increase in preference for adverts containing sexual appeal.

Analysis 2 - Method

This behavioural study was collected during the eye-tracking test. After participants had seen each fictitious advert and eye-tracking measures had been recorded. Their task was to attend to and rate their preference for different images, using a 5-point preference scale. As study 1 and 2 were using the same stimuli/pictures for measuring results, the set up was as well similar. Hence, fictitious adverts attached with unknown brand logos. The adverts were classified in a 2x2 factorial design using sexual appeal (sexual, non-sexual) and direct gaze (yes, no) as factors. Images were shown and rated by all subjects.

Analysis 2 - Results

Data was collected and statistics for study 2 was concerned with group effects on preference ratings. An ordinal logistic regression model with Preference Score (PS) as the dependent variable was carried out with Group, Picture Type and their interactions as factors. Here, an overall effect of the model was found (chi^2=21.85, p=0.026), which was driven by a general difference between groups (chi^2=15.57, p<0.001) but no difference between groups on different picture categories (chi^2=0.76, p=0.99).



After running the statistics the tests indicate that there were no differences between groups on preference for images of different categories. Thus, hypothesis 2 can be rejected.

Analysis 3 – memory performance across the ovarian cycle

It was expected that women just prior to ovulation would demonstrate an increase in visual attention for pictures containing sexual appeal (e.g. supported in hypothesis 1), and that this would be related to an increase in preference (e.g. hypothesis 2, rejected) and as well an increase in memory for these images. Therefore, hypothesis 3 would be that women in the pre-ovulation group will outdo women in the post-ovulation group when it comes to memory performance on advertisement containing sexual appeal.

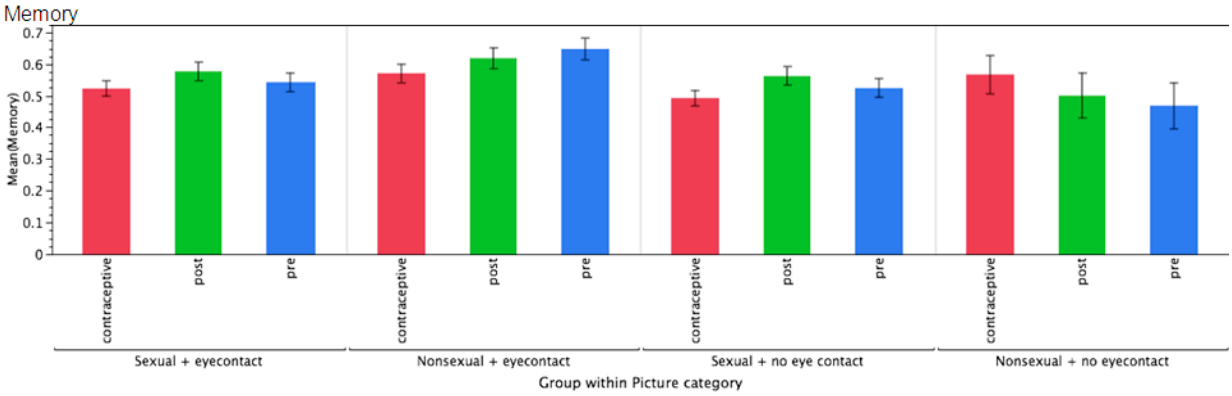
Previously mentioned studies regarding "sex in advertisement" conclude that sexual appeal in advertisement reduces consumer recall and recognition (Alexander and Judd 1979; Chestnut, La Chance, Lubitz 1977; Richmond and Hartman 1998; Reid and Soley 1981; Servan, Belch, Belch 1990). Evidence provides knowledge of the fact that perceptual and processing resources are directed towards the sexual information in the advert instead of towards the brand (Reichert, Heckler, Jackson, 2001). Results of analysis 1 showed that an increase in visual attention was not at the cost of visual attention to the brand/logo. However, it was not tested in analysis 1 if this increase in visual attention was at the cost of a reduced memory. Therefore this will be tested in analysis 3.

Analysis 3 - Method

Wedel and Peiters (2000) have argued that while eye movements are eminent indicators of attention, eye-tracking currently misses a serious account of the processing that takes place to store long-term memory. Therefore, in order to account for the lack in eye-tracking measures of memory, analysis three was collected. It was performed with a nominal logistic regression model. Memory scores were outlined as the independent variable where as group, picture type and their interaction was placed as independent variables.

Analysis 3 - Results

It was found that although the overall model was significant (chi^2=22.88, p=0.0183), this effect was driven by general differences in memory for picture type (chi^2=13.95, p=0.003) but not for the interaction effect (chi^2=4.23, p=0.645)



Considering the statistics above, it can be stressed that there are no differences between pre-group, post-group and contraception group in how well they remember the brand/logo presented along with different kinds of sexual and nonsexual visual contents. Thus, hypothesis 3 must be rejected. The effect of using sexual appeal in advertisement does not seem to manifest as changes in preference for the images or memory for the accompanying unrelated information (e.g. brand or logos).

Discussion

The study presented has focused on the extent with which women's ovarian cycle can influence their cognitive and emotional responses for advertisement with sexual contents. Three analyses were carried out in order to answer the research question. The ovarian cycle is marked by specific hormonal changes approximately half way through the average 28 days of the ovarian cycle.

Drawing on theory and research based on the Ovulatory Shift Hypothesis (Gangestad and Thornhill, 1998, 2008) it was predicted in hypothesis 1 (H1) that women close to ovulation would have a higher visual attention towards adverts with a sexual appeal. After testing the hypothesis by using eye-tracking equipment it can be argued that the ovarian cycle has an impact on visual attention, especially for images containing sexual appeal. Therefore, H1 was supported. This finding corresponds with studies after 1990 which are in favor of applying "sex in advertisement" in order to enhance marketing communications and consumer behavior (Jones, Stanaland, and Gelb, 1998; Putrevu, 2008; Dolliver, 1999; Thorson, 1990). Thus, analysis 1 of the experimental research backs up evidence after 1990 for the fact that "sex in advertisement" enhances marketing communications and consumer behavior. Though, this is only evidential for research investigating immediate visual attention.

It is further interesting to acknowledge from analysis 1 that this increase in immediate visual attention for sexual content did not work at the cost of attention for other kinds of information, such as the brand information.

Moreover, it can be discussed if the increase in visual attention was caused by a bottom-up or a top-down attention. It was debated previously that due to hormonal responses of the ovarian cycle a person can be more inclined to observe a given stimuli. The person is not consciously aware that he/she is being motivated by hormonal responses to act. Reversed, it could be assumed that a person is actively looking for something and is motivated due to a hormonal response of the ovarian cycle. Data from the analysis revealed that women in the pre-ovulation group demonstrated initially higher visual attention in regards to sexual ascribed stimuli compared with the two other groups. This initial increase in visual attention was only found for the pre-ovulation group due to the fact that they returned to view the sexual appeal within the six seconds of exposure time. Adding up the time spent on revisiting sexual appeal was the crucial factor in order to support H1. Thus, considering that participants revisited

sexual objects, it could indicate the use of top-down attention. They "chose" to view the sexual objects more than once and therefore it could be argued that they were consciously aware of the fact that they had seen something of interest and therefore re-examined it. However, having in mind that the participants had no longer than 6 seconds to evaluate the adverts, it might not be possible to discuss the fact of total consciousness at a time sequence this limited.

Analysis 1 does not make any predictions for whether this increase in attention is in coherence with an increase in preference, therefore analysis 2 was carried out. Moreover, analysis 1 does not tell how much visual attention is actually intercepted and remembered, therefore analysis 3 was carried out.

Analysis 2 was carried out in order to see if the increase in visual attention also corresponds to an increase in preference for advertisements containing sexual appeal. Previous mentioned study (Durante et al., 2011) has explored the fact that close to or at ovulation women change their behaviour to outdo attractive rival women by wearing sexy clothing. However, other studies have also indicated that women seek to have a change in preference across their ovarian cycle (Jones et al. 2008; Feinberg et al. 2006; Puts 2005). Considering that women seek to look sexier before ovulation could indicate an accompanying increase in preference for adverts containing sexual appeal. However, analysis 2 found that there were no differences between groups on preference for images of different categories (e.g. stimuli containing sexual appeal vs. non sexual appeal) and therefore hypothesis 2 was rejected.

Rejecting hypothesis 2 could indicate that there is a non-conscious motive involved when women choose sexier clothing close to or at ovulation which studies by Durante et al., (2011) have been arguing for. However, the fact that no increase in preference was found could also indicate that women close to or at ovulation are not willing to show that they are attracted towards sexual appeal. Hence, they could be embarrassed to admit their increase in preference. Interpreting the results could on the other hand also indicate that women are repulsed by sexual adverts. Analysis 1 showed that AOI for sexual objects was revisited, which could indicate that participants were shocked by the image. An interpretation of that could be that women revisit sexual objects because they by first sight respond repulsively and looks away. Later on they have to return to the sexual object to support what they saw at first

sight was actually real.

From an advertisement point of view this could cause serious damage to the brand (Belch & Belch, 2009). As a marketer it is of high importance to consider *attitude toward the ad*[15], thus, consumers' affective reactions to an advert are an important determinant of advertising effectiveness (Belch & Belch, 2009). If a consumer has a negative feeling towards an advert this negative feeling could be directly transferred to the brand itself and thereafter influence purchase intentions (Belch & Belch, 2009). This is also supported by Damasios somatic markers which contribute to the soma of the brand. A study by Lindenmann (1993) has discovered that people enjoying an advert are twice as likely as those who are neutral towards it to be convinced that it is the best brand to purchase.

Another survey collected by an advertising research company[16], showed that a difference resides between men and women when it comes to the effectiveness of using sexual appeal in advertising (Belch & Belch, 2009). The survey measured the effectiveness of sexual appeal in regards to liking the ad, product liking, and purchase intentions. It was clear that a perceived positive preference was found for men on all three criteria whereas women answered more neutral. However, it is debated in the survey that women rated the adverts containing sexual appeal lower on all three criteria but they did not answer repulsively towards these adverts. Even though they were not repulsed by sexual appeal the findings by Lindenmann (1993) did emphasize that being neutral also decreases the chances of a purchase by 50 per cent. It should be stressed that when debating this survey it is notable that hormonal change across the ovarian cycle has not been accounted for and the results of the study are in coherence with those found in the experimental research.

Considering these comparable results it can be argued that sexual appeal in advertising does not have a conscious effect on purchase intentions for women, even though hormonal changes are accounted for. Though, on the other hand this does not exclude the fact that women might be driven by a non-conscious behaviour to buy items which have been advertised for if the adverts contain sexual appeal.

[15]The term "Attitude towards the ad" represents the receivers´ feelings of favorability or unfavorability towards the advert (Belch & Belch, 2009, page 167).

[16]MediaAnalyzer Software and Research

As a marketer it is as well crucial to consider consumer response and feelings when *decoding*[17] an advert. The feelings and responses that are generated after viewing an advert depend on several factors which should be accounted for. Primary factors can be argued to be product category, stage of product life cycle and the target audience (Belch & Belch, 2009). As discussed earlier (e.g. the role of sex in advertisement) it was found that when sexuality is related to the product or cause, the brand attitude and corporate image will benefit from using sexual appeal. If it on the other hand seems disconnected to use sexual appeal when branding the product it will favour neither the brand attitude nor the corporate image (Pope, Voges, and Brown 2004; Simpson, Horton and Brown 1996). Having this in mind it should be noted that analysis 2 consists of a test with fictitious adverts and logos and it did not account for any of the above factors. Thus, only biological responses accorded to the ovarian cycle have been accounted for in regards to preference.

It can therefore be argued that no increase in preference was found for adverts containing sexual appeal across the ovarian cycle due to a lack of a natural relevance for linking sexual appeal to the adverts.

An additional exploratory hypothesis referred to as hypothesis 3 was tested as well due to the interest of finding out whether the use of sexual appeal in advertisement could enhance memory performance. An earlier study by Solís-Ortiz and Corsi-Cabrera (2008) showed that visuo-spatial memory and verbal fluency tests covaried across the ovarian cycle. On the other hand previously mentioned studies regarding "sex in advertisement" conclude that sexual appeal in advertisement reduces consumer recall and recognition (Alexander and Judd 1979; Chestnut, La Chance, Lubitz 1977; Richmond and Hartman 1998; Reid and Soley 1981; Servan, Belch, Belch 1990). Evidence provides knowledge of the fact that perceptual and processing resources are directed towards the sexual information in the advert instead of towards the brand (Reichert, Heckler, Jackson, 2001).

[17] *"Decoding is the process of transforming the sender's message back into thought. This process is heavily influenced by the receivers frame of reference or field of experience, which refers to the experience, perception, attitude, and values he or she brings to the communication process" (Belch & Belch, 2009, page 152).*

Analysis 3 was carried out in order to see if biological responses, not previously accounted for in above stated studies, could have an influence on memory performance. It should investigate whether sexual appeal could have a significant influence on memory performance across the ovarian cycle. It was debated in a previous section (e.g. Segmentation – a paradigm shift) that in order to enhance marketing communications and consumer behaviour a paradigm shift for segmentation was needed. The whole segmentation process should comprise biological responses as part of understanding market segments. However, it should be noted that even though biological features should be included in the segmentation process and that this should not be considered as the only criteria when segmenting the market. Biological features should be accounted for but as an extra criterion when segmenting the market into geographic, demographic, psychographic and behavioural criteria. However, it is, as described earlier, an important factor when considering the efficiency of an advert to include primary factors (e.g. product category, stage of product life cycle and the target audience) besides biological factors. Having this in mind it is of great importance when developing the advert to thoroughly know the target audience that is to purchase the product being advertised for. Hence, carrying out a solid segmentation process beforehand is necessary. Having this in mind, it can be stressed that the experimental research did not comprehend above stated factors. The adverts were fictitious and no real market segment could be tested for in regards to cognitive and emotional changes across the ovarian cycle.

The experimental research found that memory performance for women across the ovarian cycle was not enhanced. Therefore, hypothesis 3 was rejected. It was hypothesised that the internal feedback system resulting from the mixture of dopamine and estrogen should theoretically create a bond. This biological process should lead to a strong gestalt and thereby memories of the advertisement. However, this research is contradicting to the results found in analysis 3.

It can be argued that the hypothesis was rejected due to a lack of insight with *consumer-product relationships*[18]. It is notable that the study by Putreu (2008), has investigated the use of sexual appeal in advertisement in regards to consumer involvement. Whereas it was actually found in this survey that involvement with the product matters in regards to applying sexual appeal in advertisement. Putreu´s results revealed that sexual appeal leads to better

[18] The term is used in regards to how consumers relate to a product (Zinkhan, 2004, page 184).

memory and increased purchase among low-involvement consumers. On the other hand high-involvement consumers process both sexual and nonsexual adverts more thoroughly and exhibit increased purchase intent toward nonsexual appeal (Putreu, 2008).

Thus considering Putreu´s results it can be discussed that the outcome of the experimental research could have been different if other factors (e.g. primary factors and low vs. high involvement) beside biological responses had been accounted for. Hypothesis 3 might have been supported if the experimental research had been carried out with real adverts considering the factors discussed before. Though, on the other hand it would not have been possible to make allowance for impressions received in advance. Hence, first impression of the brand would have been under the influence of previous knowledge about the brand (e.g the brand soma). It can be argued that due to the work of gestalts it would not be possible to measure non-conscious reactions in regards to women´s cognitive and emotional aspects if the experimental research was carried out without fictitious adverts.

Discussing the outcome of the experimental research in regards to hypothesis 3 it should lastly be stressed that there are no differences between pre-group, post-group and the contraception group in how well they remember the brand/logo presented along with different kinds of sexual and nonsexual visual contents. The effect of using sexual appeal in advertisement does not seem to manifest as changes in preference for the images or memory for the accompanying unrelated information (e.g. brand or logos) across the ovarian cycle.

Overall it has been discussed that when seeking to find out whether women's ovarian cycles influences their cognitive and emotional responses towards sexual appeal in advertisement, biological and individual differences should be accounted for.

Limitations of the experimental research

The next section will discuss limitations in regards to the experimental research. Thereafter, "real time eye-tracking" will be presented as a suggestion to limit down some of the implications found with the experimental research.

Considering that main parts of the experimental research are built on eye-tracking data it

should be noted that there are drawbacks when using this method. Eye-tracking does not reveal why a particular area of interest (AOI) catches the eye or how participants of a test respond to what their eyes focus on. On behalf of this it is recommendable to exploit eye-tracking and further draw on additional survey based methods (Duchowski, 2003). Is should also be noted that while eye movements are prominent indicators of attention the measures of eye-tracking do not account for or measure the process that takes place to store information in the long-term memory of the viewer. Therefore eye-tracking leaves the question of whether the advert or brand will be remembered when the consumer is exposed to it later on, when consumption takes place.

It was further discussed in the section addressing the experimental research that fictitious ad were used. This was in order to account for bias. This leaves the question of whether other results could have been found if real advertisements had been applied in the study. It could be intriguing to carry out other studies with the same research question but for a certain product category, a certain stage of product life cycle and a certain segment which has a product relationship (e.g. preference for the brand).

Future research should therefore seek to include above stated and convey scientific evidence for women in different segments. Research in regards to the use of sexual appeal did pinpoint the importance of a relevant link between product and the use of sexual appeal. It could therefore be interesting to see how the research would evolve if it was carried out where product category is relevant in regards to the use of sexual appeal.

As previous mentioned the experimental research was carried out with a 2x2 factorial design using sexual appeal (sexual, non-sexual) and direct gaze (yes, no) as factors. This was done in order to limit down factors that are being tested and thereby exclude other factors. Thus, pictures and participants (e.g. pre-group, post-group and contraception group) were the only factors that could not be counted as stable. The location, eye-tracker and light amongst others were all the same for each and every participant. Therefore, it should be noted that the experimental research was carried out with internal validity.

Furthermore it should be noted that when a study is collected it is almost impossible to have a natural testing environment. Advertisement is usually exposed in very disrupting surroundings where lots of stimuli interrupt the opportunity for consumers to be able to

decode an advert. However, in an attempt to account for limitations of the experimental research which has been put forward above, the future might provide better equipment in order to carry out an even better research and thereby create better external validity. It is fascinating to consider the opportunities by applying what will be referred to as real time eye-tracking.

Real time eye-tracking

One weakness of the experimental research has been that participants were "forced" to look at adverts in the current eye-tracking study. Thereby they have not been in a real situation as when they would normally be exposed to the adverts. This can be considered as lack of external validity. It is therefore arguable if women in the pre-group would actually spend more time viewing sexual appeal if they were attending the adverts in a real environment.

A study that would attain more knowledge about prominent indicators of attention and brand recall could be done by using computer simulations. This method will be referred to as "real time eye-tracking" and is a method applied by the company Perception Research (www.prsresearch.com, 10th. of May, 2011). If the right equipment had been present it would have been possible to simulate a walk through a shopping mall or a walking street in 3D format. Considering this computer simulation, random commercials are located along the wall so they are visible on the periphery of the eye sight. Participants are supposed to do the test by sitting in front of the computer but on the other hand being exposed to all incoming stimuli which would have taken place in a real life setting.

In regards to future research it is suggested to set up an everyday life simulation of walking down a shopping street. Multiple commercials at the same time would be preferable containing both non sexual appeal and sexual appeal. Best scenario would be an actual video in 3D format with the above mentioned composition of commercials. People walking by would then create distractions that could interfere with the attention towards the advertisement even further.

Data for the pre-group participants in the experimental research showed that this group returned more often to the displayed sexual appeal. In the end the pre-group lingered for a longer period of time in regards to adverts with a sexual appeal than the post-group and the

contraception group. In view of this data it should be noted that participants were exposed to the advert for 6 seconds. Considering a real life situation it is probably only the first 2-3 seconds that is of importance when catching the attention of a consumer. Knowing that significance was found for visual attention only due to the fact that AOI´s were revisited could cause some implications for the validation of findings.

Therefore it is suggested to carry out a study that apply "real life eye-tracking" with the use of computer simulations and thereby account for the limitations that were found in regards to the experimental research. A "real life eye-tracking" study would comprehend factors of real life and therefore give a better indicator of how women´s cognitive and emotional aspects change across the ovarian cycle. It is further suggested with the application of "real life eye-tracking" to account for consumer product relationship and primary factors (e.g. product category, stage of product life cycle and target audience).

It should be noted that it is possible to monitor eye-tracking equipment on people as a pair of glasses and conduct data in real life settings. This will be referred to as mobile eye-tracking (www.prsresearch.com. 10th of May). However, it is recommended for future research to take advantage of computer simulations. Suggesting this method over the other is due to the fact that it is easier to control the environment with a computer simulation. It is possible to recreate exactly the same shopping trip over and over again for all participants in a study when using a computer simulation. By doing this quantitative analyses can be carried out without interfering elements from a real life setting as would be the case with mobile eye-tracking.

Part 4 – Future perspectives

The hypotheses and analysis in the experimental research were derived from theory and research based on the Ovulatory Shift Hypothesis (Gangestad and Thornhill 1998, 2008). Other researchers have focused mainly on consumer behaviour in general where as research of the immediate attention has not been carried out before. The experimental research therefore leaves many intriguing questions that need to be investigated and tested for in the future.

While carrying out the experimental research, inquisitiveness for other related research topics was rising. Having the results of the study in mind it could be interesting to expand the knowledge to other research fields.

It was part of the research question (e.g. sub question C) to consider how marketers can increase their knowledge and enhance marketing communications and consumer behaviour in the future. This part of the thesis will therefore seek an answer to that question by drawing up 3 examples for real life application.

Applying experimental research in real life cases

It has been the purpose of this thesis to carry out primary research in order to enhance marketing communications and consumer behavior. Little, if any research has been carried out on immediate visual attention for women across their ovarian cycle. Contrary to this line of research in biology, marketing research has been debating the use of sexual appeal for years. It was therefore appealing to combine the two fields of research and seek to implement this new knowledge in real life situations. The next section will therefore reflect on how findings of the experimental research can be applied in real life. Therefore, some examples will be described below.

Dating commercials

Considering the study of consumer behavior and product choice by Durante et. al. (2011) women´s preferences change across the ovarian cycle and evidence backs up the fact that women are attracted towards men who have different characteristics depending on where women are in their ovarian cycle (Jones, DeBruine, Perrett, Little, Feinberg and Smith, 2007; Feinberg et al 2006; Puts 2005). Furthermore primary research has revealed that women in the

pre-ovulation phase of the ovarian cycle compared to women at post-ovulation phase of the ovarian cycle focus more on sexual appeal in advertisement. Thus, evidence has pinpointed that biological factors should be accounted for when doing a proper segmentation process and carrying out marketing campaigns.

Considering previous mentioned studies of consumer behavior it could be possible that women´s attention would be even more drawn towards dating commercials depending on the phase of the ovarian cycle. As debated before, women´s natural instincts for maximizing a healthy offspring or their nursing instincts depend on where they are in their ovarian cycle. Therefore it could be interesting to consider how marketing communications and consumer behavior would benefit from including biological factors in the segmentation process. Hence, it can be argued that due to women´s natural instincts, attention is increased towards adverts like dating commercials before ovulation. Extending the example of dating commercials, biological features could also have an impact on the selling opportunity for support products in regards to dating. Durante et. al., (2011) found that women have a natural inclination for wearing more sexy clothing near ovulation and thus, increasing the possibility to increase sales for this sort of outfit.

Furthermore it was found in a previously mentioned study that women in general are attracted towards men´s voices. However, this study showed that the masculinity preference in men´s voices were greater before ovulation than after ovulation (Feinberg, Jones, Smith, Moore, DeBruine, Cornwell, Hillier, Perrett, 2006). Having this study in mind, marketers should take advantage of these hormonal changes in women´s ovarian cycles. Thus, suggesting to consider the opportunity of using men´s voices in dating commercials to segments of fertile women and thereby increase the attention of women that are not yet ovulating.

Focus group participants

Focus groups are another pivotal point to consider in regards to how biological segmentation can have an impact on marketing communications and consumer behavior in the future. When introducing a new product it is common to use focus groups in order to estimate how segments of the target audience will perceive a new product.

When a marketer decides who shall be recruited for a focus group interview, it is interesting to consider findings from the experimental research in order to be able to carry out an

effective sampling plan[19] (Hair, Bush and Ortinau, 2009). When gathering a focus group there is no one set of human characteristics that can guarantee the right group dynamics. However, it can be argued that the group must be as homogenous as possible yet with enough variation to allow for contrasting opinions (Hair, Bush and Ortinau, 2009). Central factors in the selection process must be accounted for in order to have a dynamic group. It should consist of a representative picture of the target segment that the product is being tested for. Knowing that women´s cognitive and emotional aspects change across the ovarian cycle it is becoming more of a necessity to compose the focus group in regards to when the female participants are ovulating. Due to this change in consumer behavior and visual attention across the ovarian cycle it would be more complete to have 8-12 women in a focus group who are at different phases of their ovarian cycle. Including these biological responses could be argued to create a more representative picture of women´s general process of information towards the new product. Thus when improving the recruiting process for focus group interviews it would be beneficial to consider when the ovulation takes place for all women participating in the focus group.

Healthy products for men.

It is evidential in previously mentioned studies concerning the Ovulatory Shift Hypothesis (Gangestad, Garver-Apgar and Thornhill, 2005) that in order to maximize healthy offspring, women are drawn to healthy looking men (Miller and Todd, 1998; Thornhill and Gangestad, 1999). Therefore marketers should have these studies in mind when they create marketing campaigns in regards to products appropriated for increasing men´s health. It could be assumed that women would buy those products to their husband/boyfriend in order to increase their healthiness. Following examples for health products could be sport clubs, vitamin tablets, crèmes and products made of no harmful material (e.g. Bio active skincare with no petrochemicals, sulfates, parabens, synthetic fragrance, silicones etc.)

This thought could further be considered in regards to food and beverage products. Knowing that women at certain phases of their ovarian cycle would consider if their food and beverage purchase consist of any harmful ingredients could be utilized.

[19] Sampling plan includes characteristics of the participants attending the focus group. It includes considerations for demographics such as age, gender, education level, family structure and product-related behaviours such as purchase and usage behavior.

However, besides the examples above, suggesting how to apply findings of the experimental research in real life cases, many intriguing questions was found in the process and they need to be investigated and tested for. Therefore, the next section will consider future perspectives of the experimental research and propose suggestions for what could be investigated in the future.

Future research

In line with the experimental research it is interesting to consider the rising trend in psychology and behavior. An emerging body of research is springing within this field and is concerned with how psychology and behavior are influenced by many different hormones (Durante et. al., 2011).

In addition to the ovulatory hormones and the changes in behavior they contribute to, it has become interesting to consider the effect of male hormones and whether men have an associated behavior caused by changes in their hormonal fluctuation (Durante et. al, 2011). It has been investigated that high levels of testosterone in men might be associated with mating efforts, social dominance as well as entrepreneurship. However, this higher level of testosterone found in men pointed in the direction of an increased desire to purchase products which are related to status display or male competition (Mazur and Booth 1998; Mehta, Jones, and Josephs 2008; Saad and Vongas 2009; White, Thornhill, and Hampson 2007).

On the other hand, studies have shown that when men get married and become fathers a decrease in testosterone is found (Burnhamet al. 2006). Therefore it is suggested that future research should investigate how hormonal changes affect purchase patterns for men. Thus, investigate if hormonal changes cause an emotional and cognitive effect in men and whether it is possible to consider that men also have a cycle. Considering this, it would be fascinating if men in fact were able to recall brands better at certain phases of their hormonal cycle in regards to sex in advertisement. Previous studies have pinpointed that the level of testosterone decreases when men get married and become fathers. This could potentially be useful for marketers. Both that men have a natural monthly cycle in their testosterone level but also that this cycle changes when men get married and have children. Future research should throw light on this question and how the testosterone level influences men's preference.

Newer research further investigates the hormone cortisol and how this has an impact on purchase patterns for men (Durante et. al., 2011). Cortisol is usually activated in response to physical exertion and in times of psychological stress (e.g., fear, defeat; Dickerson and Kemeny 2004). It is debated that a boost in cortisol for men might have an effect in regards to consumer purchase and shift consumption away from status-display goods to products related

to safety and comfort. As stress has become a "common disease"[20] this might point in the direction of an increase in demand for safety and comfort products, hence, further research should be done in regards to the effect of increase in cortisol.

When discussing future perspectives it should be clear from above stated that the future should discuss and investigate hormonal changes in men and women from different perspectives in regards to marketing communications and consumer behavior. It is fascinating to reflect on how biological responses can help marketers get even closer to an understanding of their target audience and their needs.

[20] www.smartmanager.com, 02.05.2011, 10:11am.

Conclusion

The study of sexual content in advertising either implicitly or explicitly acknowledge that there is a biological component that may affect information processing. Therefore, the thesis has thrown light on biological phenomena and their effect on marketing communications and consumer related behaviors. After 1990 it has been generally accepted that sexual appeal catches consumers' attention. However, no study before or very limited research has investigated "sex in advertisement" where the ovarian cycle is a determinant factor for immediate visual attention. Hence, it has been the interest to investigate following research question;

Do women's ovarian cycles influence their cognitive and emotional responses towards adverts with a sexual content?

Within the field of neuroscience, cognition and emotions are investigated as an interactive system. This interactive system is further linked with attention and memory and therefore this is addressed in the first part of the thesis. These interactive systems are investigated in regards to "sex in advertisement". Therefore the term "sex in advertisement" is firstly addressed. This is followed by a general discussion of the role of sex in advertisement. It was found that after 1990 most research is in favor of using sexual appeal to enhance attention. However, it should be noted that in order for sexual appeal to work most efficiently a natural link or relevance for applying sexual appeal in the advertisement should be present. Furthermore a study showed that using sexual appeal is only beneficial for adverts seeking to attract low involvement consumers. Interestingly, previously discussed studies within "sex in advertisement" do not consider that there are different definitions of what "sex in advertisement" is nor how the genders differ from a biological point of view. In order to account for this neglected research an experimental research was carried out. Four hypotheses were addressed;

Hypothesis 1 was supported. It was found that women in the pre-ovarian group demonstrated more visual attention compared with the two other groups. It was further found that this increase in visual attention did not work at the cost of attention for the brand.

Hypothesis two was rejected. No differences between groups on preference for images of different categories were found (e.g. stimuli containing sexual appeal vs. non sexual appeal). Assumptions were drawn in regards to the results of analysis two. Feelings and attitude

towards a brand was discussed in this context and further how a repulsive attitude can damage brand soma. Moreover it was discussed that a response in regards to an increase of attention to sexual related stimuli could be due to a non-conscious processing. Figure 5 presents and visualizes the process of cognition and the responses at different phases associated with the emotional stimuli.

Hypothesis 3 was rejected. No difference was found in regards to memory performance on brand logo between the three different groups. Memory performance was measured along with different kinds of sexual and nonsexual content. The three groups where overall equally good at remembering the brands.

Overall it was argued that when seeking to find out whether women's ovarian cycles influences their cognitive and emotional responses towards sexual appeal in advertisement, biological and individual differences should be accounted for.

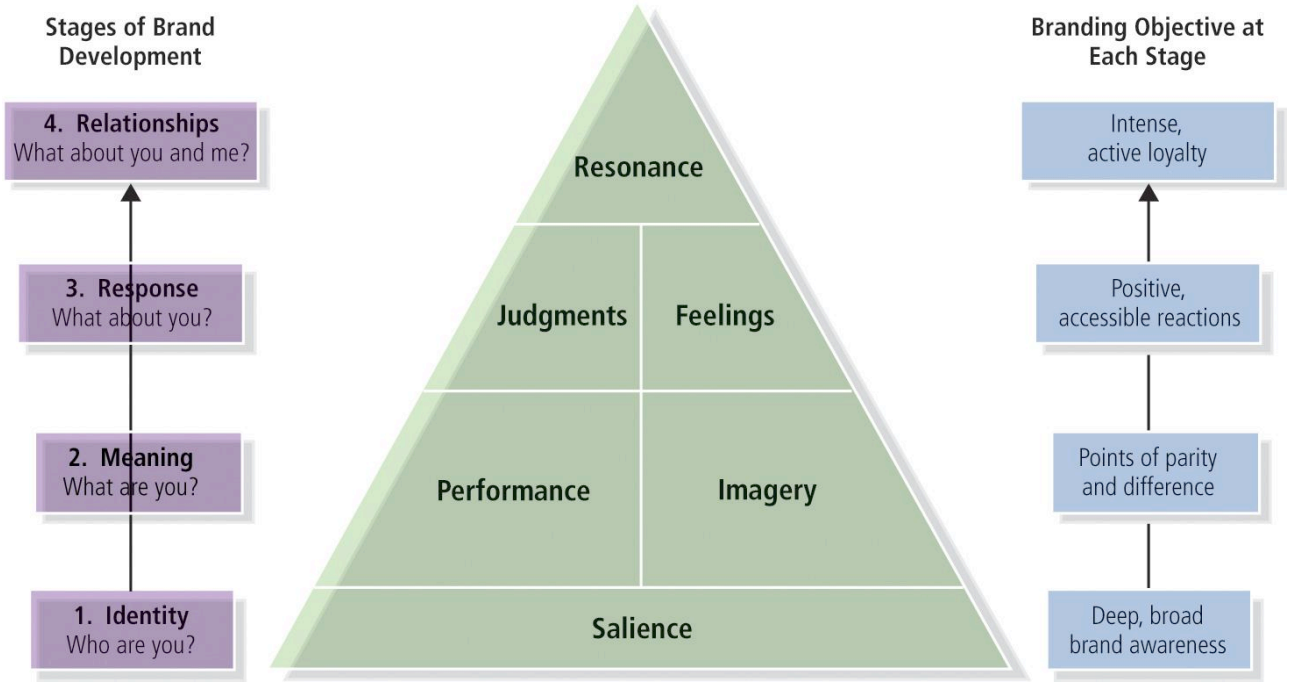
It was recommended to develop a computer simulation of a walking street in 3D format. It was argued that it would comprehend factors of real life and therefore give a better indicator of immediate visual attention. Moreover, this approach would enhance future quantitative analyses.

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. Following three examples was outlined for this purpose; composition of focus groups, dating commercials and healthy products for men.

In regards to future perspectives it is suggested to further investigate hormonal changes in women. Newer research indicates that men change purchase behavior caused by changes in their hormonal fluctuation. Therefore, it was as well discussed to investigate the impact of hormonal fluctuations in men in regards to marketing communications and consumer behavior.

Appendix A - The Customer Based Brand Equity Pyramid

Keller, K. L. (2008), "Strategic Brand Management: Building, Measuring, and Managing Brand Equity", third ed. *Prentice Hall*, Upper Saddle River, NJ.), page 75



Appendix B – Protocol

Course of the experimental research for one respondent

In order to find suitable participants a screening procedure was the first activity in the experimental research. The purpose of the screening was to recruit respondents that belong to the defined segments as well as remove respondents that for any reason might bias results. An elaboration can be found in the thesis.

The participant was asked to show up at Cog Lab which is a laboratory at Dalgas Have, Copenhagen Business School where an eye-tracker is available for testing purpose. The participant was told that the test would take approximately 40-45 minutes and after the test she would receive a voucher for the canteen as thank you for participating voluntary.

The participant was situated in front of an eye-tracker in order to record eye movements during the test. In total the participant went through 5 tests on the computer.

The first test consisted of 30 IAPS pictures (explained in the thesis) which had beforehand been modified in order to look like real advertisements with logos on. The participant was told that she would be presented to some adverts from the 80´ties that had never been used before. She was told to rate the adverts on a liking scale from 1 to 5 dependent on how much she liked the adverts. She was asked to rate this based on her first immediate impression. Before the participant saw the first fictitious advert a calibration took place. The calibration was done in order to measure each participant's unique eye-movement. Hereafter the first advert was shown and 6 seconds after the advert the liking scale was presented on the computer screen. The participant had to rate the liking of the advert by using numerlooks on the keyboard. During the short phase of 6 seconds the eye-tracker software Iview X recorded eye movements of the participant. After rating 30 adverts the data was collected for analysis 1 and 2 of the experimental research. In order for the participant to do the memory test she was asked to do three other tests still sitting in front of the computer. Those tests were carried out for another purpose than this thesis. After the participant had finished the three tests just mentioned, it was assumed that she had had time enough to either store the memory of logos from the adverts in the first test or forget them. The last test regarding memory performance the participant was situated in front of the computer and 60 logos was shown to her. This was a random mix of logos that had been shown before in the first test and logos that had not been

shown before. After each logo was presented she was asked to answer if she remembered the logo from before or not. After doing this test the data for analysis 3 was collected.

After the participants had taken 5 tests in total they were asked to fill out a survey regarding the test number 2, 3 and 4 which had nothing to do with the experimental research for this thesis. However, in the end of the survey the participant was asked to state when she last had her menstruation. This question was asked in order to double check that she was booked in accordance with the defined segment she was pre-booked for.

Acknowledgement

Writing this master thesis has without doubt been the most interesting project during my time at Copenhagen Business School. In the last half year I have learnt so much and been in contact with the most inspiring people. Due to my experimental research I now work with eye-tracking and I am proud of being part of a team at Imotions A/S. In this context a special thanks should go to my college Ole Baunbæk Jensen who have been supportive and presented me to the commercial industry of immediate visual attention.

In the process of writing the thesis many people I love have been there to support me. I like to thank my loving parents and my flat mate Yvonne Reinhardt for supporting me with nice dinners. My best thanks should go to my brother Rho Loving for keeping me company during the late evenings before my hand in-date and to my boyfriend Preben Olauf Tensø who has supported me with love and care during the whole process.

References

- Aitchinson, Jim (1999), "Cutting Edge Advertising: How to Create the World's Best Print for Brands in the 21st Century", *Prentice Hall* PTR, 1 edition, (august)

- Alexander, M.W., B. Judd (1979), "Do Nudes in Ads Enhance Brand Recall", *Journal of Advertising Research*, 18, 2, 47-50.

- Ambler, T. (2010), "Predicting consumer supermarket brands choices with neural markets", *Neuropsychoeconomics Conference*, Copenhagen.

- Arnould, E., Price, L., & Zinkhan, G. (2004), "Consumers" (2nd ed.). *McGraw Hill Irwin.*

- Baars, B.J., & Gage, N. M. (Eds.). (2007), "Cognition, brain, and consciousness: An introduction to cognitive neuroscience", London, England*: Elsevier*.

- Belch, G.E., and Belch M.A., (2009), "Advertising and Promotion: An Integrated Marketing Communications Perspective", 8th ed., New York: *McGraw-Hill.*

- Belch, M. A., Holgerson, B.E., Belch, G.E., & Koppman J. (1981):" Psychophysical and cognitive responses to sex in advertisement". In A. A. Mitchell (Ed.), *Advances in consumer research* (Vol.9, pp. 424-427. Ann Arbor, MI: Associations for Consumer Research.

- Bello, D.C., Pitts, P.E., & Etzel, M.J. (1983): "The communications effects of controversial sexual content in television programs and commercials". Journal *of advertising,* 12(3), 32-42

- Brumbaugh, A.M. (1993)," Physical attractiveness and personality in advertising: More than just a pretty face", In L. McAlister & M.L. Rothschild (Eds.), *Advances in consumer research* (Vol.20, pp. 159-164). Provo, UT: Associations for consumer Research.

- Burnham, Terence C.J., Flynn Chapman, Peter B. Gray, Matthew H. McIntyre, Sarah F. Lipson, and Peter T. Ellison (2006), "Men in Committed, Romantic Relationships Have Lower Testosterone," *Hormones and Behavior*, 44 (August), 119–22

- Cesarkas Y., Rivas J., (2008), "Are you irresistible? Understanding the law of attraction and putting them to work for brands", *WPP Atticus Awards*, Merit, 1-6

- Chestnut, R.W., La Chance, C.C., Lubitz A., (1977), "The decorative Female Model: Sexual stimuli and recognition of advertisement", *Journal of adverting*, 6(4), 11-14

- Cosmides, L., Tooby, J. (2000), "Evolutionary Psychology and the Emotions", in Lewis, M. & Haviland-Jones, J.M. (Eds.): Handbook of Emotions, *The Guilford Press*, New York

- Cramon, D., and Zihl, J. (1977), "Die Haeufigkeit schneller Augenbewegungen und Blinks als Aktivationsidikator".J. *Neurology,* 215: 115-125.

- Cristina De Balanzó, Nuria Serrano and Siemon Scamell-Katz (2010), "Damasio: A Starting Point for Integrating Neuroscience Findings Into Retail Research", *ESOMAR Congress Odyssey*, Athens September 2010

- Cunningham Jane, and Roberts P., (2007), "Marketing to Women*".* *Admap*, 481, march

- Damasio, A., R. (1994):" Descartes´ Error: Emotion, reason and the human brain". *Penguin Books Ltd*.

- De Balanzó, C., Serrano, N., Siemon, S.K., (2010)," Damasio: A Starting Point for Integrating Neuroscience Findings Into Retail Research", *Esomar*, Congress Odyssey. Athens, September.

- De Bruine M. L., Jones C. B., and Perrett I. D., Little C., A., Feinberg R., D., Smith M., J., Law (2007)," Effects of menstrual Cycle Phase on Face Preference", *Archives of Sexual Behaviour*, ASEB, article:10508-9268

- De Bruine M.L., Jones C.B., and Perrett I.D., (2005)," Womens attractiveness judgements of self-resembling faces changes across the menstrual cycle": *Hormones and behavior*, 47, 379-383

- De Lemos, J., (2007), "Measuring emotionally 'fuelled' marketing", *Admap,* (april), issue 482

- Dickerson, S., S., and Kemeny M., E., (2004), "Acute Stressors and Cortisol Responses: A Theoretical Integration and Synthesis of Laboratory Research," *Psychological Bulletin*, 130 (May), 355–91.

- Dolliver, M., (1999), "Question of the week: is there too much sexual imagery in advertising?" *Adweek,* 40 (11), p.22

- Du Plessis, E., (2008), "The advertised mind, groundbreaking insights into how our brain respond to advertising", *Millward Brown*

- Du Plessis, E., (2011), "The branded mind, what neuroscience really tells us about the puzzle of the brain and the brand", *Millward Brown*

- Duchowski, A., T., (2003), "Eye tracking methodology*:* Theory and practice*"*. *London: Springer-Verlag Ltd.*

- Dunkley, C., J., (2009), "Differences between the sexes; It´s all in the brain", *Market Leader*: Quarter 3, pp. 36-39

- Durante, K.M., Griskevicius, V., Hill, S.E., Perilloux, C., and Li, N.P. (2011),"Ovulation, female competition, and product choice: Hormonal influences on consumer behavior". *Journal of Consumer Research*

- Durante, K.M., Li, N.P., Haselton, M.G., (2008):" Changes in Women´s choice of Dress across the Ovulatory Cycle Naturalistic and Laboratory Task-Based Evidence", *Personality and Social Psychology Bulletin*, 34 (November) 1451-60.

- Eichner, S.F., Timpe, E.M., (2004);"Urinary-Based Ovulation and Pregnancy: Point-of-Case Testing", *Annals of Pharmacotherapy*, 38, 325-31.

- Englis, B.G., Solomon, M.R., Ashmore, R.D. (1994),"Beauty before the eyes of beholders: The cultural encoding of beauty types in magazine advertising and music television". *Journal of Advertising*, 23-(2), 49-64

- Feinberg, D.R., Jones, B.C., Law-Smith, M.J., Moore, F.R., De Bruine, L.M., Cornwell, R.E., Hiller, S.G., & Perrett, D.I., (2006), "Menstrual cycle, trait estrogen level, and masculinity preferences in the human voice". *Hormones and Behavior*, *4*9, 215-222.

- Field, J., (2009),"What women really want from campaigns", *Admap Magazine*, (march), Issue 503.

- Fleischman, D.S., Navarette, C.D., Fessler, D.M.T., (2010):"Oral contraception Suppress Ovarian Hormone Production", *Psychological Science*, 21 (April), 1-3.

- Ford, J., Bennett, R., Greenwood, C., (2008), " Comments: Challenges facing charity advertisers", *International Journal of Advertising*, Vol.27 , No.1

- Ford, J., (2005), "Comments", *International journal of advertisement*, 24(1)

- Franklin, S., (1997), "Artificial Minds", *MIT Press*, Cambridge, Mass

- Gangestad, S.W, Simpson, J.A., Cousins, A.J., Grarver-Apgar, C. E., Christiansen P.N., (2004),"Women´s Preferences for Male Behavioral Displays across the Menstrual Cycle", *Psychological Science*, 15 (May), 203-7.

- Gangestad, S.W., Thornhill, R., & Garver-Apgar, C. E. (2005), "Adaptations to ovulation: Implications for sexual and social behavior", *Current Directions in Psychological Science, 14,* 312-316.

- Gangestad, S.W., Thornhill, R., (1998):"Menstrual Cycle Variation in Women´s Preferences for the Scent of Symmetrial Men", *Proceedings of the Royal Society of London* B, 262 (May), 727-33.

- Gangestad, S.W., Thornhill, R., (2008):"Human Oestrus", *Proceedings of the Royal Society of London* B, 275, 991-1000.

- Gangestad, S.W., Thornhill, R., and Graver, C. E. (2002),"Changes in women´s sexual interest and their partners´ mate-retention tactics across the menstrual cycle: Evidence for shifting conflicts of interest", *Proceedings of the Royal Society of London,* B, 296, 975-982

- Graver-Apgar, C.E., Gangestad, S.W., Thornhill, R., Miller, R.D., Olp, J.J., (2006):" Major Histocompatibility Complex Alleles, Sexual Responsivity, and Unfaithfulness in Romantic Couples", *Psychological Science*, 17, (October), 830-835.

- Grazer W., and Keesling G., (1995), "The Effect of Print Advertising's Use of Sexual Themes on Brand Recall and Purchase Intention: A Product Specific Investigation of Male Responses," *Journal of Applied Business Research* 11 (summer)

- Hair, J.F. Jr, Bush, R. & Ortinau, D. (2009): Marketing Research, In a Digital Infornmation Environment (4rd edn), *McGraw-Hill.*

- Harris, R.J., (1994),"The impact of sexually explicit media. In J. Bryant & D. Zillman (Eds.), Media effects; Advances in theory and research (pp.247-272). *Hillsdale, NJ*: Lawrence Erlbaum Associates.

- Haselton, M.G., Gangestad, S.W., (2006):" Conditional Expression of Women´s Desires and Men´s mate Guarding across the Ovulatory Cycle", Hormones and Behavior, 49 (April), 509-18.

- Haselton, M.G., Miller, G.F., (2006)," Women´s Fertility across the Cycle Inreases the Short Term Attractiveness of Creative Intelligence", Human Nature, 17 (1), 50-73.

- Haselton, M.G., Pillsworth, M.M., Bleske-Rechek, E.G., Frederick A.E., (2007), "Ovulatory Shifts in Human Female Ornamentation: Near Ovulation, Women Dress to Ipress", *Hormones and Behavior*, 51 (January), 40-45.

- Hess, E.H., and Polt, M.J., (1960), "Pupil size Related to Interest Value of Visual Stimuli". *Science,* (August), (132) pp. 349-350

- Horowitz, B., (1987), "Sex in Ads: It even Sells Detergent*", Los Angeles Times*, Wednesday, July 8, C1-C3

- Hugdahl, K. (2001), "Psychophysiology*:* The Mind-body Perspective", *Harvard University Press*

- Jones, B.C., Little, A.C., Boothroyd, L.G., DeBruine, L.M., Feinberg, D.R., Law Smith, M.J., Moore, F.R., and Perrett, D.I. (2005a), "Commitment to relationships and Preferences for femininity and apparent health in faces are strongest on days of the menstrual cycle when progesterone level is high", *Hormones and Behavior*, *48*, 283-290.

- Jones, B.C., Perrett, D.I., Little, A.C., Boothroyd, L., Cornwell, R.E, Feinberg, D.R., Et al. (2005b), "Menstrual cycle, pregnancy and oral contraceptive use alter attraction to apparent health in faces", *Proceedings of the Royal Society of London,* B, 272, 347-354.

- Jones, M.Y., Stanaland, A., Gelb, B.D. (1998),"Beefcake and cheesecake: Insights for advertisers". *Journal of advertising*, 27(2),33-51

- Jones, B.C., DeBruine, L.M., Perrett, D.I., Little, A.C., Feinberg, D.R., & Smith, M.J.L.
(2008), "Effects of menstrual cycle phase on face preferences", *Archives of Sexual Behavior*, 37, 78-84, doi: 10.1007/s10508-007-9268-y

- Judd, B.B., Alexander, M.W (1983), "On the reduced effectiveness of some sexually suggestive ads." *Journal of the Academy of Marketing Science*, 11(2), 156-168

- Keller, K. L. (2008), "Strategic Brand Management: Building, Measuring, and Managing Brand Equity", third ed. *Prentice Hall*, Upper Saddle River, NJ.

- Kuszewski, Andrea (2010), "Your brain on sexual imagery, The Rogue Neuron", Institute for Ethics and Emerging Technologies , August 17/ http://ieet.org/index.php/IEET/more/4155

- La Tour, M., S., (1990): "Female Nudity in Print Advertising: An Analysis of Gender Difference in Arousal and Ad Response". *Psychology & Marketing*, 7(1), 65-81.

- La Tour, M.S., Henthrone, T.L. (1993), "Female nudity: Attitudes towards the ad and the brand, and implications for advertising strategy". *Journal of Consumer Marketing*, 10(3), 25-32

- LaTour, M.S., Pitts, R.E., and Snook-Luther, D.C., (1990), "Female nudity, arousal, and adresponse: An experimental investigation", *Journal of Advertising*, 19(4), 51-62

- Lane R., D., and Nadel L, editors (2002), "Cognitive Neuroscience of Emotion", New York: *Oxford University Press*.

- Lang, P.J. (1988), "What are the Data of Emotion?", in Hamilton, V., Bower, G.H. & Fridja, N.H. (Eds.): *Cognitive Perspectives on Emotion and Motivation*, Kluwer Academic Publishers, the Netherlands

- Larry Percy and John R. Rossiter, (1992) "Advertising Stimulus Effects: A Review," *Journal of Current Issues and Research in Advertising* 14 (spring), 75-90

- Lindenmann, W.K., "An Effectiveness Yardstick to Measure Public Relations Success", Public Relations Quarterly 38, no.1 (Spring), pp. 7-10.

- Lipson, S.F., and Ellison, P.T., (1996), "Comparison of salivary steroid profiles in naturally occurring conception and non-conception cycles", *Human Reproduction* 11,2090–2096

- Maki P.M., Rich J.B., Rosenbaum RS. (2002), "Implicit memory varies across the menstrual cycle: estrogen effects in young women", *Neuropsychologia*; 40: 518–529.

- Mazur, A., Booth, A., (1998), "Testosterone and Dominance in Men," *Behavioral and Brain Sciences*, 21 (June), 353–63.

- McEwen, B.S., Wise P.M., Brige, S., (2002),"Estrogen and the brain" In: Manni, A., Verderame, F., (Eds.), Contemporary Endocrinology: Selective Estrogen Receptor Modlators: *Research and Clenical Applications*. Humana Press, Totowa, NJ, pp.121-144.

- Mehta, P.H., Jones, C.A., and Josephs, R.A., (2008), "The Social Endocrinology of Dominance: Basal Testosterone Predicts Cortisol Changes and Behavior following Victory and Defeat," *Journal of Personality and Social Psychology*, 94 (June), 1078–93.

- Miller, G.F., Todd, P.M. (1998) :"Mate Choice turns cognitive", *Trends in Cognitive Science*, 2, 190-198.

- Moriarty, S., (1986), Creative Advertising: Theory and Practice. Englewood Cliffs, NJ: *Prentice Hall.*

- Partala, T., and Surakka, V., (2003), "Pupil size variations as an indication of affective processing", *International Journal of Human-Computer Studies* 59, 185-198.

- Penton-Voak, I.S., Perrett D.I., (2000):"Female Preference for Male Faces changes Cyclically: Further Evidence", Evolution and Human Behavior, 21 (January), 39-48

- Percy, L., and Elliott, R., (2009), "Strategic Advertising Management",Third edition. Oxford: *Oxford University Press*

- Percy, L. (2003), "Understanding the role of emotion in advertising", *Forum for Advertising Research/* downloaded fromWarc.com

- Peters, M., Simmons W.L., Rhodes, G., (2009), "Preferences across the menstrual Cycle for Masculinity and Symmetry in Photographs of Male Faces and Bodies", *PloS One*, (January), Volume 4, Issue 1, e4138

- Peterson, R.A., Kerin, R.A. (1977), "The female role in advertisements: Some experimental evidence", *Journal of Marketing*, 41, October, 59-63

- Petty, R.E., and Cacioppo, J.T., (1986), "Communication and Persuasion: Central and Peripheral Routes to Attitude Change", *New York: Springer-Verlag*

- Pieters, R., &Wedel, M., (2004), "Attention capture and transfer in advertising: brand, pictorial, and text-size effects", *Journal of Marketing*, 68 (April), 36-50.

- Pipitone R.N., and Gallup, Jr. G., (2008), "Women´s voice attractiveness varies across the menstrual cycle", Evolution and Human Behaviour 29, 268-274

- Pope, N.K.L., Voges K.E., Brown M.R., (2004), "The effect of Provocation in the Form of Mild Erotica on Attitude to the Ad and Corporate Image", *Journal of advertising,* 33 (1), 69-82

- Popper, K., (2002) [1959], "The Logic of Scientific Discovery" (2nd English ed.), *New York, NY*: Routledge Classics. p. 3.

- Putrevu, S., (2008), "Consumer responses towards sexual and nonsexual appeals: The influence of Involvement, need for cognition (NFC), and Gender", *Journal of advertising*, 37 (2), 57-69

- Puts, D. A. (2005), "Menstrual cycle and mating context affect women's preference for male voice pitch", *Evolution and Human Behavior*, *26*, 388-397.

- Reichert, T., Heckler E.S., Jackson, S., (2001), "The effects of Sexual Social Marketing Appeals on Cognitive Processing and Persuasion", *Journal of advertisement*, 30 (March), 13-27

- Reichert T., Lambiase, J., (2003), "Sex in Advertisement: Perspectives on the erotic appeal", Mahwah, New Jersey: *Lawrence Erlbaum Associates*

- Reichert, T., & Ramirez, A. (2000)," Defining sexually oriented appeals in advertisements: A grounded theory investigation." *Advances in Consumer Research*, 27, 267-273.

- Reid, L.N., Lawrence C., Soley L.C., (1981)," Another look at the Decorative Female Model: The Recignition of Visual and Verbal Ad Components", *Current Issues and Research in Advertising,* James H Leigh and Claude R.Martin, eds., Ann Arbor, MI: The University of Michigan, 122-133

- Richardson, J.T.E., (1992), "The menstrual cycle, cognition and paramenstrual symptomatology". In: Richardson, J.T.E (Ed.), Cognition and the menstrual cycle Richardson, 1992; *McEwen et al., 2002*

- Richmond, D., and Hartman, T.P., (1982), "Sex Appeal in advertisement", *Journal of Advertising Research*, 22 (5), 53-61

- Rossiter, J.R. & Percy, L. (1997), "Advertising Communications and Promotion Management", New York: *McGraw-Hill.*

- Saad, G., and Vongas J.G., (2009), "The Effects of Conspicuous Consumption on Men's Testosterone Levels," *Organizational Behavior and Human Decision Processes*, 110, 80–92.

- Scherer, K.R. (2000), "Psychological Models of Emotion", in Borod, J.C. (Eds.): *The Neuropsychology of Emotion,* Oxford University Press

- Schmolze, R., Hedger, G., Morris, L., (2004), "Forever Jung. Identifying consumer archetypes to help guide communications strategy" *ESOMAR, Annual Congress, Lisbon, (Sept)*

- Sciglimpaglia D., Belch M.A. et Cain R.F. (1978), "Demographic and cognitive factors
influencing viewers' evaluations of 'sexy' advertisements", *Advances in Consumer Research*, 6, pp. 62-65.

- Severn, J., G.E. Belch, M.A. Belch (1990), "The effects of Sexual and Non-Sexual Advertising Appeals and Information Level on Cognitive Processing and Communication Effectivness," *Journal of Advertising*, 19 (1), 14-22

- Simpson, P.M., Horton S., and Brown, G., (1996), "Male Nudity in Advertisments: A Modified Replication and Extension of Gender and Product Effects," *Journal of the Academy of Marketing Science*, 24(3), 257-262

- Soley, L., & Kurzbard, G. (1986), "Sex in advertising: A comparison of 1964-1984

magazine advertisements". *Journal of Advertising*, 15(3), 46-54.

- Solís-Ortiz, S., Corsi-Cabrera, M. (2008), "Sustained attention is favored by progesterone during early luteal phase and visuo-spartial memory by estrogens during ovulatory phase in young women", *Psychoneuroendocrinology*, 33 (7), 989-998. Elsevier Ltd.

- Solomon, M.R., Ashmore, R.A., & Longo, L.C. (1992), "The beauty match-up hypothesis: Congruence between types of beauty and product images in advertising", *Journal of advertising*, 21(4), 23-34.

- Steadman, M. (1969), "How sexy illustrations affect brand recall". *Journal of Adverting Research*, 9(1), 15-19.

- Sullivan, A., (1988), "Flogging Under wear: The New Raunchiness of American Advertisement", *The New Republic*, January, 20-24

- Theus, K.T. (1994), "Subliminal advertising and the psychology of processing unconscious stimuli: A review of research". *Psychology & Marketing*, 11 (39, 271-290.

- Thornhill, R., Gangestad S.W., (2003), "Do Women Have Evolved Adaption for Extra-Pair Copulation?", *Evolutionary Aesthetics*, ed.K. Grammer and E.Voland, Berlin: Springer, 341-68

- Thornhill, R., Gangestad S.W., Mill, R., Scheyd, G., McCollough J.K., Franklin, M., (2003), "Major Histocompatibility Complex Genes, Symmetry, and Body Scent Attractivness in Men and Women", *Behavioural Ecology*, 14 (September), 668-78

- Taflinger, R.F., (1996), "Taking Advantage/ You and me, Babe: Sex and Advertising", http://www.wsu.edu:8080/~taflinge/sex.html, February 02-2011.

- Thornhill, R., Gangestad S.W., (1999), "Facial attractiveness", *Trends in Cognitive Science*, (3), 452-460.

- Thornhill, R., Gangestad, S.W., (2008), "The Evolutionary Biology of Human Female Sexuality", New York: *Oxford University Press.*

- Thorson, E., (1990), "Consumer Processing of Advertising", *Current Issues and Research in Advertising*, J. Leight and C. Martin, eds., Ann Arbor, MI: University of Michigan, 197-230.

- Thurén, T. (2008), "*Videnskabsteori for begyndere",* København: *Rosinante.*

- Trachtenberg, J.A., (1986), "It´s Become Part of Our Culture*", Forbes*, May, 134-135

- Venners, S.A., Liu, X., Perry, M.J., Korrick, S.A., Yang, Z.L.F., Yang, J., Lasley, B.L., Xu, X., Wang, X., (2006), "Urinary Estrogen and Progesterone Metabolite Contraception in Menstrual Cycle of Fertiale Women with Non-contraception, Early Pregnancy Loss or Clinical Pregnancy", *Human Reproduction*, 21 (9), 2272-80.

- Wedel, M., Peiters, R., (2000)," Eye Fixations on Advertisement and Memory of Brands: A model and Findings", *Marketing Science*, 19(4), 297-312

- White, R.E., Thornhill, S., and Hampson, E., (2007), "A Biosocial Model of Entrepreneurship: The Effect of Testosterone and Family Business Background," *Journal of Organizational Behavior*, 28 (January), 451–66.

- Wilcox, A.J., Dunson, D.B., Weinberg, C.R., Trussell, J., Baird, D.D., (2001), "Likelihood of Conception with Single Act Intercourse: Providing Benchmark Rates for Assessment of Post-coital Contraceptives", *Contraception*, 63, 211-15.

- Wolfgang, Grassl, Hillsdale, College, (2000), "Book Review: Strategic Brand Management: Building, Measuring, and Managing Brand Equity." *Journal of Consumer Marketing* Vol.17 (3), p. 263-272

- Young, L.J. and. Insel, T.R., (2002), "Hormones and Parental Behavior," in *Behavioral Endocrinology*, 2nd ed., ed. Jill B. Becker, Marc S. Breedlove, David Crews, and Margaret M. McCarthy, Cambridge, MA: MIT Press, 331–69.

Webpages

http://www.drdavidlewis.co.uk/assets/NeuroMarket1.pdf, 03.05.2011, time 23:11

(Lewis Dr., D.Phil., BSc (Hons) FINSTD, FISMA.)

http://www.en.wikipedia.org/wiki/Luteal_phase, 04.01.2011, time 16:35

(Luteal phase description)

http://www.imotionsglobal.com, 01.05.2011, time 18:10

(iMotions homepage)

http://www.prsresearch.com, 10.05.2011, time 08:30

(Perception Research Service)

http://sexinadvertising.com., 03.12.2010, time 12:30

(Professor Dr. Tom Reichert homepage)

http://www.smartmanager.com.au/web/au/smartmanager/en/pages/86_stress_all_around.html,

08.03.2011, time 13:15 (Article regarding; Stress is all around us)

http://www.wsu.edu:8080/~taflinge/sex.html, 02.05.2011, time 10:11,

Richard, F., Taflinger, PhD (1996), "Taking Advantage/ You and me, Babe: Sex and Advertising"