The effect of endorsers on brand attitude and purchase intention: A consumer neuroscience research on female consumers.

MASTER´S THESIS

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Endorsers effect on brand attitude and purchase intention: A consumer neuroscience research on female consumers.

This study is specifically concerned with the effect of endorser advertisement on brand attitude and purchase intention. It is the initial attempt to investigate whether the neuroscience research methods of GSR, EEG and eye tracking with benefit can be applied in the selection process of endorsers.

The study has three main objectives; (1) To investigate whether brand advertisement can gain from changing the visual construction by portraying more positive emotions. (2) To find out whether investments in expensive endorsers such as elite athletes and bloggers pay off in terms of increased attitude towards the brand. (3) To discover whether the effectiveness of the endorser purely depends on the perceived source variables suggested by the source models.

The researched was conducted in Copenhagen, at the Center of Decision Science, Copenhagen business School in March 2017. 48 participants successfully finished the test. The means of “Time to First Fixation (TTFF)”, “Time Spends Fixating (TSF)”, peaks per/min in GSR, EEG asymmetry and self-reported measures on source were used to draw conclusion from the data.

The results did not support the expectations of stimuli portraying more positive important to be more persuasive for the case of the sport industry. Furthermore, the findings suggest that the sub-category of celebrity endorser, elite athletes and sport/fitness bloggers are not correlated with brand preference are not a driver of emotional arousal nor approach motivation observed by the EEG asymmetry. However, celebrity endorsers influence initial eye movements and bloggers are observed to be better than elite athletes to drive this initial attention. Furthermore, results show that selected source variable have significant influence on the emotional arousal and approach behaviour. On the basis of the results of the research, it can be concluded that celebrity endorsers need the right combination of attributes to unconsciously modify brand preference with consumers and neuroscience research tools can provide the necessary insights.

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1. Introduction

1.1 intro

In the advanced world of today, consumers are continuously overloaded with immense amount of information and stimuli pushing for their attention in the aim of influencing their purchase behaviour. A common mean to present brand or product information is advertisement (Percy & Rosenbaum-Elliott, 2009). The increased competition in the market place and advanced technologies are forcing brands to fight for the marginals to be that little bit more effective and relevant for the consumers. A recognised tactic and commonly used strategy to change brand attitude and to stand out of from the crowd, is the use of endorsements (Erdogan, Tagg, & Baker, 2001; Nord & Peter, 1980; Percy & Rosenbaum-Elliott, 2009).

Macro trends

One of the acknowledged macros of the last decades is the growing influence of the female consumer. It is observed that the female consumers are increasingly taking over the consumption decision in the household, including product areas which were thought to be male dominated, such as cars and electronics(Silverstein & Sayre, 2009). Due to this shift, as well as females becoming more educated and taking greater part in the workforce globally, the consumer group has been of increasing interst to brands. From own observation of marketing practises, as well as insight into working in several global companies, finding the right approach and strategy to appeal to this growing female economy is high on the agenda for many companies.

Shift in marketing practise when targeting female consumers

The sport industry (incl. sport goods and sport nutrition) is one industry where the female consumer is a key influencing factor for the growth of the total market. Winning the female consumer can therefore have impact on the future success of the brands and companies are trying to find the right combination of marketing parameters to build appeal to the female consumer.

In recent years, sport brands have started to engage with other subcategories of celebrity endorsers, such as music performers and sport/fitness bloggers. For example, the famous brand Puma has collaborated with the music star, Rihanna recently. They presented her as being the face of the female training campaign in the AW 2015 collection (Anaya, 2015). Even more recently, Reebok used only bloggers in the Nordic countries (Nordic fitness lifestyle bloggers) in their training brand owned campaigns including in-store advertisements. However, no true insights are available about the effect

of using bloggers instead of the elite athletes which has been observed to be the standard endorser strategy when targeting the female consumer.

Consumer neuroscience

The evolving field of consumer neuroscience also referred to as decision science and is thought to enable access to the unconscious brain processes connected to decision making(Plassmann, Ramsøy, & Milosavljevic, 2012). Recent neuroscience research suggest that neuro imaging tools can help understand consumer persuasive behaviour patterns and help develop cost effective marketing campaigns, thus providing more efficient trade-off between costs and benefits. Contemporary neuroscientists have demonstrated that neuro imaging methods can provide information about the consumer preference creation process which cannot be obtained from "regular" consumer research tools (Vecchiato et al., 2014). Furthermore, current consumer neuroscience research only identify that use of endorsers in advertisement does cause reaction in the brain, which has led to the objective of this study.

The goal of the study is to uncover whether neuroscience research methods can help reveal "margins" that can affect the success of endorser advertisement and if the current marketing practise around endorsers in the sport industry is the most effective when aiming to target the female consumer. To do this, a consumer neuroscience research will be conducted applying the methods of EEG, Galvanic skin response and eye tracking. The experiment conducted in this paper simulates product advertisement applying an endorser strategy.

1.2 Research Question and delimitation

The following research question will be the guiding framework for the study:

Research question:

"How can brands in the sports industry choose the most effective endorser when persuading female consumers? Can consumer neuroscience research methods beneficially be applied to identify effective endorsers in increasing attitude and purchase intention?"

Sub questions:

- *Are positive emotional portrayal via face expression be more effective in persuading*
- *Are bloggers more effective than elite athletes in increasing purchase intention.*

- *Is the currently used "serious" facial expression, the so-called sport expression, in sport advertisement the most effective.*
- *Can neuroscience research methods help predict endorser effectiveness of attitude formation.*

1.3 Delimitations

The focus of the study purely evolve around endorsers´ effect on attitude and purchase intention towards the brand. Therefore, other relating topics or objectives for using endorser will not be included; such as; endorsers influence on long-term consumer-brand relationship (Dwivedi, Johnson, & McDonald, 2016). The study has only considered the perspective of endorsers in brand owned marketing e.g. not product exposure through endorser´s own channels and social media networks.

For the reason of limited space, the paper will not provide a deeper insight into the actual happenings in the brain or other biological explanations to the reactions infused by advertisement and endorsers.

2. Study of established methods influencing consumer decision behaviour

To reach the objectives of the study, a significant amount of theories and methods have been researched and established in brand management with regards to influencing consumer behaviour. A study of current published literature has been carried out in order to gain deep insight into consumer decision behaviour. Firstly, current brand management and consumer psychology theories were reviewed to understand the role of endorsers in advertisement, and subsequent consumer decision behaviour. Secondly, a literature review of consumer neuroscience and decisions science has been carried out to gain understanding of probable decision influencing factors towards exposure to brand endorsers and media. Finally, current limitations of established theories and methods of influencing consumer decision behaviour have been discussed. A new hypothesis model based on neuroimaging method has been proposed with the aim to improve favourable consumer decision behaviour towards brand exposure.

2.1 Brand management and consumer psychology

2.1.1 Brand equity

A recognised and broadly used brand management concept, is brand equity creation and is described as, “a set of brand assets and liabilities linked to a brand, its name and symbol that add to or subtract from the value provided by a product or service”, by the founder Aaker who first introduced the concept(1992). There are several scholars who have explored the concept of brand equity, and are supportive of Aaker´s definition of being the “added value” additional to a physical product. In other words, increasing brand equity help firms differentiate their products or services, both on the conscious and unconscious level in the minds of consumers, which adds to competitive advantage of the brand (Aaker, 1992, 1996). Keller (1993) revised the model and established the concept of customer-based brand equity, which is about the “differential effect that brand knowledge has on consumer response to that brand´s marketing” (Kotler & Keller, 2012, p. 141). The original concept by Aaker suggested five kinds of assets as sources to create brand equity; brand loyalty, brand awareness, perceived quality, brand associations and other proprietary brand assets, as illustrated in Figure 1. The foundation of the customer-based brand equity model suggests it is a consumers knowledge that steers perception and subsequent preferences.

Consumer knowledge is explained as everything that the consumer has stored in his/her memory consisting of all previous thoughts, feelings, images, experiences and beliefs around the brand (Keller, 1993; Kotler & Keller, 2012). These stored attributes in the human memory control the subsequent brand choice. It implies that consumer-based brand equity is increased by strengthening the positive brand associations and by reducing the negative brand associations, which will be reflected through increased purchase intention of the consumer towards the brand.

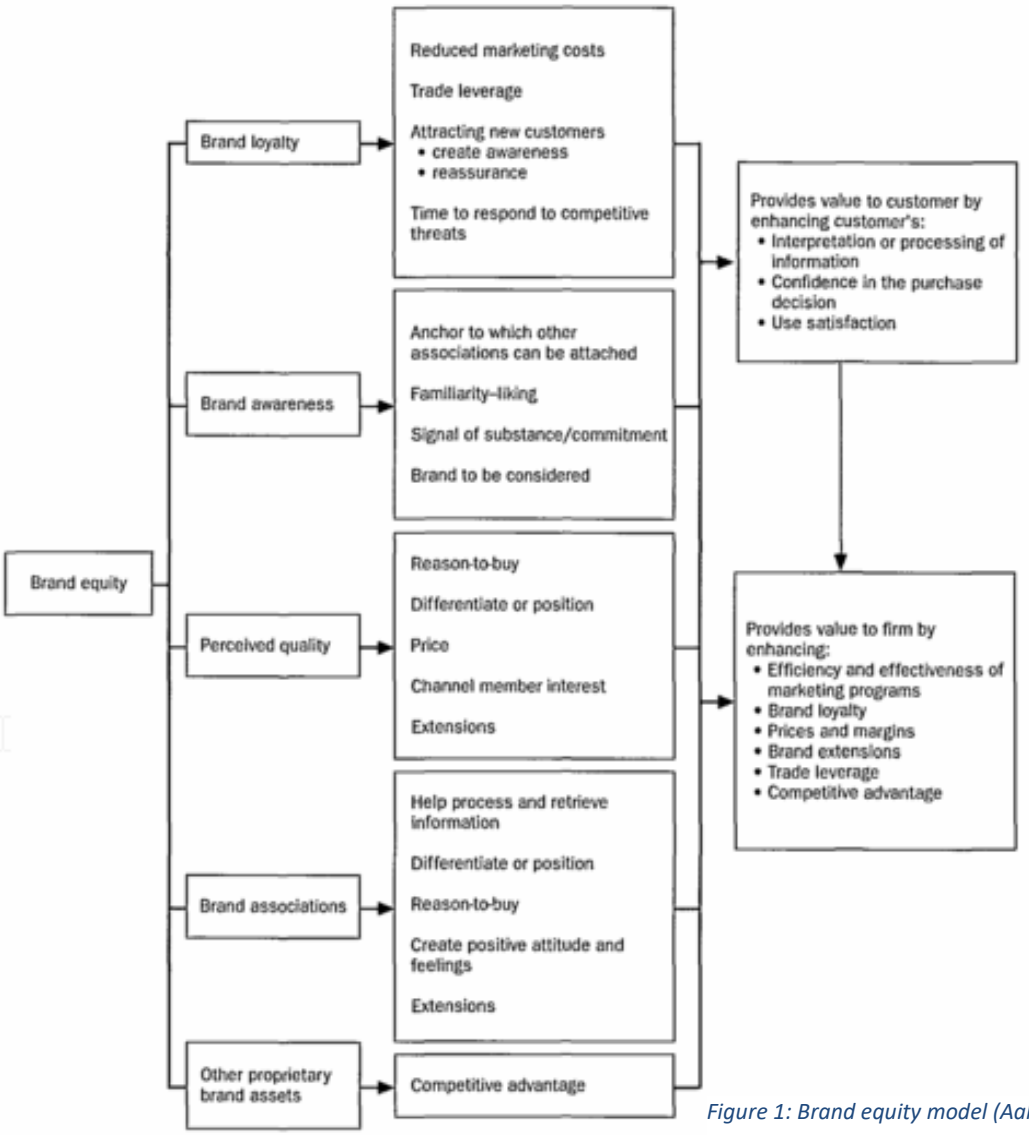


Figure 1: Brand equity model (Aaker, 1992)

Brand associations are recognised for being created through brand extensions such as, products, event sponsorships and brand endorsers (Nord & Peter, 1980). It is observed that the terms, brand ambassadors, brand/product endorser, individual sponsorships, have been used interchangeably in published literature to describe the use of endorsers in advertisement. However, the term sponsorship

is observed as primarily referring to the event sponsorships (Aaker, 1992; Byers, 2016; Heding, Knudsen, & Bjerre, 2009; Koernig & Boyd, 2009; Kotler & Keller, 2012; Spry, Pappu, & Cornwell, 2011; Brian D. Till & Busler, 2000; Uggla, 2008). The brand associations are thought to be expressed in two different levels. A primary brand association exploits new categories and the secondary brand association leverages brand alliances (Kotler & Keller, 2012). An increase in brand equity through alliances occurs due to increase in brand awareness by additional exposure in the channels of the alliance partner. Likewise, a brand exposure together with the brand alliance have been proved to cause transfer of quality perception, credibility and brand loyalty. The credibility perception of a brand is observed to be noticeably improved through correct alliances. Brand endorsers are seen as a part of the secondary source level of brand equity alliances (Aaker, 1996; Keller, 1993; Uggla, 2008).

Brand alliances including brand endorsers are seen as means that can alter brand association. The consumer attitude towards brands can improve with the right alterations, thus improving the perceived value of a brand and also purchasing intention, which are interconnected. Furthermore, establishing collaboration with endorsers and using them in advertisements increases brand awareness among target consumers.

The consumer-based brand equity concept follows the consumers decision-making process based on consumer psychology. It proposes that several stages are required in order to influence brand preference over time; firstly representation and attention, secondly predicted value, thirdly experienced value, and lastly remembered value and learning (D. Kahneman & Snell, 1992; Rangel, Camerer, & Montague, 2008). The first two steps are the most crucial, where extensions such as endorsers and the visual expression are claimed to be able to influence a subsequent modification of memory, preference and hence choice.

2.1.2 Self-concept theory on consumer behaviour

It has been established that consumers base their decisions on a mix of different information that is processed and stored in the memory, both consciously and unconsciously. However, it doesn't explain what is the "right" thing to do to create positive attitude and preference towards the brand or product with the target group and/or individual consumer.

Current researchers of consumer behaviour argue that a consumers decision behaviour is not rational and that they purchase partly because of the perceived experience provided by the choice of product (Arnould, Price, & Zinkhan, 2005; Østergaard & Jantzen, 2000). However, consumer behaviour to an increasing degree has shown dependence to reflect consumers wanted affiliations or group belonging

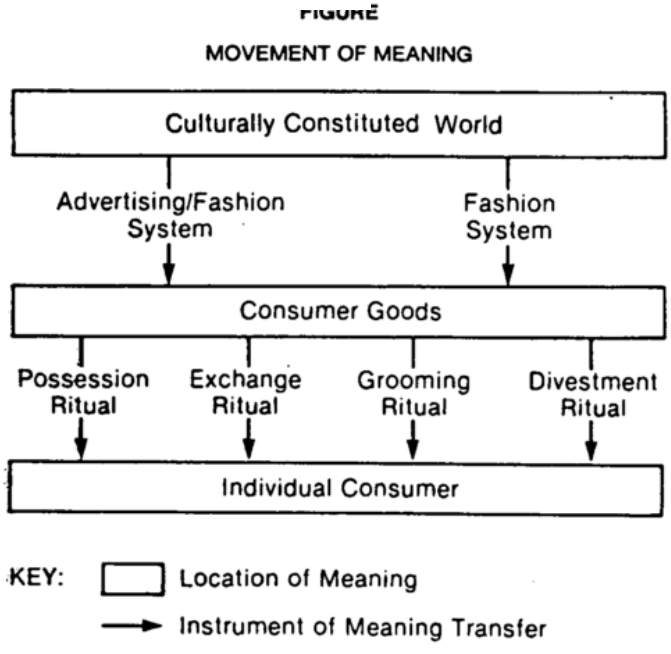
(Belk, 1988; Østergaard & Jantzen, 2000). Self-concept theory suggests that possessions become part of consumers "extended self". Furthermore, possessions are observed to become not only a symbol of affiliation, but even stronger symbols of unwished affiliations (Arnould et al., 2005; Belk, 1988; McCracken, 1986). Thus, consumption is used to reinforce the self-concept visually towards others. Fournier even goes as far as saying that "consumers do not choose brands, they choose lives" (Fournier, 1998, p.376). Thus, brands with stronger associations enhance the symbols realised through consumption (Arnould et al., 2005). People are expected to be attracted towards products which enhance their desired self-identities and clearly communicate their group memberships.

2.1.3 Creation of symbols and meanings of brands

McCracken (1986) suggest that the meaning of products to consumers is transferred in two levels, 1) through the advertisement and/or fashion system, and 2) what is translated to the "acquiring" and personalisation process of consumers, which is individual and can vary depending on product type. The first level, the advertisement and/or fashion system, is more relevant for the purpose of this study.

From the perspective of McCracken´s (1986) model "meaning of movement", the advertisement and fashion systems are essentially seen as agents for transferring the meaning of current perspectives and beliefs from the culturally constituted world (CCW) to the brand or product. However, the information

Figure 2: The process of meaning movement (McCracken, 1986)



or input is still to be encoded by the consumers, hence the consumer is the final author influencing the process of meaning transfer (see Figure 2).

Furthermore, McCracken suggests that the dynamics of the two systems are different from one another. The movement of meaning through the advertisement system is accomplished by means of advertisement, which unhooks meaning from CCW and transfers it to the brand or product. In a later article, McCracken (1989) argues that celebrity endorsers, also referred to as opinion leaders or reference groups, play a key role in the meaning transfer process of how persuasive and successful the advertisement is. The use of reference groups transfer meaning via the associations held by the consumer regarding the group (Muniz & O'Guinn, 2001). Hence, advertisement depend upon the symbolic properties offered by the endorser, whereas the fashion system has more sources of meaning, agents of transfer, and media of communication involved in the process. The fashion system is seen as the agent of inventing new cultural meaning, which is then undertaken and spread by the opinion leaders who help form and alter current cultural meaning (McCracken, 1986). Therefore, consumers also use celebrities as a their reference group when constructing or altering their self-identities (Escalas & Bettman, 2005) .

2.2 Endorser theory

Marketeers often pursue endorsement as a promotional strategy with the aim to communicate the qualities of a brand or product. An endorser is anyone right from a typical consumer, the expert of the product category to the CEO of a company or a celebrity (Friedman & Friedman, 1979).

In the following section, current research and theories about the use of endorsers in advertisement have been reviewed. The section aims to establish how a consumer behaviour theory enables marketing or brand managers to identify the right endorser and ensure the transfer of anticipated associations to the product. It also aims to identify the most effective endorser when altering the beliefs, feelings and perceived value to generate positive attitude towards the brand, and subsequently purchase intention from the consumer.

Researchers who investigated the effectiveness of endorsement have also described it as a conditioning process by combining a positively valanced stimulus (the endorser) with a neutral stimuli (a product) to transfer positive affect from the valanced stimulus to the non-valanced (B. D. Till, Stanley, & Priluck, 2008). It has been observed that brands today, especially the brands from the sport industries, use a mix of models perceived as unknown endorser (UKM) and celebrity endorsers in their advertisement. A celebrity endorser is defined by McCracken as any individual who enjoys public recognition and who

uses this recognition on behalf of a consumer good by appearing with it in an advertisement (1989, p.310). Elite athletes and bloggers with a significant number of followers are therefore both considered as subcategories of celebrity endorsers.

2.2.1 Celebrity effect

All types of endorsers offer a demographic information, for instance age, gender distinction, and status. However, their meaning is rather basic and general. Due to their public exposure, celebrity endorsers are thought to provide and transfer an additional and wider range of personality and/or lifestyle meanings to a brand or product due to higher awareness and knowledge about their persona (McCracken, 1989). Hence, advertisements with celebrity endorsers are expected to be more effective and precise in transferring meaning and associations to a brand.

Usually, the cost of engaging with celebrity endorsers is also much higher compared to UKM. Nevertheless, they are thought to provide more opportunities to reach out to other possible strategic objectives for a brand. They are able to capture and hold the attention of consumers much longer when they are used in different marketing related activities e.g. message recall (Friedman & Friedman, 1979; McCracken, 1986; Percy & Rosenbaum-Elliott, 2009; Brian D. Till & Busler, 2000) and credibility perception of the advertisement (Kamins, Brand, Hoeke, & Moe, 1989). Celebrity endorsers are therefore regarded to have a higher degree of positive influence on consumers' brand attitude and subsequently their purchase intention towards the product or brand they endorse (Aaker, 1992; Keller, 1993; Liu, Huang, & Minghua, 2007; McCracken, 1989; Ohanian, 1991). It can be expected that elite athletes and bloggers are more successful in persuading consumers and hence enhancing brand perceptions and beliefs.

Athletes are among the most used subcategories of celebrity endorsers in advertisement. This is not just the case for the sport industries but also among non-sport brands (Bush, Martin, & Bush, 2004; Jones & Schumann, 2000). Historically, it has been the industry standard to use elite athletes in the sports industry with the objective to be able to claim performance (Holt & Cameron, 2010; Jones & Schumann, 2000). The use of athlete endorsers has not just been a standard strategy to reach out to consumers, but it has also been considered the most effective and basic approach of sport marketing (Aaker, 1996).

2.2.2 Source models of endorser persuasiveness

Most research around effectiveness of endorsers evolve around the persuasive influence of the "source-variables", where the source is referring to the endorser (Klucharev, Smidts, & Fernández, 2008).

While reviewing the literature, it has become apparent that there are three models which have directed the research on endorser effectiveness/persuasiveness; the source credibility model, the attractiveness model and the match-up hypothesis. These three models have been used as guiding frameworks for further study.

The source credibility and attractiveness model (the source models), both aim to define the characteristics or variables by which the endorser is the most persuasive, and hence effective and successful at increasing purchasing intention towards the brand or product (McCracken, 1989; Ohanian, 1991).

2.2.3 The source credibility model

The source credibility model suggests the perceived credibility of the sender of the message, a sender being the endorser. The model evolved from a study uncovering the leading factors for perceived credibility by Hovland, Janis and Kelly (1953). A source´s credibility is said to primarily consist of two factors: perceived expertise and trustworthiness of the endorser. The term source credibility is frequently used to judge the endorser or model´s attributes from which the consumers evaluate the truth of the message, either the endorser is persuasive or not. The consumer consequently accepts (believes) or rejects (doesn't believe) the content of the advertisement (Koernig & Boyd, 2009; Ohanian, 1990).

Expertise is the first factor viewed as a highly significant source variable of the successful persuasion (Ohanian, 1990; Brian D. Till & Busler, 2000). It is arguably the most investigated variable. The expertise variable is defined as, the extent to which a communicator is perceived to be a source of valid assertions (Hovland, Janis, & Kelley, 1953; Ohanian, 1991). Furthermore, the variable of expertise has been claimed and proved to be most frequently associated with the intent to purchase (Premeaux, 2009). As an example, athletes with top rankings in their respective sports receive higher perceived expertise valuations, and even more within their own sport (Stone, Joseph, & Jones, 2003). For this reason, an anticipation can be made of the athlete endorser as being an appropriate and more successful in persuading within the sports industry in comparison to non-athlete endorsers (Ohanian, 1991).

Trustworthiness is the second factor explaining the model. It is defined as the confidence the consumer has in the endorser for sharing and speaking the truth about the product brand. Alike perceived expertise, athlete endorsements are found to be more successful in persuading consumers due to a higher perceived trustworthiness. Their persuasiveness is found to be even stronger when endorsing sport related products (Koernig & Boyd, 2009; Stone et al., 2003).

Numerous researchers have successfully applied the source credibility model in different industries and scenarios to confirm its validity (Atkin & Block, 1983). One being Till & Busler (2000) who investigated endorser effect (athlete or unknown model) in advertisements for candy and sport energy bars. The findings from the study underlined the truth of previous research as their study discovered an increased effectiveness when athletes endorsed the sport energy bar compared to candy bars. They also identified a statistically significant relationship between gathered ratings of perceived expertise of the endorsers after the test (Koernig & Boyd, 2009; Brian D. Till & Busler, 2000).

In summary, it can be concluded that the athlete endorsers are more persuasive than UKM because of their perceived higher credibility, especially when they endorse sports related product or brands. However, current findings also highlight their persuasiveness is related to the respective ratings in perceived level of credibility, which is a construct of perceived expertise and trustworthiness.

2.2.4 Source-attractiveness model

The Source-attractiveness model is the second source model and it is originated from the social psychology research. The model is a component of the source valence model developed by McGuire (1985). In contrary to the source-credibility model, the source-attractiveness model claims that the persuasiveness ability of a message, or marketing advertisement, depends on the endorser´s "familiarity", "similarity", "likability", and "attractiveness" to the consumer (McGuire, 1968; Ohanian, 1990).

The variable familiarity is explained as the collective knowledge and level of awareness collected through acquaintance with the endorser. The likeability of the endorsers is said to be the affection or liking to the endorser's physical appearance and behaviour. The last variable suggested to drive endorser persuasiveness is the similarity between the endorser and the consumer, thus the resemblance in them.

In summary, the model suggest that the persuasiveness of endorser depends on the level of knowledge and awareness, liking and/or resemblance to the consumer (Erdogan et al., 2001; McCracken, 1989). Thus, it can be assumed that a celebrity endorser or a local well known endorser is more persuasive than unknown models. Furthermore, it can be expected that endorser with similar features or interest, such as exercising or competing in sports similar to the consumer should be more successful in persuading and transfer of positive associations.

Celebrities are traditionally perceived as more dynamic people with both attractive and likable characteristics (Atkin & Block, 1983). The increased use of celebrity endorsers has made the variable of

physical attractiveness more vital (Ohanian, 1990). In an effort to build a source credibility scale for the selection of endorsers, Ohanian suggest that attractiveness has developed into a dimension of source credibility (1991). The effect of physical attractiveness of the endorser in persuading and modifying beliefs relative to unattractive endorser has been backed-up by several researchers (e.g. Baker & Churchill Jr, 1977; Chaiken, 1979; Friedman & Friedman, 1979; Kahle & Homer, 1985a; Liu et al., 2007).

For this reason, it can be expected that either the attractiveness of the celebrity endorser or the unknown models is an important variable. It can be expected that physically attractive endorsers capture the attention of the consumer better, thus affecting and influencing liking of the advertisement.

Ohanian (1991) has built a scale, the source-credibility scale to measure the effectiveness of endorsers. In order to construct the scale, the dimensions from both source models, i.e. the source-credibility model and the attractiveness model, were used to identify the valance of the source. Finally, the variable of expertise, trustworthiness and physical attractiveness were selected. Ohanian did not include the source likability that includes physical attractiveness and behaviour as well as similarity in the development of the scale. She assumed that these attributes are already present in the trustworthiness factor.

There is some criticism of the source models by several scholars (McCracken, 1986, 1989). The source variable discussion has been challenged, arguing that the effectiveness of endorsers depends greatly on the symbolic properties of the individual endorser and the CCW around them. The investigative findings by Erdogan and his team supports this argument. Their findings strongly indicates that not all endorsers are suitable for all markets and cultures due to variations in the CCW in different countries (Erdogan et al., 2001).

The source models have also received criticism regarding their argued lack of inclusion and reflection on the perceived match between the endorser and the product (e.g. Erdogan et al., 2001; Liu et al., 2007; Brian D. Till & Busler, 2000). Studies have demonstrated that the endorsers, despite strong source variables, have appeared ineffective for some product categories (Friedman & Friedman, 1979). Thus, the effectiveness of the endorsement has proven a match-up effect on the persuasiveness. Friedman & Friedman also found proof of the source-attractiveness model during their study (1979). Nevertheless, there is disposition to the source models proposing that the persuasiveness of endorsers entirely depend on the consumers´ perceptions and characteristics as an individual. The product type being endorsed is not considered at all.

To summarise, it can be inferred that a "one-fits-all" endorsement strategy would not work equally successful where the CCW are different. There seem to be no research work which investigate whether the CCWs varies among different kinds of sport athletes, despite growing up and living in the same geographic location. However, it could be assumed that different sports grow their own sub-cultures as different sports demand; different training plans, different talents and mindset to perform in the specific area of sport. Thus, a company that would like an endorser to transfer association, should ensure to choose an endorser who resonates with the current perceptions and meanings in Danish culture, and perhaps specifically the sport sub-culture within the target group.

It can be concluded that the source models only offer information regarding whether or not the target consumer can identify, likes and are worthy of their trust. It doesn't provide information regarding the persona properties held by the endorser, which can be argued, is to hinder advertisers from identifying the matches and mismatches between endorsers and product groups in the eyes of the consumers.

2.2.5 Match up hypothesis

A match-up hypothesis has evolved from the criticism of the source models. A number of researchers demonstrated inconsistencies in effectiveness of the supposed attractive models when paired with different product categories (Kahle & Homer, 1985b; Kamins, 1990; Kanungo & Pang, 1973; Westover & Randle, 2009). It was initially described as a lack of "fittingness" between the endorser and the product (Kanungo & Pang, 1973). The match-up hypothesis proposes that the celebrity endorsers physical attractiveness is only capable of transferring compelling attributes to establish and improve positive evaluations of the product, depending on the perceived "match" between the product attributes and the associations conveyed by the individual endorser (Kahle & Homer, 1985b; Kamins, 1990). Although, most research efforts investigating the match-up hypothesis focus on the attractiveness variable(Liu et al., 2007; Westover & Randle, 2009), other studies looked at the impact of the expertise variable and product match-up. Consistent findings were presented, indicating that the perceived expertise of the endorser should be co-considered when selecting celebrities who are perceived as experts by the target consumers (Ohanian, 1991; Brian D Till & Shimp, 1998). It is worth highlighting that the studies presented do not consider the engagement level of the targeted consumer. For example, despite being a part of the target consumer group, people have different engagement levels in a certain product areas e.g. organic foods. One consumer is highly engaged in the community and therefore buy organic food. Another target consumer, with lower engagement, buys organic food because he/she believe it taste better and is perceived as the right thing to do. These two types of consumers may react differently to the endorsers due to insights and knowledge in the area. Perhaps

the low engagement consumer doesn't know the celebrity endorser in the advertisement, causing the endorser not to have the intended effect.

Researchers investigating the persuasiveness of athlete endorsers indicate that they are more persuasive than other celebrity endorsers and UKMs (Koernig & Boyd, 2009; Brian D. Till & Busler, 2000). However, studies have found that unknown models portrayed as athletes are also more effective than unknown models for sport related brands. In addition, Koernig & Boyd (2009) found that the perceived match between the athlete and product drive positive responses rather than the celebrity or fame level. Moreover, a study based on Philippine consumers indicate that cultural background may variate the response toward the expertise and fame level. This specific study identified a relationship between the fame or celebrity status of the athlete endorser and the purchase intention (Rodriguez, 2008). A perceived attractive athlete endorser with a perceived match to the product can increase consumers´ purchase intention more successfully (Koernig & Boyd, 2009; Liu et al., 2007). The higher effectiveness of athlete endorsers, when endorsing sport related products, is not found in non-sport related products (Koernig & Boyd, 2009).

From the literature in the area of endorsers, it can be further concluded that the endorsers, including athletes, are only persuasive when there is a perceived match between the product and the endorser. At the same time the athlete endorser is found to be more effective than others when he/she endorses sports related products.

It can be inferred that the source models and match-up hypothesis' are best used in combination. Critique of the match-hypothesis highlight that it should go beyond attractiveness and credibility, and preferably it should consider the match of their entire image, not only particular properties of the endorser (Erdogan et al., 2001).

Hence, it can be concluded that there are still many research gaps and theory around endorsers yet to be investigated. Furthermore, with today's growth of "new" celebrities, bloggers and their persuasive abilities in company-owned advertisement prove a new type of endorser and research area.

2.3 Gender theory of marketing and consumer behaviour

It is not only important what endorser you choose, but also the choice of language and image construction to influence how the consumer receive the information in the advertisement (e.g. Percy & Rosenbaum-Elliott, 2009).

The decision-making for men and women are culturally associated with different concepts. Sproles & Kendall (1986) have identified different decision-making styles of consumers, which they define as a mental orientation to uncover consumers´ approach to making decisions. Different processing strategies or styles and influencing factors between the genders have been identified (Meyers-Levy & Maheswaran, 1991; Stevens & Ostberg, 2011). Femininity (influencers of choice making) is associated with concepts such as, passion, instinct, nature, carnality, nature, body, impulse, emotion, irrationality and inability to resist the desire of bodily urges. Whereas, masculinity (influencers of choice making) are associated with concepts such as, logic, the mind, reason, spirituality, control, discipline, culture and rationality, which together also reflect and impact men's ability to better resist the desires of bodily urges (Stevens & Ostberg, 2011). Underscoring this difference, a study by Premeaux (2009) demonstrates that the celebrity endorsers influence both men and women. On one hand, it was found that men are influenced to a higher extend than the middle-class women. On the other hand, upper class women are the most influenced by celebrity endorsements.

Based on above observed gender behavioural patterns, it can be expected that women and men have different decision making styles and, likewise, are affected by different kinds of input. Females tend to purchase more irrationally and it is more based on emotional input.

2.4 Neuroscience perspective and theory on decision making and influence of endorsements.

2.4.1 Consumer neuroscience

Neuroscience, also known as Neural Science, is the study of how the nervous system develops, its structure, and what it does. Neuroscientists focus on the brain and its impact on behaviour and cognitive functions. The neuroscience study also deals with neural conditions and processes that underlie consumption, their psychological meaning, and their behavioural consequences'' (Reimann, 2011, p. 610). Thus, neuroscience research is able to provide access and insight into the unconscious influencers of consumer behaviour. The following sections describe the study of published literature on consumer neuroscience and relevant decision science to identify areas in the brain and their influence on human decision processes. The relevant insights obtained from the study shall be used to construct a research design and methodology of the proposed hypothesis in the next chapter.

2.4.2 Attention

Humans are primarily visual creatures and thus they receive most information through the visual sensory system from where it is sent to other parts of the brain to be processed (Koch, 2004). Attention is the mental faculty of considering or taking notice of someone or something. It is argued to be the specific mechanism accountable for selecting the information received with favoured status compared to other information that has also been received (Plassmann et al., 2012a). In other words, attention chooses which areas are being looked at and hence being processed in the brain. The eye-movements alone does not impact preference creation, however, stimulus-driven attention has been demonstrated to influence subsequent behaviour (Orquin & Mueller Loose, 2013). A strong correlation has been discovered between the time of attention, also referred to as fixation duration or gaze time, and the subsequent choice (Shimojo, Simion, Shimojo, & Scheier, 2003). This effect is also referred to as the Gaze bias. The longer the attention, the higher the chances of reflection and influence on preference.

There are two determinants of attention established in psychology and neuroscience, namely top-down and bottom-up (R. Pieters & Wedel (2004). A further two determinants of competitive visual selection and working memory have been established followed by a review by Knudsen in 2007. Establishment of these determinants or factors of attention over a period of time are indicative of changing awareness of attention, from traditional meaning of attention to that of something taking clear possession of the mind (Plassmann et al., 2012,). Considering the scope of this study, the attention determinants of bottom-up, top-down, and competitive visual selection have been studied and presented below.

2.4.2.1 Bottom-up attention

The bottom-up attention, also referred to as saliency-based attention is a fast and automatic selection from all available information driven by the intrinsic properties of visual input (Milosavljevic & Cerf, 2008; R. Pieters & Wedel, 2004). It implies low level features of the visual input constructing the information, such as colours and its luminance, orientation, size and movement (Wolfe & Horowitz, 2004). These bottom-up factors have been proved to have relatively stronger impact on consumer's initial eye movements when exposed to marketing information, like advertisements. Established research findings indicate that within an initial 2,5 seconds of exposure, the first four eye movements are made (Leven, 1991). The salient stimuli attract initial attention, the initial eye-movement, which has shown biased behaviour towards visual inputs or elements in the marketing information (Camus et al., 2009; van Zoest, Donk, & Theeuwes, 2004). Therefore, early attention can be expected to bias later behaviour. This also strongly applies to online behaviour (Plassmann et al., 2012a). Milosavljevic and Cerf verified this phenomenon in a study by testing online banner advertisements, where salient factors

increased the liking due to perceived initial attention effect (Milosavljevic & Cerf, 2008). There are also some higher-level factors that have the capability to gain automatic favoured status among other inputs. For example, the counts for text, faces, the viewers own name and the novelty factor (Plassmann et al., 2012a). Stewart, Pickering, & Sturt (2004) demonstrated that consumers spend about 200 milliseconds longer examining implausible brand extension and they infuse immediate disruption of the regular visual process. Stewards and his team suggest that eye tracking could be a plausible tool for testing and consequently identifying the degree to which the targeted consumer segment find brand extensions plausible or not.

There are other automatic biases discovered in visual attention, such as location effect. For example, Durgin, Doyle, & Egan (2008) and Plassmann et al., (2012) proved that the upper visual field receives more attention together with the right visual field (Efron & Yund, 1996; Plassmann, Ramsøy, & Milosavljevic, 2012b). Moreover, a center bias, within a certain area, of viewing has been identified, e.g. on a computer screen (Plassmann et al., 2012b; B. W. Tatler, 2007), which highly affect behaviour. The study has shown that products placed in the middle are chosen 60% more frequently (Reutskaya, Nagel, Camerer, & Rangel, 2011). Plassmann and her colleagues argue that attention behaviour is not a very influential mechanism of 'expert power', which is very relevant for the scope and objective of this project . Plassmann's argumentation is based on missing "persuasive effects" observations made in the sensory cortices.

2.4.1.2 Top-down attention

The top-down attention contrary to bottom-up attention, is dependent on internal as well as external conditions; one being goal orientation (Orquin & Mueller Loose, 2013). The external condition, meaning when a person is looking for a specific product that has certain shape or colour, e.g. a coca cola can when the person is thirsty. This is an example of a particular external condition where people pay more attention to drinks compared to other product categories because they are looking for a certain need (R. I. K. Pieters & Wedel, 2007; Plassmann et al., 2012b). The goal orientation also show severe impact on eye-movement patterns. In reality, it result in shorter fixation duration, meaning the time one holds the attention on a certain element or input in the information. Research shows that the eye moves on as soon as they realise it is not what they are searching for. (Rayner, Smith, Malcolm, & Henderson, 2009; Shimojo et al., 2003)

The top-down attention appears to impact the semantic learnings, built up by internal state of "cultural background" which is assumed, constructed and influenced over time. Cultural differences have shown apparent influence on the cognitive processing style, including eye-movement and attention behaviour

(Schaefer, Berens, Heinze, & Rotte, 2006). The study conducted by Schaefer and colleagues observed that Westerners (e.g. North Americans) attend to more focal objects, whereas East Asians attend to more contextual information when both are exposed to the exact same visual information or visual stimuli.

To conclude, the influence on consumers' eye-movements and attention depends on how the visual information is represented and illustrated. There are many automatic processes that can take place, thus the process is complex and bias in brand preference and subsequent decision-making can occur. Neuroscience and neuro research methods can uncover insights into eye-movement and attention that "regular" consumer behaviour theories and methods are not capable of.

2.4.3 The decision making and the pre-frontal cortex

Previous research provides evidence of several regions in the prefrontal cortex (PFC) being involved in decision making (e.g. Ravaja, Somervuori, & Salminen, 2013). It is important to understand the construction of the PFC before presenting the review of published research.

There are several significant subdivisions of the PFC, which are identified to be relevant for the affective processing and decision making (e.g. Davidson & Irwin, 1999). First, there is one between different brain sectors; the dorsolateral (dlPFC), ventromedial (vmPFC), and orbitofrontal cortex (oPFC). Secondly, there is a division between left and right sectors, also referred to as left and right hemisphere in some situations. Usually, the hemisphere describes one side of the brain as a whole, not just the PFC. (Richard J. Davidson & Irwin, 1999; Glimcher & Fehr, 2014). See Illustration 1 for visual illustration (borrowed from Davidson & Irwin, 1999, p. 13).

A substantial amount of lesion, neuroimaging and electrophysiological data backup the perspective of the PFC. It has an important role in the circuitry that evaluate and implement both positive and negative effects (Richard J. Davidson, 1992, 2004; Richard J. Davidson & Irwin, 1999).

For example, both the oPFC and vmPFC have shown involvement in the decisions process between alternative options and expected outcomes of the assessment of the perceived value (Daw, O'Doherty, Dayan, Dolan, & Seymour, 2006; Tremblay & Schultz, 1999). Moreover, Rilling and his colleagues have identified a high involvement of the dlPFC in processing occurring during decision-making. The dlPFC is specifically recognised for being involved in the cognitive control of emotions. It is also infused by marketing information (e.g. R J Davidson, Ekman, Saron, Senulis, & Friesen, 1990; Harmon-Jones & Allen,

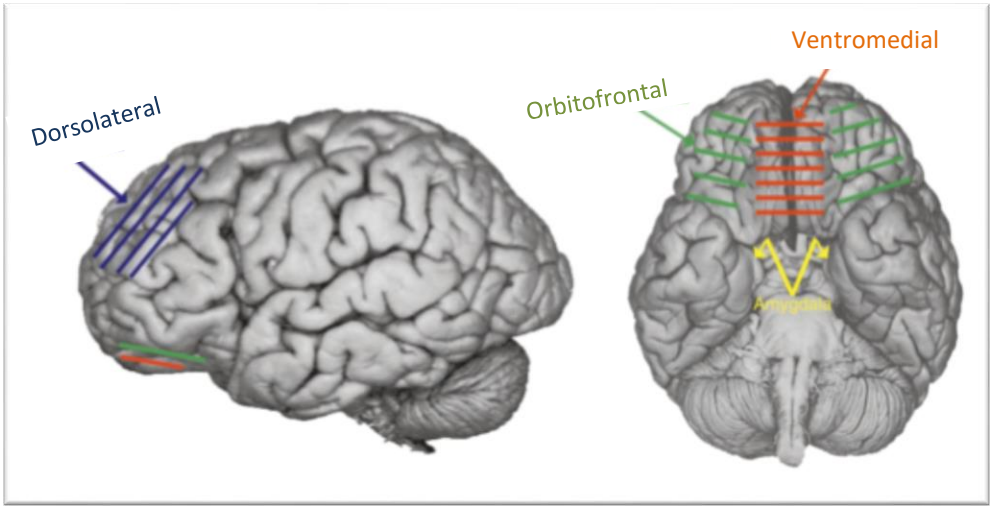
1998; Rilling, King-Casas, & Sanfey, 2008; Sutton & Davidson, 2000) and its subsequent influence on the evaluation of the product or brand. The involvement of the PFC in preference formation has also been recognized among other things because of its involvement in value prediction of products. The perceived value (also sometimes referred to as predicted value) is the consumer beliefs about value provided by the product at consumption point at some time in the future. In other words, the predicted evaluation of how much enjoyment the consumers derive from consuming the product at a point in the future.

To summarize, the relationship between preference, decision making and activity in the PFC is apparent.

2.4.4 Memory and decision making

Let us examine the question of what influences the activation in the PFC, and hence the decision making? Human decision-making is argued to be based on the perceived value of the product or brands stored in the long/term memory. The formation of memory is said to be a result of stimuli received through the senses. In other words, input exposed to the sensory register, such as the visual cortex, which distributes the stimuli or input to the relevant areas of the brain for processing e.g. the Amygdala (I will return to the functions of the amygdala later in this section (Glimcher & Fehr, 2014). Different areas can however pass it on again to more areas for further processing. After the processing of the input, the results are "returned" to the hippocampus responsible for memory, which adds or modifies already existing information stored in the long-term memory system (Glimcher & Fehr, 2014; Omrod, 2010). The visual cortex is special in the sense that it is the only cortex receiving direct input from the eyes (Glimcher & Fehr, 2014).

Illustration1: Sectors of human prefrontal cortex.



Out of the vast number of stimuli and/or information that humans are exposed to every minute, not all of it is processed and stored in the memory because human processing capacity is simply limited. It has been identified that humans are exposed to 11 million bits of information collectively through our senses. Humans can only process around 50 of those bits, hence most of that information goes unprocessed or unnoticed (Wilson, 2002). This underscores the reasoning for the essentiality of products and brands to develop advertisement with the right composition for the message to "make it" through the masses to successfully modify attitude and memory.

2.4.5 Memory recall

Research has shown that enhanced activity in the amygdala is connected to later memory (recall) upon exposure to stimuli, irrespective of whether it is a positive or negative type of stimuli (Dolan, 2002). The amygdala is a subcortical module in the brain and is a part of the limbic system. It is recognized for being the "center" responsible for emotions (Solnais, Andreu-Perez, Sánchez-Fernández, & Andréu-Abela, 2013). Moreover, evidence from fear conditioning studies indicates that the amygdala is also involved in associative learning (Daw et al., 2006; Poldrack, 2006). For this reason, it can be inferred that emotionally loaded information has a higher probability of being processed and consequently stored in the memory system. Likewise, products connected to the information will be encoded together with the emotions established through the information.

The research conducted by Klucharev, Smidts, & Fernández (2008) used self-reported measures and fMRI scanning tests. They tested the persuasive effect of the source variables "expert power" and "attractiveness" of the celebrity endorsers on attitude and memory recall of objects through stimulated advertisement. Endorsers with perceived expertise improved memory recall, whereas physical attractiveness of the celebrity endorsers showed to have no effect on memory recall. This subsequent memory effect established in the behavioural test yielded greater activity in the inferior and middle frontal gyrus (part of the PFC), the para hippocampal gyros and the hippocampus (part of the limbic system) (Klucharev et al., 2008) among others which are all in line with previously demonstrated involvement in declarative memory encoding(Brewer, Zhao, Desmond, Glover, & Gabrieli, 1998; Fernandez, Effern, Grunwald, & et al., 1999; Wagner, Schacter, Rotte, & et al., 1998).

In summary, findings show that it can be expected that creating higher emotional arousal will enhance the chance of being processed which reflects on increased memory recall. Likewise, increased overall activity in the PFC can be expected during memory encoding.

2.4.6 Memory and preference

To achieve a spot in the memory can become essential as several researchers have demonstrated a positive correlation between the memory and preference/attitude (e.g. Mcclure et al., 2004; Schaefer, Berens, Heinze, & Rotte, 2006). The veracity of this correlation has additionally been supported by findings of Klucharev and his team (2008). They found that percieved expertise and the physical attractiveness of the endorsers both had a significant effect on the attitude towards the object measured by (self-reported) purchase incidence. The fMRI results of this subsequent attitude effect revealed however, that there is no increased activity for favoured objects. Nonetheless, stronger activity for not favoured objects was observed across cortical and sub-cortical networks. Considering the scope of this project, it is worth mentioning that the activity was identified in the PFC (specifically the superior- and middle frontal gyros). At the same time, they observed activation in the amygdala and para hippocampal gyrus (Klucharev et al., 2008).

Hence, in summary, one should expect no overall increased activity in the PFC (inferior- and middle frontal gyrus) during encoding of preferred products (with stronger positive attitude). However, increased activity (power of the frequency) is expected to be higher overall for products of disliked endorsers.

2.4.7 Memory and perceived value

As discussed in the section for attention, the perceived value is argued to be a construct of how the brand associations are encoded, consolidated and recalled in the memory of the consumer. The creation of perceived value and consequent preference has been proved to happen on the unconscious level of the consumer (Plassmann et al., 2012a). It has been established that the areas of vmPFC and dlPFC are facilitators of information processing and the encoding of behavioural preferences in the memory (Camus et al., 2009; Plassmann, 2007; Wallis & Miller, 2003).

It has been specifically proven that advertisement alters consumers' belief on an unconscious level, resulting in modification of the consumers' perception of the value of the product, which effects the attitude and purchase intention towards the brand. For example, Braun-Latour & Zaltman (2006) have demonstrated the influence of advertisements on consumers' belief in their research. They observed a change in the recall of the consumers' initial beliefs after exposure to an advertisement. Likewise, the research revealed that exposure to imagery evoking emotions led to false memory of past beliefs, hence the images caused alterations in attitude towards the product. Furthermore, as previously highlighted in the attention section, studies examining the interaction between memory and attention have concluded that visual stimuli cause different intensity in emotional arousal. The same studies show that

visual stimuli infuse increased and faster activation in the (left) frontal cortices, which are better recognized and recalled due to perceived brand preference. This implies that the ability of an advertisement to establish and infuse an emotional arousal with the consumer impacts the recognition, and hence memory recall and choice (Mcclure et al., 2004). This point has been investigated further in the following section.

In summary, it has now been demonstrated that marketing information, such as advertisements, can modulate brand beliefs on an unconscious level of the consumer and that the brain areas involved in the encoding of brand preference are (among others) vmPFC and dlPFC. The choice of endorser can therefore impact the recall of an advertisement. Furthermore, it has been established that the subsequent arousal effect infused by an advertisement is dependent on the visual execution.

2.4.8 The role of emotions in decision making

The term emotion is described as a set of discrete reactions. These discrete emotional reactions are called emotional arousals, which can be experienced on both a conscious and an unconscious level; for example, slight changes in heart rate, brain wave activity and sweat levels. These bodily reactions happen automatically and cannot be controlled (Dolan, 2002; Glimcher & Fehr, 2014). Emotional arousal can be initiated by internal forms of stimuli such as own thoughts and/or external stimuli captured by the senses, for example when the eyes captures an advertisement (Bradley, Miccoli, Escrig, & Lang, 2008; Glimcher & Fehr, 2014; Groeppel-klein, 2005; Ohme, Reykowska, Wiener, & Choromanska, 2009). There are two kinds of emotional arousal that have been acknowledged, tonic and phasic arousal. The tonic arousal is defined as a long-term state of mind and therefore the level of arousal changes slowly over time, e.g. due to long-lasting and/or extremely intensive stimuli. The phasic arousal is an effect of exposure to a specific stimuli and it cause only short term changes in the arousal level (Groeppel-klein, 2005).

Currently, no clear division is established between areas of the brain responsible for emotions and cognition. There is no evidence provided so far for the existence of a single unified system that processes of emotion. However, several cortical and subcortical modules have been recognized for their involvement in the processing of emotion, e.g. the Amygdala, the striatum, the medial, and orbital regions of the PFC and the insular cortex (e.g. Cohen, 2005). This has been reaffirmed by recent fMRI studies highlighting a reciprocal relation between vmPFC and the amygdala during the encoding of emotionally valence stimulus (Heller et al., 2014). It has been specifically demonstrated that emotions can modulate cognitive functions (e.g. Glimcher & Fehr, 2014; Ravaja, Somervuori, & Salminen, 2013). Contemporary models of decision-making claim that reactions or activities induced by emotions can

drive “irrational” choices (e.g Cohen, 2005; Kahneman, 2003). Damasio, A. (1999) even proposes that one of the main factors driving the decision making is “emotion”. According to his theory, emotion makes the final “human guide for choices”. Humans are unconsciously influenced by finely adjusted affective mechanisms, which influences the latter decision making and/or actions (Richard J. Davidson & Irwin, 1999). Economic decisions often depend on “automatic, fast and effective processes” which are recognized for happening without cognitive control (Bargh & Chartrand, 1999).

Although the hippocampus has been observed to be the key player for memory storage, it has been proved during highly arousing events that the amygdala moderates the hippocampal storage process in order to keep certain memories (McGaugh, 2000). Likewise, research findings indicate that the amygdala can also control the visual cortex to further ensure that emotional events are a priority in perception and attention (Anderson & Phelps, 2001; Vuilleumier, Richardson, Armony, Driver, & Dolan, 2004). This underscores the previous statement stressing that highly emotionally valanced stimuli are prioritised before other stimuli in the memory storage process and the same counts for attention and perception.

To summarize, emotionally valanced information can be expected to be more effective than non-emotional in terms of persuading, or in other words modulated attitude and consequently the purchase intention towards a brand.

2.4.9 EEG asymmetry as a moderator and mediator of emotion

Frontal EEG asymmetry appears to serve as (1) an individual difference variable related to emotional responding and emotional disorders, and (2) a state-dependent concomitant of emotional responding. So far it´s been established that various areas of the brain are involved in the processing of persuasive/emotional stimuli (Cohen, 2005; Richard J. Davidson, 1992). The amygdala has been defined as the “center” of emotion. Nonetheless, currently available brain imaging tools cannot measure on the amygdala which type of arousal (positive or negative) is causing the increased activation (Solnais et al., 2013; Tanveer & Lodhi, 2016). However, the PFC has been acknowledged for the processing of positive and negative valanced stimuli and the subsequent emotional arousal (Richard J Davidson, 2004; Glimcher & Fehr, 2014; Ohme et al., 2009).

Likewise, it has been identified that there is a relationship between the emotional state and changes in frontal EEG asymmetry i.e. positive stimuli, such as joy or happiness, has been associated with greater left frontal activity, while negative, such as disgust or fear has been associated with greater right frontal activity (Richard J. Davidson, 1992; Ravaja et al., 2013). Divergent from this, are the findings indicating

that the anger is also connected with activation in the left hemisphere (e.g. Harmon-Jones & Allen, 1998).

It is suggested by Davidson (1992) that each of the frontal hemispheres, left and right, are specialized in processing the approach and the withdrawal/avoidance motivation, respectively (Richard J. Davidson, 1992; Richard J Davidson, 2004; Ohme et al., 2009). It has also been observed that some indications of frontal asymmetry measures are unable to foresee dispositional trends of positive or negative valence of stimuli (Harmon-Jones & Allen, 1998; Sutton & Davidson, 1997). Inspite of that, more recent studies have continuously proved the predictability of the frontal asymmetry regarding the approach/avoidance behaviour. Ravanja and his colleagues have for example demonstrated a relationship between the perceived need and higher perceived product quality with greater relative left frontal activation. Furthermore, numerous of studies have reported a relationship between the left prefrontal cortex and reward biases (e.g. Pizzagalli, Sherwood, Henriques, & Davidson, 2005; Vecchiato et al., 2014). The connection to reward bias suggest that the activation in the prefrontal cortex might be influenced by individual differences (Pizzagalli et al., 2005). In other words, people with different goals and aspirations can be expected to have different approach and motivation towards the same stimuli. Even cultural background has shown to impact timing of activation in the prefrontal but also emotional arousal whilst watching TV commercials (Vecchiato et al., 2011).

The execution of essentially "the same" stimuli is also proven to have immense impact on reaction and arousal level on the viewer. Research conducted by Ohme et al. (2009) shows that by changing the execution of a particular moment in a TV advertisement can have immense impact on emotional reactions and arousal level, which is induced by that specific scene. Although the alteration of the scene didn't have an affect in the ad recall between the two tested versions of the TV advertisement, differences were found in the level of knowledge regarding the product benefits and key benefits. In addition, increased product choice has been observed in the behavioural test among the participants who saw the TV advertisement with higher emotional arousal levels. Likewise, men and women can also be expected to act unalike due to their different semantic interpretations (Vecchiato et al., 2011, 2014).

Finally, individual differences have been identified in baseline activity in the area and it is observed to be correlated with mood, with genetics also having an influence (Allen, Coan, & Nazarian, 2004). Thus, is it important to remove the baseline activation before calculating the asymmetry fluctuations in activities relating to left and right side(Allen et al., 2004; Harmon-Jones, Gable, & Peterson, 2010).

2.5 Potential of consumer psychology and neuroscience for managing brands in sports industry

The established theories, models and methods in the fields of brand management, consumer psychology and consumer neuroscience have been studied and discussed in previous sections. The studies reveal that the brand alliances are articulating consumers' attitude by various means. Endorsers have been used as tactical stragegy to change or modify brand associations, which can be measured in subsequent increase in attitude and/or purchase intention towards the brand or product (Aaker, 1996; Klucharev et al., 2008). Likewise, these fields lean on the ability of advertisements to facilitate positive transfers of associations from endorser to the brand or product (McCracken, 1986; Ohme et al., 2009).

The fields further align on consumers' perceived brand or product value being an artefact of all previous experiences, exposures, feelings and beliefs consequently established about the brand in the memory (Keller, 1993; Solnais et al., 2013).

Consumer psychology researchers argue that an endorser can be almost anyone from the "typical consumer", the product expert, to the CEO of the company or a celebrity (Friedman & Friedman, 1979). However, celebrity endorsers are found to better attract consumer attention, which has influence on subsequent brand valuation and choice behaviour. Comparable findings from consumer neuroscience have also shown indications of stimuli-driven attention altering subsequent behaviour (Orquin & Mueller Loose, 2013). Moreover, the bottom-up visual attention theory has proved that the faces in advertisement can influence initial eye movement in general, independent of who they are (Orquin & Mueller Loose, 2013). Nonetheless, celebrity endorsers are observed to capture the attention of the viewer quicker than unknown models and the initial attention has been found to be associated with later choice (Milosavljevic & Cerf, 2008).

Consumer neuroscience research has also found "recognition" to be a driver and attracter of attention, such as, a known celebrity endorser or someone else that you know, thus implying the importance of the celebrity level (global vs. local). In other words, the familiarity and knowledge of the endorser matter to the consumer. Similarly, the source attractiveness model specifically suggest that familiarity of the endorser is a dimension impacting the persuasiveness of endorsers (McGuire, 1968). Hence, the celebrity endorsers can be expected to hold the attention of the consumer longer than unknown models.

Contemporary consumer psychology theory suggest that the choice behaviour is highly dependent upon the image transfer of the consumers wish to gain from the product purchase in order to express the brand/group belonging or to distance from the same. From this perspective, the product purchases is viewed as a way to construct the self-image, thus the purchase becomes a part of extended self. Consumer associations attached to the products are highly important in the choice process and cannot be rationally controlled. This aligns with consumer neuroscience suggesting that (positive) emotional portrayal in advertisement is correlated with later positive decision behaviour. It can therefore be expected that when consumers are more emotionally touched or aroused, their attitude towards the brand as well as intention to purchase are increased. This positive reaction should infuse the "approach motivation" expressed in asymmetry activation in the PFC.

As previously stated, the celebrity endorsers and elite athletes both fall in the sub-category of celebrity endorsers, because they "enjoy public recognition" (McCracken, 1989, p.310). From the perspective of consumer psychology, celebrity endorsers are more effective and precise in the meaning and association transfer compared to unknown models (McCracken, 1989). This is claimed to have several positive benefits in influencing decision-making. Including being more attractive in the eyes of the consumers, leading them to increase purchase intention and attitude. The use of celebrity endorsers have also been found to impact the recall ability.

Meanwhile, consumer neuroscience research suggest, that increased memory recall is related to the emotional impact of the stimuli/the endorser (Braun-Latour & Zaltman, 2006; Glimcher & Fehr, 2014), which has been related to increased overall activity in the PFC and subsequent attitude and preference (Camus et al., 2009; Plassmann, 2007). Hence, it can be expected that both SAE, eye-movement, arousal level and activation in the PFC is correlated with the appearance of celebrity endorsers in advertisements. Several researchers have detected a relationship between changes in frontal asymmetry activation indicating approach vs. withdrawal behaviour with brand preference encoding resulting in positive later choice making (R J Davidson et al., 1990; Ohme et al., 2009; Sutton & Davidson, 1997). Consequently, it can be assumed that increased approach motivation measured in frontal asymmetry activation reflects brand preference, thus attitude towards the product.

To summarize, the two fields take two different standpoints, consumer psychology focuses specifically on the endorser and their perceived attributes, whereas consumer neuroscience is more concerned with the emotional portrayal and execution and subsequent arousal effect infused by the exposure to advertisement when concerned with attitude modification, purchase intention and memory.

Consumer psychology research suggests that different consumer segments can have different decision making styles. These are also observed between men and women. Similar findings have been discovered by consumer neuroscience research. It shows that cultural differences and semantic learnings can influence the cognitive processing style, eye-movement and attention behaviour (Schaefer et al., 2006). This suggests that people with different semantic learnings can be expected to react differently.

In the sport industry, consumers come from different kinds of sport-subcultures or communities. The published literature review has shown that different people depending on their choice of sport background may have different cognitive processes and semantic associations saved in their memory. This can happen as a result of many years of frequent engagement with a specific sport-sub-culture. The difference in semantic associations can be inferred to have created different triggers causing emotional arousing in general, and especially in eye-movements, attention and emotional affection. In other words, different behaviour and reactions can be expected when people come from different cultural backgrounds/cultural constituted worlds. However, the source credibility scale presented by Ohanian (1991) (consumer psychology) neither include similarity nor likability. The latter include both physical attractiveness and way of behaving. For this reason, the source credibility scale could be questioned and perhaps may not be adequately applicable for the sport industry, do to to the potential opportunities provided by the additional insights from neuroscience research.

Conclusively, it can be assumed that by gathering and analyzing the data for eye tracking, GSR, and EEG behaviours behind increased attitude towards brands or products can be identified. This should provide additional information about which endorsers are more effective than others, and which perceived source attributes and/or executional tacitcs influence subsequent attitudes and purchase intentions in a specific scenario of product brands in the sport industry.

2.5.1 Observed gap in current research

As discussed previously, the elite athletes are thought to be more persuasive than other celebrity endorsers and unknown models when presenting sport products compared to endorsing non-sport brands or products. The current research however, does not seem to have investigated the persuasiveness of a “new” kind of sport endorsers; the sport and fitness bloggers. The sport and fitness bloggers are increasingly used in current advertisement of sport brands and are regarded to have high expertise among their followers. Their persuasive power is relatively unexplored and it will be interesting to find out whether these new kind of sport endorsers have the same persuasive power as elite athletes.

The current consumer neuroscience research around endorsers have attempted to map out the areas involved in the processing of advertisements with endorsers through fMRI scannings. It has provided no insight into the intensity, type of activation (positive vs. negative), nor indicated if these reactions are correlated with the information provided from the visual sensory system.

3. Methodology and Research design

The following description outlines a set of methods, rules and rationale to collect and analyse data in order to prove the proposed hypotheses and therefore the goal of the project. The goal of studying consumer behaviour with neuroscience insights is essentially threefold;

1. To investigate whether the brand marketing advertisements can gain from changing the visual construction by portraying more positive emotions.
2. To find out whether the investments in expensive endorser such as elite athletes and bloggers pay off in terms increased attitude towards the brand.
3. To discover whether the effectiveness of the endorser purely depends on the perceived source characteristics suggested by the source model.

3.1 Methodology

3.1.1 Participants

The sample population for the study was Danish females living within the area of greater Copenhagen, between the age of 18-35. Additionally, the participants must do (any kind of) sport or training at least once a week. This criterion was created to ensure that they were within the target group of the sport industry and that the product categories used would be relevant for them.

The participants for the study were identified through a purposive sampling which was selected based on the characteristics of a sample and objective of the study with a critical case sampling approach. Due to the specific investigation within the sport industry as well as endorser theory testing, the approach was chosen to ensure reference and relevancy of the participants to the goal of the study. Moreover, this approach was selected to ensure a high level of variety in participants in order to make some generalized findings within this otherwise wider consumer group (Bryman, 2012, p. 418). The sample was further identified by the training personality characteristics (high engagement, medium engagement, low engagement) and main way of training.

The participants were selected after 2 rounds, by applying a snowball approach (Bryman, 2012, p. 424), i.e. when a network of networks are used to identify suitable participants for the study. First, the invitations were sent out to several different sport communities to ensure broad representations of different sports. The first round brought about two thirds of the participants. The samples were then reviewed to identify gaps in either the training personality characteristics or the sport representation. Following the review, more invitations were sent out to ensure relatively balanced samples, thus matching the scope and the goal of the study. The training personalities were observed closely while reviewing the first round of participants. It is assumed that highly engaged training characteristics may have a higher level of brand/product biases as well as product knowledge, thus minimizing the influence of endorser on purchase intention towards the products in the study. All participants were selected through the wider network of the author to build a more representative sample of the population(Bryman, 2012, p. 187). Thus, the selected participants were not only students, as is often seen in other studies, but also work professionals.

3.1.2 Research approach

The study used a mixed method research approach. Combining three neuroscience research tools; eye tracking, GSR and EEG which gather data about visual attention and behavioural (e.g Rayner, Smith, Malcolm, & Henderson, 2009; Shimojo, Simion, Shimojo, & Scheier, 2003) reaction in the autonomous nerve system and in the cortex (e.g. Solnais, Andreu-Perez, Sánchez-Fernández, & Andréu-Abela, 2013), respectfully. Additionally, self-reported measures were gathered via a questionnaire filled out right after finishing the test. The data was treated from a "quantitative research" perspective(Bryman, 2012), using statistical analysis to interpret the data. Methodological discussion and review of each of the chosen methods have been presented in the following sections.

3.1.3 Stimuli construction

Previous studies researching the persuasiveness or effectiveness of endorsers have successfully recorded increased brain activity in certain parts of the brain and collected increased behavioural responses when showing either the endorser together with the product, or the endorser on the left side and the product on the right side of the stimuli-slide like in the study conducted by Stallen et al., (2010). Other studies, such as Klucharev et al., (2008), focused on the imitation of the memory- and semantic learning process, showing a visual with the endorser followed by a separate visual with the product.

For the goal of this study and to enhance the ecological validity (Bryman & Bell, 2007), the visual stimuli is constructed to imitate real static advertisement as much as possible. The endorser and product was therefore shown at the same time as it is usually the case in a magazine advertisement, a billboard, or in facebook advertisement.

3.1.4 The product categorisation and choice.

Two types of products have been chosen for the test study to imitate regular products offered by the industry (or supplier/brands?)). The selected product categories were sport apparel and sport nutrition, each category was presented by two different product types. As presented in the research design section, each endorser is paired with two types from each category. This construction is done to remove any specific attitude, evaluation, and fluctuations due to specific product type, and to be able to measure only the persuasiveness of the endorser.

Furthermore, to eliminate possible effects suggested by the Match-up hypothesis (Kamins, 1990) only the endorsers and UKMs with obvious relevance to the product categories either by profession or by appearance in the image have been used.

The product types and sport endorsers were selected based on a pre-investigative survey that was answered by 9 respondents within the target group of the study (it was sent out to 20 prospective respondents). The respondents were asked to indicate the products they purchased most frequently in relation to their sport. The survey identified that the most frequently purchased products were training apparel, (running) shoes, protein powder, protein bars and energy drinks. Thus, the survey confirmed the relevance of the products used in stimuli for the participants in the study.

The products types chosen were sport bras, training tank tops, protein bars and protein powder packs of 500 grams. The prices of all considered products are between 20-500 kr. The final product types chosen have been narrowed down as per the survey findings by focusing on low involvement purchases. These products are regarded as frequently purchased and relatively inexpensive products (Kotler & Keller, 2012). Considering the broad target group of the study, especially the percentage of students participation, it was important to include lower price level products to ensure participants' ability to purchase, and thus the low involvement perspective. This product criterion eliminated the consideration of sport apparel items such as shoes and very technical or outdoor sports wear, which are primarily above the target price range.

The sport nutrition products were created specifically for the purpose of this study, as strong semantic bias has been observed in this category among players in the Danish market. All the product types had the same wording and were judged by the Design Director of Nutramino (a leading danish sport nutrition company). They all had the same look and feel, and no product appeared more cheap or luxurious than others. The sport bra´s and tank tops were found online from various sport brands, bigger and smaller. All the apparel had brand logos or other identification point removed for the reason of possible brand bias influence on evaluations (Solnais et al., 2013). Deppe and colleagues had demonstrated that favour of brand associations show brand bias, which influences the (predicted value) signals observed in the brain dlPFC and vmPFC (Deppe et al., 2005).

Furthermore, all the products selected were tested on 4 females matching the target group. They were asked to indicate their perceived value for each of the products on a continuous scale of low, middle or high price. The products were shown one at a time on a laptop. The test found that there was no relationship between the products and their evaluations except for a few single outliers which were consequently removed.

3.1.6 Endorser categorisation and selection

There have been two different categories of endorsers used for the test study, the elite athletes and the sports/fitness bloggers, based on previously discussed marketing trends within the sports industry. The elite athlete endorsers were selected based on their performance and general awareness. Caroline Wozniacki[1], the previous Tennis world tour no.1 and still top performing athlete within her sport. Tennis receives a lot of media attention and the awareness of Caroline is very high within the target group of the study. The second athlete selected is the Olympic Swimmer, Pernille Blume[2], who won gold in the 50 meters freestyle at the last Olympic games in Rio (2016). She received broad media coverage in Denmark due to her performance.

The bloggers cannot be selected based on their performance and their follower base doesn't say anything about the awareness within exactly the target group in question. Therefore, like the products types, the most known and followed fitness/sport bloggers within the target group were identified through the pre-investigative survey. The participants of the pre-investigative survey were asked to indicate which sport profiles and sport/fitness bloggers they knew or perhaps followed on the social media. There were 3 bloggers identified through this method, the top two of them being the two biggest

[1] http://www.wtatennis.com/players/player/313402/title/caroline-wozniacki-0, retrieved 23.04.2017
[2] https://en.wikipedia.org/wiki/Pernille_Blume, retrieved 23.04.2017

fitness lifestyle bloggers in Denmark with approximately 80.000 followers. The survey also confirmed the choice of the elite athletes which were the two most mentioned. The UKM were taken from a sport nutrition brand primarily sold in the UK and the US and from the not yet launched campaign from a successful danish running brand. Both choices were made to eliminate recognition bias of the images (Milosavljevic & Cerf, 2008; R. Pieters & Wedel, 2004).

3.1.7 Questionnaire

The self-reported measures were collected in two parts. Firstly, during part one of the study which collected subsequent attitude measures towards the products following exposure to each of the stimuli from the set one stimuli. The actual procedure has been covered later in this section.

The second part was part two of the study, which consisted solitary of a questionnaire. The questionnaire was structured in 3 parts:

1. ***Personal information***

This section covered the personal and contact information for each of the participants.

2. ***Personality traits - training and sport consumption behaviour now and earlier***

This section had questions intended to find out the sport engagement, current primary sport/training type of the participant, as well as which sport they had exercised the most over the course of their whole life. This information should uncover which form of fitness or sport they identify themselves with and relate to the most. Moreover, the information should be able to identify the "source similarity" (match or no-match) between the sport illustrated in the set 2 stimuli and the participant.

3. ***Attitude towards the Endorsers***

The third section of the questionnaire collected semantic attitude measures of each of the endorsers used in the set 1 stimuli. The participants were asked to indicate their opinion or attitude towards the endorser on 5 different measures; awareness, physical attractiveness, trustworthiness, liking, perceived expertise within both product categories (sport wear and sport nutrition) following the main components of the source-credibility and attractiveness model. Alternatively, the source-credibility scale by Ohanian (1990) could have been applied. As previously touched upon, Ohanian suggested that measures of attractiveness, trustworthiness and expertise can collectively reveal the effectiveness of a specific endorser. This can be identified within a specified target group when there is an apparent connection between the product and the endorser. However, it doesn't cover consumer involvement in the product nor does the causal relationship between the constructs. Furthermore, Ohanian´s source credibility scale argue that source-similarity is expressed in the trustworthiness measure. The scale

doesn't include source-familiarity level. Nonetheless, there were specific aims to explore the impact of source-similarity on bio-metric responses and change in brain activations and, secondly, bloggers' actual effectiveness in sport advertisement on attitude and purchase intention. Therefore, it was found necessary to test each of these variables separately in order to examine the influence of each variable alone. For these reasons, the source credibility scale was omitted.

3.1.8 Self-reporting attitude measures

The continuous semantic differential scales were used to collect attitude measures about each of the endorsers as well as for the subsequent attitude effect towards the products. The scale was based on a 1 to 7 point scale. All scales both in part 1 and part 2 of the study were constructed with bipolar identification, e.g. not at all/very much matching the question at hand. The type of scale was found suitable specifically for this study, as the self-reported measures aimed to collect the semantic attitude measures from each of the participants (see appendix 3 for reference).

3.1.9 Procedure

An "arrival zone" was created outside the testing lab to greet each of the participants and to remove any anxiety, stress or enhanced emotional state from the participant before the actual test, which can influence both the biometric and EEG (Allen et al., 2004; Rayner et al., 2009). The participants would first take a seat in the "arrival zone" and were offered a coffee, water and/or a healthy snack. During this time, they would receive an introduction to the different parts of the tests, For example, explanation about how the mobile EEG headset and the electrodes would work and also about the 9 min long EEG baseline test they would have to do prior to the actual test. However, not all details were shared with the participants at this point, e.g. specifics about test topic, industry focus or the collection of eye tracking data.

Swiftly after the "arrival zone" the participants were taken to the lab where they would get the EEG headset and the shimmer on (See illustration 3). When impedance for all electrodes was approved, the participants would take the EEG baseline test.

Illustration 3: Procedure – arrival zone and Lab set up.

The actual test followed the EEG baseline test. The participants were asked to sit comfortably in front of the built-in eye-tracking computer screen used to present the later stimuli, and to hold their left hand to the side, away from the body with the palm of the hand facing upwards (See illustration 4). The participants were further instructed to sit as still as possible and pay attention during the test. Prior to the start of the test they would receive the instruction slide and if there were any further questions they would be answered before starting. The data regarding the visual attention and movement, the frequencies in the cortex and autonomic signals (GSR) were collected from the participants during the entire test. The signals collected during the exposure to the constructed simulated advertisement with different endorsers and execution strategies were used to investigate correlations with SAE.

The test was split into two parts; in part one, set 1, set 2 stimuli and distraction questions would be shown mixed together in a random order. Each stimulus was showed for 4 seconds and the participant could answer the survey questions in a self-passed manner.

After the data recording of the first part and the questionnaire in part 2, the EEG headset was removed from the participants and they would receive a de-brief regarding the research purpose of the study. Each participant took about an hour to test and process.

3.2 Data collection

Previous consumer neuroscience studies researching endorsers influence on brain reactions had the aim to map out which area of the brain is involved during attitude formation driven by the application of endorsers in advertisement (Klucharev et al., 2008; Stallen et al., 2010). Functional magnetic resonance imaging (FMRI) is advantageous to use when identifying and/or mapping out which areas of

the brain is involved during the processing of stimuli (Smith, 2012). However, fMRI doesn't measure neuronal activity directly nor does it the intensity of arousal; how many neurons are activated do to the exposure to the stimulus (e.g. Smith, 2012). For these reasons, as well as the interest to uncover if other biometric, autonomous (Heart rate and GSR) or brain imaging tools can be used to measure the effectiveness of an endorsers to increase brand attitude, this study does not use FMRI. The chosen data collection methods, EEG, GSR and Eye-tracking, will be reviewed in the following sections.

3.2.1 EEG – Electroencephalography

The primary method used in this study is EEG, which records the electrical signals generated by neurons in the cerebral hemisphere (Glimcher & Fehr, 2014; Vecchiato et al., 2011). Previous EEG research on advertising has proved that the aspects of consumer cognition and emotional responses can be monitored and analysed in real time, even when below conscious awareness of the subject (Ohme et al., 2009). One of the major benefits of applying EEG is that it has high temporal resolution, which goes down to sub milliseconds. The temporal resolution with the EEG is significantly greater than what other brain imaging tools, such as FMRI, can provide. The high resolution benefit of the EEG allows detection of deviations in brain activity connected with rapidly changing stimuli, such as TV spots (Ohme et al., 2009) or during moments and areas of specific fixations or gaze when exposed to static images, just like print advertisements.

Furthermore, contrary to other brain imaging tools, the EEG can identify the characteristics of the specific arousal through tracking of the frequency power in the frontal asymmetry and general increased activity in the different areas of the cortex associated with different cognitive behaviour (Glimcher & Fehr, 2014; Solnais et al., 2013) This will be covered in more detailed in the data analysis section. fMRI and galvanic skin response (GSR) are able to indicate where in the brain the stimuli is processed as well as the intensity of the subsequent arousal created, respectively (Smith, 2012; Vecchiato et al., 2014). The limitations of EEG could be a constraint for some studies, but as this project objective aim to study the emotional reactions and effects of the participants during the specific time of exposure to the stimuli, the EEG brain imaging method is suitable for this purpose.

Additional benefits and holdbacks were considered in the selection process of methods to apply for the study. Firstly, in terms of brain imaging tool, EEG is a more inexpensive solution than both MEG (magnetoencephalography) and fMRI which were above the funds accessible for the study. Moreover, in contrary to the invasive method MEG the EEG is an non-invasive mobile method which allows the testing to be conducted at a more convenient locations (Glimcher & Fehr, 2014; Vecchiato et al., 2011).

This specific benefit of the EEG increases the ecological validity of the study especially when comparing to fMRI where the participants lay in a scanner at a hospital.

As previously discussed, the EEG delivers a high temporal resolution but also an accepted spatial resolution (Ratcliff, Philiastides, & Sajda, 2009) despite being more limited compared to the other, more expensive brain imaging options (Vecchiato et al., 2011). Nevertheless, fMRI is said to be better at answering the "where" question, explaining where the activity or processing of the stimuli is occurring in the brain subsequently to the exposure of the stimuli. While both EEG and MEG are both stronger tools to track moment-by-moment neural fluctuations infused by, e.g. static advertisement (Glimcher & Fehr, 2014). EEG (and MEG) enables researchers to observe increased activity in both brain hemispheres and as discussed in the literature review, the left and right hemisphere are associated with the approach and avoidance behaviours respectively (Ravaja et al., 2013; Solnais et al., 2013). Likewise, increased activity in the left hemisphere relative to the right, has been associated with brand preference (Mcclure et al., 2004). Previous research conducted by Davidson (2004b) has successfully applied EEG power spectrum analysis to uncover the different lateralization of the left and right in the PFC for approach and avoidance/withdrawal behaviour. Additionally, a relationship between asymmetrical EEG activity and emotional portrayal in stimuli (Richard J. Davidson & Irwin, 1999) has been observed. One example is the study directed by Vecchiato and his colleagues where subjects were presented to two different datasets with advertisements judged to be pleasant (referred to as the LIKE dataset), and unpleasant (referred to as the DISLIKED dataset). Each of the two datasets generated two different EEG power spectrum maps in the theta and alpha bands upon exposure of the datasets to the subjects (Vecchiato et al., 2011). The above findings further underscore the appropriateness of applying and testing with EEG as research tool for this specific study.

3.2.2 Eye tracking – attention and fixation

The data retrieved from the eye tracking, will be complementing the data collected from EEG asymmetry monitoring. In the following section the argumentation for the use of (total) time spent fixating (TSF) and the time to first fixation (TTFF) as research method is presented. The reasoning for omitted data and thus exclusion from the later analysis has also been discussed. The two variables are carefully selected among the various options provided by Tobii T-60 and the software from Imotions.

The monitoring of eye-movements pattern, also referred to as scan pattern or gaze-pattern, during the exposure to the imitated advertisement can provide more detailed insights such as which area receives more attention than other, how many times the eye re-visits the elements, what draws the attention of the consumer first etc.(Rayner et al., 2009; Shimojo et al., 2003).

Previous studies have proved that there is a relationship between preference and their fixation pattern and how long they hold their fixation on an element relative to the other products or elements in a visual (Milosavljevic, Koch, & Rangel, 2011). Likewise, the later has increased purchase intention and memory recall, which is associated with total TSF (Milosavljevic & Cerf, 2008). The above observation provides reasoning for the applicability of TSF as a measure to investigate possible correlations to the SAE.

Many things have been argued to control and bias a person's eye movement. A study conducted by (Yarbus, 1967), one of the early pioneers in the field, established that eye movement is highly dependent on the goals for looking. This has also been reaffirmed by later studies recognizing the influence of "goal oriented" looking(R. I. K. Pieters & Wedel, 2007). Strong cognitive influence on where the viewers look has been demonstrated. Providing information to subjects about what to look for or what will be shown, could consequently modify the "natural eye movement" patterns (Hayhoe & Ballard, 2005). In other words, when subjects are searching for a specific object, they would look where it would be expected to find the object. I.e. a plane in the air (Allen et al., 2004; Rayner, 2009), a flower in the ground.

It was therefore expected that participants would after a while start looking at the products directly as they would see the pattern of them having to evaluate them. To avoid this, "trick-questions" were added during part 1 of the study to ensure that the participants would look equally long at the products and the endorsers.

Additionally, it has been demonstrated already by early research that the eyes are quickly drawn towards informative (Rayner, 2009), unusual, emotional (Becker, Pashler, & Lubin, 2007; Becker & Rasmussen, 2008) and/or highly salient aspects or elements in a visual (Milosavljevic et al., 2011). The above findings provide a scientific reasoning for the validity of using TTFF as a measure to investigate possible correlations to the SAE.

The saliency of elements in a visual influence fixation behaviour has been continuously proven by researchers (e.g. Milosavljevic & Cerf, 2008; Benjamin W Tatler, 2016). The saliency is typically defined as the low-level components of the scene [the visual], such as contrast, colour, intensity, brightness, spatial frequency, etc.(Rayner, 2009, p. 1478). Thus, the execution and choices for the different elements e.g. product designs used in advertisements can have high impact on eye movements patterns of the participants during the test. To minimize or even eliminate such impact on the data collection, the packaging design for the sport nutrition product, purely created for the purposes of this study, was only made with subtle colours. Likewise, only black bras and tank tops were used for the test to eliminate such influence on the eye movement.

The pupil dilation is another eye tracking measure that can provide additional insight into reactions on the unconscious level of the participants(Bradley et al., 2008; Lempert & Phelps, 2014; Rayner et al., 2009). Previous research has provided indication of its reflection caused by emotional arousal and attention (Lempert & Phelps, 2014). Furthermore, the research around pupil dilation demonstrates that dilation of the pupils occurs when exposed to emotionally arousing images (Bradley et al., 2008) regardless of the type of illustration; pleasant or unpleasant (Orquin & Mueller Loose, 2013).

Some limitations of studying Pupil dilation are apparent, which can reflect unexpected or the strength of outcomes, one being very sensitive to light and changing environments (Percy, 2003; Solnais et al., 2013). On a practical level, a neutral screen has to be shown for approx. 10 second between stimuli to "re-set" or neutralize the dilation of the pupil. Moreover, is it also highly influenced by the luminosity or colour of the stimuli. Despite being interested in the emotional arousal infused by the stimuli. This was disregarded in this research method in order to minimize the total time to run the test.

3.2.3 GSR – Galvanic skin response

Like eye tracking, the GSR is a complimentary research method to EEG. GSR is applied to track additional arousal measures to complement the data provided by the EEG. In contrary to both EEG and eye tracking, the GSR is a reflection of reaction controlled by the Autonomic nervous system (ANS). GSR specifically measures the level of perspiration on the surface of the skin (Glimcher & Fehr, 2014; Ohme et al., 2009). Being different from the other research methods, the data collected by GSR monitoring can provide insight into the level of emotional engagement of the participant to the exposed stimuli; in other words, the intensity of the arousal. The data collected by GSR does not however provide information about the valence of the emotion, even though the method has been verified to be an indicator of the emotional intensity (Ohme et al., 2009) and has the ability to uncover subconscious levels of emotional reaction beyond what the individual can control. Other methods, like previously highlighted facial expression or pupil dilation, could be used as an emotional arousal indicator, yet, GSR is found more reliable and the data is easier to process (Glimcher & Fehr, 2014; Ohme et al., 2009). Additionally, in comparison to pupil dilation, the GSR can run alongside the EEG and eye tracking without having to adjust the study-design, and therefore not adding additional time needed to conduct the study.

3.2 The proposed hypothesis

The overarching goal of this study is to demonstrate neuroscience research methods and current consumer behaviour theories for effective use of endorsers in advertisement in the sport industry. The findings should provide additional insights into the use of endorsers in advertisement by neuroscience research methods.

The following hypotheses have been proposed for pursuing the objectives of this project and they are outlined in the table below.

General endorser assumptions	
H1.a	Endorser associations are transferred to the product and is correlated with the attitude towards the brand.
Positive emotional portrayal - smiling face vs. sport expression	
H2.a	Endorser portraying positive emotions (smiling) increase attitude towards the brand.
H2.b	The finding from H2a is correlated with how fast the endorser captures the attention of the consumer.
H2.c	The finding from H2a is correlated with visual attention
H2.d	The finding from H2a is correlated with arousal intensity
H2.e	The finding from H2a is correlated with approach behaviour
Endorser theory - celeb effect (endorser type) on:	
H3.a	Advertisements with celebrity endorsers are stronger positively correlated with the attitude towards the brand.
H3.b	The finding from H3a is correlated with how fast the endorser captures the attention of the consumer.
H3.c	The finding from H3a is correlated with visual attention
H3.d	The finding from H3a is correlated with arousal intensity
H3.e	The finding from H3a is correlated with approach behaviour
Endorser theory - celebrity endorser:	

H4.a	Elite athletes are stronger positively correlated with the attitude towards the brand compared to bloggers and UKM.
H4.b	The finding from H4a is correlated with how fast the endorser captures the attention of the consumer.
H4.c	The finding from H4a is correlated with arousal intensity
H4.d	The finding from H4a is correlated with visual attention
H4.e	The finding from H4a is correlated with approach behaviour
Endorser theory - familiarity effect:	
H5.a	Familiarity of the of endorser is positively correlated with the attitude towards the brand.
H5.b	The finding from H5a is correlated with how fast the endorser captures the attention of the consumer.
H5.c	The finding from H5a is correlated with visual attention
H5.d	The finding from H5a is correlated with arousal intensity
H5.e	The finding from H5a is correlated with approach behaviour
Endorser theory - expert effect:	
H6.a	The perceived expertise of endorsers is positively correlated with the attitude towards the brand
H6.b	The finding from H6a is correlated with how fast the endorser captures the attention of the consumer.
H6.c	The finding from H6a is correlated with visual attention
H6.d	The finding from H6a is correlated with arousal intensity
H6.e	The finding from H6a is correlated with approach behaviour
Endorser theory - credibility effect:	
H7.a	Perceived credibility of endorsers is positively correlated with the attitude towards the brand.
H7.b	The finding from H7a is correlated with how fast the endorser captures the attention of the consumer.
H7.c	The finding from H7a is correlated with visual attention

H7.d	The finding from H7a is correlated with arousal intensity
H7.e	The finding from H7a is correlated with approach behaviour
Endorser theory - physical attractiveness effect:	
H8.a	The perceived physical attractiveness of endorsers is positively correlated with the attitude towards the brand
H8.b	The finding from H8a is correlated with how fast the endorser captures the attention of the consumer.
H8.c	The finding from H8a is correlated with visual attention
H8.d	The finding from H8a is correlated with arousal intensity
H8.e	The finding from H8a is correlated with approach behaviour
Endorser theory - liking	
H9.a	The perceived Liking of endorsers is positively correlated with the attitude towards the brand
H9.b	The finding from H9a is correlated with how fast the endorser captures the attention of the consumer.
H9.c	The finding from H9a is correlated with visual attention
H9.d	The finding from H9a is correlated with arousal intensity
H9.e	The finding from H9a is correlated with approach behaviour
Endorser theory - similarity effect "sport at heart"	
It is assumed that the trends within SAE and bio metric correlations observed in study will follow in study 2.	
H10.a	A match in similarity between sport illustration and the "sport at heart" of the consumer is correlated with how fast the image with the sport illustration captures the attention of the consumer.
H10.b	A match in similarity between sport illustration and "sport at heart" of the consumer is correlated with visual attention
H10.c	A match in similarity between sport illustration and "sport at heart" of the consumer is correlated with arousal intensity
H10.d	A match in similarity between sport illustration and "sport at heart" of the consumer is correlated with approach behaviour

3.3 Research design

3.3.1 Dependent variables

The dependent variable is what is being measured in an experiment or evaluated in a mathematical rule/equation and the independent variables are the inputs to that measurement.

The dependent variables are: the subsequent attitude effect (SAE), Time to first fixation (TTFF), Time spend fixation in percentage (TSF%), GSR peaks per/minute and EEG asymmetry.

3.3.2 Independent variables

The independent variables are: Emotional portrayal (smiling face vs. Sport expression), Endorser category (celebrity), Perceived physical attractiveness,

Perceived credibility, Perceived liking, Perceived expertise, familiarity and perceived similarity.

3.3.3 The participants

56 female participants within the age group of 18-35 years of age doing sport on a weekly basis. All participants were compensated with a goodie bag full of Neutralino sport nutrition products to the value of 275 kr. All participants had undergone a pre-screening in order to ensure their suitability for the study.

3.3.4 Stimuli

The stimuli were constructed to simulate an advertisement by visually combining an image of an endorser and a product. Two similar sets of stimuli were constructed for this study. The first set (1) with endorsers and a product and a second set (2) with a picture clearly illustrating a specific sport (see appendix 1 for visuals and appendix 2 for overview of stimuli construction.

Set 1 stimuli:

7 different endorsers from three different endorser types used for the images:

- 2 Athletes - performance related
- 3 Fitness/sport bloggers – none performance related
- 2 Unknown models (UKM)

Advertisement combinations - Endorser X (stimuli set 1.)
1 x Smiling/bar
1 x Smiling/powder
1 x Smiling/sports bra
1 x Smiling/sports top
1 x Sport expres./bar
1 x Sport expres./powder
1 x Sport expres./sport bra
1 x Sport expres./sports top

Figure 3. Example of (simulated) advertisement combinations for each endorser.

All images were either portraits, upperbody or full-body images. Each of the endorsers had 2 images presented with different facial expressions; one with a "smiling face expression" and one with a "serious face expression" (from hereon referred to as sport expres). The 2 images were each paired with 4 different products; 2 sport nutrition products and 2 sport apparel products, creating a total of 56 stimuli for set 1. For the reference and further clarification please see figure 4. The products used for set 1, were not used for set 2 stimuli advertisement and vice versa.

Set 2 stimuli:

There were 11 different sports presented with each sport presented by 3 different combinations, thus set 2 consisted of 33 stimuli in total (see figure 5. for an overview of the sports represented). Each sport was combined with 3 different products, being either a musli protein bar, an energy bar, a 500 gram protein powder, a training tights, a long sleeve training/running tee, a sports bra or a sports top. The sports and products were randomly paired with products from both the two product categories, the sports nutrition and the sports apparel.

Sports illustrated (stimuli set 2):
Weight training
Handball
Football/soccer
Ice Hockey
Running (urban/nature)
Running (track)
CrossFit
OCR (obstacle running race)
Fitness (aerobic)
Triathlon
Swimming

Figure 4: The sports presented in the (simulated) advertisement combinations.

3.3.5 Behavioural measurement

The behavioural question was asked on a separate slide following right after each stimuli from set 1.

3.3.6 Distractors

8 distraction survey questions was randomly shown during the study on a separate slide.

3.3.7 Study

The study was separated into two parts. Part 1; showing all the stimuli (set 1 + behavioural self-reporting) and set 2 stimuli showed in randomized order. Part2; consisted of a self-reporting survey.

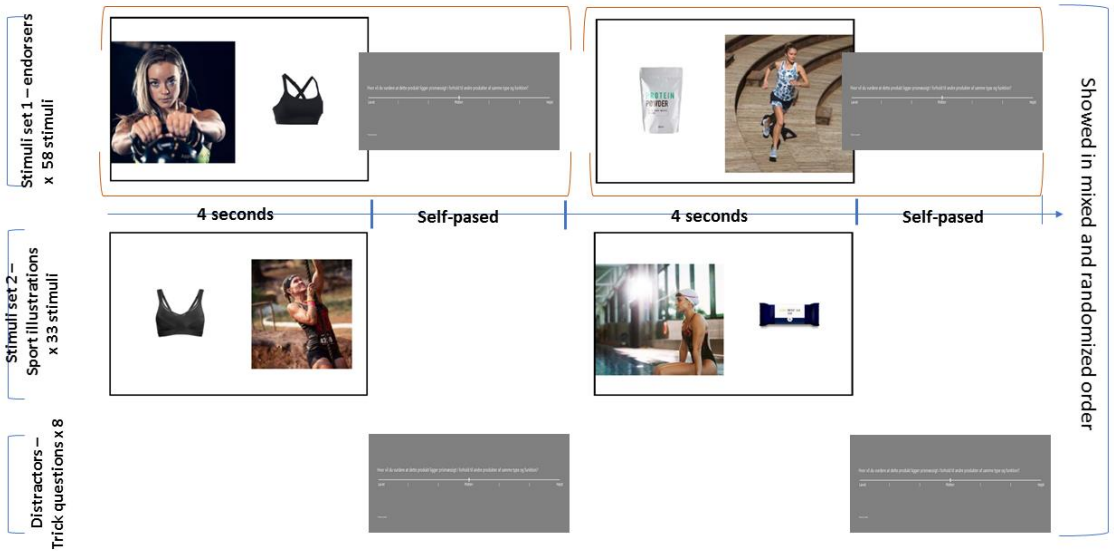


Illustration 3: study design

A pilot study was conducted a few days before the start of the actual study. Two studies were carried out with two different participants matching the target group for the study. The two pilot study participants were not participating in the official study. The pilot study was conducted exactly as the actual study was intended to be executed, but on smaller scale as recommended by Bryman & Bell (2007). The pilot study was conducted in order to identify any potential adjustments needed in the methods, stimuli and/or in the general procedure for the study before the start of the actual research study.

4.0 Data analysis and findings

This chapter analyses the data that has been collected during the study, presents the results and discusses the significance of investigative findings.

4.1 Data analysis

There had been 48 successful samples collected out of 56, as originally planned. The remaining 8 samples were not considered for the analysis. The data samples collected from 4 participants were disregarded as they were not able to connect probably to the EEG and therefore did not finished the test. The remaining 4 samples were removed while extracting the data due to low quality of the eye tracking data. The eye tracking data was collected with the Tobii T60, the Shimmer 92F9 was used for GSR, and the ABM B-Alert X10 EEG collected the frontal asymmetry frequency data. The average age of the participants was 23.6 years, with the youngest participant was about 18, and the oldest was about

34 years old. All participants, i.e 100%, had confirmed that they had at least one sport engagement per week. Out of the total participant 59.57% of them used daily sport nutrition in higher or lower degree. All participants spent money on sport wear/training wear on a monthly basis. Furthermore, it was found that 25% of the participate were very engaged and would never miss sports training (i.e. personality type 1), the 64.58% were found with medium engagement level (i.e. personality type 2), the consumer that trains to live. The last group of 10.42% were found to be low engagement (i.e personality type 3), as they found it hard to motivate themselves to go to work-out and/or to do sport in general. Hence, the data has not found to be biased by highly engaged people with immense insight in either of the presented product groups.

The data collected for raw eye tracking, GSR, and EEG asymmetry was postprocessed and cleaned directly through the emotions software (version 6.3). The postprocessing removed noise and muscular artefacts, which may influence the data analysis. Such a noise in data are caused by the head movement, the eye movements, (eye) blinks, or the other ocular and/or muscular artefacts, which can bias the data output (Allen et al., 2004). The valid/acceptable data was statistically analysed by using the simple or multiple regression analysis method to identify the significance level and possible correlation power of the proposed hypothesis. All variable were checked for normal distribution prior to running the regression analysis, to ensure that the regression analysis uses normally distributed data.

The data collected in study 1, and the self-reported opinion/beliefs about the endorser by the participants were used to answer the hypotheses H1-H9. The data collected in study 2 was used to answer the hypothesis H10.

4.1.1. Eye tracking data

In study 1, the face of each of the endorsers in the simulated advertisement was indicated as an “area of interest”. The TTFF measurement was based on the facial expressions of each endorser, and hence,

Illustration 4: Procedure – EEG headset and illustration F3/F4 electrode location.

the time to the first fixation within the face of the endorser in each advertisement. For the TSF measure, the whole photo of the endorsers was used. The TSF measure was based on the time each participant spends on looking at anything within the endorser's image, including the whole body and the image background.

In study 2, contrary to study 1, the TTFF measurement was based on the endorser's whole image, meaning, the time taken by the participant to look anywhere within the endorser's image. The TSF was based on the whole endorser image, like in study one for comparative reasons.

4.1.2. GSR

To measure the intensity of arousal between the different stimulus combinations was the measure "peak per/minute", which was obtained from the shimmer during the exposure to the advertisements. However, due to the set-off time being 2-5 seconds for the study 1, an average of the peak per/min. of the stimuli (4 secs exposure). The following product evaluation (self-paced) was calculated due to lack of useful data before the averaging.

In study 2, the arousal measure of peaks/per minute was also used. However, with no opportunity to gather the measure, with the data eliminated to substantial amount after evaluation, thus making the sample too small for statistical testing. However, the collected information was used for identifying the direction or trend, as the stimulus with the highest or even any emotionally arousing, are assumed to be the most arousing by the methods.

4.1.3. EEG

The observation from the frontal asymmetry focused on the motivational behaviour, approach or withdrawal, towards different combinations of endorser advertisements. It was measured (following Davidson´s model) by the variation of amount of alpha frequencies (8-13hz) between the left and right hemisphere, which were subtracted from the prefrontal electrodes F3(left) and F4(right) (R. J. Davidson, Schwartz, Saron, Bennett, & Goleman, 1979) see illustration XX.

The alpha waves are thought to be representing relaxation.This has been subsequently interpreted as, the higher alpha in left PFC = avoidance motivation, whereas lower alpha = approach motivation (Allen et al., 2004; Harmon-Jones & Allen, 1998). To clarify, high levels of alpha in the left PFC relative to the right PFC mean that the participant is more relaxed, which inferred that there is little approach motivation and vice versa. Thus, low alpha activity in right side relative to left side indicates withdrawal

motivation. The following table illustrates the relationship, which is useful when interpreting EEG alpha asymmetry measures:

Asymmetry equation: Ass= ^{log}(F4) - ^{log}(F3)	Motivational behaviour:
Negative number (LEFT > Right)	**Withdrawal/avoidance motivation** towards the advertisement/endorser (dislike)
Positive number (RIGHT > Left)	**Approach motivation** towards the advertisement (liking/brand preference)

4.2 Findings

In the following section the findings of the study have been presented and discussed. The hypothesis, H1 reveals that the general perceptions of endorsers´ influence on product evaluations is true for this study as well. The following part of the section will follow the given objectives of the study; (1) the hypothesis H2 will investigate whether the brands can gain from changing the visual construction by portraying more positive emotions in endorser advertisement. (2) the hypotheses H3 and H4 will examine whether the investments in expensive celebrity endorsers such as elite athletes and bloggers pay off in terms increased attitude towards the brand. (3) finally, the hypotheses H5-H10 will investigate whether the effectiveness of the endorser purely depends on the perceived source characteristics suggested by the source models.

The following tables presents the hypothesis with corresponsing Dependant Variable (DV) and Independent Variable (IV).

General endorser assumptions		**DV:**	**IV:**
H1.a	Endorser associations are transferred to the product thereby effect the attitude towards the brand.	SAE	endorser type

The general assumption of endorsers' theory is that they can modify attitude and purchase intention. By examining the reported SAE proves beyond reasonable doubts the truth of this assumption. The observation data shows that the endorsers affect the SAE, on the scale of highest and lowest values of

7 and 1 respectively, with the total mean of 4.138 and standard deviation of 1.056, meaning that 96 percent of the data is approximately within 2-6 on the 1-7 scale.

4.2.1 Study objective 1 findings

Positive emotional portrayal - smiling face vs. sport expression		**DV:**	**IV:**
H2.a	Endorser portraying positive emotions (smiling) increase attitude towards the brand.	SAE	face express. (smiling)
H2.b	The finding from H2a is correlated with how fast the endorser captures the attention of the consumer.	TTFF	face express. (smiling)
H2.c	The finding from H2a is correlated with visual attention	TSF(%)	face express. (smiling)
H2.d	The finding from H2a is correlated with arousal intensity	GSR	face express. (smiling)
H2.e	The finding from H2a is correlated with approach behaviour	EEG	face express. (smiling)

To test H2.a, a simple linear regression (SLR) was calculated. A highly significant relationship between the emotional portrayal was expressed through the facial expression in the advertisement (smiling/positive emotional portrayal or serious/sport face expression) ($p=0.028$, $r2= 0.002$). However, the coefficient of 0.092 it implies that the smiling endorsers get a 0.092 lower SAE compared to the endorser with sport expression. For the statistical purposes, the expression was coded as, Smiling expression=1 Sport expression=2. This is an unexpected result compared to neuroscience literature previously presented suggesting that endorsers portraying more positive emotion are perceived to be more persuasive. This study reveals that it is not true in the context of the sports industry. Nonetheless, it is worth noting that the average SAE of smiling endorser = 4.09, and for the endorser with “sport” expression= 4.14. Indicating that sport endorsers, on average, only enforce a slightly higher SAE.

Likewise, the facial expressions was found to be significant predictor of TTFF($p=0.000$, $r2= 0.007$). This supports the attention theories presented by the bottom-up effect in the literature review. However, unexpectedly, the coefficient of 142.099 implies that smiling endorser are looked at 142.099 milliseconds later than compared to endorsers with serious sport expressions. This finding is not following the expected outcome, but does follow the outcome of H2.a.

The facial expression was also found to be a highly significant predictor of TSF(%) (p=0.000, r2= 0.025). With a significance level of 0.000 and a much higher r2, it implies a better predictor than TTFF and explains more of the model. Surprisingly, compared to the findings from TTFF, with a coefficient of 4.544, a positive correlation has been observed. In other words, it predicts that smiling endorsers is expected to be looked at 4.544% longer compared to endorsers with the sport expression. Thus, smiling endorsers holds the attention longer compared to endorsers with sport expressions, which is associated with greater latter memory and choice behaviour.

There was no significant model was found for face expression and peaks per min. (P=0.655, r2= .000). It implies that the arousal intensity induced by the stimuli is neither correlated with the facial expression nor the SAE. There was no statistical significance prediction ability found for face expression and EEG asymmetry measures collected, which is inconsistent with the previous findings indicating the increased approach behaviour during more positive induced stimuli. (R J Davidson et al., 1990).

Despite lack of prediction ability for face expression in GSR reactions and EEG asymmetry frequencies, the findings from visual attention suggest that sport expression are more attention driven factor for consumer while viewing the sport advertisement. These findings demonstrate that the marketers in sport industry cannot gain from changing their visual construction to portray more positive emotion on any of the variables measured. Conversely, it has been demonstrated that the "serious" sport expression, which seem to be used as a standard visual expression is better at attracting and holding the attention of the consumer.

4.2.2 Study objective 2 findings

As discussed before, the result of hypotheses H3 and H4 should demonstrate the outcome of objective 2.

Endorser theory - celeb effect (endorser type) on:		**DV:**	**IV:**
H3.a	Advertisements with celebrity endorsers are stronger positively correlated with the attitude towards the brand	SAE	celebrity status
H3.b	The finding from H3a is correlated with how fast the endorser captures the attention of the consumer	TTFF	celebrity status
H3.c	The finding from H3a is correlated with visual attention	TFT	celebrity status
H3.d	The finding from H3a is correlated with arousal intensity	GSR	celebrity status

H3.e	The finding from H3a is correlated with approach behaviour	EEG	celebrity status

The SLRs were calculated to test H3(a-e). The celebrity-effect have a predictive ability for SAE (p=0.000) with a r2 of 0.011. In this case fitness bloggers and athlete endorsers was combined into one celebrity-category. With a positive coefficient of 0,244, it is in alignment with the endorser theory presented by consumer psychology. The different categories were coded namely, UKM=1, and Celebrity endorsers=2. With a regression equation of SAE = 3.966+0.224(celebrity endorsers), the model predicts that the sports brands can expects to increase SAE by 0.244 (on a 1-7) equivalent to 3,733% (0.225/6*100) compared to if they would use UKM.

Likewise, the celebrity effect on TTFF also indicates to have highly predictable significance (p=0,000) with a r2 of 0,014. As expected, the correlation is negative which confirms the H3.a hypothesis. Hence, the TTFF is shorter when the participants are exposed to advertisement with celebrities. Thus, the model has predicted that the consumers look 238.652 ms faster at faces of sports celebrity endorsers compared to UKM.

In the next hypothesis of H3.c, the celebrity endorsers also indicate to have a statistical predictive significance on TSF (p= 0.000b), thus proving beyond reasonable doubt the hypothesis of H3.c. Moreover, with the value of r2 to be 0,048, it indicates that compared to TTFF, it is a stronger variable to explain the dependent variable (TSF). With a regression equation of TSF = 14.562+7.189%(celebrity endorser), the model predicts that sports brands can expect consumers to spend 7.189% more time on celebrity endorser in advertisements compared to UKM. This result is significant, at least when viewing periods are over 4 seconds.

The result of H3.d hypothesis proves a positive correlation between celebrity endorser and higher emotional intensity. However, there was no statistical significant prediction ability found for celebrity endorsers and consumer's arousal intensity for (p= 0.797). Likewise, the celebrity status of endorser indicates to have no predictive ability for EEG asymmetry activation (p=0.900, r2=0.002). Hence, the hypothesis H3.e can be rejected as no correlation between approach motivation and celebrity status is found any significance.

Endorser theory – Elite athletes:		**DV:**	**IV:**
H4.a	Elite athletes are stronger positively correlated with the attitude towards the brand compared to bloggers and UKM.	SAE	endorser category

H4.b	The finding from H4a is correlated with how fast the endorser captures the attention of the consumer.	TTFF	endorser category
H4.c	The finding from H4a is correlated with arousal intensity	TFT	endorser category
H4.d	The finding from H4a is correlated with visual attention	GSR	endorser category
H4.e	The finding from H4a is correlated with approach behaviour	EEG	endorser category

A multiple linear regression (MLR) was calculated to test all the assumptions of hypotheses H4(a-e). For the hypothesis H4.a, both the categorical IV's, and the Athlete and blogger endorsers show significant predictive ability of P=0.000 and P=0.029 respectively. The UKM was used as the baseline/constant for the analysis. However, it is observed that different endorser categories have performed differently. Athlete endorsers perform better in persuading the consumer and increase their attitude towards the product, consequently confirming H4.a. The regression analysis indicates that the athlete endorser increases SAE of the participant by 0.450 more compared to the baseline of UKMs. Whereas, bloggers only manage to increase the SAE by 0.109 more compared to the UKM models.

Both Elite athletes and bloggers have shown highly significant predictability of TTFF with both having a P-value of 0.000 with adjusted r-squared of 0.013. furthermore, as expected both IV are found to be negatively correlated with coefficients of athletes=-254.453 and bloggers=-228,176. Unexpectedly, bloggers were found to have a shorter TTFF compared to athletes, thus rejecting the hypothesis H1.b. The difference found in TTFF between the two types of endorsers, elite athletes and bloggers, is only 26.277ms. The difference can be caused by general bottom-effect of faces. In the simulated advertisements, some of the faces of the endorsers are bigger than those of the elite athletes, thus possibly biasing the slightly shorter TTFF observed with bloggers.

The trend from H4.b follows in the TSF(%) MLR as well. Both celebrity endorsers are found to be statistically highly significant predictors of TSF with p-values of 0.000 and adjusted r-squared of 0.048. As expected, both sub-groups are found to be positively correlated with coefficients of Athletes=6.591 (%) and Bloggers=7.584 (%).

Similar to previous test, the elite athletes (endorser types) show neither the prediction ability for reactions in GSR (p=0.204, adjusted r2=0.00) nor for the infused reactions in the EEG asymmetry (p=0.535, r2=0.022).

Hence, only the hypothesis H4.a, suggesting that athletes are the most persuasive endorser among the three type can be confirmed by the MLRs as subsequent tests didn't follow the outcomes as expected. The hypotheses H4.b-e were all rejected. Nonetheless, both athletes and bloggers have predictive ability for both TTFF and TSF(%), as shown in the hypotheses H3.b-c. The bloggers seem to be better at attracting the first attention, and also to hold the attention of the consumer, given the total exposure time of 4000ms the percentage difference in milliseconds is only 28ms, indicating the minimal difference. The lack of consistency in the findings could indicate that other attributes of the endorser drive the metrics of visual behaviour, emotional arousal and EEG asymmetry.

4.2.3 Study objective 3 findings

The hypotheses H5 to H10 concern the influence of perceived source variables of each of the endorser. The SLRs were calculated to test the influence of the various source attributes (i.e. IV) on all of the selected metrics (i.e. DVs).

Endorser theory - familiarity effect:		**DV:**	**IV:**
H5.a	**Familiarity** of the of endorser is positively correlated with the attitude towards the brand.	SAE	reported familiarity
H5.b	The finding from H5a is correlated with how fast the endorser captures the attention of the consumer.	TTFF	reported familiarity
H5.c	The finding from H5a is correlated with visual attention	TTSF(%)	reported familiarity
H5.d	The finding from H5a is correlated with arousal intensity	GSR	reported familiarity
H5.e	The finding from H5a is correlated with approach behaviour	EEG	reported familiarity

The familiarity of the endorser was found to be a highly significant predictor of SAE (P=0.000) with a r-squared of 0.046. With a linear regression of SAE=3.838+0.098(familiarity), it predicts that for every unit of increase in reported familiarity of the endorser by consumer, the SAE increases by 0.098, which is equal to about 2% increase (0.098/6*100). Hence, the hypothesis H5.a can be confirmed to be true beyond reasonable doubt.

However, there was no significant regression model found for the familiarity of the endorser and TTFF (p=0.257). Hence, the familiarity (i.e. how well you know a person) doesn't influence how quickly people

look at the endorser. Differently, familiarity indicates to have significant predictive ability for TSF (p=0.001) with a R-squared of 0.005. With the established regression equation of TSF=18.510+0.439(%) (familiarity), a positive relation is apparent. The model predicts that for every unit increase in familiarity, the percentage of the total time spend on viewing the advertisement will increase by 0.439%. Consequently, rejecting the hypothesis H5.b and confirming H4.c.

With a P-value of 0.004, the familiarity was found to have significant predictive ability for the arousal intensity measured in GSR peaks per/min, With a regression equation of GSR peaks per/min=10.491+0.329(familiarity), the hypothesis H4.d confirms a positive correlation, meaning that for every unit increase of familiarity the average amount of peaks per/min will increase by 0.329. In other words, the more people are familiar with the endorser the more emotionally aroused they are.

The endorser familiarity also showed predictive ability for EEG asymmetry reflections in alpha wave frequencies. With a regression equations of EEG asymmetry = 0.461+0.076 (familiarity), it predicts a positive correlation, thus suggesting that for every unit increase in familiarity, the approach behaviour shall be strengthened by 0.075 mhz. The mean value of 0.223 for EEG asymmetry (min = -22.117, max = 19.889, s.d.3.61, N=2615), indicates a rather flat correlation.

In summary, familiarity is significantly correlated with all metrics except the TTFF. Hence, familiarity alone does not explain how fast the consumer looks at the endorser. However, it does help to hold the attention of the consumer and it is also correlated with emotional arousal as well as the approach motivation. This suggests that endorser status, celebrity status, or endorser category has no statistical grounded influence on emotional impact unless the consumer is familiar with the endorser.

Endorser theory - expert effect:		**DV:**	**IV:**
H6.a	The perceived **expertise** of endorsers is positively correlated with the attitude towards the brand	SAE	perceived expertise
H6.b	The finding from H6a is correlated with how fast the endorser captures the attention of the consumer.	TTFF	perceived expertise
H6.c	The finding from H6a is correlated with visual attention	TSF(%)	perceived expertise
H6.d	The finding from H6a is correlated with arousal intensity	GSR	perceived expertise

H6.e	The finding from H6a is correlated with approach behaviour	EEG	perceived expertise

The next source attribute investigates is the influence of a perceived expertise. The perceived expertise of the endorser was found to be a significant predictor of SAE (p=0.000) with the r-squared value of 0.048. This is not a surprising finding, considering that it is one of the most studied variables in existing literature with many supporting findings. However, the regression equation of SAE=3.431+0.153(expertise) provides specific insight for the sport industry and confirms the H6 hypothesis to be true. The model predicts that for every unit increase in perceived expertise, an increase of 0.153 or equivalent to 2.55% increase in SAE can be expected.

In contrary, the expertise has no predictability for TTFF (p=0.225). Thus, there is no statistical significant correlation with the perceived expertise of the endorser regarding how fast consumers look at the endorser, thus, rejection of the hypothesis H6.a. The expertise shows predictability for TSF(%) (p=0.000) with a r-squared of 0.007. The finding is in alignment with studies from existing literature. Furthermore, with a regression equation of TSF=16.309+0.770(expertise), a positive relation is apparent and the model predicts that for every unit increase in perceived expertise of the endorser the percentage of time looking at the endorser during the exposure time increase by 0.770%. hence, confirming the hypothesis of H6.b.

The SLR analysis found that the expertise does not have predictive ability for the emotional arousal intensity (p=0.195). Hence, there is no statistically significant relationship identified between perceived expertise and emotional arousal intensity level. Likewise, there was no significant prediction model found between perceived expertise and approach motivation (p=0.058, r2=0.001). However, the p value is only “just” above rejection level. Thus, a trend could be possible. Nonetheless, there is no statistical significant correlation is established between expertise and approach motivation in this study.

Endorser theory - credibility effect:		**DV:**	**IV:**
H7.a	Perceived **credibility** of endorsers is positively correlated with the attitude towards the brand.	SAE	perceived credibility
H7.b	The finding from H7a is correlated with how fast the endorser captures the attention of the consumer.	TTFF	perceived credibility

H7.c	The finding from H7a is correlated with visual attention	TSF(%)	perceived credibility
H7.d	The finding from H7a is correlated with arousal intensity	GSR	perceived credibility
H7.e	The finding from H7a is correlated with approach behaviour	EEG	perceived credibility

Let us look at the findings concerning the influence of perceived credibility of the endorsers. There is found to be statistically significant correlation between the SAE and the self-reported perceived expertise (p=0.000) with the r2 of 0.026. With a regression equation of SAE=3.591+0.117(credibility), the model predicts a positive correlation between the two variables. The equation predicts that for every unit increase in perceived expertise of the endorser the SAE increases by 0.117 or equivalent to 1.95%. Hence, the hypothesis H7.a is true.

The other source variable of perceived credibility is not a statistically significant predictor of TTFF (p=0.625). Hence, the perceived credibility of the endorser is not significantly correlated with how fast the consumer looks at the endorser. Likewise, for TSF, the credibility is a significant predictor for TSF(%) (p=0.011) with a r2 of 0.003. The calculated regression equation is TSF(%) = 17.456+0.523(credibility) predicts that for every unit increase in credibility the percentage time spent on looking at the endorser has increased by 0.523%.

There was no statistically predictive model found for the credibility (p=0.056, r2=0.008). However, it suggested a trend with the significance of only slightly above the rejection level of 0.05. I other words, the credibility was found to have predictive ability for EEG asymmetry reflecting (p=0.038) with an r2 of 0.002. With a regression model of EEG asymmetry = -0.691+0.100(credibility), it predicts a positive correlation. Hence, for every unit increase in credibility, the model predicts the approach motivation to increase by 0.1 alpha frequencies.

In summary, the hypothesis H7.b is rejected and H7.c can be confirmed as true, meaning that the credibility of the endorser doesn't drive initial eye movement but it does hold the attention of the consumer longer. Furthermore, peak per/min in GSR or emotional intensity does not correlate with the perceived credibility of the endorser. However, the credibility is found to be a significant predictor of approach motivation, demonstrating that a credible endorser seems to resonate and thus infuse approach motivation and liking towards the advertisement.

Endorser theory - physical attractiveness effect:		**DV:**	**IV:**
H8.a	The perceived **physical attractiveness** of endorsers is positively correlated with the attitude towards the brand	SAE	physical attractiveness
H8.b	The finding from H8a is correlated with how fast the endorser captures the attention of the consumer.	TTFF	physical attractiveness
H8.c	The finding from H8a is correlated with visual attention	TSF(%)	physical attractiveness
H8.d	The finding from H8a is correlated with arousal intensity	GSR	physical attractiveness
H8.e	The finding from H8a is correlated with approach behaviour	EEG	physical attractiveness

The physical attractiveness was the next source variable tested. A simple linear regression was calculated for all the metrics and a highly significant relationship was found between physical attractiveness and SAE (p=0.000) with a r2 of 0.030. With a regression equation of SAE=3.566+0.121(physical attractiveness), the model predicts a positive correlation. It proposes that for every unit increase in perceived attractiveness, the SAE increases by 0.121 or equivalent to 2.02%. In other words, the more physically attractive the endorser in the eyes of the consumer, the higher their perceived value of the product.

However, again, no significant model was found for perceived physical attractiveness and TTFF (p=0.607). Hence, physical attractiveness of the endorser is not a significant predictor for TTFF, meaning that the attractiveness of the endorser is not dependent on how fast the endorser in the advertisement catch the attention of the consumer. On the other hand, was physical attractiveness found to be a significant predictor of TSF(%) (P=0.016) with a r2 of 0.003. The regression equation of TFS(%)=17.635+0.478(physical attractiveness) indicates a positive correlation and, more specifically, it implies that for every unit increase in perceived attractiveness the percentage of how long the consumer look at the endorser increases by 0.478% out of the total exposure time.

However, the arousal level (GSR) was not found to be a significant predictor for TSF(%) (p=0.309) with r2 of 0.002. Hence, arousal intensity infused by the advertisement with endorser is not significantly correlated. Physical attractiveness did show to have significant predictive ability for EEG asymmetry activation (p=0.019) with a r2 of 0.002. The regression equation EEG asymmetry = -.746+0.110(physical

attractiveness) predicts a positive correlation of 0.110. It means that, for every unit increase in physical attractiveness (i.e. from the eyes of the consumer) approach motivation is increased by 0.110 Hz.

In summary, significant prediction models were found for physical attractiveness SAE, TSF and EEG asymmetry. Hence, hypothesis H8a/c/d are confirmed to be true. All being positively correlated, however, the TTFF and GSR peaks per/min cannot be explained by physical attractiveness of the endorser. Hence, the "pleasantness" of the visual created by the attractive looks of the endorser seems to influence the SAE, TSF as well as the EEG. This follows many findings of the current study suggestion that physically attractive people appeal more to the consumer and influence their subsequent behaviour. This could further be linked to the perspective of the reference group and people they would like to be affiliated with, other pretty people as the CCW perceives pretty. It is a good and desired variable.

Endorser theory - liking		**DV:**	**IV:**
H9.a	The perceived **Liking** of endorsers is positively correlated with the attitude towards the brand	SAE	liking
H9.b	The finding from H9a is correlated with how fast the endorser captures the attention of the consumer.	TTFF	liking
H9.c	The finding from H9a is correlated with visual attention	TSF(%)	liking
H9.d	The finding from H9a is correlated with arousal intensity	GSR	liking
H9.e	The finding from H9a is correlated with approach behaviour	EEG	liking

The liking of the endorser was the next source variable tested for the study, for which the SLR is used to analyse the possible significant correlations to the different metrics. Firstly, the liking was found to be highly significant predictor for SAE (P=0.000) with a r2 of 0.012. With a regression equation of SAE=3.717+0.09(liking) it predicts a positive correlation and more specifically, for every unit increase in liking it can be expected that SAE will increase with 0.09, which is equivalent to 1.5% increase. Secondly, liking was found not to have predictive ability for TTFF (p=0.894, r2=0.000). Thirdly, liking was found to

be a significant predictor for TSF(%) (p=0.012) with an r2 of 0.002. The regression equation suggests a positive correlation of TSF(%)=14.238+0.565(liking). Hence, it can be expected that for every unit increase in liking, the time spend in looking at the endorser increases by 0.565% out of the whole exposure time. Thirdly, has it been investigated and found that arousal intensity in peak per/min in GSR cannot be predicted by the liking level towards the endorser (p=0.422, r2=0.001). However, the liking was found to have predictive ability for EEG asymmetry activation. The regression equation of EEG asymmetry =-0.771+0.117(liking), foresees a positive correlation suggesting that by every unit increase in liking of the endorser the approach motivation towards the advertisement increases by 0.117.

To summarize, the liking attribute was found to have predictive ability for SAE, TSF and EEG asymmetry, all being positively correlated. Hence, confirming the hypothesis H9a/c/e to be true. However, it could not explain TTFF and GSR. The impact of liking could be a indicator of the endorser being a reference group, in other words a aspiration for them, and thus someone they would like to be like, hence the increased approach motivation. It also indicates that less liked or even disliked endorsers infuse less approach motivation, meaning, that the liking of the target group is influencing persuasiveness of the endorser.

Endorser theory - similarity effect "sport at heart"		**DV:**	**IV:**
It is assumed that the trends within SAE and bio metric correlations observed in study will follow in study 2.		-	-
H10.a	A match in **similarity** between sport illustration and the "sport at heart" of the consumer is correlated with how fast the image with the sport illustration captures the attention of the consumer.	TTFF	sport at heart (match)
H10.b	A match in **similarity** between sport illustration and "sport at heart" of the consumer is correlated with visual attention	TSF(%)	sport at heart (match)
H10.c	A match in **similarity** between sport illustration and "sport at heart" of the consumer is correlated with arousal intensity	GSR	sport at heart (match)
H10.d	A match in **similarity** between sport illustration and "sport at heart" of the consumer is correlated with approach behaviour	EEG	sport at heart (match)

The last source variable tested was similarity to the endorser. Based on the literature review it is assumed that, the similarity to endorser is based on top line levels such as gender and age, however,

also by the sport and community they mainly engage in. On the basis of the semantic learning theory and the thought of the CCW of the consumer to initiate meaning transfer of the interpretation of sport at heart, indicating the importance of similarity factor. As discussed before, the CCW is different between sport communities as well as the experiences and feeling around the sport that one had engaged the most. These most memories and feelings are stored in the memory.

The questionnaire uncovered that most people in the target group are currently exercising running or going to the gym, due to lack of time in their daily life to commit to other sports. They may still be highly involved in the same sport they have competed/exercised for many years, depending on the time commitment. This could possibly reflect the wider range of age group and thus current lifecycle stages of the consumers. In later life you come across more commitment requirements for other things, e.g. work and/or studies, a partner, children etc. The variable was based on match findings between the sport illustrated in the stimuli and the so called “sport at hear” factor. The two categories were coded as, no match=0, match=1 for statistical purpose.

The similarity attribute was tested for significant predictive abilities for TTFF. However, there was no significant correlation model was identified (p=0.671, r2= 0.000). Nonetheless, similarity was found to have significant predictive ability for TSF(%) (p=0.016, r2=0.004), indicating that the sport illustrated in the advertisement does influence how far the attention is given to the image. With a regression equation of TSF(%)=38.339+4.852 (similarity of sport at heart). The model predicts a positive correlation and more specifically it suggests the when similarity is matched in terms of sport and heart. The consumer looks at the illustrated sport in the advertisement and give it more attention by 4.852% longer, when similarity

EEG assymmetry			
Sport illustration		Mean	N
weight training	Folie31	0.031464523	47
	Folie32	-0.169251943	47
	Folie33	0.724409758	47
	Total	0.195540779	141
handball	Folie25	0.447325519	46
	Folie26	-0.323183449	46
	Folie27	-0.414145137	46
	Total	-0.096667689	138
soccer	Folie10	-0.786347137	47
	Folie11	-0.156981146	47
	Folie12	0.688376474	47
	Total	-0.084983936	141
ice hockey	Folie13	0.369710187	47
	Folie14	0.541516537	47
	Folie15	-0.041579369	47
	Total	0.289882452	141
run_nature	Folie4	-0.683087282	47
	Folie5	0.746096850	47
	Folie6	-0.283855795	46
	Total	-0.072113692	140
running	Folie1	-0.684517933	47
	Folie2	0.141580058	46
	Folie3	0.354257555	47
	Total	-0.064353965	140
Crossfit	Folie7	0.402868093	47
	Folie8	0.141933297	47
	Folie9	-0.018142860	47
	Total	0.175552843	141
OCR	Folie19	-0.921484376	47
	Folie20	-0.421086905	46
	Folie21	0.541054696	46
	Total	-0.271879477	139
fitness	Folie16	0.616469459	46
	Folie17	-0.462276978	47
	Folie18	0.970017762	47
	Total	0.373010086	140
triathlon	Folie28	-0.027418377	47
	Folie29	-0.176402734	45
	Folie30	-0.245526602	46
	Total	-0.148702974	138
swimming	Folie22	0.164064925	47
	Folie23	0.427677667	47
	Folie24	0.159720101	47
	Total	0.250487564	141

Illustration 6: Study 2 EEG asymmetry mean grouped by sport illustrated and

and sport at heart is matched. Thirdly, similarity/sport at heart have been checked for its predictive ability for EEG asymmetry reaction infused by the advertisement. It was established that no significant model is apparent (p=0.655, r2=0.000), consequently rejecting both hypotheses H10.a and H10.c, but confirming the truth of H10.b.

The finding reveals that there is no significant correlation between how fast consumer's eyes attend the image with a sport illustration, but it does affect how long attention people pay to the image. The correlation is relatively steep compared to previous findings. The attention time to the sport illustration suggests that it is not directly comparable to the findings from the study 1. The study 2 uses all different images. Hence there is no visual repetition, which is found to create boredom while viewing, and subsequent attention and interest in the image could be negatively biased due to the repetition factor. Surprisingly, variation in the EEG asymmetry showed no significant relationship. The expected approach motivation towards the advertisement, to do the similarity to the sport at heart of the consumer did not confirm. However, this could have been biased by different ways the stimuli were constructed and also due to varying emotional portrayal in the image. For example, the happy emotions portrayed from the winning situation, no matter the sport is. When examining the means of the EEG asymmetry collected and sorted by sport and per stimulus, it indicates that some sport categories and the stimulus receive motivation approach, however, 16 out of 33 stimuli received an average approach motivation, whereas the remaining have observed withdrawal motivation (see highlighted results in green in table X). Furthermore, the matches have been observed and also no sport at heart matches were found for swimming. However, the swimming illustration is the only one that seem to infuse approach motivation across all three advertisement. The above explanation indicates that the illustration of the image may bias the approach motivation.

4.2.4 concluding findings and further discussion.

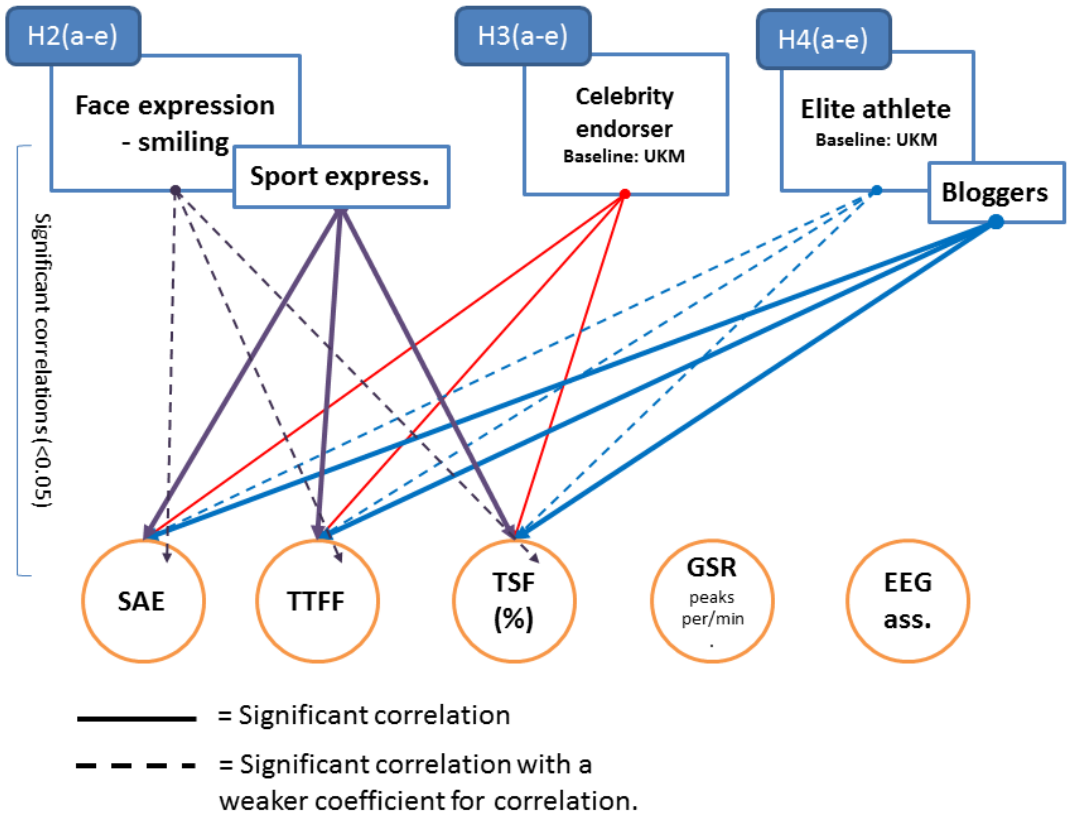
The findings have shown that facial expression is a significant predictor of SAE, TTFF and TSF(%) (see figur 6 for an illustration of the H2-H4 findings). However, unlike the expected outcome of smiling faces being more persuasive, the sport expression usually used in the sport industry appears to have stronger SAE modification abilities. It has likewise been demonstrated that advertisements using the defined sport facial expressions, receive both shorter TTFF as well as longer TSF on the endorser. Thus, sport expressions appear to increase the information processing of the advertisement more than smiling endorsers. This finding goes against current published literature, proposing stronger positive valanced stimuli to influence brand attitude to a greater extent than other. The findings of the study demonstrate

no significant correlation between perceived emotional engagement infused by facial expressions, nor in GSR peak per/min or EEG asymmetry frequency variations.

Celebrity endorsers are thought to be more successful in persuading consumers, which gives reasoning for the companies to invest more to get them to endorse for their product and appear in company owned advertisement. The findings from the hypothesis H3 demonstrates that this is partly true. The celebrity "status" of endorsers alone indicates to have significant predictability ability of SAE, TTFF and TSF. However, there is no significant correlation observed between the celebrity and the GSR and EEG asymmetry behaviour. The endorser, whether it is a blogger or elite athlete, are positively correlated with behaviour within SAE, TTFF and TSF. The celebrity status is not a predictor for the emotional engagement in the advertisement. Hence, firms can predict visual behaviour around the advertisement by the use of celebrity endorser but not the level of arousal or approach behaviour.

The hypothesis H4 has established greater insight into the difference in persuasiveness in different type of endorsers, the UKM, bloggers and elite athletes. Contrary to current literature on endorsement studies in the sport industry where it is firmly believed that elite athletes are the most persuasive endorser for sports related products, the findings from this study have revealed that bloggers are much more persuasive and better at attracting the attention of the consumer. They are observed to be both faster, and they hold the gaze longer than the elite athletes.

Illustration 6: Visual illustration of findings H2-H4.

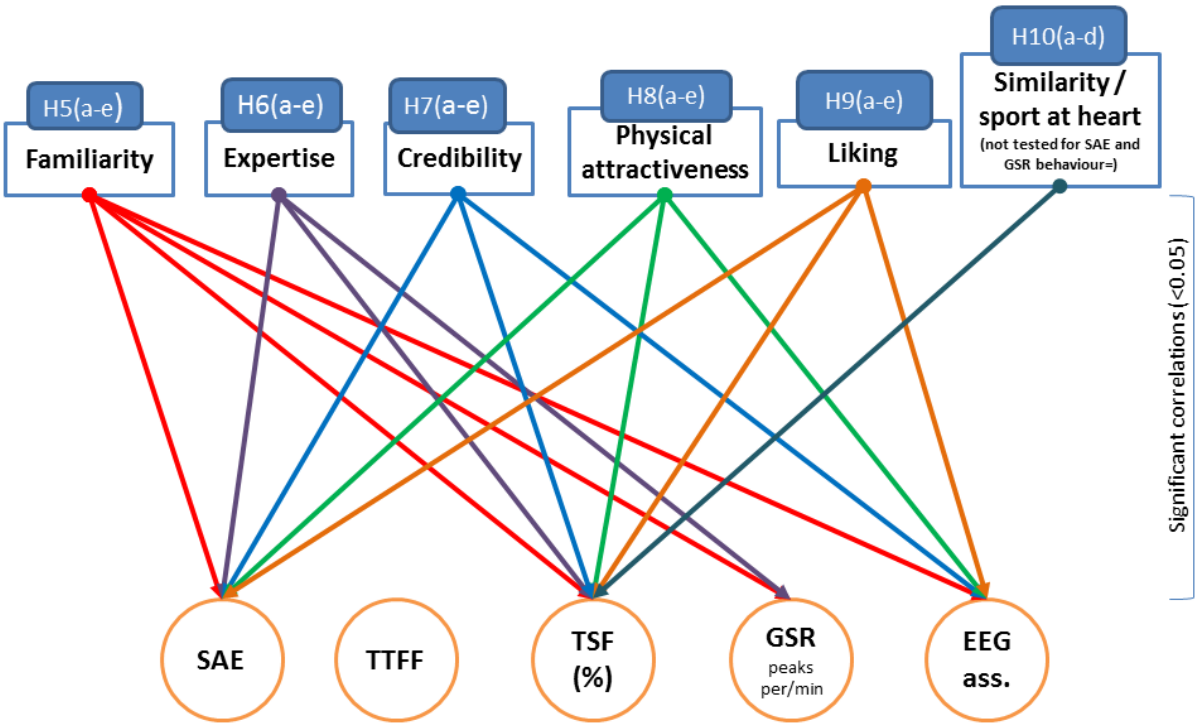


The hypotheses H5-H10 have tested the ability to predict effectiveness of endorsers from various source variables suggested by endorser theory from consumer psychology. The analysis established many statistically significant correlations (illustration 7 for visual summary of the findings). The findings of hypothesis H3 and H4 reveal that none of the source attributes suggested by the source model had a significant predictability for TTFF. The findings of celebrity status and endorser category have significant correlation with TTFF, which could be thought to follow the familiarity measure of the source models. Nonetheless, it could indicate the recognition factor of celebrity endorsers despite reported variance in familiarity levels of different celebrity endorsers.

All source variables have shown significant predictability for both SAE (except similarity which was not tested for SAE) and TSF. The expertise of the endorser has the strongest coefficient and liking of the endorser has the lowest, when predicting SAE. In other words, the similarity showed to be the variable with the strongest coefficient and familiarity the lowest. This indicates that the association transfer to the memory suggested by published literature of sport advertisement can improve by using endorsers

who matches consumers sport at heart. Furthermore, expertise of the endorser is the source variable with the highest coefficient from the study. This shows that the perceived expertise is a strong source variable to hold the attention of the consumer.

Illustration 7: Visual illustration of findings H5-H10.



With a noticeable smaller sample size, the statistical power of the findings observed by the GSR measured in peaks per/min should be considered carefully. Furthermore, with the delay in response time due to set-off times varying from 2.5 seconds, some arousal reactions can be expected to be observed during the following slide. Nonetheless, due to the randomization, showing study 1 and study 2 at the same time, the potential bias is minimized. Familiarity and expertise are the only source variables that have demonstrated statistical significance as predictors for the subsequent emotional intensity infused by the advertisements. However, as previously discussed, the low sample size available for this metric only provides indications and not prominent findings. Familiarity appear to be a slightly more effective variable with coefficient of 0.329, compared to expertise with 0.240.

The insights provided by GSR only gives additional information about the intensity of the emotional arousal, as variation in EEG asymmetry frequencies indicate whether the arousal is positive or negatively

valanced. Several source variables demonstrated significant predictive ability of the approach motivation towards the advertisement (i.e. Familiarity, Credibility, and physical attractiveness and Liking). The other three attributes showed more or less the same coefficient (i.e. 0.1, 0.11 and 0.117). This indicates an almost identical influence on the approach motivation for every unit increase in one of the three variables.

r2	DV	IV
0.992	EEG	liking
0.002	EEG	physical attrac.
0.002	EEG	credibility
0.002	EEG	familiarity
0.018	GSR	familiarity
0	GSR	similarity/sport at heart
0.46	SAE	familiarity
0.048	SAE	expertise
0.03	SAE	physical attrac.
0.026	SAE	credibility
0.012	SAE	liking
0.007	TSF	expertise
0.005	TSF	familiarity
0.004	TSF	similarity/sport at heart
0.003	TSF	credibility
0.003	TSF	physical attrac.
0.002	TSF	liking

The calculated regression analysis show that only two out of 17 correlations are identified to be significant correlations where source variables have r^2 above 5%. Since r^2 is the proposition of variance in the DV, which can be explained by the IV, it suggests whether or not the identified correlation model is useful for the intended measure of prediction.

Most of the correlations established with the source variables are observed to explain between 0.2 - 4.8% of the measured reactions. However, these findings can be biased by the nature of study related to consumer behaviour which is less predictable compared to engineering tests for example. Furthermore, due to the self-paced design of the study, the evaluation is not a measurement of autonomic behaviour, but instead a highly cognitive driven behaviour.

5. Conclusion and managerial application

5.1 The conclusion of the study

The study was initiated to provide possible solutions to the identified gaps for managing brands with established methods within consumer psychology and consumer neuroscience. It has been observed that the current trend in marketing sports brands is increasingly switching from selecting elite athletes as endorsers to female bloggers as endorsers in their marketing campaigns. The review of the published literature on current endorser theories from consumer psychology and neuroscience have shown that they may not be adequate for efficient brand management in sport industry. It has been discovered that there are almost no studies conducted with mobile neuroscience research technologies.

The objectives of the study undertaken by this project have been concluded successfully in terms of methodology, study design, study testing and data collection, data analysis, and investigative findings. It was found out that (1) the brand owned marketing advertisements can gain from changing the visual construction by portraying more positive emotions. It has also been discovered that (2) the investments in endorsers such as elite athletes and bloggers can pay off incremental benefits in terms increased attitude and purchase intention towards the brand. Finally, the study has also shown that (3) the persuasiveness of the endorser does not entirely depend on the perceived source attributes suggested by the source models.

The study found that the smiling faces, which are assumed to portray more positively valanced emotions, did not perform better than the advertisement using "sport" expressions. The sport expression performed better than the smiling endorsers. Overall, only a limited unconscious modification of the brand attitude can be expected by the use of endorser image either by smiling expression or by sport facial expressions in constructing the advertisement for sports brand.

Furthermore, the study demonstrated that celebrity endorsers were persuasive. The elite athletes are found to be the most persuasive of the endorser types tested in respect of SAE. The use of the bloggers appeared to have a stronger impact on both initial eye movement and the total visual attention given to the endorser. Neither of the sub-categories of celebrity endorsers used for the test have showed correlation to the subsequent emotional arousal nor the approach motivation. It implies that the sport celebrity endorsers alone does not provide return on investment.

The ability to generate emotional arousal and approach behaviour are found to be more unconscious creators of positive brand attitude within consumers. Relevant to the sport industry, the study has shown that the endorsers' capability of consumer familiarity, credibility, physical attractiveness, and liking have significant influence on the consumer approach and motivation behaviour. The perceived influence of similarity measured between the sport illustrated in the advertisement and the sport at heart of the consumer showed that they have no significant influence on the variation in approach or avoiding motivation infused by the advertisements despite some theoretical grounded reasoning. The consumer familiarity is an important source variable for selecting the endorser for the sport industry.

Collectively, the findings suggest that celebrity endorsers with the right combination of source variables should be used for a successful advertisement campaign to target specific consumer groups. The celebrity endorser's ability to attract initial fixations can be essential for aiming to win the attention of the consumer, among all other information targeted at the them. It is observed that the use of bloggers

can be advantageous for advertising sports brands, because they are better at attracting initial eye movements compared to the elite athletes, at least for targeting female consumers.

The findings of all the studies has shown beyond reasonable doubt that the insights from neuroscience research methods can help the current endorser theories in identifying more persuasive endorsers as well as in construction of the advertisements aiming to increase favourable attitude and purchase intention within target consumer groups.

5.2 Managerial implications

The nature of the study, being the first to test the suitability of neuroscience research methodologies for endorser effectiveness research it is a relative broad study testing many hypotheses. The initial findings can encourage brand managers of sport brands to choose more effective endorser and/or to pursue further studies towards specific objectives in the near future.

The study provides insights about the effect of different endorser types, facial expressions and certain endorser attribute in endorser advertisement on female consumer behaviour and neurological reactions. These finding should enable prospective brand managers to be more successful in increasing brand attitude at the unconscious level of the consumer within the specific target group or even down to individual consumer level, for example in the online space where immense consumer targeting opportunities are possible.

The marketing managers in the sport industry should continue to use sport facial expressions in their marketing advertisement. The smaller brands may not have the budget to get expensive endorsers with broader and clearer associations. However, the methods used in this study should enables brands manager to optimize the right composition of endorsers with higher consumer familiarity. The usability of EEG asymmetry enables the brands to run pre-test advertisement campaign on static images before the actual role-out, thus providing greater confidence to marketing manages.

6. Limitations and suggestions for further research

The TTFF findings could be biased by goal oriented eye movements while running the tests. Some participants have noted during the de-brief after participating in the test that they had found themselves looking directly for the product because of the evaluation question. However, the trick-questions did work as expected and made them re-focus on the endorser as well. The goal oriented behaviour could bias other metrics as well. The TSF has shown influence on the endorser. As previous

studies have indicated, the eyes move again to continue searching. However, due to participant's size, randomization as well as the scenario being in an unnatural setting, which are not directly transferable to real life situations but rather provide some guidance.

The study has not adjusted for negative associations towards the endorsers that may not be included via the chosen source attributes and whether it influences the observed data outcome. This is a topic that require further research to uncover such possible implication and influence of negative association on subsequent attitude and behaviour.

Furthermore, all findings and interpretations are based on 4 second exposure time of the stimuli. This is thought to stimulate short exposures that also occur in real life. However, much shorter exposures occur when people scroll on Facebook or Instagram . Hence, the findings are only providing a direction for marketers for designing and planning their campaign with longer exposure than what is apparent on social media. The findings are applicable for banners in outdoor setting e.g. metro stations, billboards etc. where exposure times are slightly longer compared to perceived on social media. For the application on social media channels, the findings from TTFF are slightly higher for selecting the endorser as well as general bottom-up factors, which also is observed to be attention drivers and thus assumed likely to stop people "scrolling".

A further possible limitation of the study is the topic of duchenne smile, also called the real or genuine smile (Ekman, Davidson, & Friesen, 1990). The concept suggests that viewers, in this case consumers, can instantly recognize whether or not it is a duchenne smile or not (Ekman et al., 1990). Duchenne smiles are thought to have an impact on the subsequent emotional arousal, thus the following reactions both in the autonomic nervous system and in the brain. The imagery used for the simulated advertisement where not controlled for the possible factor of influence results into possible biasing of the facial expressions tested.

The findings from investigating the influence of the source variable similarity/sport at heart indicates a correlation with TSF. However, no significant correlation with TTFF nor EEG asymmetry reaction. Due to the study 2 set up, the GSR data was disregarded and no SAE information was not collected. The lack of significant findings could reflect the variation images and their visual construction. Furthermore, these images was in general showing the whole body captions where study 1 mainly used upper body captions, thus the interpretation of facial expression are more difficult in study 2. The absence of correlation between the sport illustrations and EEG asymmetry reflections could be argued to have influence on the limited ability of observed the aimed portrayed emotions. Furthermore, the strength of the proposed sub-cultures was not investigated which could have further influenced the results. This

is therefore an area of endorser effectiveness that could be further investigated and could possibly provide insights that could change marketing practises especially for online channels.

Lastly, the relative small sample size impact the statistical power of the study and opportunities of running multiple regression analysis with many variables which could have been suitable for this kind of study.

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