

Conference Paper

Ethics in Neuromarketing and its Implications on Business to Stay Vigilant

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Abstract

Neuromarketing is an emerging field in which academic and industry research employ neuroscience techniques to understand the consumers' mind by explaining consumers' preferences, motivations, and expectations. Nevertheless, some people claimed that the use of neuroscience in marketing somehow had introduced companies to a 'buy button' that can read the mind of potential consumers and influence their buying decisions. Plus, those that oppose neuromarketing also believe that the act of 'reading' consumers' mind with the aim of improving company services is unethical and should not be used, let alone implied. However, what does actually 'ethics in neuromarketing' mean in the first place? Moreover, how does this become an issue in the marketing field? Herein, we will articulate common ethical concerns with neuromarketing. We argue that the most frequently raised concerns- autonomy, informed consent, confidentiality, privacy, benevolence, and no maleficence-given the current capabilities for business to stay vigilant. However, we identify how potentially serious ethical issues may emerge from neuromarketing practices in the industry, which are primarily exclusive. We identify approaches that business can use and reduce the threats to consumers. We conclude that neuromarketing has clear potential for business to stay vigilant and mitigate the positive impact on society.

Keywords: consumer behavior, neuromarketing, neuroscience tools, buy button, ethics

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1. Introduction

Neuromarketing is a research area that evolved from the combination of concepts of neuroscience and theories of classical marketing research that examines the decision-making process of the consumer from a cognitive perspective. These new concepts bring powerful insights and techniques, particularly on consumer analysis to marketing research. The neuromarketing concept was the reason for new marketing research. Thus, the study of cognitive neuroscience, the study of the mind through the brain, has become increasingly important, mostly through advances in neuroimaging tools. Miletic,

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Guido, and Prete (2016) stated that neuromarketing has contributed to the evolution of marketing by illustrating how the unconscious responses and emotion can affect consumers' perception and decision-making proceeding. They mentioned that neuro-marketing is established on the inference of individual senses and motor systems that can be found by observing the brain activity, which can represent the insensible or emotional attribute of consumers' decision making. The nature of neuromarketing is to gain understanding and the answer which is unobtainable from traditional marketing methods such as pen and paper. This is because respondents are not always honest, and sometimes they give answers, and sometimes it is difficult to say how they are feeling correctly. According to Stanton et al. (2016), the objective of neuromarketing is to study the consumer behavior that beyond survey or focus group study using the new method. This is because, Neto, Filipe, and Ramalheiro (2011), Murphy (2005), Poldervaart (2009), Zurawicki (2010), Zaltman (2003) and Brierley (2017) endorsed 95% of consumers decision making are made subconsciously. The subconscious mind is a key player in the consumer decision-making process (I.A. & M., 2013). Consumer behaviour comes from the brains, and if we can understand what brains do when making purchasing decisions, then we can tailor marketing accordingly. A finding by Luan, Yao, Zhao, & Liu (2016) proves that consumers' subconscious is hard to be measured by traditional research method. Researchers have shown interest in applying neuroscience technology in marketing research to study consumer subconscious response in detail to close the gap. The advancement neuromarketing reveals a few responses, and consumers may begin to believe that neuromarketing violates their privacy. Where the company uses the findings from neuromarketing for profit-oriented purposes. It is scanning the brain waves to improve marketing by using medical equipment as an unethical practice of the neuromarketing process (Babu & Vidyasagar, 2012). This will result in unethical business ethics. Thus, the main question arises, is it ethical to probe into consumers' brain and use the findings for the business? This is why the use of neuroscience for market research raises ethical considerations, one of neuromarketing main barriers (Pop, Dabija, & Iorga, 2014; Ariely & Berns, 2010; and Madan, 2010). To understand more in-depth about ethics in neuromarketing, further discussions that discussed potential use and misuse of neuroscience in marketing are needed. Thus, this writing aims to study the ethical issues arouse from applying neuromarketing in companies and organizations. Specifically, the first half of this paper focuses on ethical considerations in neuromarketing, while the second half highlights several approaches that can be taken by companies in their attempts to stay vigilant in applying neuromarketing.

2. Neuromarketing: The Science of Decision Making

The term 'neuromarketing' was proposed by Smidts in 2002 and is a discipline that combines marketing with the advancing neuroscience (Ulman, Cakar & Yildiz, 2015). The purpose of neuromarketing is to study consumer behaviour and preferences, as well as their buying decisions. Since years ago, industries have been adopting neuromarketing into their companies to improve the effectiveness and accuracy of their marketing strategies. However, the approach, and application of neuromarketing varies according to the goals that a particular company wanted to pursue (Stanton, Sinnott-Armstrong & Huettel, 2017). For example, Yahoo Company uses neuromarketing to study how consumers would react towards television commercials while Microsoft Company is more interested in studying consumers' interactions (satisfaction, frustration, etc.) with a computer.

2.1. Neuroscience in marketing

Before the emergence of neuromarketing, traditional techniques such as pen and paper surveys, satisfaction forms and focused-group experiments were the primary approach to understand consumer behavior (Stanton et al., 2017). In most cases, subjects were asked to complete surveys regarding their feeling and satisfaction towards the service given by the company. However, these techniques were subjective and prone to human error because sometimes they tend not to speak honestly or even worse, not even read thoroughly what the survey was asking. Thus, with the help of neuroscience in marketing, the use of neuroimaging tools such as functional magnetic resonance imaging (fMRI), electroencephalography (EEG) and the eye-tracking device can improve the accuracy of consumer behavior studies. Even, there is a research-based company known as 'NeuroFocus' that uses wireless EEG to conduct their neuromarketing research on big companies such as Google and Walt Disney (Flores, Baruca & Saldivar, 2014). The study of brain imaging solves these problems, allows the researchers to understand consumer decision making and purchasing patterns without prejudice that the experiments are done through by reading the unconscious mind. To a certain extent, human sense can get fooled; expectation is the driver of success in sensory marketing (Marjin K. K., 2016). Many companies use neuromarketing to create impulsive purchase behaviors, or to connect the senses of consumers. According to Owen Gough (2017), a t-shirt printing company Printsomenote, "sensory marketing has a 'subconscious influence' on

consumers brand appeals to three senses rather than just on you are three times more likely to make a sale.”

Research in neuromarketing is based on neuroscience, and the role of neuroimaging techniques is to test hypothesis, improve existing knowledge and test the effect of marketing stimuli on the consumer’s brain (Bercea, 2012). In Figure 1, the tools of neuroimaging are shown and divided into three categories: (1) record metabolic activities in the brain, (2) record electrical activity in the brain and (3) without recording brain activity.

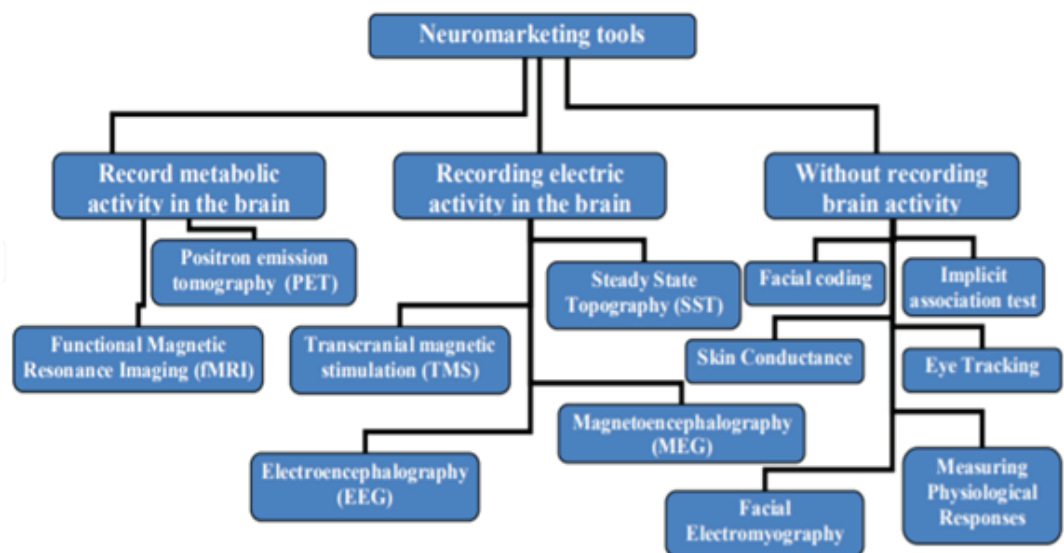


Figure 1: Classification of Neuromarketing Tools. Adapted from Bercea (2012).

fMRI and PET measure brain activities indirectly through analyzing the metabolic activity in the brain. fMRI provides excellent spatial resolution but poor temporal resolutions. In neuromarketing, fMRI is used to measure memory encoding, sensory perception, the valence of emotions, craving, brand loyalty and trust, brand preferences, and brand recall. Due to the high cost of using fMRI, the small sample size is used, and generalizability is affected. Nonetheless, it guides marketers in their marketing strategies. PET is an invasive method and less used if compared to fMRI. It can measure sensory perception and valence of emotions in contact with marketing stimuli. Among the tools that can measure direct brain activities through electrical signals are EEG, magnetoencephalography (MEG), transcranial magnetic stimulation (TMS), and steady-state topography (SST). After fMRI, EEG is the most used neuromarketing tool. It is cheaper and less intrusive. Attention, boredom, excitement, emotional valence, cognition, memory encoding, recognition and approach/withdrawal can be measured via EEG neuromarketing research. MEG is a stronger version of EEG with better spatial resolution but very expensive. Both MEG and EEG are used in research on product choice, gender

differences in decision making, hedonic logos evaluation, advertisements, pleasantness and tracking cultural differences in reaction towards advertising.

TMS is used in causal inferencing by analyzing the subject’s reaction towards marketing stimuli after certain brain areas are excited or inhibited by TMS. TMS mostly used in neuromarketing research related to attention, cognition, and behavioral changes. The downside of using TMS is the ethical concerns tied to the usage. The most important feature that set away SST from EEG is that SST can measure variations in the delay between stimulus and Steady-State Visually Evoked Potential response over extended periods. The usage of SST in neuromarketing research is in evaluating consumer behavior, video material effectiveness, long term memory encoding, engagement, emotional intensity, and valence, processed visual and olfactory input and attention. Same as EEG, both have a poor spatial resolution. Other tools are used in neuromarketing research without recording brain activities are eye trackers, measuring physiological responses, implicit association test, skin conductance, facial coding, and facial electromyography. These methods can be used together with neuroimaging tools to offer more in-depth insights into neuroimaging results and offer internal validation. Eye-tracking is used in assessing attention cues in marketing stimuli and eye movement patterns. Emotions related to marketing stimuli can be measured by measuring physiological responses, skin conductance, and facial coding. Facial electromyography can investigate emotions and social communications while the implicit association test is used in celebrity endorsement and brand positioning via the measurement of reaction time and underlying attitudes. Each technique has its advantages and disadvantages. The selection of neuromarketing tools depends on the research objective and scope. Table 1 illustrates the differences between Social Behaviour Neuroscience, Animal Behaviour Neuroscience, Neuroimaging (Human), Cognitive Psychology (Human) and Neuromarketing.

TABLE 1: Neuroscience Methods.

Type of Research Report	Research Aims	Research Scope	Methodology	Research Implications
Social Behavior Neuroscience	- study of neurobiology of social behavior from a comparative perspective	- motivational systems such as parental, aggression and sexual behavior, and play	- functional neuroimaging (correlational studies)	- Policy making
			- lesion studies in animals (causal studies)	- Education

Type of Research Report	Research Aims	Research Scope	Methodology	Research Implications
			- human case studies coupled with neuroimaging tools	- Society
			- TMS (causal studies)	- Contextual issues (cultural, gender, economy background etc.)
Animal Behavior Neuroscience	- generate hypotheses regarding psychiatric disorders	- biological psychiatry	- causal analog model	- Translation of findings from non-human animals to humans
	- understand variations in gene expression or developmental trajectories in relation to brain and behavior	- behavior genetics	- hypothetical analogical model	- Identification of new psychiatric drugs
	- contribute to the prevention and treatment of cognitive and affective disorders (such as depression and anxiety) in human beings	- experimental psychopathology		- Evaluate new therapy
		- neuropsychopharmacolc		
Neuroimaging (Humans)	- utilize any experimental technique than enable the human brain structure or function to be researched, especially in vivo	- behavioral and cognitive neuroscience	- structural neuroimaging	- prediction study with statistical modelling
		- construction of models	- functional neuroimaging	- relate brain structure and function to behavior
		- computational neuroscience	- multimodal neuroimaging	- discover neural correlates of cognition, behavior and disorders
		- neuroeconomics	- mathematical modelling	- study effects of brain trauma
		- psychiatry		
		- biophysical modelling		
		- statistical models		

Type of Research Report	Research Aims	Research Scope	Methodology	Research Implications
Cognitive Psychology	- the study of human perception, learning, memory and the thinking process about information	- human intelligence	- controlled laboratory experiments	- in-depth insights on human mind and higher order cognitive processes
		- linguistics	- Psychobiological research	- human development
		- human development	- Self-reports	
		- social psychology	- Case studies	
		- artificial intelligence	- naturalistic observation	
		- problem solving	- computer simulations	
		- perception	- artificial intelligence	
Neuromarketing	- research the process of decision making in consumer behavior and the factors that associated with it	- product marketing and advertising	- neuromarketing tools that record metabolic brain activity	- policy making
		- purchasing behavior	- neuromarketing tools that record electric brain activity	- increased sales
		- entertainment	- neuromarketing tools without recording brain activity	- political influences
		- architecture		- brand recognition
		- political candidates		- better movies
				- developing trends

This challenging framework rise of neuroimaging techniques that have provided new strategies options and such approach finally allow marketers to probe the consumers' brains in order to gain valuable insights on the subconscious processes explaining why a message eventually succeeds or fails. The marketers eliminate the biggest issue facing conventional advertising research, which is to a belief that people have both the motivation and ability to express how they are aroused by a specific piece of advertising (Morin, 2011).

2.2. “Push the buy button” in customers’ brains

As marketers’ desire, the “buy button” can be triggered by the marketing efforts such as advertisement that aims to increase the sales or purchase. The “buy button” could be affected by advertisers to create impulse purchasing behaviour. Some might already say marketers have been pushing the button with seductive products and advertisement. However, the consumer’s decision making is a complex process and behaviours over time. The behaviours entice with feelings, emotions, and experiences at the same time, including the conscious and non-conscious processes. The purchase decisions and behaviours are not processed solely by a single spot of the brain, but many, including the medial frontal cortex, hippocampus, amygdala and so on. According to Steve (2014), purchase decisions are complex behaviours that play out over time, engage both conscious and non-conscious processes, forced trade-offs between anticipation of reward and the pain of paying for it. According to Sandar (2014), researchers have found that knowing the brand you are buying can influence your preferences by commandeering brain circuits involved with memory, decision making, and self-image.

2.2.1. Consumer decision making and preference

Consumer decision making is looking at how consumer preferences are formed and how neural activities can be used to predict their preferences. There is a lot of consumer neurosciences research has been investigated in this area and found out the role of ventromedial prefrontal cortex in consumers’ decision-making process. The research reported that right and left ventromedial prefrontal cortex is responsible for emotional engagement in decision-making (Bechara, Damasio, & Damasio, 2000). The emotional factor is important in decision-making. If consumers experience positive emotional engagement, it is more likely to enhance buying behavior. One of the examples is music-evoked positive emotions responses. Ju and Ahn (2016) stated that music could evoke emotional responses such as pleasure and arousal and is significantly related to impulse purchasing. Although it cannot help marketers to ‘push the buy button’ in consumers’ brain, what we can read from the research is there are many factors contributing in increasing the purchase intention of consumers through different circumstances.

2.2.2. Engagement of the brain reward system

Products that represent higher status in terms of wealth and social status can influence the reward system in the brain, specifically in the striatum. According to Raab, Elger, Neuner, and Weber (2011), the regional brain activation shown in purchase decisions between compulsive and non-compulsive consumers is found to be different. Non-compulsive consumers shown significantly lower activation of the nucleus incubent within the striatum, suggesting that the compulsive buying behavior may result from a positive relationship of the brain's reward system in response to marketing stimuli. Hulten (2017) reported that if a positive brand experience perceived could enhance buying behavior. The positive brand experience could refer to the pleasure perceived during the experience. Research shows that pleasure and arousal can influence purchase intention. When we feel the product experience is satisfied with our needs, we tend to feel pleasure, and there is where the brain reward system plays its role.

2.2.3. Motivational and emotional responses

According to the approach-avoidance model (Davidson, 2004), pleasantness engaged in advertising could be one of the factors that prompt approach motivations of consumers towards the products and it happens to have more brain activation occur in the left hemisphere. Research carried out by Vecchiato et al. (2011) also reported the different brain activation related to the levels of perceived pleasantness with regards to advertising. The pleasantness is referring to the extent of liking an advertisement by an individual. The higher pleasantness shows higher neural activation in the left hemisphere while the lower pleasantness shows more brain activation in the right hemisphere. By understanding how the neural activities represent the emotional responses, marketers can design their advertisement and products by using these approaches and therefore motivate the consumers in acquiring their products.

2.2.4. Neural foundations of consumers' attention and memory

Attention and memory are also important for consumers to understand more about the products. After capturing the attention, making consumers memorizing the products also a vital factor in order to promote purchase intention. According to Stoll et al. (2008), attractive packaging is related to significant brain activations at the occipital lobe and presumes at the parietal lobe, which referring to the stimulation of visual input

and attention. They also mentioned about the attractive packaging usually having two important factors that are colors (multi-colored and bright) and shapes (oval, rectangular and abstract shapes). Both factors can contribute to drawing attention and processing of spatial information related to episodic memory. Figure 2 illustrates a heat map on the product, price, promotion, and place (4Ps) on a green product. The following statistical parameters are shown to dwell time and average fixation.



Figure 2: Heat Map on the Single-subject Level on the 4Ps Marketing Mix using Eye Tracking.

Table 2 shows the area of interest of a green product.

TABLE 2: Area of Interest (AOI) for Brand A.

Item	Price	Product 1	Product 2	Promotion	Place
Dwell time	12.1%	10.7%	29.5%	24.2%	12.3%
Average fixation	426.1 ms	389.8 ms	460.1 ms	443.9 ms	326.9 ms

A dwell was defined as a gaze that stays at least 120ms on a product, and total dwell time on each product is information measurements acquired specifically from each product. (Gidlöf, Wallin, Dewhurst, & Holmqvist, 2013). Dwell time is the amount of time spent looking at an image (Morey, 2013). The result shows that the highest dwell time was on “Product 2”, which is the image of the product itself. Next respondents dwell time, 24.2% is more on the promotion offered by the non-green body wash. Next, followed by Place (12.3%), Price (12.1%) and Product 1(10.7%). The study found that participants were spending more time on Product 2, compared to the other marketing mix elements.

According to Favier, Celhay, and Pantin-Sohier (2019), package design is one of the factors that can affect brand perception and buying intention of consumers. The extent of simplicity in package design has a significant effect on the brand perception that simpler graphic design suggests a more successful image and is prone to have higher buying intention from consumers. One example of companies is Apple. Apple takes up

simplicity as its core design principle in designing their packaging. It is not only become their significant label in packaging but also makes consumers memorize it easily.

Although neuromarketing cannot help marketers to push the buy button in consumers' brain, it can influence consumers' purchase intention. As mentioned above, there are many factors that could affect decision making and buying behavior in consumers. Thus, sensory marketing that focuses on the five senses of human, which are sight, hearing, smell, taste, and touch is also one of the core factors in neuromarketing. By understanding the five senses and the trigger points, marketers can implement the knowledge into their marketing strategies and thus affect consumers' buying behavior. One of the examples of sensory marketing is touch or haptic marketing. The power of touch is mentioned in this marketing strategy. According to Mulcahy and Riedel (2018), touch can improve the experience of advertisements and enhance purchase intentions. If what consumers were exposed from the advertisement is align with the haptic information in real life, it tends to enhance their decision-making and purchase intentions.

Nevertheless, many claimed that the use of neuroscience in marketing somehow had introduced companies to a 'buy button' that can read the mind of potential consumers and influence their buying decisions. Plus, those that oppose neuromarketing also believe that the act of 'reading' consumers' mind to improve company services is unethical and should not be used, let alone implied. However, what actually does 'ethics in neuromarketing' means in the first place? Moreover, how does this become an issue in the marketing field?

3. Is Neuromarketing Ethical?

Ethics are moral principles and rules that take up most of the aspects of human life. It governs the conducting behavior of people and even influences their decision making (Detert, Treviño & Sweitzer, 2008). Ethics in neuromarketing is often viewed as a guideline to how companies or researchers should act when applying neuroscience in their marketing field or studies. They must abide by the ethical rules and regulations to avoid violating both company and consumer rights.

Despite the effective use of neuroscience in marketing, some critics argued that neuromarketing brings negative impacts to consumers. They claimed that neuromarketing leads to manipulation of the minds of consumers, which later will influence their buying decisions (Berlińska & Kaszycka. 2016). For example, through neuromarketing, Microsoft

can know their customers' preferences and behaviors and thus, can provide more profitable services. According to Ariely and Berns (2010), the application of neuromarketing by companies that are concentrating on making a profit can be the reason why ethics in neuromarketing should be discussed. Also, researchers studying neuromarketing will have access to customers' personal information, which can further lead to issues of privacy and confidentiality.

Certainly, neuromarketing helps marketers and advertisers to understand further consumer's decision making, behavioral and purchase intention, which provides benefits and help to develop their product and brand success. According to Stanton et al. (2016), neuromarketing is often indicted for violating ethical boundaries and breaking the consumer's trust. Ethical objections to neuromarketing fall under the category that neuromarketing causes risks of harm and violations of rights. There are two common ethical issues attributed to neuromarketing; first, there is a buy button in the brain that can be used to manipulate and second, influence consumer choice. Therefore, the advertisers that use neuromarketing have a potentially unfair advantage over those that cannot, or do not, use it. With this, the media also portrays neuromarketing as a field of study that finds a buy button in the consumers' brain and can influence consumers to buy products. In reality, the idea behind neuromarketing is for the companies to create a better product or advertisement to entice the consumer, but not manipulate the consumer's mind (Stanton et al., 2016). Neuromarketing will allow an exceptional level of manipulation by any companies through their marketing activities. Hence, the companies should focus more on marketing activities which promote one product to the other, rather than manipulating a consumer's mind. They should create a mood of consumers more likely to know and enjoy their product.

Moreover, companies that afford to buy fMRI and EEG machines, will be the ones that benefit from neuromarketing science, while the smaller companies without the money to afford these luxuries need have to put more effort in their marketing activates and strive to create uniqueness in their product as well as their advertising just to compete with the big companies. Small companies will struggle to market their products in comparison. This could provide a situation where larger companies can take customers from the smaller companies using this superior marketing practice and offering a superior product, ultimately will eliminate the smaller companies (Stanton et al., 2016). If neuromarketing practices become important and provide benefit on understanding into consumer minds, it will become necessary that the advertisers act under a set of laws to ensure their actions are ethical. The primary concern endorsed by critics is that by scanning consumer's brains and perhaps finding a super-effective message means,

advertisers will be able to push the buy button in a consumer's brain thus being able to manipulate consumer behavior. The morality of such an act is observed as dishonesty from the start (Murphy, Illes, and Reiner, 2008). So, as a result of this risk, Murphy et al. (2008) specified that there is a need to secure numerous parties that can be misused by the research and to protect consumer independence if neuromarketing becomes highly effective.

Therefore, ethical codes and guidelines in companies' ethical behaviour are important. Companies must abide by the rules outlined in ethical codes (Hesis, Arlauskaitė, & Sferle, 2013). Research on neuromarketing poses many ethical issues that marketers need to consider (Fisher, Chin, & Klitzman, 2010). Therefore, the NMSBA Code of Ethics for the Application of Neuroscience in Business is being used. This code to ensure that the highest ethical standards are maintained for the neuromarketing study. The code emphasis on three important elements, which is; to establish public trust in neuro marketers 'integrity; protect participants' privacy and protect neuromarketing service purchasers (Neuromarketing Science & Business Association, 2016). Most papers discussing on ethical issues in neuromarketing focused on similar codes of ethics. These codes, or also known as principles, are autonomy and informed consent, confidentiality and privacy as well as no maleficence and beneficence (Dierichsweiler, 2014; Stanton et al., 2017; Ulman et al., 2015). Each of the codes play an important role to ensure the righteousness in applying neuroscience technologies in marketing. Plus, violations to these codes can result in ethical crises, which may blindfold the advantages and embrace the disadvantages of neuromarketing. Further explanation on each code is discussed below.

3.1. Autonomy and informed consent

The concept of autonomy explains the freedom of right given to everyone to choose or make decisions. In selling-buying practice, this principle is associated with allowing customers to make informed decisions about product or service they want to buy or receive. However, some critics viewed that the emergence of neuromarketing has led to neglecting of autonomy of these customers because their mind have been 'directed' or manipulated to choose a neuromarketing product (Dierichsweiler, 2014).

For example, an experiment was conducted to study the influence of the frequent appearance of a product on customers' choice. Subjects were shown photographs of Dasani water bottle a couple of times without their conscious awareness of the brand, and at the end of the experiment, were asked to choose one out of four brands (including

Dasani) of a water bottle. Surprisingly, the majority of the subjects chose the Dasani water bottle instead of the other three brands. The finding of this experiment revealed that repeated exposure towards a product could manipulate the brain into choosing that product, even without one's consciousness (Stanton et al., 2015). In accordance to this, it can be deduced that the autonomy and informed consent of customers have been compromised by frequent exposure to a certain product, which in the claim of ethic critics, is wrong and unethical.

However, the claim can be counter-argued by saying that the freedom of the right of a customer to choose is not totally influenced by repeated exposure. This is generally because the human mind is not as simple as that. Yes, it is fair to say that, by frequently showing customers a product, it will lead to them *considering* in buying that product, but it does not necessarily lead to customers *buying* the product. Plus, the decision making process during buying is very complex and involves many connections to parts of the brain. Perhaps a simple concept of 'repeated exposure' will influence and trigger their memory, but indeed not their ability to make their own decision.

3.2. Confidentiality and privacy

Confidentiality and privacy in neuromarketing concern on the assurance given from companies to customers that their personal information and data will be kept confidential and will only be shared anonymously. Results from neuroimaging, for example, can show researchers much information regarding a subject, and if this information is revealed to public or other agencies without legal permission from the subject, it may be misused and violate ethics codes of conduct.

According to Ulman et al. (2015), one of the reasons that highlight the importance of keeping confidential and private information is to take care of vulnerable groups. These groups, such as mental health subjects, children, and young adults, are prone to discrimination and exploitation. Besides, consumers like children and young adults are less mature in making decisions, thus easier to be influenced. In other words, these groups need higher protection to avoid any ethical violations of their privacy and confidentiality. This is the reason why critics opposed the use of vulnerable groups as subjects for neuromarketing studies. In a more extreme case, France even banned companies from conducting any neuroimaging researches about neuromarketing (Ulman et al., 2015).

However, using vulnerable groups as neuromarketing subjects do bring advantages to companies. Example of studies done on children is the one performed by Robinson et al. (2007), that investigated young children of age 3 to 5 on their preferences

between branded and non-branded fast foods. A similar study was done seven years later by Bruce et al. (2012), to study children's perception of with-logo and non-logo products. This study was conducted using fMRI on children of age 9 to 16 years old. Both studies revealed the importance of popularity and attractive logos in the eyes of young customers.

By considering both advantage and risk of using vulnerable groups as subjects in neuromarketing studies, it is important for companies to have strict ethical guidelines in handling their confidential. Because these groups are less able to protect themselves, irresponsible individuals or third parties might overuse their data for additional profit. Thus, it is suggested to have a standardized procedure for research on vulnerable groups to ensure their information are interpreted confidentially. Also, significance of neuromarketing studies should first be investigated and justified before allowing the use of these groups as subjects.

3.3. Benevolence and no maleficence

Benevolence means 'well,' or 'do good' while no maleficence is defined as 'do no harm' (Ekstrand & Ekstrand, 2016). Both terms often go together because, in ethics, it is insufficient to only 'do no harm'. For someone to be considered as virtuous, he must also 'do good' and be beneficial to everybody (Summers & Morrison, 2009). However, ethical issues aroused when these two codes of ethics are neglected in some markets, especially those that prioritize profit rather than their customers' wellbeing. Issues had been raised by ethics critics on advertisements that promote harmful or damaging products such as tobacco and alcohol. Fortunately, in Malaysia, such advertisements have been banned by the Malaysian Communication and Multimedia Commission (MCMC) (Yoon, 2005).

Another issue is also raised by ethics critics about an advertisement that does not represent the exact image of the product. For example, fast foods advertisements by Mc Donald's or Kentucky Fried Chicken (KFC) are often *prettier than it seems*. The burgers and chickens look so deliciously tempting on television; however, in reality, they are freakishly small and look less delicious. Hence, question aroused whether this is considered as an act opposite to benevolence. The reason for this is because companies such as Mc Donald's and KFC are manipulating and influencing consumers with their overly tempting advertisements when, in reality, the foods look nothing like that. If this act is not benevolent, then these companies are violating the ethical code of 'do good.'



Figure 3: Example of Mc Donald's Menu in Commercial versus How it Looks Like in Reality.

The question of whether exaggerated advertisements are ethical or not is still and may forever be a continuous debate. Ethics critics, with their stance on the concept of benevolent, argue that these kinds of advertisement are like a bad trick to influence consumer behavior. However, this claim can be counter-argued by the fact that even though consumers' mind has been injected with these pretty and delicious advertisement, it does not disturb their autonomy and freedom of choice. They are still free to make their own informed decisions on whether or not to buy the advertised product. Besides, in the case of Mc Donald's and KFC, most of their loyal customers prioritize the taste instead of the look. Hence, as long as this issue is acceptable by consumers, it can be said that no harm or malicious tactic is being practiced.

In a brief conclusion, inculcating neuroscience in marketing has brought positive impacts to companies and marketers in their attempt to understand consumer behavior. Plus, neuromarketing also helps in the increment of popularity through effective advertisements. However, issues aroused by ethic critics in terms of potential discriminations towards autonomy, privacy, and confidentiality of customers and the act of benevolence and no maleficence by companies.

4. Suitable Approaches for Business to Stay Vigilant

The practice of neuromarketing in markets and companies has raised several ethical issues, especially those on the state of mind of customers. Since the application of neuroscience in marketing is still new in most countries, most people, including marketers themselves, are unclear on the dos and don'ts and are unaware of the potential threats neuromarketing can cause. Thus, here are some approaches that marketers can apply in order to stay ethically honest and vigilant before adopting neuroscience into their

companies. According to Lindstrom (2013), neuromarketing has no motivation to rise up sales or profits at all, in conjunction with it can be claimed that every cutting-edge technology has this capability to be misused and there is an ethical responsibility for neuromarketing also. So, in point of consumers' view, the brain imaging approach may support the consumers to assess and divulge hidden and delicate methods used by marketers due to it organize our decision-making mechanism in the brain (Renvoise and Morin, 2012).

4.1. Abide by the guidelines and codes of ethics

Before using neuroscience in marketing, companies should set up rules and regulations that highlight what can be done and what cannot be done with neuromarketing technologies (Dierichsweiler, 2014). These rules must follow the standard operating procedure (SOP) of the company and must be strictly validated by higher authorities such as the ethics committee and neuroscience experts before its installment. Furthermore, without the presence of rules and guidelines, it is possible for workers of the company to go astray and misuse the neuromarketing data.

Apart from that, companies must also abide by the laws or declarations made by the government, especially regarding the health and safety of vulnerable groups like children, minorities, and patients. For example, in Finland, any studies or researches that involve human research, including neuromarketing a neurotechnology, must follow ethical codes specified in the Declaration of Helsinki (Ulman et al., 2015). Plus, ethics committees are present to perform strict investigation following any human researches (Moreno & Arteaga, 2012).

4.2. Include neuromarketing issue in meetings

Following rules and regulations is not enough if a company does not bother to make regular check up on issues pertaining to neuromarketing. Employees need to be reminded regularly on the practice of neuroscience so that potential misuse of this technology can be avoided. An ethically vigilant company is the one that knows exactly what their strengths and weaknesses are in applying neuroscience in marketing and brainstorms their way through possible threats and opportunities regarding this issue. In this way, workers will be frequently reminded of what to do and what not to do when it comes to conducting neuromarketing research.

4.3. Keep trust between marketers and consumers

Another approach that can be used by marketers to stay vigilant is by being truthful to customers, especially about products or services offered. In neuromarketing, consumer behaviors are being studied and investigated to reach consumer satisfaction. Once marketers understood what their customers want, first thing first is that they might come out with effective advertisement regarding their products. However, as mentioned in the previous section, sometimes these advertisements are exaggerated from reality. Marketers must keep the trust of their customers as a priority. Hence, one way to ethically do that is by putting a disclaimer at the bottom of the advertisement to inform customers that the products or services may not be as it seems. In this way, customers will not put such high expectation to the said product, and trust will not be shattered. All in all, marketers can stay ethically vigilant while imparting neuroscience in their marketing, if they follow the rules and regulations, do regular analysis to avoid potential misuse and be truthful with their customers.

Marketers and advertisers are striving to increase sales and profits of their products and services as well as to maintain frequent purchase actions among their consumer/customer toward their products and services. Hence, they are always trying their very best to make the most effective advertisement that somehow well persuades the consumer to push the buy button. In this context, to gain more knowledge about their consumers purchase behavioral intention, marketers and advertisers applied neuro-marketing methods to understand how their brain works. Neuromarketing is strictly focused as a tool to help them to create and improve their product and brand. As for neuromarketing findings, marketers and advertisers should not be used for the purpose to manipulate the consumer's mind; in fact, they should be using it for creating the best advertising campaign. Let the consumer make their own decision about whether to buy their products and services. Marketers and advertisers should appreciate and respect consumer's autonomous thinking, which always leads to their decision based on their needs and wants. The needs and wants of consumers are unpredictable; however, marketers and advertisers need to maintain doing their advertising campaign as much as they can and create the most revealing and persuading advertisements that help to increase sales and profits. Marketers and advertisers should try to avoid creating an advertisement that is going to push consumers into doing things they do not want to do. For example, creating the most persuading commercial about drinking alcohols and smoke cigarettes. This is not only generating interest in the target market but also to those who are not the target and potential markets such as school students and kids.

Marketers and advertisers should maintain the purpose to use neuromarketing that is to study the human brain and physiological feedbacks to understand about purchasing behavior and what makes them buy a particular product and service (Yucel and Cubuk, 2013).

5. Conclusion and Future Research

Neuromarketing offered much more valuable information. However, the field of neuromarketing receives a great deal of criticism because it is still young in the field of marketing research. Discussions on neuromarketing and ethics have focused on consumer manipulation and lack of transparency (Fisher, Chin, & Klitzman, 2010 and Hensel, Iorga, Wolter, & Znanewitz, 2017). Therefore, neuromarketing raises particular ethical issues, for example, the need for protection of research subjects, the need for prevention of exploitation of vulnerable populations and the need to make sure correct rather than exaggerated information is provided to the public (Nyoni & Bonga, 2017 and Lim, 2018). This situation, however, is due to the lack of awareness, consent and understanding on the part of targeted consumers (Wilson, Gaines, & Hill, 2008). Thus, more research could be done to make neuromarketing more ethical and understandable. It is time to implement neuromarketing in a marketing and research study with ethical way. Ethics should not be a strange field for any professional as it generally relates to society (Burgos-Campero & Vargas-Hernandez, 2013). In conclusion, neuromarketing helps to better understand the customer and deliver the best, but at the same time protects customer privacy and confidence.

Issues have been raised by ethics critics regarding the use of neuroscience technologies in marketing. This is because the application of said technologies is still new and unclear, especially regarding researches or studies that involve human subjects. In the light of human health and safety in neuromarketing, marketers should always prioritize consumers' autonomy, informed consent, privacy, and confidentiality. Plus, the act of benevolence and no maleficence towards customers and clients must not be neglected as well. Approaches such as following rules and regulations and keeping consumers' trust are good baby steps for companies to ensure ethical neuromarketing application.

The future of neuromarketing is expected to grow because marketers and advertisers need a deeper understanding of consumer's buy button mind. Our brain is traditionally seen as an important part of our society; the simple remark on its manipulation has greater cultural effects. Through neuromarketing's growth over the past time, there has been consistent progress of neuroscientists conducting research in business school

and an influx of consumer neuroscientists developing their competence and generating more studies and findings (Plassman et al., 2015). Furthermore, it is suggested that future directions in neuromarketing studies should include the construction of a standard legal framework that is applicable for marketers and companies, especially for those that are operating in populations where neuromarketing emergence is still new. Even though there is no 'buy button' that can be pushed by marketers to manipulate consumer behavior, but ethical consideration must always be a priority.

In a nutshell, neuromarketing can serve as a bridge between consumers and companies by supporting to understand consumers and to outline the process of their brain to develop better, more efficient, and human-coherent products. On the contrary, neuromarketing shows and discovers insights to consumers and clues about how companies design their advertising campaigns, create their products and what do they reveal and know about our brains so that consumers could be positive for vulgarity marketers and companies when confronted.

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References

- [1] Ariely, D., & Berns, G. S. (2010). Neuromarketing: the hope and hype of neuroimaging in business. *Nature reviews neuroscience*, 11(4), 284.
- [2] Babu, S. S., & Vidyasagar, T. P. (2012). Neuromarketing: Is Campbell in Soup? *The IUP Journal of Marketing Management*, XI(2), 76–100.
- [3] Brierley, G. L. (2017). *Subconscious Marketing Techniques: the implications for consumer regulations and the marketing profession Submitted in partial fulfilment of the requirements for the*. Cardiff Metropolitan University.
- [4] Burgos-Campero, A. A., & Vargas-Hernandez, J. G. (2013). Analytical Approach to Neuromarketing as a Business Strategy. *Procedia - Social and Behavioral Sciences*, 99, 517–525.
- [5] Bechara, A., Damasio, H., & Damasio, A. R. (2000). Emotion, decision making and the orbitofrontal cortex. *Cerebral cortex*, 10(3), 295-307.

- [6] Berlińska, E., & Kaszycka, I. (2016). Neuromarketing—Chance or Danger for Consumers in Opinion of Mcsu'S Students.
- [7] Bruce, A. S., Bruce, J. M., Black, W. R., Lepping, R. J., Henry, J. M., Cherry, J. B. C.,... & Savage, C. R. (2012). Branding and a child's brain: an fMRI study of neural responses to logos. *Social cognitive and affective neuroscience*, 9(1), 118-122.
- [8] Davidson, R. J. (2004). What does the prefrontal cortex "do" in affect: Perspectives on frontal EEG asymmetry research. *Biological Psychology*, 67 (1), 219–234.
- [9] Deppe, M., Schwindt, W., Kugel, H., Plassmann, H., & Kenning, P. (2005). Nonlinear responses within the medial prefrontal cortex reveal when specific implicit information influences economic decision making. *Journal of Neuroimaging*, 15(2), 171-182.
- [10] Detert, J. R., Treviño, L. K., & Sweitzer, V. L. (2008). Moral disengagement in ethical decision making: a study of antecedents and outcomes. *Journal of Applied Psychology*, 93(2), 374.
- [11] Dierichsweiler, K. L. A. (2014). Ethical Issues in Neuromarketing (Bachelor's thesis, University of Twente).
- [12] Ekstrand, J. D., & Ekstrand, M. D. (2016). First do no harm: Considering and minimizing harm in recommender systems designed for engendering health. *In Engendering Health Workshop at the RecSys 2016 Conference* (pp. 1-2). ACM.
- [13] Favier, M., Celhay, F., & Pantin-Sohier, G. (2019). Is less more or a bore? Package design simplicity and brand perception: an application to Champagne. *Journal of Retailing and Consumer Services*, 46, 11-20.
- [14] Fisher, C. E., Chin, L., & Klitzman, R. (2010). Defining neuromarketing: practices and professional challenges. *Harvard Review of Psychiatry*, 18(December 2009), 230–237. <http://doi.org/10.3109/10673229.2010.496623>
- [15] Gani, M.O, Reza, S.M.S, Rabi, M.R.I and Reza, S.M.S. (2015). Neuromarketing: methodology of marketing science. Institute of research engineer and doctors, USA.
- [16] Gidlöf, K., Wallin, A., Dewhurst, R., & Holmqvist, K. (2013). Using Eye Tracking to Trace a Cognitive Process: Gaze Behaviour During Decision Making in a Natural Environment. *Journal of Eye Movement Research*, 6(1), 1–14.
- [17] Hesis, M. A. T., Arlauskaitė, A. E., & Sferle, A. (2013). Ethical Issues in Neuromarketing, 63. <http://doi.org/10.1109/32.738346>
- [18] Helme Falk, M., & Hultén, B. (2017). Multi-sensory congruent cues in designing retail store atmosphere: Effects on shoppers' emotions and purchase behavior. *Journal of Retailing and Consumer Services*, 38, 1-11.

- [19] Hultén, B. (2017). Branding by the five senses: A sensory branding framework. *Journal of Brand Strategy*, 6(3), 281-292.
- [20] Isabella, G., Mazzon, J. A., & Dimoka, A. (2015). Culture Differences, Difficulties, and Challenges of the Neurophysiological Methods in Marketing Research. *Journal of International Consumer Marketing*, 27(5), 346–363. <http://doi.org/10.1080/08961530.2015.1038761>
- [21] Ju, J., & Ahn, J. H. (2016). The effect of social and ambient factors on impulse purchasing behavior in social commerce. *Journal of Organizational Computing and Electronic Commerce*, 26(4), 285-306.
- [22] Khushaba, R. N., Wise, C., Kodagoda, S., Louviere, J., Kahn, B. E., & Townsend, C. (2013). Consumer neuroscience: Assessing the brain response to marketing stimuli using electroencephalogram (EEG) and eye tracking. *Expert Systems with Applications*, 40(9), 3803-3812.
- [23] Kumar, H., & Singh, P. (2016). Neuromarketing: An Emerging Tool of Market Research. *International Journal of Engineering and Management Research*, 5(December 2015), 530–535.
- [24] Lindstrom, M. (2013). Buy-ology. U. Şensoy (translation), Istanbul: Optimist Press,
- [25] Lim, W. M. (2018). Demystifying neuromarketing. *Journal of Business Research*, 91(November 2017), 205–220. <http://doi.org/10.1016/j.jbusres.2018.05.036>
- [26] Luan, J., Yao, Z., Zhao, F. T., & Liu, H. (2016). Search product and experience product online reviews: An eye-tracking study on consumers' review search behavior. *Computers in Human Behavior*, 65, 420–430. <http://doi.org/10.1016/j.chb.2016.08.037>
- [27] Madan, C. R. (2010). Neuromarketing: the next step in market research? *Eureka*, 1, 34–42. Retrieved from <http://ejournals.library.ualberta.ca/index.php/eureka/article/viewArticle/7786>
- [28] Mileti, A., Guido, G., & Prete, M. I. (2016). Nanomarketing: a new frontier for neuromarketing. *Psychology & Marketing*, 33(8), 664-674.
- [29] Moreno, B. A. C., & Arteaga, G. M. G. (2012). Violation of ethical principles in clinical research. Influences and possible solutions for Latin America. *BMC medical ethics*, 13(1), 35.
- [30] Morin, C. (2011). Neuromarketing: The New Science of Consumer Behavior, Symposium: Consumer Culture in Global Perspective, 48, 131-135.
- [31] Morey, A. C. T. (2013). *Memory for Positive, Negative, and Comparison Ads: Studying Semantic Associations Between Candidates and Issues Using EEG*. The Ohio State University.

- [32] Mulcahy, R. F., & Riedel, A. S. (2018). 'Touch it, swipe it, shake it': Does the emergence of haptic touch in mobile retailing advertising improve its effectiveness?. *Journal of Retailing and Consumer Services*.
- [33] Murphy, E.R., Illes, J. and Reiner, P.B., 2008. Neuroethics of neuromarketing. *Journal of Consumer Behaviour*, 7(4-5), pp.293-302.
- [34] Murphy, J. (2005). *The Power of Your Subconscious Mind*. AsAManThinketh.net. USA: AsAManThinketh.net. <http://doi.org/10.1093/jrma/47.1.23>
- [35] Neto, J. C., Filipe, J. A., & Ramalheiro, B. (2011). Neuromarketing: Consumers and the Anchoring Effect. *International Journal Latest Trends Fin. Eco. Sc*, 1(4), 183–189.
- [36] Neuromarketing Science & Business Association. (2016). NMSBA Code of Ethics.
- [37] Nyoni, T., & Bonga, W. G. (2017). Neuromarketing: No brain, No Gain! *Journal of Economics and Finance*, 2(2), 17–29.
- [38] Plassmann, H., Venkatraman, V., Huettel, S. A., & Yoon, C. (2015). Consumer neuroscience: Applications, challenges, and possible solutions. *Journal of Marketing Research*, 52, 427.
- [39] Poldervaart, R. (2009). Exploring the subconscious with guided relaxation. *Qualitative*, 1–10.
- [40] Pop, N. A., Dabija, D.-C., & Iorga, A. M. (2014). Ethical Responsibility Of Neuromarketing Companies In Harnessing The Market Research – A Global Exploratory Approach. *Amfiteatru Economic*, 16(35), 26–40.
- [41] Popa, L., Selejan, O., Scott, A., Mureşanu, D. F., Balea, M., & Rafila, A. (2015). Reading beyond the glance: eye tracking in neurosciences. *Neurological Sciences*, 36(5), 683–688.
- [42] Raab, G., Elger, C. E., Neuner, M., & Weber, B. (2011). A neurological study of compulsive buying behaviour. *Journal of Consumer Policy*, 34(4), 401.
- [43] Ramakrisnan, P., Jaafar, A., Razak, F. H. A., & Ramba, D. A. (2012). Evaluation of user Interface Design for Learning Management System (LMS): Investigating Student's Eye Tracking Pattern and Experiences. *Procedia - Social and Behavioral Sciences*, 67, 527–537. <http://doi.org/10.1016/j.sbspro.2012.11.357>
- [44] Renvoise 'P, Morin C. (2007), Neuromarketing: Understanding the "Buy Button" in Your Customer's Brain. T. Nelson: Nashville, TN. Retrieved from <https://www.forbes.com/forbes/2009/1116/marketing-hyundai-neurofocus-brainwaves-battle-for-the-brain.html#72ea1f0b17bb>
- [45] Robertson, D. C., Voegtlin, C., & Maak, T. (2016). Business Ethics: The Promise of Neuroscience. *Journal of Business Ethics*, (August). <http://doi.org/10.1007/s10551-016-3312-6>

- [46] Robinson, T. N., Borzekowski, D. L., Matheson, D. M., & Kraemer, H. C. (2007). Effects of fast food branding on young children's taste preferences. *Archives of pediatrics & adolescent medicine*, 161(8), 792-797.
- [47] Santos, R. D. O. J. Dos, Oliveira, J. H. C. De, Rocha, J. B., & Giraldo, J. D. M. E. (2015). Eye Tracking in Neuromarketing: A Research Agenda for Marketing Studies. *International Journal of Psychological Studies*, 7(1), 32–42. <http://doi.org/10.5539/ijps.v7n1p32>
- [48] Solnais, C., Andreu-Perez, J., Sánchez-Fernández, J., & Andréu-Abela, J. (2013). The contribution of neuroscience to consumer research: A conceptual framework and empirical review. *Journal of Economic Psychology*, 36, 68-81.
- [49] Stanton, S.J, Sinnott-Armstrong, Walter, & Huettel, Scott (2016). Neuromarketing: Ethical Implications of its Use and Potential Misuse. Springer Science and Business Media 2016.
- [50] Stanton, S. J., Sinnott-Armstrong, W., & Huettel, S. A. (2017). Neuromarketing: Ethical implications of its use and potential misuse. *Journal of Business Ethics*, 144(4), 799-811.
- [51] Steven J. Stanton, Walter Sinnoc-Armstrong, Scoc A. Huecel (2016) Neuromarke1ng: Ethical Implica1ons of its use and potential misuse
- [52] Stoll, M., Baecke, S., & Kenning, P. (2008). What they see is what they get? An fMRI-study on neural correlates of attractive packaging. *Journal of Consumer Behaviour: An International Research Review*, 7(4-5), 342-359.
- [53] Summers, J., & Morrison, E. (2009). Principles of healthcare ethics. *Health Care Ethics*. 2nd ed. Sudbury: Jones and Bartlett Publishers, 41-58.
- [54] Ulman, Y. I., Cakar, T., & Yildiz, G. (2015). Ethical issues in neuromarketing: "I consume, therefore I am!". *Science and engineering ethics*, 21(5), 1271-1284.
- [55] Vecchiato, G., Toppi, J., Astolfi, L., Fallani, F. D. V., Cincotti, F., Mattia, D.,.... & Babiloni, F. (2011). Spectral EEG frontal asymmetries correlate with the experienced pleasantness of TV commercial advertisements. *Medical & biological engineering & computing*, 49(5), 579-583.
- [56] Wan Adilah Wan Adnan, Wan NurHafizhoh Hassan, Natrah Abdullah, & Jamaliah-Taslim. (2013). Eye Tracking Analysis of User Behavior in Online Social Networks. *Online Communities and Social Computing SE - 13*, 8029, 113–119. http://doi.org/10.1007/978-3-642-39371-6_13
- [57] Wilson, R. M., Gaines, J., & Hill, R. P. (2008). Neuromarketing and consumer free will. *Journal of Consumer Affairs*, 42(3), 389–410. <http://doi.org/10.1111/j.1745-6606.2008.00114.x>

- [58] Yoon et al., (2012). Decision neuroscience and consumer decision making. Springer science+business media, LLC 2012. Retrieved from https://www.sas.upenn.edu/psych/kable_lab/Joes_Homepage/Publications_files/Yoon%20et%20al%202012.pdf
- [59] Yucel, A. and Cubuk, F. (2013) (Translation) Neuromarketing and Ozdogan, F.B., 2008. A conceptual study on the use of subliminal advertising approaches in eye tracking and marketing. Comparison of Gazi. Nigde University Economics and Administrative Science University Faculty of Commerce and Tourism Education Journal, 2, Journal of the Faculty of Sciences, 6 (2), p.172.
- [60] Zaltman, G. (2003). The Subconscious Mind of the Consumer (And How To Reach It).
- [61] Zurawicki, L. (2010). *Neuromarketing: Exploring the Brain of the Consumer*. (Springer, Ed.). USA: Springer.