

Analysis of Consumer Awareness of Neuromarketing

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Abstract – Neuromarketing research is being used by more and more companies to gain a better understanding of what is happening in a body of consumers when they are subject to marketing incentives and when purchasing decisions are being made. The presented research aims to examine the consumers' awareness of neuromarketing and their willingness to participate in neuromarketing research. Based on the goal, two hypotheses were established. The research sample consisted of 222 respondents aged from 20 to 52 years. In terms of consumer willingness to undergo Neuro-Biofeedback, we can observe that the Slovak population is more inclined to undergo the research than not to undergo.

Keywords – Neuromarketing, consumer awareness, Neuro-Bio Feedback.

1. Introduction

The promising field of neuromarketing, which uses neuroscience in decision-making, has recently attracted growing interest from various industries. Conventional marketing techniques are sometimes ineffective in selling products because they do not inspire people to buy products.

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Traditional marketing techniques assess the customer's tendency, which does not necessarily mean attitude to the brand and its purchasing intentions. The seller may misinterpret the customer's behavior. The main goal of marketing is undoubtedly to help companies link their intentions to the needs and preferences of current and potential customers and learn more about their behavior. Neuromarketing provides information on how consumers' brains work when facing different market incentives. The advantage of this measurement technique is that the information obtained is not affected by consumer bias and reluctance to reveal the truth. The problem with technologies used in neuromarketing is that researchers can see beyond the boundaries that research objects can set for these tests [5].

2. Literature Review

The term neuroscience was introduced in the mid-1960s as an interdisciplinary term. Today, neuroscience represents a wide range of scientific subsystems, from the molecular biology of nerve cells to cognitive and emotional psychology. Neuroscience is currently one of the most widespread disciplines. The cardinal question of the research is how neuroscience helps solve practical marketing issues. The neuroeconomic sub-area that examines marketing-relevant issues is called 'neuromarketing' or 'consumer neuroscience' [15]. Neuromarketing is specified as a field of study that uses the application of neuroscientific methods to analyze and understand human behavior concerning markets and market changes [2], [3]. Neuromarketing, like its predecessor, neuroeconomics, uses clinical information on brain functions and mechanisms to help explain what is happening inside the black box, leading to an explanation of consumer behavior [10], [8]. Consumer neuroscience is an interdisciplinary discipline that combines psychology, neuroscience, and economics to study how the brain is physiologically influenced by advertising and marketing strategies [17]. It serves as a tool for obtaining consumer data, how and where and in what environment he/she prefers to shop, where he/she

spends the most time shopping and where they spend the most money [7]. Based on an examination of different definitions of neuromarketing, [6] compiled a merging definition: „Neuromarketing is an interdisciplinary field of science that uses various tools traditionally used in medicine, psychiatry, and psychology on neurofeedback, biofeedback, and metabolic processes measures, in conjunction with traditional marketing tools in the search to better understand the most diverse types of emotions, cognitions, physiological reactions, behaviors and thoughts of economic agents, both conscious and unconscious related to typical issues of Marketing and its various sub-areas.”

Neuromarketing is characterized by using special tools to examine human behavior. Currently, the best-known neuromarketing tools are:

- fMRI - Functional Magnetic Resonance Imaging - it monitors the increase in the oxygenated blood to specific areas of the brain during the exposure to a specific stimulus [12].
- PET - Positron emission tomography - uses radioisotopes to label molecules in the brain and detect specific neurotransmitters of interest [14].
- EEG - Electroencephalography - a tool for measuring brain activity through electrodes placed on the respondent's head [25].
- Eye-tracking - this is a measurement of visual attention, which can map a person's view and level of excitement in response to a stimulus [18].
- GSR - Galvanic skin response - represents a physiological response of the level of arousal to any given stimuli [22].
- Heart rate and respiration - this measurement allows you to reliably measure changes in a person's emotional response to stimuli [11].

In routine marketing research, the research sample is selected based on predetermined criteria in terms of research goals to ensure its representativeness. However, the willingness of respondents in the case of neuromarketing research to undergo such measurements plays an important role in the selection of the sample. As reported by [29] the sample used is often not representative of the target population because it favors respondents who appreciate the monetary incentive offered for spending time in the laboratory. Also point to the problem of sampling and willingness to participate in the research, which raises the mentioned problem of representativeness [16], [13].

However, financial reward is not the only thing that convinces respondents to engage in neuromarketing research, as potential respondents are often afraid of such measurements. Here, neuromarketing meets the principles of ethics. The

two main ethical concerns in the use of neuroscientific methods in marketing are the protection of test subjects and the scientific reliability, validity, and transparency of neuroscientific findings. Measuring and mapping neurological responses to marketing stimuli in the human brain can compromise test subjects' autonomy [20], [21]. These measures include information on study procedures, the benefits and risks of participating in the study, the rights of test subjects, the types of findings that can be obtained from them, and the steps taken to ensure confidentiality and privacy [26], [27]. States that some of the most challenging ethical cases that have arisen in the world of neuromarketing are when people are experimenting without seeking their informed consent [32]. States that the use of neuromarketing in some cases can create a negative consumer attitude towards the society that uses it if the consumer is convinced that such practices are unethical. Many experts and theorists continue to find the answer to the holy grail of marketing: What leads consumers to choose one product over another? What factors influence consumer brand perception? In this context, a way of examining consumers' perceptions of neuromarketing is essential to increase their willingness to participate in this research. The overriding aim has to be to inform consumers thoroughly why they should be the subject of research, with an emphasis on adhering to research ethics.

3. Methods and Results

The research aims to examine consumers' awareness of neuromarketing and their willingness to participate in the research. Based on the goal, hypotheses were established:

H1: We assume that consumers who perceive neuromarketing research as dangerous are less willing to engage in research.

H2: We assume that consumers who agree to a financial reward for a research participant are more willing to engage in neuromarketing research and are less aware of its adverse effects.

The research sample consisted of 222 consumers aged from 20 to 52 years, with an average age of 31.67 years, and consisted of 122 (55%) women and 100 (45%) men. To maintain the proportionality of the research sample, we used a deliberate selection where Slovak consumers from all regions were addressed. The minimum education of the respondents was secondary (69%) secondary school and 153 (69%) university education.

The research was conducted through a questionnaire, which describes three factors:

- Willingness to undergo Neuro-Bio Feedback for neuromarketing purposes - a factor formed by the summation index of 6 items of the questionnaire: (Q1 to Q6). Cronbach's Alpha 0.907;
- Perception of neuromarketing research influence on the consumer - a factor formed
- by the summation index of 3 items of the questionnaire: (Q7 to Q9). Cronbach's Alpha 0.888;
- Perception of financial reward for participants in neuromarketing research - a separate questionnaire item: (Q10).

These factors are rated by respondents on a scale from 1 - strongly disagree to 5 - strongly agree. The normality of the data distribution was assessed based on Skewness and Kurtosis (Table 1). The data were judged to be normally distributed without significant outliers. Reliability was assessed based on the Cronbach's Alpha calculation, where acceptable values were observed.

Table 1. Skewness and Kurtosis – assessment of data normality

	Skewn.	SD.	Kurt.	SD.
Willingness to undergo Neuro-Bio Feedback	0,322	0,221	0,329	0,129
Perception of neuromarketing research influence on the consumer	0,278	0,244	0,376	0,202
Perception of financial reward for participants	0,139	0,332	0,332	0,111

List of questionnaire items:

- Q1: You would be willing to undergo neuromarketing research;
- Q2: You'd be willing to have your eyesight checked in response to different types of ads;
- Q3: You would be willing to have controlled your heart rate during purchase;
- Q4: You would be willing to undergo a method in which the camera recognizes movements and facial language;
- Q5: You would be willing to undergo magnetic resonance imaging to determine your body's response to advertising;
- Q6: You would be willing to record your brain responses while watching ads;
- Q7: Neuromarketing research is dangerous.
- Q8: Marketing research done through medical devices can be harmful;
- Q9: Tracking an ad predetermined to examine bodily reactions can negatively affect me;
- Q10: Participants in neuromarketing research should be provided with a financial reward.

Evaluated respondents' willingness to undergo neuromarketing research through Neuro-Bio Feedback is shown in Table 2.

Table 2. Confidence interval - willingness to undergo Neuro-Bio Feedback

	Mean	Std.	Lower Bound	Upper
Willingness to Undergo Neuro-Bio Feedback	3,195	0,071	3,053	3,33

On a rating scale of 1 - strongly disagree to 5 - strongly agree, the average value in the item: willingness to undergo neuromarketing research is 3,195. There is a 95% probability in the range of 3,053 - 3,336 for Slovak people. The average value and confidence interval do not deduce a clear conclusion whether Slovak consumers are willing to undergo Neuro-Bio Feedback for neuromarketing purposes. The result points to a relatively narrow confidence interval, where we can observe that the Slovak population is more inclined to undergo research than not to undergo it. Similar results from a study in Pennsylvania in a sample of 489 reported that 46% of respondents would be willing to participate in a medical research study [11]. Further research by [1], [24], [9] deliver similar results with a slightly higher percentage of willingness to participate in research. These surveys point to the variables such as social status, respondents' education, social environment, and cultural stereotypes that play a significant role in the willingness to participate in research where human physiological changes are observed. In addition to these variables, the respondent's knowledge includes methodological and research practices, how important is the respondent's participation and altruism, etc. According to [4], the problem is that the public accesses information about neuromarketing in a mediated or distorted way, e.g., through reports that are published in the mainstream press and not through high-quality peer-reviewed studies, which are rare. It ultimately reduces people's willingness to participate in similar research. [28] presents MUDr. Boris Mravec's opinion from the Institute of Experimental Endocrinology points to the high potential of neuromarketing research in Slovakia. However, he believes that results are misused rather than used for the good of society. Research of neuromarketing in terms of perception by Slovak consumers, conducted by [25], shows that a high level of neuromarketing unfamiliarity prevails among respondents. The author states that respondents do not trust this method and generally rate neuromarketing as unethical and dangerous. The survey found that 51% of respondents were willing to

participate in neuromarketing testing in terms of willingness, which is consistent with the results of our research.

Based on the above, we state that the willingness to participate in research that measures human physiological changes for neuromarketing purposes needs to be explored further. Science and practice have to focus on raising consumer awareness of neuromarketing research to increase the willingness to participate. Also, attention should be paid to examining the significant differences between willingness to participate in neuromarketing and medical research in the context of improving medical practices in the treatment of life-threatening diseases.

Table 3. Assessment of the relationship between willingness to undergo Neuro-Bio Feedback and perception of negative influence - Pearson's correlation coefficient

	Willingness
Perception of negative influence	-,405** 0,000

At the same time, consumers who have assessed that neuromarketing research has a negative or dangerous influence on humans are less willing to undergo research. This result is rational and supports the above. It is necessary to raise consumer awareness while maintaining the ethical nature of neuromarketing research in the context of the true dissemination of information about the research in question, its benefits, risks, and real application for the benefit of society. We can state that hypothesis H1 has been confirmed: We assume that consumers who perceive neuromarketing research as dangerous are less willing to engage in research.

Table 4. Confidence interval - Perception of negative influence

	Mean	Std.	Lower Bound	Upper Bound
Perception of negative influence	2,420	0,060	2,300	2,540

An average value of 2.42 with a 95% probability in the range of 2.30 to 2.54 is shown in Table 4. Consumers are more inclined to say that modern neuromarketing methods do not have a negative influence on humans. Nevertheless, we refer to Table 2, where respondents who assessed that there was a negative influence of neuromarketing research are less willing to participate in the research. Among other things, [31] refers to a code of ethics, which includes, for example, the following points: only non-invasive and safe measurement tools may be used in neuromarketing; keep participants fully informed of the progress and purpose of the research; maintain anonymity.

The average value for question Q10 is presented in Table 5 (participants in neuromarketing research will be provided with a financial reward).

Table 5. Confidence interval - Financial reward

	Mean	Std.	Lower Bound	Upper Bound
Financial reward	4,450	0,060	4,330	4,570

Based on the result in Table 5 and the average value, we can state that consumers agree with the financial reward for participants in neuromarketing research. Financial compensation to research participants is not contrary to ethics if certain principles are noted, e.g., a person who does so only for financial reward should not participate. Conditions for compensation for the participant's time have to be set in advance, too [19]. We can expect a similar result in the entire population of Slovaks with a probability of 95% in the range of 4.33 to 4.57. Following this result, we assumed that respondents who agreed to provide financial compensation would be more willing to participate in neuromarketing research and consider negative human influence.

Table 6. Assessment of the relationship between perception of negative effects, willingness to undergo Neuro-Bio Feedback and financial reward - Pearson's correlation coefficient

	Perception of negative effects	Willingness
Financial reward	0,036 0,598	0,014 0,833

From Table 6 it is clear that consumers who are more in agreement with the financial reward for a research participant are not more willing to participate in research for neuromarketing purposes. There was also no statistically significant link between assessment of negative effects of neuromarketing research on humans and financial reward. Financial compensation may not be a sufficient motivator for consumers to increase their willingness to engage in neuromarketing research. We can state that hypothesis H2 has not been confirmed: We assume that consumers who agree to a financial reward for a research participant are more willing to engage in neuromarketing research and less perceive its negative effects. It follows those other factors such as status, education, and others are also important [32]. [23] points to the connection between willingness to undergo neuromarketing research and the respondent's age. Her research shows that respondents over the age of 40 do not trust neuromarketing more than younger respondents. Examined the relationship between the perception of

the fMRI method as dangerous to health and demographic characteristics, the correlation with the age, education, and income of the respondent can be confirmed. The authors further investigated the relationship between willingness to engage in fMRI research and demographic characteristics. In this case, the relationship in terms of age, income, and social status was confirmed.

4. Conclusion

Neuromarketing is a discipline that should be complementary to marketing research. It should bring the most realistic results and should not violate ethical rules because results of analyzes are used to produce and sell products based on consumer preferences [30]. Together 222 consumers took part in our research, while 64 respondents who had never encountered the term neuromarketing were selected from the research. Respondents who feel that research can have a negative influence on humans are less willing to participate in measuring their physiological changes to neuromarketing stimuli. Attention has to be focused on informing consumers in more detail about the used methods and procedures.

The people of Slovakia think that they should receive a financial reward for participating in neuromarketing research. We agree to financial or other compensation in compliance with ethical principles. The question is whether neuromarketing research is funded by grant schemes. Or who should bear the expenses of the participants' remuneration? Answers may vary in terms of commercial or academic research. We have to keep in mind that financial compensation should not be the only motivator for a particular respondent to participate in the research.

Willingness to undergo neuromarketing research is generally an open issue for further scientific studies. We can summarize that the willingness of Slovaks to participate in neuromarketing research does not differ significantly from the willingness of consumers in other countries. Our results are within the scope of mentioned and also other non-mentioned studies. In further research, we plan to focus on neuromarketing research in terms of socio-demographic variables such as social status, education, age, consumer gender, as well as differences in willingness to undergo the same type of research for medical purposes.

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