Neuromarketing Research and its Application in Marketing Activities. Some Examples

Beata Tarczydło
AGH University of Science and Technology
beata.tarczydlo@poczta.fm

Abstract
The following questions were my inspiration to literature study and empirical research in this article in order to offer optimal marketing solutions and to show how neuromarketing research is applied in Poland depending on marketing needs: How to examine deeply hidden emotions ? How to reach the human subconsciousness ? How to recognize processes happening in the brain in certain situations (particularly under marketing stimulants) ? The aim of this article is to explain the basic methods of neuromarketing research and to present the research results due to their applications in different areas of marketing activities on the Polish market. At first, under current environmental factors which induce to apply neuromarketing research for the sake of effective marketing activities, the definition of them and the systematics were described in this article. Then, the methods such as: eyetracking, electromyography, voice analysis, reaction time, functional magnetic resonance imaging, electroencephalography and galvanic skin response were characterized. Neuromarketing research enable to reach the human subconsciousness and also it is very helpful in the process of optimization of varied marketing tools, such as advertising, packaging, the web interface. The author's intention was to introduce neuromarketing research for marketing activities, to show the usefulness of the discussed methods, to recognize the Polish market of neuromarketing research and to describe examples of their application in Poland.

Key words: neuromarketing research for marketing activities, methods of neuromarketing research, Polish market of neuromarketing research, examples.

JEL classification: M31.

1. Introduction

Neuromarketing and its area – neuromarketing research – have their origins in the United States and it is generally adopted that the beginning of professional activities in this domain dates back to the 1990s (Bradley, 2013, p. 8; Bridget, 2015, p. 11; Woźniak, 2013, p. 12).
Present day marketing activities are particularly marked by neuromarketing practices generally targeting central nervous system and its core element: the human brain (see more in: Bradley, 2013, p. 165, Dooley, 2015, pp. 9–299; Renvoise, Morin, 2007, pp. 5–10; Świda, Kabaja, 2013, s. 26–30; Woźniak, 2012, pp. 12–28; Wrona, 2014, pp. 194–195). In particular, it covers: specific methodologies of research, creation of communication message as provided for by the neuroscience, and uses the neuro-techniques to support marketing activities, including the sales process.
In general, neuromarketing research can be identified by means of specialist tools, methodologies and measuring procedures, as well as complex IT applications for the purposes of data analysis for information collected on human neurological reactions (see more in: Bridget, 2015, pp. 89–153; Bulska, 2014, pp. 60–63; Davidson, Bergley, 2013, pp. 54–58; Feinberg, Kinnear, Taylor, 2013, pp. 110–111; Mostafa, 2013, pp. 343– 344; Ohme, Matukin, Wolińska, 2011, pp. 3–5; Szymusiak, 2012, pp. 137–408). This type of research includes, *inter alia*, biometric research (Mościchowska, Rogoś-Turek, p. 337) based on observation of neurophysiological processes triggered in human body by various stimuli.
Current marketing conditionalities, such as hypercompetition, the development of marketing tools, methodologies and procedures and the supporting activities, prompt the marketers to opt for solutions targeting increasingly deep layers of human brain. This is due to the results of researchers' work in the areas of neurology and psychology, which have contributed to formation of a new paradigm in management (see more in: Szymusiak, 2012, pp. 21–42). In

short, there appeared a need to incorporate in the marketing and management activities emotions as well as conscious and unconscious thinking processes which shape human behaviour.

This study focusses on the following question: How can we study carefully guarded emotions, how can the human subconsciousness be accessed, what are the methods of detection of the processes taking place in an individual's brain in a specific situational context, in particular when triggered by marketing stimuli – in order to offer optimal marketing solutions. For this purpose, it is worth using neuromarketing research, and the subsequent part of the study shall aim at its presentation.

2. Definition and instruments of neuromarketing research for effective marketing activities

Detailed description of neurobiological techniques used in business in general is provided by Szymusiak (2012, pp. 137–408), who makes the following distinction: neuroimaging techniques (pp. 137–173), techniques based on measurements of the brain electric and magnet activity (pp. 174–210), eye tracking (pp. 211–286), techniques based on measurements of psychophysiological reactions (pp. 137–173), and biometric techniques (pp. 346–411).

In turn, Mościchowska and Rogoś-Turek (2016, p. 338) list the following objects for observation of neurophysiological processes: brain activity, muscle reflexes, skin reactions, eye tracking, and breath and blood pressure.

Finally Smyczek and Turek (2011, pp. 68–70) mention the need to use the methodology of medical diagnostics for the diagnostics of internal mechanisms directing the process of formulation of consumer preferences, adapting information coming from the market or governing the emotions and motives shaping individual purchasing decisions. They specify the methods such as electroencephalography, encephalography, functional magnetic resonance, electrocardiography, voice stress analysis, measurement of galvanic skin response, oculography, electromiography, electrogastrography, or laboratory research.

This article focusses on presentation of selected neuromarketing research applied for the purposes of effective marketing activities.

Neuromarketing research methods	Description
eye tracking (ET)	the measurement of distribution of visual attention; it allows for eyeball movement tracking by means of a special device (eyetracker); it visualises changes in the diameter of pupil, gaze direction and sequence, number and duration; it shows the objects recorded visually by the person, how long his or her attention is focussed on the object and the frequency of gazes directed at the object; numerous marketers use this method in design of web content, product display, packaging, advertising campaigns etc.; the results can feed into so called visual scan paths or heatmaps
electromyography (EMG)	the method for diagnosis and analysis of emotions triggered by a marketing stimulus, reflected by facial muscles movements, so called microexpressions; most often the technique covers basis emotions, such as joy, fear, repulsion, anger, sadness and surprise; neurone network trained on the basis of thousands of faces provides a means for measurement of emotion level in response to images, sounds, and other neurostimuli
vocal analysis	registration and analysis of timbre offers a useful indication of a person emotional state
reaction time	the method aims at supra-declarative measurement of attitudes, the shorter reaction time the stronger link between the image attribute and the analysed stimulus, such as logo, packaging or a person; analysis of reaction time leads to determination of the image attributes which are attached to the analysed brand and the ones attached to the competitive brand, and whether, and which image attributes are in equal measure attached to the analysed and the competitive brand

functional magnetic resonance imaging (fMRI)	in general, the technique consists in an analysis of blood flow in the brain in its most active area (assessment of reaction to stimulus); it offers a means for accurate observation of activation in specific brain areas (e.g. related to body functions or emotions); the technique is based on the assumption that measuring the blood flow and volume in the vessels can lead to conclusions over the activation of the nervous tissue, since active neurons use more oxygen obtained from capillary vessels, and as a consequence the brain directs more of it to these areas; this is a so called haemodynamic response – a change in blood supply and the resulting concentration of arterial blood is observed with a delay of several seconds (approx. 5 sec.) after the raised activation of the neurons
electroencephalography (EEG)	register of brain hemispheric activation; it allows for registration of electrical activity in cerebral cortex; observation and analysis of brain waves shows which stimuli in an advertisement trigger a positive or negative emotional reaction; moreover, it is possible to observe the degree of attention of the person in real time, and the changes in emotional engagement in each second of the watched advertisement
galvanic skin reaction (GSR)	by means of registration of perspiration reaction in response to a stimulus (which is controlled by human nervous system) the level of engagement, excitement, as well as fear, can be assessed

Table 1. Characteristics of basic neuromarketing research
Source: own analysis based on literature sources indicated in the article.

Table 1. presents basic methods of neuromarketing research, however, it should be stressed that in practice their mix is often used for the purposes of marketing activities. For example, electroencephalography is supplemented by additional biometric measurements, such as a GSR test and pulse, which provide more accurate information on human emotional reaction activated by marketing stimuli (compare with Wąsikowska, 2015, p. 149). As far as the electromyography is concerned, it is often performed along with eye tracking, giving a quite accurate indication as to the emotional reaction triggered by each specific element of the analysed material (Stasiuk, Maison, 2015, p. 75).

According to practitioners, classic research reveals customer opinions and attitudes, while neuromarketing research provides an insight into emotions experienced by them when confronted with marketing stimuli, e.g. an advertisement. For an entrepreneur it is important to use the expertise of specialists who perform such tests and analyses.

3. Neuromarketing research services market in Poland and examples of use

In Poland, R. Ohme, creator of the LABoratory&Co., is regarded as a founding father of neuromarketing. One of the largest Polish companies from the analysed sector – Institute of Sensory Analysis – has been established by P. Soluch: not an expert in marketing studies, but a doctor of medical science from the Medical University of Warsaw specialising in brain imaging (Ohme, Matukin, Wolińska, 2011, p. 4). Other selected representatives of the sector are: Institute of Sensory Analysis, Brain Tracking, Neuroidea, Sage, and Neuro Innovations.

Neuromarketing in Poland and in the world is a domain pursued by experts from various fields of science – neurology, medical study, psychology, marketing, sociology, cultural studies, as well as research companies, media houses, scientists, advertising agencies, and many other market entities associated with contemporary marketing activities.

Neuromarketing research can be applied in a variety of marketing activities (see more in Booth, Freeman, 2014, pp. 177–189; Mostafa, 2013, pp. 343–372). For example, at the NeuroConnections conference four case study sessions have taken place: 1) NeuroAds with a focus on the question of how a consumer brain reacts to advertisements of beer; 2) NeuroMedia with results of studies on human consciousness and subconsciousness; 3) NeuroShowbiz with results of tests on MTV clips, in the direction which can very well become a real hit, and 4) NeuroPolitics – what is hidden in the politician's brain. Neuromarketing practice requires the research on and setting out of: neuroperspectives, advantages and disadvantages of these activities, inventing new ways of accessing the subconsciousness and gaining knowledge of intuition, or a skilful holistic approach, incorporating the achievements of neuroscience.

Neuromarketing research used in the process of design of advertisements or video materials (due to the analysis of respondents' brain waves) may lead to (Ohme, Matukin, Wolińska, 2011, p. 5): description of consumer engagement in the marketing message with an accuracy to a fraction of a second; indication of the scenes with the strongest emotional attraction and most energising; description of the reaction to image, audio track, expressed words, special effects applied; selection of the best version of the soundtrack which optimally strengthens the message conveyed by the image; selection of the best way for exposition of logo and packaging, the most convincing version of narration or the most engaging product demo version; specifying if the opening scene has the potential to single the advertisement out from the block; making the decision which version of the ending will most effectively stimulate the pro-purchasing behaviour; analysis of the communication carried out to date with a view to find new inspirations.

Very interesting examples of application of neuromarketing research by Neuro Innovations with respect to currently presented advertisements of well known brands (Bakoma 7 cereals Men, Warka Radler, EB, Volkswagen Passat, Subaru) can be accessed online (http://www.neuro-innovations.pl/; https://www.youtube.com/watch?v=JMDKz9ICTLs&index=3&list=PLzfUx30ER9I0WrEmJUQTDcIJ5Ly6VyWd6; https://www.youtube.com/watch?v=_ubHwQmToiA&list=PLzfUx30ER9I0WrEmJUQTDcIJ5Ly6VyWd6&index=4, 7.05.2017).

IT application used by Neuro Innovations provides an opportunity to analyse both the EEG signal (status of the user attention) and the eye tracking method, which shows the moments of strongest visual concentration of the user on the components of the advertising spot. The agency offers also studies on efficiency of advertising content with an option of measurement of indicators: the respondent's mental effort, knowledge, relaxation, and attention.

Another research project which applied neuromethodologies was performed by NeuroHM for the purposes of rebranding of the Virgin mobile brand. Its objectives comprised a selection of the brand's face and appropriate expression of the characters. Thirty nine photographs of models in various poses, with various face expression, hair arrangements and outfits were analysed in view of their best tuning for the brand target market. In the process of neuroscience research, a woman and a man were selected who inspired the most positive involvement of the young targeted recipients and stirred their readiness for action. The research revealed that the creation of the brand personification should be „intensive" and „crazy". And that in the marketing communication products – bearing in mind the target market – singles and not couples should be presented. Finally, the slogan „I feel, therefore I am" was decided upon, and the most advantageous position was tested for the logo, prices and online advertisements.

For the purposes of the social campaign „Stop violence", NeuroHM tested three photographs of a small boy's face looking sadly down; in the second of these photos there was additionally a trace of blood flowing from the nose towards the boy's lips, and in the third a trickle of blood flew from the nose towards the lips and the chin, dripping down from the boy's face (the most drastic one). Neuroresearch performed on forty four representatives of the target market allowed for monitoring the emotional (EEG+GSR) and visual (ET) involvement. The best variant proved to be the least drastic one, which appealed to imagination but let the observers notice the advertising slogan. It aroused the highest level of compassion and high involvement which results in the highest degree of memorisation of the message. Similar examples confirm high usability of neuroresearch in various marketing activities.

Conclusions

Neuromarketing has already gained recognition throughout the world and is increasingly appreciated in Poland. Neuroresearch is particularly useful in the process of optimisation of various marketing tools (advertisements, packaging, website features, etc.). Their effectiveness is conditioned by the measuring instruments and special applications used for meticulous analysis. In the current market conditions, the marketers more and more often use tools which stimulate right hemisphere of the human brain, and in particular the senses. The number of

research on the ways of analysis of customer's subconsciousness has been growing, as 95% of human processes and behaviour is said to take place without conscious control (Dooley, 2015, pp. 17–18; Zaltman, 2003, p. 5). According to Weinschenk (2011, p. 21), subconsciousness constitutes thinking processes which are inaccessible to conscious mind but they influence evaluations, feelings and behaviours as a specific type of "shortcut" to assessment of the environment, its interpretation, and quick initiation of the given purchase.

Important benefits generated by neuroresearch include: increased effectiveness of the communicated content, optimisation of production, or objectivisation of marketing activities. Neuroscience research raises the value of the results, since it allows for accessing the brain and reading directly the signals originating from it and the occurring reactions,which however raises justified ethical and moral doubts. Knowledge of purchasers' behaviour shows that the persons who are the subjects of research not always present their true opinions in their responses. Moreover, as discovered by the scientists, in real purchasing decisions they are most often directed by subconscious choices and the consumer is not aware that his or her choice is determined by a controlled choice. What is more, asking the customer directly what are his or her needs is useless, because they may be unrealised, and the contemporary entrepreneur should therefore "access" the purchaser's brain to obtain this knowledge.

In general, marketers make an effort to obtain knowledge on the processes taking place in human brain upon application of various marketing stimuli. There is a growing need to use qualitative marketing research with a focus on neuroresearch, as well as special methodologies which combine various methods.

Results of neuroresearch, such as eye tracking, provide valuable information on, among other: the elements which attract the respondent's attention and the time needed for such a reaction; which of the elements attract attention for the longest time; what are the features which maintain the respondent's interest; which elements are returned to; what is the model and direction of the space scanning sequence; do the users feel lost or is their interest maintained. The resulting heatmaps show the distribution of attention directed at the analysed element, allowing for separation of the elements noticed and omitted during the visual scan; they facilitate understanding why a given element is perceived in the specific way.

In turn the functional magnetic resonance offers the opportunity to study neurophysiological phenomena in the human body (see more in: Mostafa, 2013, pp. 343–372). It is accurate, thorough, and non-invasive. Knowledge gained in the process raises doubts, as it may lead to unethical behaviour of marketers who prioritise pursuit of profit over human good (a desire to steer human behaviour). fMRI is a complicated and expensive method which requires immense expenditure in terms of financial, human, analytical, and scientific effort, etc. Further doubts are raised by the conditions in which the purchasers are observed, significantly different from the real ones.

Neuroresearch attracts an immense interest, but also lead to many doubts (difficulties with interpretation of results, costs, ethical and moral aspects, risks of excessive interference with functioning of human body). They are perfected and increasingly often used due to their practical benefits. In the era of holistic marketing (spanning the purchaser's heart, mind and spirit), neuroresearch seems to be highly useful if not indispensable. The more so as they can be applied by means of mobile devices (smartphone, tablet, etc.) and the Internet.

The effectiveness of the neuroresearch process is determined by interdisciplinary expertise, application of expensive and complex apparatus, as well as limitations in scientific mapping of the brain functioning – but the benefits outweigh the risks.

References

BOOTH D, A., FREEMAN, R. P. J. 2014. *Mind-reading versus neuromarketing: how does a product make an impact on the consumer?*, Journal of Consumer Marketing, Vol. 31, Iss 3, pp. 177–189.

BULSKA, D. 2014. *Oczy zwierciadłem duszy konsumenta?*, Brief nr 1 (171)/2014, pp. 60–63.

BRADLEY, N. 2013. *Marketing research. Tools & techniques*,3rd ed., Oxford University Press, United Kingdom, Oxford.

BRIDGER, D. 2015. *Decoding the irrational consumer. How to commission, run and generate insights from neuromarketing research,* Kogan Page Limited, United Kingdom, London.

DAVIDSON, R. J., BEGLEY, S. 2013. *Życie emocjonalne mózgu,* Wydawnictwo Uniwersytetu Jagiellońskiego, Kraków.

DOOLEY, R. 2015. *Neuromarketing. 100 szybkich, łatwych i tanich sposobów na przekonanie klienta*, Wydawnictwo Naukowe PWN, Warszawa

FEINBERG, F. M., KINNEAR, T. C., TAYLOR, J. R. 2013. *Modern marketing research. Concepts, methods and cases*, 2nd ed., South-Western Cengage Learning, USA.

http://www.neuro-innovations.pl/.

https://www.youtube.com/watch?v=JMDKz9ICTLs&index=3&list=PLzfUx30ER9I0WrEmJUQTDcIJ5Ly6VyWd6.

https://www.youtube.com/watch?v=_ubHwQmToiA&list=PLzfUx30ER9I0WrEmJUQTDcIJ5Ly6VyWd6&index=4.

MOSTAFA, M. M. 2013. *Functional neuroimaging applications in marketing: some methodological and statistical considerations*, Qualitative Market Research: An International Journal, vol. 17, Iss 4, pp. 343–372.

MOŚCICHOWSKA, I., ROGOŚ-TUREK, B. 2016. *Badania jako podstawa projektowania user experience*, PWN, Warszawa.

OHME, R., MATUKIN, M., WOLIŃSKA, D. 2011. *Neurobadania: w głąb umysłu konsumenta*, Magazine Think Tank, nr 9, pp. 1–7.

RENVOISE, P., MORIN, C. 2007. *Neuromarketing: understanding the "buy buttons" in your customer's brain*, SalesBrain LLC, USA, Nashville.

SKOWRONEK, I. 2012. *Marketing doświadczeń. Od doświadczeń klienta do wizerunku firmy*, Wydawnictwo Poltext, Warszawa.

SMYCZEK, S., TUREK, A. 2011. *Możliwości zastosowania diagnostyki medycznej w badaniach zachowań konsumentów*, [w:] MAZUREK-ŁOPACIŃSKA K., SOBOCIŃSKA, M. (red.), *Badania marketingowe w zarządzaniu przedsiębiorstwem,* Prace Naukowe UE we Wrocławiu, nr 237, Wrocław, pp. 65–75.

SOŁODUCHA, K. (red.) 2010. *Wypalanie śladów w mózgu. Wstęp do teorii komunikacji marketingowej*. Wojskowa Akademia Techniczna, Warszawa.

STASIUK, K., MAISON, D. 2015. *Psychologia konsumenta*. PWN, Warszawa.

SZYMUSIAK, H. 2012. *Neurobiologiczne techniki stosowane w biznesie.* Wydawnictwo Uniwersytetu Ekonomicznego w Poznaniu, Poznań.

ŚWIDA, J., KABAJA, B. 2013. Wykorzystanie technik neuromarketingowych do badań postrzegania opakowań produktów. *Marketing i Rynek*, 1, pp. 26–30.

WĄSIKOWSKA, B. 2015. Zastosowanie technik neuronauki poznawczej w zarządzaniu marketingowy. *Polityki Europejskie, Finanse i Marketing*, 13 (62), pp. 145–156.

WEINSCHENK, S. M. 2011. *Kliknij tu! Wykorzystaj neuromarketing w projektowaniu WWW. Siła skutecznego kliknięcia*. Wydawnictwo Helion, Gliwice.

WOŹNIAK, J. 2012. *Neuromarketing 2.0: wygraj wojnę o umysł klienta*. Wydawnictwo Helion, Gliwice.

WRONA, K. 2014. Neuromarketing i jego rola w budowaniu marki, wprowadzaniu innowacji produktowych oraz przekazach reklamowych. *Marketing i Rynek*, 3, pp. 193–211.

ZALTMAN, G. 2003. *Jak myślą klienci? Podróż w głąb umysłu rynku*. Wydawnictwo FORUM, Poznań.