

NEUROPSYCHOLOGY IN NEUROMARKETING SERVICES

Miroslav Poláček¹, Tímea Šeben Zafková²

Slovak University of Agriculture in Nitra^{1,2}

Centre of pedagogy and psychological counselling

Tr. A. Hlinku 2

Nitra, Slovakia

e-mail^{1,2}: miroslav.polacek@uniag.sk, timea.zatkova@uniag.sk

Abstract

The emerging discipline of neuromarketing employs methods originally used in brain research and neuropsychology for investigating economic problems. Neuromarketing or consumer neuroscience addresses marketing relevant problems with methods and insights from brain research. With the help of advanced techniques of imaging, which are applied in the field of consumer neuroscience provides a more direct view into the human. The study contains overview of the origin and development of neuropsychology and neuromarketing, list of relevant sources in neuropsychology and describes selected influential authors and findings in neuromarketing. In the study is neuropsychology seen as the theoretical basis for neuromarketing research.

Keywords: *neuropsychology, gestalt psychology, cognitive psychology, neuromarketing*

JEL classification: *M3, I2, I3*

1 Introduction

In the last years interest in applying neuroscientific findings and methodology to other disciplines and fields of science has been raising and examples of such disciplines are also neuropsychology and neuromarketing.

Neuropsychology is generally defined as a science that explores the relationship between brain and behaviour. It is a psychological scientific discipline which, based on its own knowledge and experiments, as well as the theoretical origins of other human sciences, explains the rules of the dialectical relationship between psychic phenomena and neurophysiological, neuropathological patterns.

Neuropsychology, in addition to the previous monistic (materialist) approach to the identity of man expressed in psychophysiology, and the later dualistic (idealistic) hypothesis of interaction expressed by psychosomatics, holds a specific definition of the connection of the psyche with the nerve processes and the qualitative distance from the physical processes (Benesch, 2001).

1.1 Brief history and origin of neuropsychology

The gradual development of psychology and other neuroscience areas contributed to formation of neuropsychology. Sciences that have made a major contribution to its development include behavioural neurology, cognitive neuroscience, neuroanatomy, neuroengineering, neuroinformatics, neurolinguistics, neurology, psychiatry, neuroeconomics, social neurosciences etc. Its' research approaches have influenced several psychological directions such as behaviourism, Gestalt psychology, or cognitivism.

Experts have consistently emphasized the need to go beyond the boundaries of behaviourism and explore topics that cannot be explained by conditionality alone, as well as to develop methods that would not only deal with the experimental manipulation of environmental influences. The greatest critic of behavioural psychology was gestalt (shape) psychology and later cognitive psychology.

Gestalt psychology was a response to early behavioural tendencies to interpret behaviour based on conditionality as well as the structuralist tendency to decompose mental processes into basic feelings. According to Gestalt psychology, we can best understand the psychological phenomena if we perceive them as ordered entities and not break into parts. The influence of Gestalt psychology was most evident in the field of shape and sight research. (Sternberg, 2002).

Cognitive psychology, which originated partly from neobehaviorism and partly by defining itself against behaviourism, describes the human mind as a system of information processing (Kučera, 2013). Its goal is to explore the mind compared to computer information processing, while there arise testable models. The cognitive approach has been a great achievement and still prevails in psychology (Hill, 2004).

2 Data and Methods

The study provides brief theoretical overview of origin and development of neuropsychology as it is the theoretical basis for neuromarketing. The study processing was based on the theoretical text analysis. Main focus is on descriptions of relation between neuropsychology and neuromarketing and brief outline of the

techniques and methodologies development used in both sciences. Overview of the most influential scientific journals aimed at neuropsychology is also a part of the study.

3 Results and Discussion

The following list of important **stages in neuropsychological research**, as well as the names of the influential neuropsychology researchers, were described according to Kulišťák (2001). Kulišťák (2001) states that we could even track non-scientific neuropsychological experiments since the fourth millennium, when Sumerian doctors watched the influence of opium in the poppy on the euphoric expressions of addicted individuals. The academic period has been described since the end of the 19th century. The term neuropsychology was used by William Osler for the first time in 1913. The first researches were concerned mainly about the anatomical differentiation of fine cortical structures in the brains of animals and humans (Brodmann, Flechsig, Meynert) and surgical removal of particular parts of the brain (Ferrier, Fritsch, Hitzig, Munk). Later, brain damages were localized and researchers monitored corresponding utterances (Bonhoeffer, Broca, Gudden, Jackson, Liepman, Wernicke, Wilbrand). Psychological experiments in the area of thinking, perception, or memory (Binet, Henri, Ebbinghaus, Fechner, Stern, Wundt) have gradually begun to emerge. Research continued on the exact location of function in the brain structure (Flourens, Goltze, von Monakow, Goldstain, Lashley). Differential neuropsychology was also important for the gradual development of clinical neuropsychology (Binet, Henri, Stern) and the creation and production of psychological tests (Binet, Simon, Cattell, Galton, Spearman). Research on psychiatry (Kraepelin), experimental pedagogy (Meuman), occupational psychology (Munstenberg) and psychological techniques (Lurija) were also significant. In the period between the two world wars, several investigators devoted attention to the diagnosis and treatment of soldiers who suffered head injuries during the First World War (Popelreuter, Goldstain, Kleist). Other investigations in brain function and brain treatment have coped with an increasing number of issues, such as aphasia and prozopagnosia (Conrad, Bodamer, Faust, Alajouanine, Ombredan, Durand). Just after the Second World War, significant neuropsychological work has been noticed, mainly in England and America. In England it was, for example, work on space processing by the right hemisphere (Zangwill, Paterson), work on the so called "blind vision" (Weiskrantz, Humfrey) or amnesic disorders (Weiskrantz, Warrington). Zangwill founded the Institute of Experimental Psychology at the Oxford University and participated in the formation of the neuropsychological department. In America, were followed the ideas of

experimental psychologists (Hull, Skinner, Watson). Some papers have focused on research on primates (Blum, Clark, Hebb, Riesten, Sperry, Semmes), others on aphasia (Weisenburg, McBride), and another on psychodiagnostics (Helstead, Reitan).

3.1 Overview of neuropsychology after 50ties of 20th century

In the fifties of the 20th century, larger international cooperation began. Most working groups have a direct or indirect connection to Kurt Goldstein, who worked at the National Veterans' Aphasia Center in Framington. His collaborators (Quadfasel, Goodglass, Kaplan) elaborated well-known aphasiological examination of The Boston Diagnostic Aphasia Examination. In 1966, Geschwind- Professor of Neurology founded the Center for Aphasia at the University of Boston. Lukas Teuber initiated the psychological institute at Massachusetts Institute of Technology (MIT) and in 1961 the World Congress in Bon, was dealing with experimental and clinical neuropsychology issues. In the next few years, further work on brain functions related to neurosurgery (Miller, Sperry) was carried out. In 1967, the International Neuropsychological Society was established in the USA, and after nearly ten years the National Academy of Neuropsychology. Over the next ten years, the American Psychological Association has formed its "Division 40" (Division of Clinical Neuropsychology). Works on rehabilitation of brain functions (Finger, Dialler, Ben-Yishay, Goldstain, Prigatano, Brown, and Spivack) appear in this period in America. European development in the following years was influenced mainly by scientists in Germany (Bay, Leischner, Schmieder, Poeck), Austria (Potzl, Hoff, Gloning) and Switzerland (Perret) and they have made significant contributions to the history of neuropsychology.

In Eastern and Central Europe, throughout the era of neuropsychology development, the name of Soviet scientist A. R. Lurija dominated. He was influenced by his teacher ontogenetical psychologist and pedagogue Vygotskij, further by the neurophysiologists (Sechenov, Bechterev, Bernstein, Sokolov, Anochin), by austrian psychologist and neurologist Sigmund Freud and his psychoanalysis as well as Berlin's "gestaltpsychology" had a great influence on his thinking. Lurija participated in the observation of neurosurgical patients, he was dealing with problems of speech, aphasia, memory, neuropsychology of frontal lobes in connection with thinking, social determination of cognitive processes. Lurija also proposed a neuropsychological examination scheme and wrote a basic textbook of neuropsychology. Neuropsychology was developed also by other Russians, respectively Soviet scientists (Tonkonogij, Uznadze, Korsakova, Moskovičjute, Zejgarnik, Simernickaja, Achutina).

In Slovakia and the Czech Republic, the development of neuropsychology was influenced by Lurija thinking. Experts who most contributed to its development in Slovakia are Kondáš, Košč, Jariabková, Mikulajová, Cséfalvay, Kováč. Among the Czech scientists dominate Míka, Jelínková, Švancara, Diamant, Vašina and Langmeier.

A significant shift in neuropsychological research has occurred with the development of research methods. According to Kassin (2007), neuroscientists nowadays most often use four types of projects: clinical case studies, experimental procedures, electrical records and imaging techniques. Among them are modern imaging techniques valuable tool in the research of the relationship between brain and behavior. The use of these devices is also an example of how progress in one area of science is shifting forward through development in another area (Atkinson, 2003).

Neuropsychology is very progressive area of research and also other names of authors can be listed as for example Stránsky, Pagel, Harmony, Choi etc.

Nowadays, many sources for study of Neuropsychology are available. As the research in the field is expanding, also number of books and scientific journals is growing.

In the following tables, we present a basic neuropsychological literature, ranked according to the significance and benefit. Table 2 includes order of neuropsychological journals sorted by the number of subscribers.

Table 1 List of the most important neuropsychological literature

1.	Lezak, M.D. (1995): <i>Neuropsychological assessment</i> (3 rd ed.). New York: Oxford University Press.
2.	Heilman, K.M., Valenstein, E. (eds.) (1993): <i>Clinical neuropsychology</i> (3 rd ed.). New York: Oxford University Press.
3.	Walsh, K.W. (1994): <i>Neuropsychology: a clinical approach</i> (3 rd ed.). New York: Churchill-Livingston.
4.	Kolb, B., Whishaw, I.Q. (1996): <i>Fundamentals of human neuropsychology</i> (4 th ed.). New York: W.H. Freeman.
5.	Filskov, S.B., Boll, T.J. (eds.) (1981/1986): <i>Handbook of clinical neuropsychology</i> . Vol. 1 & II. New York: Wiley.
6.	Luria, A.R. (1973): <i>The working brain: an introduction to neuropsychology</i> . New York: Basic Books.
7.	Luria, A.R. (1980): <i>Higher cortical functions in man</i> (2 nd ed.). New York: Basic Books.
8.	Mesulam, M. (ed.) (1985): <i>Principles of behavioral neurology</i> . Philadelphia: F.A. Davis.

9.	Grant, I., Adams, K.M. (1986): <i>Neuropsychological assessment of neuropsychiatric disorders</i> . New York: Oxford University Press.
10.	Spreen, O., Strauss, E. (1991): <i>A compendium of neuropsychological tests: administration, norms and commentary</i> . New York: Oxford University Press.
11.	Levin, H.S., Eisenberg, H.M., Benton, A.L. (eds.) (1989): <i>Mild head injury</i> . New York: Oxford University Press.

Source: Ryan &Bohac, 1996.

Table 2 **List of the most widely read neuropsychological journals**

	In year 1996	In year 1999
1.	Journal of Clinical and Experimental Neuropsychology	The Clinical Neuropsychologist
2.	The Clinical Neuropsychologist	Archives of Clinical Neuropsychology
3.	Neuropsychology	Journal of International Neuropsychological Society
4.	Archives of Clinical Neuropsychology	Neuropsychology
5.	Neuropsychologia	Journal of Clinical and Experimental Neuropsychology
6.	Neurology	Neuropsychology Rewiew
7.	Psychological Assessment	Psychological Assessment
8.	Journal of Head Trauma Rehabilitation	Assessment
9.	Journal of Consulting and Clinical Psychology	Journal of Head Trauma Rehabilitation
10.	Cortex	Applied Neuropsychology
11.	Brain	Developmental Neuropsychology
12.	Neuropsychiatry, Neuropsychology and Behavioral Neurology	Brain Injury

Source: Kulišťák, 2001.

Table 3 shows the latest order of journals according to SCImago Journal Rank (SJR indicator), that is a measure of scientific influence of scholarly journals that accounts for both the number of citations received by a journal and the importance or prestige of the journals where such citations come from in the last three years period. In the last column of the table is shown h index of the journal (journals' number of articles (h) that have received at least h citations over the whole).

We can deduce that these journals are also the most read among the professionals today.

Table 3 List of selected neuropsychological journals according to Scimago Rankings in 2016

Title	SJR	H index
Trends in Cognitive Sciences	7.948	247
Neuroscience and Biobehavioral Reviews	4.520	189
Journal of Memory and Language	4.044	118
Cognitive Psychology	3.380	100
Neuropsychology Review	3.326	74
Learning and Memory	2.008	113
Biological Psychology	1.907	96
Frontiers in Behavioral Neuroscience	1.745	46
Frontiers in Human Neuroscience	1.739	65
Memory and Cognition	1.663	104
Neuropsychology	1.580	107
Psychophysiology	1.540	133
International Journal of Psychophysiology	1.369	101
Journal of Neuropsychology	1.328	26
Quarterly Journal of Experimental Psychology	1.320	53
Brain and Cognition	1.283	103
Child Neuropsychology	1.283	60
Neuropsychobiology	1.055	77
Archives of Clinical Neuropsychology	0.908	79
Developmental Neuropsychology	0.895	81
Journal of Neuroscience, Psychology, and Economics	0.716	17

Source: Scimago Journal, Country Ranks, 2016.

Neuropsychological knowledge is now being used by a growing number of industries. Among modern fields of science, which, in conjunction with practical requirements, builds on neuropsychological findings and increasingly gains its place among neuroscientists, belongs neuromarketing.

3.1 Neuromarketing

Neuromarketing is a modern sector of marketing that seeks to integrate the ever-increasing amount of knowledge about brain activity, and in connection with this insight into consumer behavior and incorporates it into advertising strategies. In contrast with traditional procedures, using questionnaires, street surveys, addressing target groups, etc., neuromarketing has more ambitious goals. Its ambition is to understand not only what we want but also why we want it. Modern research suggests that many of our decisions arise in our minds long before we become aware of them and how they arise and why it is so, it remains largely unthinkable. If the neuromarketing is becoming more and more familiar among so called Neurosciences, it is also because neuromarketing researchers are increasingly exploring brain activity from a variety of neurosciences and even more are using modern instrumentation. Advertisement strategies experts are more and more aware that a sufficiently comprehensive understanding of what motivates our buying behavior and also attracting customers in a fierce competition is no longer possible without the implementation of the latest knowledge of neuroanatomy, neurophysiology, neurotransmitter biochemistry, psychology, and neuropsychology. Similarly, it is no longer possible without the use of medical techniques specifically aimed at the nervous system, electroencephalography, computer tomography, magnetic resonance, functional magnetic resonance, positron emission tomography etc.

When we ask the question of what is now the most commonly used knowledge base in neuromarketing to understand consumer behavior and the subsequent development of technical or tactical strategies, the answer would be probably neuropsychology in synergy with imaging techniques. Evidence of this are the many well-known experiments today.

For example, in 2004, a famous experiment was conducted at Houston Baylor Medical School, which was the beginning of explosive development of neuromarketing. 67 participants drank Pepsi and Coca-Cola, while scientists were their brain activity using fMRI. Participants first did not know which drink they were drinking and on the next attempt they already had the beverage brand on the cup. In the first part so-called “the blind part” of the experiment, fMRI scans showed higher activity in the ventromedial area of the cerebral cortex, which is considered to be the center of reward, when the participants drank Pepsi. Later, when volunteers knew what they were drinking, brain activity in the hippocampus, middle brain and the Dorsolateral anterior cerebral cortex, which are areas associated with memory and emotional processing, increased their activity when drinking Coca-Cola. That was bad news for Pepsi. Although people liked the taste of the lemonade, the consumers were convinced by the fact that they saw the logo

of their rival. Research has shown that Coca - Cola's preference is more influenced by the brand image than the flavor of its drink.

In another well-known experiment in 2008, a US Frito-Lay potato maker investigated whether people like Cheetos with a flavor of cheese. Brain scans showed that the pattern of brain activity that arose from pleasure was actually caused by an orange powder glue that sticks to the fingers. The company used this fact in TV ads, using Canadian jokes with Cheetos. In 2009, the same company found that glossy packaging with pictures of chips caused a more negative reaction than the matte coating with the picture of potato. Glossy materials activated brain centers responsible for guilt. Subsequently, the company changed the packaging of its products. In 2013, Coca-Cola announced its intention to use neuromarketing to test the effectiveness of its ads, following the success of previous experiments. (Cave, 2015).

4 Conclusion

There is an increasing number of large companies on the market today. With the increasing number of neuromarketing experiments and neuromarketing workplaces, however, new questions arise. Opponents of the use of neurological techniques in marketing warn against customer manipulation and persuading for products. Although the most advanced procedures do not allow "mind reading", understanding some brain activities could lead to abuse of our weaknesses. Ethical dilemmas are exacerbated by use of neuromarketing methods and data, and center on issues of consumer freewill and privacy.

On the other hand, neuromarketing can, for example, help public health awareness campaigns, or help educators teach them to keep students' attention within hours. Richard Glen Boire, director of the Center for Cognitive Freedom and Ethics, thinks that if the methods of neuromarketing become more effective and widely used, we will see products marked with a warning. It could be a small symbol that indicates that neuromarketing has been used when designing a product, as with some products we see a statement that they have not been tested on animals. (Cave, 2015)

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