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NEUROMARKETING AND NEUROETHICS – AN EMERGING TREND ON EVALUATION OF EMOTIONAL RESPONSES OF CONSUMERS TO MARKETING STIMULI

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Abstract—*Neuromarketing is an emerging interdisciplinary field acted at the line between neuroscience, psychology and marketing. It emphasis on assessing consumer's intellectual and emotional responses to various marketing inducements. This paper reveals about the view of consumer's neuroscience and its increasing research areas. Also, clears about the useful and effectiveness in understanding the consumer's behavior and reasoning whenever making decisions. Neuromarketing techniques have been lined out briefly. Neuroethics in the sense looking at the ethics of neuroscience. At present, the ethics of neuroscience are divided into sub-fields of ethical aspects and ethical social and legal impact assessment for neuroscientific research. According to Roskies (2002), the ethics of neuroscience, draws the attention and interest of scientist, as it has to do with the huge potential of neuroscience to help us understand our brain functions. This reveals bounds to contribute to solving a number of instances of social injustice. So according to the recent new hot discussion in the society, neuromarketing has gained visibility in the media. It focused on the possible consequences it can have on consumers, thus overlooking the potential positive contribution that research in this field can have, particularly as to the understanding of neurobiological mechanisms and of consumer behavior. Also, the emergence of neuroeconomics, where procedures and methods developed for brain research are used as a base for economic purposes, has been a hot topic for researchers and economists from the last decade. Neuromarketing is one of the discipline of neuroeconomics. Here neuroscientific data is used to reveal marketing topics.*

Keywords—*Marketing Stimuli, Neuromarketing, Neuroethics, Neuroeconomics, Neuroscience.*

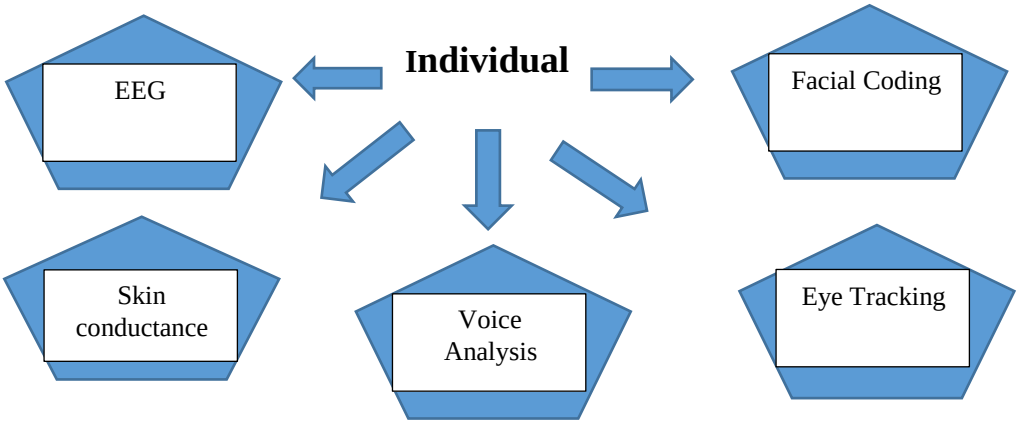
INTRODUCTION

By means of neuromarketing, several viable efficacy indicators can be measured. They are: emotional engagement, memory retention, purchase intention, novelty, awareness and attention. We make conclusions based on our emotions. The emotional commitment level is activated by the emotional enthusiasm level. The more powerful an experience is professed, the greater our emotional engagement level is. This is only one precise indicator of the method in which we respond to certain marketing stimuli and it can also help forecast making the purchase decision. The marketing stimuli encrypting level can influence the moment when we decide to purchase a certain product. This procedure has been powerfully studied and it can be pointed out by evaluating brainwaves while stimuli are being obtainable. The brainwaves' arrangement can point out the success of memorizing that specific stimulus. A great level of responsive engagement and a high level of encoding process instigation can predict the purchase intention. The buying intention seems as a result of the effectiveness of the marketing stimulus, which proved to be influential enough to generate this intention. The innovation level of a marketing stimulus can confirm the achievement of advertisements campaign. Innovation is accomplished of growing the desirability of a marketing stimulus, thus contributing to the buying decision.

NEUROMARKETING TECHNIQUES

Neuromarketing precise technology and methodology are created on very perfect instruments. A clean formulation and a worthy understanding of the message may forecast the success or effectiveness of the commercial. The retaining capacity will increase once the consideration and feeling mechanism are being engaged.

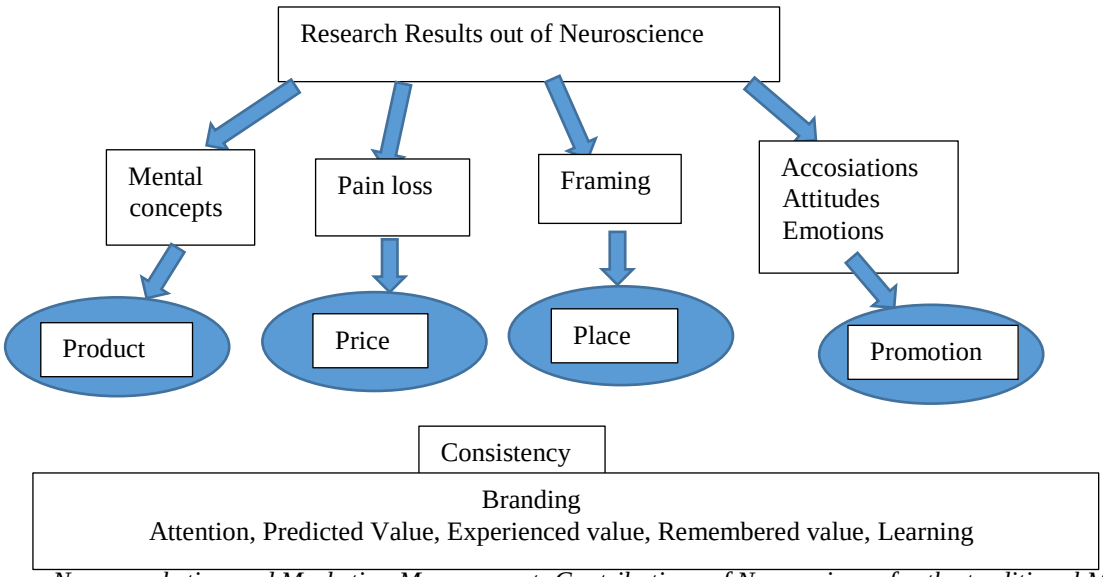
Fig:1 Techniques used in Neuromarketing



Source: Image.Slidesharecdn.com.neuromarketing

Electroencephalography- which is one of the most prevalent instruments is used in neuromarketing, was used for the first time in 1920, by Hans Berger. The researcher thus achieved to design an instrument proficient of recording the electrical indications naturally issued by the brain. From this finding, nowadays we accomplish to capture brainwaves' movement. The electroencephalography was the first instrument which permitted the researchers to comprehend and discover the interior functioning of the brain, once with the development of the digital era. This discovery fundamentally contributed to the upsurge of neurological knowledge. Computing the entire range of activity of brainwaves emerging in various cortical zones is important in order to recognize the method, the brain responds to various stimuli. A major difference between the various neuromarketing specific methods originates from spatial resolution's accurateness and progressive resolution accuracy. Hereby, we will present direct and indirect methods of measuring the neuronal action. The brain's electrical activity is measured with the EEG, at a time when a group of neurons issue signals. A weak point of this method is as per Baars and Ramsoy (2007) that the electroencephalography provides little information on the areas underneath the cortex. The EEG also easily records the data provided by the surface neurons. The electroencephalography is a non-invasive instrument, which uses sensors which are capable of capturing the electrical signals produced by the brainwaves' activity.

Fig:2 Research results of neuroscience



Source: Neuromarketing and Marketing Management: Contributions of Neuroscience for the traditional Marketing Mix -Esther Kolar University of Twente

Functional magnetic resonance imaging

Another neuromarketing specific instrument is fMRI (Functional magnetic resonance imaging or fMRI). By means of the fMRI, we can measure the increase of the oxygen level in the brain's blood flow. As part of an experiment, the subject is scanned while lying on their back in a narrow, long tube. This tube is surrounded by magnets; once activated, the magnets generate electric fields. This instrument is capable of very accurately identifying increased activity in a certain brain area while a stimulus/stimulus situation is being presented. During the experiment, the subject must remain still throughout the testing, in order not to compromise the collected data. We should also mention that unlike the electroencephalography, which is capable of recording the brain's responses in milliseconds, the fMRI has a 5 seconds' delay, caused by the time that the blood required by the brain needs to get in the area recently activated by a marketing stimulus being presented. The fMRI is not accessible technology. Using it is very costly, since it involves specially-trained personnel. The signal provided by the fMRI on the computer screen is shaped like a stain and is called BOLD (Blood Oxygen Level Dependent); it is to be analysed using 3D technology. Hereunder, we will provide a short description of the instruments which could be used in neuromarketing. The EEG, by means of the electrodes placed on the scalp measure the brainwaves, recording the changes of the brain bio currents. CT (Computerized Tomography): provides - by means of several images, tomography's collected by rotating the X-ray tube - images of the brain structure.

PET: by means of the radioactive isotopes injected in the blood stream; they are identified as X-rays and thus the radioactive chemicals emission in the blood stream can be observed.

MRI: By means of the magnet, a powerful magnetic field, which can align the molecules, is generated. This method helps with noticing shifts in the brain's electric current.

MEG: records the magnet fields generated by the brain's electrical activity. With the help of this instrument we can notice changes in the brain's electrical activity. fMRI, by means of this method, we can record the increase of the oxygen level in the blood stream. The instrument is based on the blood's magnetic property, which can provide information regarding the functioning of the brain. The MEG (magnetoencephalography), has the same temporal resolution as the EEG (a few milliseconds), but it has better spatial resolution. By magnetoencephalography, the magnetic fields generated by the electromagnetic fields are being measured. Just like the electroencephalography, the Magnetoencephalography does not cover subcortical brain activity.

Table:1- Contributions of Neuroscience

Psychophysiological measurements	*Electric cerebral activity*	*Variance of the metabolic processes*
Heart rate	Electroencephalography (EEG)	Positron emission tomography (PET)
Facial electromyography	Magnetoencephalography (MEG)	Funtional transcranial Dopplersonography
Skin conductance response		Functional magnetic resonance imaging (fMMRI)

Source: Neuromarketing and Marketing Management: Contributions of Neuroscience for the traditional Marketing Mix -Esther Kolar University of Twente

TMS: The Transcranial Magnetic Stimulation (TMS) is based on applying short electromagnetic impulses at the scalp level. By means of this instrument, a particular cortical area can be stimulated or inhibited.

Eye-tracking: Another neuromarketing specific method would be computing the ocular dynamics. At present, this can be done by means of eye-tracking. The movements of the eyes reveal the attentional prejudice and the attention degree. As Duchowski, 2007; Zurawiki, 2010 explains, the eye-tracking is a tool by means of which we can examine the way in which notices are read, the distribution and gaze time (of the look) and last but not least, the pupil dilation. Eye-tracking helps us to detect the way of printing the influence subject's attention and cognitive processing. It should also be stated that eye movement can be divided in two categories: fixed and interrupted. The limitations of this methodology are common to that of other biometric ones'. The theory supportive to eye-tracking tells us that pupil dilation and a longer blinking interval would correspond to the subject's better processing the information. We ruminate that the instruments which record brain's metabolic and electrical activity can, at any time, be substantiated with biometric data.

CONCLUSION

From the techniques of neuromarketing, we will have the chance to recognize the fundamentals of the decision-making mechanism. Thus, we will be capable to access a greater level of knowledge on the consumer's behavior. They will be the basis of understanding the method in which consumers react to various marketing stimuli. This approach is going to be a difficult one, given the context, as per the way it is presented in the specialized literature, according to which the decision-making process can activate various cortical areas (Hammou, Galib, Melloul, 2013; Lee, Broderick, Chamberlain, 2007) According to Lindstrom (2010) by means of neuromarketing we can catch out how the consumers behave and make decisions, while to access the unconscious thoughts, emotions, feelings and desires which generate us to the purchase decision. Neuromarketing can help us understand how unconscious mind processing influence the decision to purchase, providing a better understanding of the consumers' thoughts, emotions, feelings, needs and motivation in relation to the marketing products.

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