NeuroMarketing: Where Brain, Science and Market meet

Relevance Statement: Human Computer Interaction is a field of understanding users and their requirements. Just by understanding their requirements and providing them the same is not just enough to give them an awesome user experience; Emotional bond is required for that. NeuroMarketing helps you read user’s emotions and manipulate them when they see something. NeuroMarketing techniques and its results help you make interfaces which can create emotional bonds with the user.

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Abstract

NeuroMarketing is a technique that uses neuroimaging tools to capture brain activity to understand users by correlating the stimulus and the subject to create an emotional bond with the users. This paper talks about various techniques of applying NeuroMarketing with different tools and various methods and its results. We will also see how it is useful for building Brain Computer Interfaces (BCI) and Information Systems (IS). The last part discusses few advantages and disadvantages of using NeuroMarketing techniques.

Introduction

NeuroMarketing is a technique of marketing that studies consumer’s brain activity to study the effect of advertisements and commercials on them. It is a neuroscientific method to understand and analyze their emotions and changing behavior related to markets. Marketing analysts use this technique to have a better measurement of consumer’s preferences over their verbal responses. Researchers use brain imaging tools like electroencephalography (EEG), Magnetoencephalogram (MEG) and functional Magnetic Resonance Imaging (fMRI) methodology to capture and analyze brain signals of the subject. It’s not only our brain which responds, there are many other things which respond and show emotions like our skin, facial expressions, eyes, and heart. Therefore, other parameters like heart rate, galvanic skin resistance, respiration pattern, skin temperature, and eye tracking results are captured to analyze the emotions of subjects towards the product. This information is useful for marketing analysts to understand the emotional bond of the subject with the product and how it can be enhanced to make that emotional bond stronger. NeuroMarketing will help us make the transition towards understanding the truths and myths about the reason for our purchases.

NeuroMarketing results are not just helpful in enhancing marketing skills but also improving IS and BCI. If we know what kinds of interfaces of websites, application, and software are giving user the feeling of “awesome user experience” then we can hit that point and make our interfaces richer and reach users more emotionally. Similarly if we have knowledge of user’s adaptability to the new interfaces we can make BCI more accessible and intuitive. As BCI is more useful to physically challenged people we want to ease the process for them to use so they can emotionally connect to it.

How NeuroMarketing Works?

Using NeuroImaging techniques

For capturing the brain activity of user, brain imaging tools are required like EEG, MEG and fMRI. It will capture the brain signals and try to access which areas of the brain are getting excited by different stimuli.
EEG records electrical activity along our scalp. It measures voltage fluctuations which results from ionic current which flows within the neurons of our brain. In MEG, helium liquid is used to measure the tiny magnetic signals produced by our brain in order of femtoesla. [1]

Comparing EEG and MEG; EEG is done on the scalp and MEG is done on the skull. In EEG testing, subject is not sitting in a comfortable position as they cannot be in the supine position (body lying down with face up) but are sitting upright, while in MEG the user is sitting very comfortably as they will be in a supine position. Again in EEG there is a physical contact of sensors which makes subjects uncomfortable whereas in MEG there are no physical contact of the sensors, their head is mounted under huge instrument. If the user is not comfortable while testing it can deflect the results as they will be emotionally disturbed. In EEG the electrodes which are attached on subject’s scalp becomes painful sometimes. The subject preparation time is reduced considerably in MEG.

fMRI can determine the location of the brain activity along with the frequency and timing of it due to the spatial resolution.

From the experiments done it is seen that left prefrontal cortex of the brain is excited at two times. Once when a subject is observing stimuli, and second when the subject is remembering something. Prefrontal cortex plays an important role as almost all neural activity takes place in this area. It processes loads of cognitive processes like encoding complex stimuli and variations of the emotional state of the subject.

**Using other parameters (skin, heart, eyes, facial expression)**

It is known that, we not only respond through brain, but each and every part of our body responds in different ways. Our facial expression changes when we are happy, sad and angry. Electromyogram (EMG) is used to record our facial muscle activity. Smile, laughter, surprise and attention are used as facial indicators. [2]

Respiration belt is used to measure our breathing pattern and skin temperature. Plethysmograph is used to monitor subject’s blood pressure. Slow respiration means relaxation, happy and pleasantness. Irregular rhythm, quick variations means there is an arousal of emotion. [2]

Speech is also one parameter to test. If the subject gets louder there is an arousal in his/her emotion but if it is average then that is the sign of valence. [2]

**Experiment Results from all the techniques**

Experiment results shows that all these emotion indications are not general for all the users. Some emotional responses are general where as some are specific to an individual. In decision making, a cultural difference is observed, and in selection process gender difference is evident. Women select according to prior knowledge they have about that product, whereas men act according to spatial memory. Brain areas associated with trust in men and women are different.
Trust and distrust are two different constructs in the brain than two ends of the same continuum. [5]. Activation of limbic system which is responsible for emotions is higher for women in social presence, and activation of prefrontal cortex is more in men which is related to cognitive processes. Now this indicates that women have social brain and men have utilitarian brain. Trust categorizes the feeling of reward, benevolence, reliability and honesty. Distrust categorizes feeling of malevolence, fear of loss and all kinds of negative emotions. [4]

**NeuroMarketing and BCI**

Emotion elicitation is done to enrich BCIs in a controlled environment with various stimulus and subjects. Elicitation can be influenced by following factors: 1. Elicitor (subject vs. event) 2. Experiment Environment (lab vs. real world) 3. Focus (expression vs. emotion) 4. Subject Awareness (open shooting vs. spy shooting) 5. Goal (emotion vs. other). Standard emotional stimulus used for experiments are films, pictures, sound and odor.[3] To measure these emotions it depends on the factors such as contexts, emotional aspects of interest and final goal of evaluation. Other subjective methods are done using questionnaire, pictorial tools and adjective checklists. The emotions which are observed through brain signals are captured by monitoring brain activity, and then the signals are processed, signals are then translated to commands which then go back to the application, and then emotion elicitation takes place and subject gets back the feedback. Emotion consideration can thus significantly contribute to make BCI more intuitive, which can truly be personalized.

**NeuroIS**

Using fMRI, Dimoka is trying to know the relation between stimuli and neural activity which will be helpful in testing, developing, challenging current IS theories and then enhancing them more. It can complement existing IS research. Dimoka studied the impact of websites on the user, its varying degrees of usefulness and ease of navigation by looking at brain areas responsible for the activation of correlation between neural activity and stimuli by Technology Acceptance model (TAM). Two studies were performed on checking the ease of use and usefulness of the system using fMRI.

**Advantages and Disadvantages**

NeuroMarketing techniques will be useful in understanding users more and eventually making emotional bond stronger. It is useful in improving branding strategies and enriching various interfaces. We know that there are gender differences and cultural differences so we will be able to design the products accordingly, keeping in mind who is the target audience. Some disadvantages are techniques like fMRI are expensive and it generates magnetic fields which can be harmful for the subject. EEG and MEG are not as specific as fMRI. Facial expressions don’t always tell the truth like brain signals does. As subject can fake his/her expressions to portray him/her good or to impress the tester.
Conclusion

Different techniques were observed of capturing user’s emotions and then manipulating it for bettering interfaces and branding to give user a better user experience. If this can be achieved, latency in BCI techniques can be solved. We will be able to know the reasons of product failure. We can know whether it was the branding or the interface design which failed the product. Companies like Hyundai, PepsiCo, Google, Microsoft, Yahoo and Walt Disney Co. are using this technique to know what user thinks about the new products they launch or to what their adverts make user feel. Thus NeuroMarketing can bring an interesting transition in the field of branding and human computer Interaction.

References:


