Neuromarketing: I put myself into a fMRI scanner and realized that I love Louis Vuitton ads

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Abstract

In recent years, long-standing science, advanced technology, and complex management have come to a common ground that researchers and marketers are able to map science to marketing. Today, constant changes in consumer behavior and how they interact with the company in the world full of sophisticated technologies, alternative research methods are needed, fMRI could or could not be the right answer, but it is definitely a promising alternative research method. The purpose of this paper is to provide an integrative overview of neuromarketing using brain imaging techniques, particularly, functional magnetic resonance imaging (fMRI). This paper is also an attempt to investigate its potential implications for market research, based on the author’s experiences as a subject study in high-end brands advertisings. The discussion of neuromarketing, focusing on fMRI, as the application within the scope of managerial practice is provided by means of a literature review for to discussion as well as the investigation of existing problems and exploring the future challenges. A personal experience in fMRI as a study subject in high-end brands advertisings is also presented. Because this is an emerging field of marketing research and still controversial, the rising ethical issues are a challenge. Yet, fMRI offers a new cutting edge method that is able to shed light on subconscious processes which has a potential to significantly improve the effectiveness of advertising messages. This paper is written based on marketing literature and from the author’s experience as a subject study and an apprentice in the fMRI company.

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1. Introduction

There is a song by Gordon Lightfoot...“If you could read my mind, love, what a tale your thoughts could tell…” We all wish that we would have that kind of ability; so that we will not have to guess what they are thinking nor observe what those expressions on their face and their body language mean. In marketing practice, having an ability to

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read consumers’ mind is a dream come true for all marketers. The equation $E=mc^2$ has changed the world, possibly, Neuromarketing could make some different in marketing world as well.

It was not long ago when Albert Einstein said “it has become appallingly obvious that our technology has exceeded our humanity.” Technology has become a part of our life and a key to answer most of the complicated questions beyond human thoughts. The brain is the center of the nervous system that generates the mind and has long defined as “the most complex structure in the universe” (Morin, C. 2011). A wide range of technologies have changed the face of humanity and continue to do so, especially in the area that is directly involved with human behaviors, brain-technology.

Traditional marketing research has concentrated on trying to find what is inside the consumers mind or the “black box” in order to capture complex and constantly changing customer behaviors. While we assume that a consumer buys a car for its functions or price, the consumer’s brain tells us something different. BMW’s Mini Cooper had been selling so well because of its “adorable face” and the Ferrari 360 Modena and the BMW Z8 were linked to the concept of wealth and social dominance (Hunt, K. 2008). Classical marketing research could not answer that, neuromarketing could.

Recently, the rise and application of neuroscientific research methods to market research has been used by global companies namely Carlsburg Beer, Coca-Cola, Delta, ESPN, Estée Lauder, Google, McDonald’s, Microsoft, Procter & Gamble, and Yahoo (Babu, S. S., & Vidyasagar, T. P. 2012). Neuromarketing, derived from using Neuroimaging technologies to perform neurological studies for marketing purposes, is being used more due to the increase in use of marketing research areas such as product attractiveness, advertising effectiveness, price and product preference, brand choice, brand loyalty, brand knowledge, distribution (Hubert, M., & Kenning, P. 2008), celebrity endorsements, logo/brand selection, and media selection (Fugate, D.L., 2007). Undeniably, the age of mindreading, neuromarketing, has arrived and gradually become one of the most intriguing marketing research techniques. Possibly, in the near future, it will become cheaper and faster than other marketing tools and (Arieley, D., & Berns, G. S. 2010) it may replace conventional ways that marketers have relied on for ages in accessing consumer thoughts.

The technologies are used primarily as medical diagnostic devices and accepted as mind reader devices for marketers including functional Magnetic Resonance Imaging (fMRI), Electroencephalography (EEG), Psychophysical, and Magnetoencephalography (MEG), Transcranial Magnetic Stimulation (TMS). These devices are used to obtain the brain images response to the tests that can be anything related to marketing, from commercials, printed ads, movie trailers, speeches to games. Out of all these advanced technologies, it is fMRI which has seized the greatest attention and interest among market researchers (Lewis, D., & Bridger, D. 2005), and is considered to be the best technological innovation ever developed to conduct research on the brain (Morin, op. cit), and is able to shed light on subconscious processes in consumer behavior (Kenning, P., Plassmann, H., & Ahtert, D. 2007).

Using fMRI as the topic search word in Google Scholar, 391,000 fMRI-based documents came up (as of 26 July, 2013). I have every reason to be optimistic about the future of neuromarketing in understanding customers’ subconscious responses to marketing media. Prior researching finding in fMRI suggested that combining neural activities with traditional marketing tools may produce more effective marketing practice (Fugate, op. cit). Therefore, this paper not only focuses on the discussion of neuromarketing, concentrating on fMRI, the investigation of existing problems and exploring the future challenges, but also to examine the outcomes of the self-subject study of luxury brands advertisements in both fMRI technique and traditional way.

2. History of Neuromarketing at Glance

Neuro and marketing are two totally different fields of study combined, science and business. It is when high technology of neuroimaging in the neuron-activity of customers meets the art of marketing in understanding their subconscious responses to marketing activities. Neuroscience originated in ancient Egypt which progressively developed over the centuries (Babu, & Vidyasagar, op. cit). It was mentioned in a study that neuroscience was performed in an experiment when the 19th century Italian psychologist Angelo Mosso tried to analyze a subject lying on a balancing table which could be inclined only if the feet or the head become heavier (Ciprian-Marcel, P., Lacramioara, R., Ioana, M.A., and Maria, Z.M., 2009). The experiment’s result indicated that an intellectual or
emotional activity of the subject could make the balance inclined towards the head as the blood redistributed into the body (Ciprian-Marcel, Lacramioara, Ioana, & Maria, op. cit.). EEG has been around for almost 40 years since it was first used to evaluate TV commercials, toward the end of the 1990’s, the first use of fMRI as a marketing tool was reported by Gerry Zaltman of Harvard (Lewis, & Bridger, op. cit), and it was the neuroscientist Antonio Damasio’s acclaimed works during the past decade that asserted the decision making involves emotional part of the brain (Eser, Z., Isin, F. B., & Tolon, M. 2011). Although the term neuromarketing cannot be attributed to any individual (Morin, op. cit), it was believed that Dutch marketing expert/ Professor Ale Smidts coined the term in 2002 (Lewis, & Bridger, op. cit). Notably, in 2005, Harper Collins added the word “neuromarketing” to its dictionary (Morin, op. cit).

There are numerous terms and meanings that define neuromarketing; it is the research of market behavior mediated by a specific cortical response (Senior C., Smyth, H., Cooke, R., Shaw R.L., & Peel E. 2007), it is the use of advanced neuroscience that permits powerful insights into the human brain's responses to marketing stimuli (Murphy, E.R., Liles, J., & Reiner, P.B. 2008), it uses medical diagnostic devices to capture images of neuronal activity, location, and timing to help peering inside of the black box to explain the mystery of consumer decision-making processes (Fugate, D.L., 2008), it studies the consumer’s subliminal reactions to marketing material, brands, and products (Suomala, J., Palokangas, L., Leminen, S., Westerlund, M., Heinonen, J., & Numminen, J. 2012) and, in relation to marketing, it is an application of neuroscientific methods to analyze and understand consumer behavior (Lee, N., Broderick, A. J., & Chamberlain 2006).

The first scholarly piece of neuromarketing research published in 2000 was about the impact of affective advertisement having on the neural activity (Ambler, T., Ioannides, A., & Rose, S. 2000). Remarkably, the most mentioned and cited neuromarketing research study about the preference of Coca Cola and Pepsi was performed by Read Montague, Professor of Neuroscience at Baylor College of Medicine in 2003 and went public in 2004. According to the study using fMRI technique, subjects studied preferred Coke when they knew they were drinking Coke and preferred Pepsi when no brands were mentioned. The countless studies of two ultimately similar types of sugar water, Coke and Pepsi, have always captured both marketers and researchers’ attention. Undeniably, this ‘Pepsi Challenge’ prompted substantial criticism and attention toward neuromarketing.

Last but not least, in 2008, Martin Lindstrom’s book ‘Buyology: Truth and Lies About Why We Buy’ revealed his 3-year work of $7 million of advertisers’ money, neuroscientists in Australia and England, 2,000 volunteers from Britain, China, Germany, Japan, and the US using fMRI to study why people buy, he assured that “consumers will never, ever tell the truth”. Since then, neuromarketing has raised many issues in the marketing field creating interest and controversy worldwide.

3. Functional Magnetic Resonance Imaging (fMRI) Methodology

Functional magnetic resonance tomography (fMRI) is the most frequently used brain imaging technique in the world (Kenning, Plassmann, & Ahlert, op. cit.; Morin, op. cit), and the most prolific of all brain imaging techniques (Senior, Smyth, Cooke, Shaw, & Peel. op. cit). A giant functional Magnetic Resonance Imaging scanner is just over a decade old in which it combines magnetic field and radio waves to produce tomograms that are emitted by tissue water in a very strong magnetic field after excitation by high frequency electromagnetic pulses that allow viewing brain structures in detail with good contrast and high resolution (Kenning, Plassmann, & Ahlert, op. cit). fMRI aims to determine the neurobiological correlation of behavior by locating the active parts of the brain during the experiment (Kulich, R., Maciewicz, R., & Scrivani, S. J. 2009) and to measure blood flow at more than 100,000 locations in the brain and interpret how the brain processed information (Hunt, op. cit). One key measurement that for a marketing/neuromarketing researcher to understand is the Blood Oxygen Level Dependent or “BOLD” contrast (Figure 1) as the increased perfusion of activated brain tissue that can be observed by MRI technology (Morin, op. cit.; Kenning, Plassmann, & Ahlert, op. cit.; Kulich, Maciewicz, & Scrivani, op. cit.; Senior, Smyth, Cooke, Shaw, & Peel. op. cit). In general, it tracks the change of oxygenated blood flow to find which parts of the brain are using most oxygen when faced with various types of specific stimulus.

There are various different software packages which can help the researchers analyze the data images and determine at how well and how often the brain engages the areas for attention, emotion, memory, and personal
meaning (importance). With the ability to image deep brain structures, the data can tell what the subject was thinking, moment by moment, whether he/she was happy or sad, scared or excited, and paying attention or not. In the coming years, using fMRI, more likely, will become a preferred technique for neuromarketing researchers.

![Fig.1. (a) fMRI scanner (b) Author’s brain image looking at print advertisement](image)

### 4. A Century of Neuromarketing Research

With 90-plus Neuromarketing agencies worldwide (Wilson, M. R., Gaines, J., & Hill, R. P. 2008), the use of fMRI technique has been consistently increasing in both business and academic marketing research. There are already a handful of Neuroimaging studies by many researchers and marketers covering a wide range of products and involved behaviors result in many valuable outcomes.

In a study of automobile attractiveness, products which symbolized wealth and social status triggered brain areas that associate with rewards (Erk, S., Spitzer, M., Wunderlich, A., Galley, L., & Walter, H. 2002). Furthermore, Familiar automobile brands might perform as subconscious presentiments that influence the decision process, before considering the advantages and disadvantages of the cars (Schaefer, M., Berens, H., Heinze, H. J., & Rotte, M. 2006). Likewise, favorite brand information also activated the areas of rewards (McClure, S. M., Li, J., Tomlin, D., Cypert, K. S., Montague, L., & Montague, P. R. 2004). Similarly favorite brands and brand information had a vital influence on the decision-making processes; the most favorite / the more brand information, the least analytical thinking was required (Deppe, M., Schwindt, W., Kugel, H., Plassmann, H., & Kenning, P. 2005a). Also, results in service brand study shown that under indecision situations, the favorite brand leads to activation of areas responsible for integration of rewards into decision making (Plassmann, H., Kenning, P., & Ahlert, D. 2006a).

Interestingly, brand personalities and human personalities are activated in different areas of the brain; brand personalities are processed strongly in object related brain areas while human personalities stimulated brain areas that associate with rewards (Yoon, C., Gutches, A. H., Feinberg, F., & Polk, T. A. 2006). This can be assumed that the products that symbolized wealth and prestige represent human personality as they activate the same brain areas. In the study of using celebrities in advertisements, it demonstrated that the presumed expertise of celebrities significantly and positively influence purchase intention (Klucharev, V., Fernandez, G., & Smidts, A. 2005). Furthermore, attractive ads could lead to a stranger activation in decision-making process and work as reward stimulus (Kenning, Plassmann, & Ahlert, op. cit). Likewise, in a study of brand loyalty, favorite brand can be a rewarding stimulus for loyal customers (Plassmann, H., Kenning, P., Mohr, C., Backhaus, C., & Ahlert, D. 2006b). Besides, attractive ads and using celebrities, attractive packages contributed to brands as well due to attention and memory effects (Stoll, M., Baecke, S., & Kenning, P. 2008).
Another interesting research in price revealed that a high price (of wine) increased pleasantness and displayed increased neural activity when tasting the more expensive wine (Plassmann, H., O’Doherty, J., Shiv, B., & Rangel, A. 2008). One of the most outrageous results discovered by Lindstrom, was that what we hear and what we smell are more powerful than what we see which was contradictory to what we have learned that the most important sense was to see (Lindstrom, M. 2008). Creating marketing campaigns based heavily on visual media may not be enough; marketers have to add more emotional features into those campaigns which are obviously difficult to implement and hard to measure.

Until now, all these studies using fMRI technique in market research seems to shed light on the future of neuromarketing as a promising approach. However, this could be an advanced additional tool in market research, not a replacement of, or a challenge to, traditional consumer research. In the next century, the highly complex and constantly changing trends in consumer behaviors, marketers and researchers need alternative and flexible research methods. Mixed-method-designs that incorporate the combination of different methods of data collection and a methodological mix of qualitative and quantitative approaches should be intensified (Koller, M. 2008). Some multi-complex brain-related issues such as consumer behavior can benefit from mixed-method as the researchers can investigate from various phenomena. The parallel study in comparison to conventional marketing research should be conducted more with the intention to see the results from these two methods whether they are similar or different and in what ways. Keep in mind that fMRI is fairly new and the world needs more empirical studies to mature this method as the technology is constantly developing.

5. Self-subject of fMRI Experiments and Study of High-end Brand Advertisements

Whilst I was an intern Doctoral student at MindSign Neuromarketing, based in San Diego, I was a subject myself several times which give me an insight of what it felt like and how fascinating fMRI was. During my experiments, after MR safety procedures were checked, I was simply moved into the center of a high-field circular magnet bore on a Siemens 3T magnet, this non-invasive procedure began with several structural scans of the brain for about 6-15 minutes. Followed by various experimental stimuli, such as advertisements and movie trailers were projected into the bore, viewed via a small prism mirror placing just above the face, listened to auditory material through MR-compatible headphones, and then the brain images were taken during the test. I usually could also make responses to stimuli by pressing different buttons including a call button if any concerns or unexpected discomfort occur during the scan. While I was performing the task, the scanner recorded the BOLD signal, throughout the brain every couple of seconds. Finally, these images were analyzed using the AFNI and Brain Voyager software to identify active / inactive brain areas during the specified experimental condition.

One interesting study I did was a study of high-end brands printed ads that also featured in the Wired Magazine Italy, April 2010. The study aimed to indicate which advertisements affected the consumer brain the most. I was in the fMRI machine for approximately an hour to repeatedly watch five ads for each brand, total of fifteen, from, Giorgio Armani, Gucci and Louis Vuitton. After the images were being analyzed with AFNI and Brain Voyager software, before I could say anything, the result accurately showed that my brain was activated the most by Louis Vuitton, followed by Giorgio Armani, and almost no activation for Gucci ads. Out of all five Louis Vuitton ads, the ad by Gorbachev triggered my brain intensely (Figure 2).
Usually, the interpretations of images are the final results of the fMRI study; however, my results were also supported with a self-assessment, as it is generally used in marketing research, in which it relies on the ability and willingness of the consumer to truthfully report their attitudes and/or prior behaviors (Butler, M. J. R. 2009). In fact, my personal consumption and preference of the high-end brands, is always Louis Vuitton. Not surprisingly, after the test was done for a week, I could still recall all of the LV ads from the internet and asked another researcher to confirm if they were in use. As mentioned earlier, based on the result in a study of choice between different brands, when making a decision, favorite brands reduce analytical processes (Deppe, Schwindt, Kugel, Plassmann, & Kenning 2005a) and according to fundamentals in consumer behavior, consumers perception of marketing communication may depend on their interest Perreault, W. D., Cannon, J. P., & McCarthy, E. J. (2011), therefore, the result in this experiment also confirmed that I am a Louis Vuitton lover inside and out.

6. The Limitations and Challenges of Neuromarketing

There is no doubt that the use of fMRI in Neuromarketing is, apparently, a promising future marketing research method, nevertheless, this technique has also faced several limitations. The first limitation that straightforwardly comes into mind of the marketers and researcher is the high cost of using fMRI hardware and software; The cost of an fMRI scanner is between 1.0 – 1.5 million USD for a 1.5 tesla scanner and between 2- 2.4 million USD for a 3.0 tesla scanner, an additional software cost is approximately $500,000 USD, and finally tops up with the cost of maintenance, specific room and the operation cost that can vary considerably but generally fall somewhere between $400 and $3,000 depending on the facility Debunking “fMRI” (Machines Can’t Guess Your Thoughts 2010). These extreme costs can easily bring up the total cost per study more than conventional market research.

The second limitation is the limitation of the fMRI which allows rather simple designs such as printed ads, logos, pictures, movie trailers or some speeches, compared to those fully developed experimental designs in conventional marketing research. Also a too complicated study may not easily fit into this method.

The third limitation is the medical environment, the huge size of the machine, and the highly clustered space inside may limit the perceived richness of real-world marketing stimuli. It is almost impossible to conduct this research in a real environment because of the van-like size and a special room to control the maximum safety of both subjects and researchers. For many people, fMRI is more like a science project than a marketing project and the subjects may feel like laboratory rats.

The challenges are that Neurophysiological processes need a deep understanding of the specific Neuroscientific technique and how to use specific software to extract such a complex set of data. Also, the interpretation of
Neuroimaging data is much more complex than that of general behavioral data or information derived from questionnaires because the brain itself is naturally extremely complex. Moreover, all subjects must control their body movements; no head movement is a must as it affects the quality of scanning pictures, therefore the subject has to stay still for at least 45 minutes up to an hour-and-a-half depending upon the complexities of the study, within an acoustically noisy scanner in a dark cool room.

Last but not least, noticeably, there are more controversial concerns about the ethical issues; “the marketing men have got hold of these things and they're going to use them to extract first your freedom and then your soul” (Appleyard, B. 2008). Although, there is always the consent form for the subject to sign as an agreement of understanding the purpose of the study and the use the images to avoid privacy issues. As brain scanning and interpretation become more advanced, privacy issues may intensify and the need of new laws and regulations may increase and be implemented. Furthermore, in the near future, consumers might face an overconsumption as marketers find the way to unlock their “buying buttons” by identifying effective stimuli and then introduce irresistible products and services to the market.

All of these limitations have to be removed, especially the cost of initiating the research, have to be lower than the current costs in order to encourage both academia and industry to perform such a research. Challenges have to be addressed, especially to get over those ethical issues, there are many steps to take into account and there are many ways to overcome what people think pessimistically is a ‘brainwashing machine’. Ethical and privacy issues are other areas that researchers and marketers cannot overlook or avoid. To carry on this new technology to the next generation, research needs to be performed aggressively in order to establish whether there is any benefit or academic relevance from industrial implementation.

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