

Neuroeconomics and Neuromarketing

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Abstract

Neuroeconomics, a new interdisciplinary field, is comprised of cognitive neuroscience, computational neuroscience, psychology and economics. It explains how humans make decisions by processing multiple alternatives to select the optimal course of action. Researchers have combined disparate fields using the latest advances in brain imaging and genetics to determine the biological basis for human behavior. Marketers' understanding of the how brain processes that help consumers make economically relevant decisions is the new discipline of neuromarketing, which is a branch of neuroscience research. Experimental subjects' brains are scanned using an Magnetic Resonance Imaging (MRI) scanner that takes photos of brain activity. Neuromarketing has been studied from several viewpoints, including aging population, Wall Street traders and risk-taking, chemical influence on the brain and decision-making, and decision-making under uncertainty. All of these viewpoints have value for marketers in creating marketing strategies for certain target populations. Ethics of neuromarketing have been questioned.

Keywords: Neuroeconomics, neuromarketing, neuroscience, marketing, risk-taking, chemicals, uncertainty, aging, ethics, Magnetic Resonance Imaging (MRI), consumers.

(This submission is based on a paper submitted by Cynthia Sloan to Argosy University San Francisco Bay Area. The objective of this paper is to provide discussions about neuromarketing by means of a literature review.)

INTRODUCTION

Neuroeconomics, a relatively new interdisciplinary field, includes cognitive neuroscience, computational neuroscience, psychology and economics. Neuroeconomics seeks to explain human decision-making and the ability to process multiple alternatives to select an optimal course of action. The goal of neuromarketing is to "quantify, explain, and exploit the unseen subconscious level" (Barkin, 2013). The theoretical framework surrounding neuromarketing is the concept that decision-making involves competing cognitive systems (Barkin, 2013).

Neuromarketing is a relatively new discipline that stems from neuroeconomics, the study of how the brain processes economically relevant decision-making, directed not at medical professionals, but rather at marketers (de Oliveira, Henrique, Giraldo, dos Santos, Oliveira, 2014). Neuromarketing can track consumer feelings and "reactions to products by reading impressions from their brains" (Thompson, 2005, para. 1) using "MRI (Magnetic Resonance Imaging) scanners" (Thompson, 2005, para. 1). Researchers can analyze a spectrum of human feelings at the cellular level, from recognition and approval to gratification by tracking "blood flow to certain parts of the brain," (Thompson, 2005, para. 1), which can then be utilized by commercial marketers. "The extrapolation of neural sciences for marketing" research, called neuromarketing, may have significant implications for service marketing (Fugate, 2008). "Understanding the human brain will help marketing professionals develop better methods for selling products" (Lindstrom, 2009). According to deOliveira, et al. (2014), studies have shown that brand information influences brain activation. At present, it is now possible to determine if a consumer merely likes a product or if there is a desire to actually have it. This information can lead to speculation that there is a probability of the consumer to actually buy the product.

Researcher, economist and psychologist, Kahneman, believes that humans make "intuitive, mood-based, emotional decisions (often referred to as system 1), and a second (system 2) that makes more careful, planned rationally based decisions" (Barkin, 2013).

According to Thomson (2005), since 95 percent of thinking and emotion happen "below the level of awareness," (Thomson, 2005, para. 6). Thus, study of the brain can reveal a human's feelings through this method more so than from verbal expression. Advocates argue that neuromarketing links what is discovered about consumers' desires to marketing (Thomson, 2005, para. 7).

A pioneer in neuromarketing studies is "British company, Neurosense" (Thomson, 2005, para. 8), that photographs participants' brains for about an hour using an MRI (Magnetic Resonance Imaging) scanner. While the subject views images on a screen, photos of the brain are taken "every three seconds to monitor the active areas" (Thomson, 2005, para. 8).

Ethical discussions of neuromarketing often focus on concerns that it might negatively impact society overall, particularly consumers (Javor, Koller, Lee, Chamberlain, & Ransmayr, 2013), especially when it comes to "neuro"marketing of educational products (Lindell, & Kidd, 2013, para. 1) which is "the misapplication of neuroscience to education marketing" (Lindell & Kidd, para. 1). According to the Lindell and Kidd study (2013), when an MRI brain image is presented in advertising, the implication is that a "brain-based" product is scientific and consumers can be manipulated into buying it.

The development of a "biological model" that addresses "context-situated human behavior such as consumption" has not been adequately researched. Javor, Koller, Lee, Chamberlain, and Ransmayr (2013) suggest that there ought to be terminology to differentiate "commercial applications of neuroscientific methods [as] 'neuromarketing' and scientific ones [as] 'consumer neuroscience' (p. 1). Thomson argues that science-based neuromarketing is a viable alternative marketing tool, but researchers need to comprehend its limitations. Despite the growing popularity of the function of neuromarketing, the level of accuracy is being questioned (Hammou, Galib, & Melloul, 2013).

NEUROMARKETING

The goal of neuromarketing is to understand consumers' unconscious processes that can be applied to marketing, to include consumer preference, expectation and motivation, behavior prediction and the evaluation of the effectiveness of advertising (Uprety, & Singh, 2013). This is accomplished by medical imaging for market research (.Al Pop, & Iorga, 2012). Neuromarketing has been studied from a variety of viewpoints: how neuroeconomics relates to an aging population, Wall Street traders and risk-taking, chemical influence on the brain and decision-making, loss aversion, and decision making under uncertainty. All of these viewpoints have value for marketers in creating marketing strategies for certain target populations.

Research has been done in this area since 1996, starting with Shizgal and Conover (Glimcher, 2008), who combined neuroscientific and mathematical theories from the social sciences can make accurate predictions about human behavior. Glimcher ascertains that the new clearly distinct discipline of neuromarketing seems to be emerging from the study of neuroeconomics. Neuromarketing is the field that applies technology that scans the brain to marketing (Glimcher, 2008).

Hsu (2012) explains how he uses MRI to study different regions of the brain to "anticipate and respond to competitors' behavior" which can be used in marketing. His work has led to an understanding as to how people learn and act in "complex social and strategic settings" (Hsu, 2012 p. 1). The emerging fields of neuroeconomics and neuromarketing merge customary economic models with innovative "mental models of behavior" (Hsu, 2012, p. 1). Hsu (2002) states that researchers should not only look just at the "static structure" of the brain, but also how brain responses vary over time when responding to choices and possibilities that consumers are presented (Hsu, 2002. p. 1).

Researchers have combined disparate fields using the latest advances in brain imaging and genetics to determine the biological basis for human behavior. According to Brown (2012), Zak feels that economists have a stereotypical view that human beings "are highly rational and primarily motivated by self-interest", but on the contrary, people help strangers all the time. According to Brown (2012), Zak asks questions such as "Why would two people ever trust each other if they're strangers?" (p. 1). In restaurants, we eat meals that are prepared by someone we have never met. "Why is trust is a kind of social glue that sustains societies and economies?" (p. 1). We fly on airplanes piloted by people we don't know (Brown, 2012, p.1).

To study the biological basis of trust, Zak focused on a "chemical in the brain called oxytocin which was believed to be released only during childbirth and sex" (p. 1). Rodents use oxytocin to tolerate their burrow-mates (p. 1). Zak determined that the same mechanism is at work in both humans and animals; he took blood samples of participants to see whether the brain "would release oxytocin if someone sent them money via computer in a lab experiment" and whether the oxytocin effect would motivate them to reciprocate (p. 1). Zak found that when there is trust, the brain releases oxytocin. When people are hugged, "their brain will release oxytocin" (Brown, 2012, p. 1). Humans "have biology for reciprocation" (Brown, 2012, p. 1). Zak calls this the "moral molecule," or "a chemical that motivates us to engage and care about others...the basis of moral behavior" (Brown, 2012, p. 1). When applied to marketing, trust of a product, as Zak's study indicates, would lead to acceptance.

CHEMICALS AND DECISION-MAKING

Zak also studied dopamine, which is a chemical released in the brain when experiencing pleasure (Brown, 2012). He looked for "particular genetic variants that made professional stock traders on Wall Street trader successful" (Brown, 2012, p. 2). He "collected saliva samples and other information from 60 professional traders and then compared those to MBA students at Claremont who were not trading stocks professionally" (p. 2). Zak looked for "genetic markers associated with dopamine, which modulates risk-taking and reward-seeking behaviours" (sic) (Brown, 2012, p. 2). Zak wanted to determine what distinguishes the two groups, and "whether there was some combination of genes that predicted how long the professional traders could survive on Wall

Street" (Brown, 2012, p. 2). The most successful traders had "genes that gave them moderate levels of dopamine" (Brown, 2012, p. 2) leading to risk-taking resulting in a good payoff versus risk. Zak (Brown, 2012) concluded that economics and neuroscience are complementary fields, and by coupling the disciplines, relevant insight into human behavior can lead to understanding of decision-making.

RISK-TAKING AND DECISION-MAKING

Platt (2008) expresses that, although expected utility models are a theoretical framework for choice under uncertainty, they do not "describe real-world decision making" (p. 398). Individuals have differences in decision-making under uncertainty; thus, some researchers "have evaluated whether risk attitudes constitute a personality trait" and whether "some individuals are inherently risk-seeking, while others are consistently risk averse" (p. 399). However, a risk-seeking phenotype is unlikely, because risk taking is "highly domain specific" (Platt, 2008, p. 399), meaning there are different attitudes toward risk-taking in "financial versus health versus social situations" (Platt, 2008, p. 399).

AGING AND DECISION-MAKING

Peter, Mohr, Hauke, Heekeren (2012) clearly explain the relationship between the brain, decision making and aging. Neuroeconomics has made progress in decision-making in "neural systems and the neurotransmitter" (Peter, et al., 2012, p. 1). The "dopaminergic and serotonergic brain systems have been identified as key neurotransmitter systems involved in economic behavior" (Peter, et al., p. 1), and both are known for susceptibility in adults. Peter, et al., (2012) propose a "triadic relationship between (a) economic decision making, (b) dopaminergic and serotonergic neuromodulation and (c) aging" (p. 1).

It is important for people in midlife and old age to "adjust their preferences and behaviors in different domains of life," to include economical and financial transactions. "Cognitive neuroscience" links changes in the brain to "working memory, episodic memory, and processing robustness to [cognitive abilities]" (Peter, et al., 2012, p. 1). During healthy aging, dopamine, the "neurotransmitter...that influences cognitive functions, declines" (Peter, et al., 2012, p. 1). Dopamine, along with serotonin, another neurotransmitter that declines with age, both influence economic decisions and reward processing (Peter, et al., 2012, p. 1).

REWARD, RISK AND DELAY

Peter, et al. (2012) found that economic decision making is a type of value-based decision making, in which the outcomes of various actions are compared, and then the appropriate action is selected that corresponds with the maximum value. There is a relationship between value, reward, risk, and delay. When a reward increases, the value of action increases; conversely, when a reward decreases, so does the value of an action (Peter, et al., 2012, p. 3). Prediction error (Peter, et al., 2012, p. 3) occurs when there is a difference between an expected or predicted reward and the actual award. Regions of the brain are implicated in making economic decisions (Peter, et al. 2012), and expected reward correlates with brain activity when anticipating an outcome.

According to Hasler (2011), economists have attempted to design a single global theory that describes all "choice behavior" (p. 6). They define utility as a "measure of relative satisfaction" (Hasler, 2011, p. 6). In expected utility theory, choice is a "single-dimensional utility index" (Hasler, 2011, p. 6), assuming that "subjects encode the values of all things (goods, services, leisure time, wealth) in abstract common units" (Hasler, 2011, p. 6).

From an evolutionary perspective, one might not expect the same brain systems responding to primary natural rewards such as water, food and sex to respond to abstract outcomes such as points in a computer game, which are not relevant for survival (Hasler, 2011, p. 6).

THE ENDOWMENT EFFECT AND DECISION-MAKING

Neuroeconomists have studied topics of interest to marketing researchers, such as spending and investment decision-making (Scott, 2010, p. 2). An important aspect of neuroeconomics is the "endowment effect," which is the "difference between the minimum amount of money one is willing to accept to part with an owned good (selling price) and the maximum amount of money one is willing to pay to buy the good (buying price)" (Scott, 2010, p. 6). "Disutility" is the goal of avoiding making a bad deal (Scott, 2010, p. 6).

GENDER AND RISK-TAKING

Adams (2011) deals with gender inequality in the arena of neuroeconomics in the sense that men are bigger risk takers when women are present. Based on personal experiences in Wall Street firms, a collection of excerpts from book and articles is postulated to support that women were not embarrassed to ask questions, would acknowledge that they didn't know something, and as a result didn't shift their positions as often as men, and consequently made more money.

CONCLUSION

Neuroeconomics and neuromarketing are burgeoning disciplines combining neuroscience, marketing, economics and psychology. Although much research has been done, more studies and research are still needed to fully understand it, especially on the effects of aging, risk-taking, testosterone and trust, decision-making, loss-aversion, and their impacts on economically relevant decisions. Marketers should also understand the controversy of ethics and the limitations of neuromarketing.

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