

# Neuromarketing: a layman's look at neuroscience and its potential application to marketing practice

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## Abstract

**Purpose** – The purpose of this paper is to briefly cover the origins of neuromarketing, explain the process in layman's terms, enumerate some of the findings in anecdotal form, and suggest future consumer behavior research directions based on these findings.

**Design/methodology/approach** – The discussion of neuromarketing in this paper is based on reports of both a theoretical and applied nature. Their contents have been synthesized and placed into context by showing how they relate to traditional marketing research approaches and assumptions.

**Findings** – While there are no concrete findings, preliminary assessments suggest that traditional, inferential assumptions about consumer behavior might be less powerful and explanatory than once believed. Combining neural activity images with conventional tools may produce more effective marketing practices.

**Research limitations/implications** – Because this is an emerging field and still controversial, some of the key information is proprietary and/or fairly presumptive at this time. Cautions and criticisms have been included to counterbalance that point.

**Practical implications** – Understanding what is happening in this emerging field of inquiry is essential for anyone who believes that marketers can change the probability of a favorable response from consumers. The use of neuromarketing, if proven through use, has the capability of fundamentally changing how we design, promote, price, and package our products.

**Originality/value** – The marriage of cognitive neuroscience and marketing practice is a new field of inquiry. This paper provides a useful, non-technical introduction.

**Keywords** Market research, Consumer behaviour, Marketing, Brain

**Paper type** General review

**An executive summary for managers and executive readers can be found at the end of this article.**

## Introduction

About two decades ago, I wrote an article that chronicled the nascent and somewhat controversial activity of overt marketing to the homosexual and lesbian community. At that time, there were not many academic articles to reference, little hard data; just plenty of opinions. Today, we in marketing mostly view homosexuals and lesbians as an attractive target market for some products, not for others. Any reasonable marketing firm would consider the GLBT community objectively in terms of how they, like other groups of consumers, would help the firm reach its objectives. The reason I mention this history lesson is to draw a parallel with another activity that is slowly and somewhat surreptitiously attracting attention in marketing circles – the activity of neuromarketing (also neural marketing). Like before, many firms are reluctant to enthusiastically and publicly embrace this marketing tool but at the same time, are privately intrigued by the possibilities. After all, peering into

the brain of the typical consumer to actually watch physical surrogates of the consumer decision making process would seem to remove a great deal of uncertainty from the marketing mix; albeit amid accusations of “mindreading”, misuse of medical knowledge, “flirting with advertising’s twilight zone”, and “creepy science”. Like before, there are not many academic articles to reference, little hard data and lots of opinions. Therefore, the purpose of this paper is to briefly cover the origins of neuromarketing, explain the process in layman's terms, enumerate some of the findings in anecdotal form, and suggest future consumer behavior research directions based on these findings.

## Background

Neuromarketing and its precursor, neuroeconomics, uses clinical information about brain functions and mechanisms to help explain what is happening inside of the “black box” so prevalent in many explanations of consumer behavior. Up to this point, most explanations of market behavior are based on inference. If neuromarketers can “use science to locate consumers’ ‘buy buttons,’ then we have gotten closer to opening the ‘black box’ of the consumer’s mind” (Moore, 2005). See the list below for some representative “peeks” inside this box.

### Findings from inside the black box

- *Why people can be shortsighted.* People use their rational prefrontal cortex to make decisions. But the prospect of immediate rewards or punishments activates the impatient

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limbic system of the animal brain, often leading to rash choices.

- *Why people change behavior abruptly.* The anterior cingulate takes advice from the rational prefrontal cortex and the limbic system, then picks which to follow. A small change in conditions can cause it to tip from one choice to the other (Coy, 2005).

This type of biological voyeurism is made possible when subjects perform an experimental task (E) and a control task (C) while “wired up” to a variety of high tech devices that produce colorful, real-time electronic images of a working brain. By comparing differences between the images taken during the performance of the (E) task and the (C) task, the researcher can see what part of the brain is differentially activated by the (E) task. Keep in mind that until recently, brain studies were performed by freezing the brain, slicing it into thin sections, and then looking at them under a microscope; not exactly a prescription for ethical marketing research. The current biomedical applications of neurology belong to healthcare, the current melding of neurology and marketing applications are attributed to Gerry Zaltman of Harvard University). Zaltman (2003) conducted MRI projects in the 1990s for several *Fortune* 500 corporations (Reid, 2005).

### Implications of neuromarketing

At a time when the marketing balance of power is rapidly shifting in favor of the consumer, gaining access to neural diagnostic tools has major implications. In the words of an industry executive, “we can say goodbye to those endless expensive bloody research groups where consumer either lie their heads off or tell us what they think we want to hear” (Walton, 2004). Along these same lines, it avoids the problem of relying heavily upon subjects’ self-reports when it is highly unlikely that even the most determined subject could accurately articulate his or her crucial subconscious motives (Britt, 2004). It is also difficult for a survey to capture the emotional reasons underlying consumer preferences or decisions (*Nature Neuroscience*, 2004). As Schafer (2005) reports, “Not every cola drinker knows what drives her to her favorite drink, nor can she objectively describe the impulse, given the bias of the marketing influence she has already been exposed to. Neuroscience’s tools, in contrast skip all emotion, introspection and ego.” “Neuromarketing’s strength is that it may hit on subconscious biases that traditional advertising methods, such as focus groups, fail to uncover” (Quartz cited in Singer, 2004). Some marketing experts believe brain imaging, eventually, might even indicate how to ignite pleasurable feelings in consumers at the prospect of rewards (Huang, 2005). Psychiatrists think brain clues might help marketers target customers more precisely (*Psychiatric Annals*, 2004). In other words, the potential for neuromarketing to reduce marketing failures and increase marketing successes seems quite promising; although not without controversy.

### Theoretical background

Plato, Rene Descartes, Adam Smith, and the trio of Engel, Kollat and Blackwell might seem to be strange bedfellows but in the unfolding story of neuromarketing, they were part of an

unintentional conspiracy to promote a focus on rational rather than emotional thinking and decision making.

In some ways, the relevance of the “black box” began with the philosopher Plato who compared the human soul to a chariot pulled by the two horses of reason and emotion. In his mind, human behavior clearly had an emotional element. However, it is the horse of reason that has prevailed through the centuries and has been predominantly used to explain human behavior (see the Economist, 2005). For example, anthropologists typically attribute the invention and use of various artifacts to enlightened (if not serendipitous) reason.

Early economic philosophers emphasized the importance of the “economic man” who made reasoned decisions; Adam Smith adopted the thesis that the rational allocation of resources would best serve a society’s interest; and the essence of Rene Descartes’ seventeenth-century thesis of mentality assumed two kinds of mental activity: simple determinant reactions controlled by the nervous systems and complex indeterminate thoughts produced by the soul (discussed by Glimcher, 2003). Obviously, it was easier to make attributions to rationality and nervous system than to the emotions and soul of man.

More recently, marketing practitioners embraced the importance of value creation (offsetting costs against benefits) and the key role of satisfaction (fulfillment of pre-existing expectations). Both of these widely accepted marketing concepts assume a consumer seeking some form of cognitive economic rationality when making decisions.

Ignoring Plato’s horse of emotion was not intentional, it was simply easier for marketers to explore that which could more easily be empirically observed, measured and reduced to a predictive model. Marketers explained marketplace choice behaviors by constructing inferential models where carefully evaluated inputs were correlated with carefully evaluated outcomes (see for example, Engel *et al.*’s (1968) model of Consumer Behavior). In other words, there were deterministic reasons why Consumer A behaved in a particular way. There were often neat, logical causalities of behavior although the actual workings were hidden from view.

However, through the science of neuro-imaging, Plato’s horse of emotion can be reunited with his companion—the horse of reason. Neuromarketing has the capability to demonstrate that emotional and rational thinking co-exist, in fact, are co-dependent. “Neuroeconomics challenges the notion that emotions can only corrupt economic decision making. Indeed, emotions grab people’s attention and motives them to focus the rational brain on the issue at hand” (Damasio quoted in Coy, 2005). While skeptics may argue to protect their position in the status quo, neuromarketing is making its way into the lexicon of research agencies on a wave of physical evidence. Sophisticated techniques provide images that document both rational and emotional responses to marketing stimuli.

### The tools of neuromarketers

The basic set of techniques used to generate neurological images is electroencephalography (EEG), magnetoencephalography (MEG), positron emission tomography (PET) and the newest method: functional magnetic resonance imaging (fMRI) (Moore, 2005; Camerer *et al.*, 2004). Fairly unwieldy, expensive to operate, obtrusive to the

subject, with results open to subjective interpretation; these devices are far from ideal when performing marketing research. However, they offer the best physical evidence to date of how the brain processes the information behind purchase decisions. Advances in imaging technology will no doubt also provide cheaper, smaller, and less obtrusive devices in the coming years such as sensor-equipped shirts (Mucha, 2005a; McConnon and Stead, 2007).

### Practical implications of brain imaging based on preliminary findings

If knowledge of brain function during consumer decision making simply affirmed what we have already drawn from thousands of inferential studies, neural marketing would certainly be less controversial. Its power and contribution would be confirmatory rather than exploratory. However, preliminary results complicate our standard assumptions about consumer choice mechanism by suggesting complex brain interactions; a much broader role for emotions; and a disconnect between conscious reasoning and internal preference.

Detailed information on these and other results is mostly from proprietary studies, which understandably are not in the public domain (Mucha, 2005a). Clients of the 90 or so neuromarketing consultancies in the USA are somewhat reluctant to publicly confirm that they are peeking into consumer's gray matter (Reid, 2005). However, it is possible to construct a number of intriguing research possibilities based on the results that have sifted out into print media; mostly in anecdotal form. Several fundamental marketing decision areas – overlaid with neurological findings – are explored below; not necessarily because they are key variables in some overarching theoretical model, but simply because these research data are what currently exist. It may be possible to hypothesize a brain function based model of consumer behavior in the future; but only after much more research and study.

#### Testing advertising effectiveness

Conventional testing of new advertising campaigns often uses focus groups, interviews, recall and other traditional forms of market research. According to the promoters of brain-scanning, subjects could be wired to imaging devices while viewing images or video clips a new promotional campaign. Depending on which areas of the brain “light” up, assumptions can be made about the subject's unconscious thought patterns. Presumably the agency's intent for the advertisement, e.g. excitement, passion, hostility, humor, attention, etc.; can be matched to the approximate area of brain where these concepts are processed. If that brain area is unaffected after exposure to the advertising stimulus, it is obvious that the advertisement has failed this crucial test. Conversely, stimuli that produce a measurable organic change in a specified area of the brain infer a successful match although actual purchase behavior is still an unanswered question. Overall, it is viewed as a way to help advertisers tweak their messages; to know if an ad will even get out of the starting gate (McConnon and Stead, 2007)

Ford Motor Company and Pre-Diction; a UK based research firm, have performed promotional tests on automobile commercials. Likewise, British giant Unilever

and the Brainwave Science group tested one of their TV advertisements with using an EEG. The product demonstration and brand message portion of the Unilever ad evoked much weaker responses than expected. The elements that were supposed to evoke negative emotions did much better but overall the spot did not generate the respondent responses that were anticipated. Such a diagnosis prescribed for new ad executions should help the promotion team find something new; something meaningful to add to their creative efforts (Harris, 2006).

Neureco, a British market research firm, monitors television spots for clients. Individual frames are correlated with measurements of brain activity allowing Neureco to precisely indicate which ad elements are neurologically engaging. Images, tag lines, and music are just some of the elements they will evaluate (Mucha, 2005a). Related research areas include neurological reactions to smell, touch, sound or even store layout. Studying neural responses to the sense of smell is particularly intriguing since odor-generated impulses travel to the limbic (emotive) region of the brain and have profound effects on memories and feelings (Herman, 2007).

In Australia, commercials were inserted into a televised documentary program. Brain wave analysis indicated commercials that triggered an unusually fast surge in the electrical activity of the left frontal lobe were remembered best after one week. In other words, neural scanning might be able to predict the strength of advertising recall for specific advertisements (Schafer, 2005). It does not necessarily mean liking or behavior will follow – as recall is a necessary but not sufficient condition for postponed purchase influence.

Arnold Worldwide, a USA ad agency with a Human Nature Department, used fMRI images to test the emotional impact of advertising images. Their Brown-Foreman client wanted to know how audiences would respond to visual stimuli such as college students drinking on Spring Break, “twentysomethings” drinking around a campfire, or older guys at an upscale bar. Similar research has found that images which are most favored in traditional research preference tests are not the same ones that “fire up” the emotional centers of the brain (McConnon and Stead, 2007). Popeil (quoted in Harris, 2006) reminds us that “one of the keys to all marketing is emotion. By monitoring the brain...you have really strong evidence that some emotional response has been made.”

Unfortunately, these results can only indicate activation correlated with different images but cannot tell us anything about why such discrepancies exist. There is no direct link between arousal and behavior; no measure of purchase intent. As James (2004) says, “The only time a human being cannot help acting on arousal is as a toddler.”

#### Testing product appeal

Product designers typically use consciously generated consumer preferences to determine which product designs are most appealing to their target markets. In such settings, consumers are likely to be influenced by normative expectations and social influences. In addition, consumers form many unconscious attitudes that are beyond traditional methods that utilize introspection (Quartz quoted in the Economist, 2004). However, with brain imaging devices, authentic (unbiased and internal) responses should be more achievable (Friedman, 2006). For example, survey research

typically reports that women find wrestler-turned-action hero “The Rock” unattractive but records of brain activity indicates otherwise (Singer, 2004).

Britt (2004) reported that a researcher working for Daimler Chrysler showed male volunteers 66 pictures of sports cars, sedans, and small cars and asked them to rate the cars on attractiveness. It was no surprise that sports cars were significantly more attractive than the others but what made these results more interesting was where increased brain activity occurred. Brain images showed that the tiny nucleus accumbens, an area containing the self-reward center (and also activated by natural stimulants such as sex, chocolate, and cocaine) showed high levels of action when the sports cars were viewed. It was aroused by the release of the molecule dopamine and releases endogenous opiates – substances linked to lust and pleasure. Sports cars would seem to have symbolic value as a highly desirable object (Schafer, 2005) like food or sex. Is this enough to trigger purchase? Probably not, but all things being equal, product designs that are thought to produce pleasure are probably more likely to be purchased than those that do not. Sports car images also triggered increased responses in the right fusiform gyrus, an area which deals with face recognition. Perhaps, sports cars have more of an anthropomorphic identity than other types of vehicles. Could other products have “faces?”

### Celebrity endorsements

Marketers have long believed that celebrity endorsements help sell products. Tiger Woods, Michael Jordan, Katherine Zeta-Jones, and a long list of other notables have been handsomely compensated because their celebrity status allegedly boosts sales and profits. However, until now, no one could pinpoint how the auditory and visual stimuli associated with celebrities contributed to this phenomenon. Neuroscientists have determined that dopamine and phenylethylamine flood our brains when we see a familiar face, i.e. a celebrity. These hormones trigger positive emotional states thus encouraging trust in the promotional message brought to us by those faces (Mucha, 2005b). This also would seem to partially explain why favorable word of mouth recommendations from close friends/acquaintances are also effective.

In the case of well-known celebrities, it is a situation of “more is better” because multiple exposures to the celebrity’s image increased liking. From a research perspective, marketers wishing to determine which celebrity endorser would perform best should be able to empirically test the secretion level of hormones associated with exposure to various celebrities. Higher secretion levels would suggest more positive influence and thus higher trust. This does not remove the need to initially screen the celebrity pool or the need to match brand attributes with endorser characteristics, but neuromarketing does provide researchers with a way to make the final selection of endorser based on physical evidence. Presumably, highly familiar and liked celebrities would be most useful with products and/or product messages that are likely to be under suspicion.

Conversely, the brain is also programmed to avoid danger; a result of survival tendencies. Once a face becomes associated with negative or unpleasant consequences, the human brain tends to avoid contact with that image. This perhaps explains

the notable collapse of some formerly high paid celebrity endorsers.

### Logo/brand selection

fMRI provides real time images of the brain activity. When a subject is exposed to a brand logo, there is an increase of hyper oxygenated blood in the area of the medial prefrontal cortex. Hyper oxygenated blood has different magnetic properties than deoxygenated blood. Variations in MRI images between control and test exposures allow the image interpreter to make assumptions about the relationship between exposure to the brand logo and the functions associated with the affected region of the brain. In this case, the medial prefrontal cortex was activated during exposure to a brand; suggesting self-involvement. Apparently, the brain is assessing the brand/logo icon to determine if it is of personal relevance or importance to the person. Higher levels of activation would suggest higher levels of involvement.

Preliminary evidence of this relationship is found in a recent neural replication of the classic Coke-Pepsi taste challenge (McClure *et al.*, 2004a; Singer, 2004; Herman, 2005). When tasting these two colas with no brand identification, the majority of respondents preferred Pepsi, the minority preferred Coke. During this unmarked test condition, the ventral-medial putamen within the striatum region showed strong activity. This region is known to be associated with seeking reward; i.e. good taste; and was consistent with a positive sensory preference for Pepsi consistently found in the Pepsi Challenge.

When tasting colas where one was clearly identified as Coke, and the other was identified as contained either Pepsi or Coke, the majority preferred the cup marked Coke; even though both contained Coke. This was not true for the version of this test using Pepsi instead of Coke. In the marked brand condition, the most activity was in the medial prefrontal cortex; a spot associated with higher cognitive processes. In addition, brain imaging showed activity in other areas of the brain including the hippocampus, dorsal-lateral prefrontal cortex and the midbrain. These regions are related to emotion and affect; cognitive control, and working memory. The researchers concluded that more exposure to Coke, better memory of Coke, and more emotional ties to Coke produced a brand recognition/operative preference for Coke which overwhelmed the actual taste preference for (reward provided by) Pepsi. In this case, what the brain “knows” about Coke is more important than what it is “feeling” about Pepsi. More importantly, it suggests brand and image development is probably just as important as product development.

Marketers commonly engage in the practice of giving human-like personalities to their brands or products, e.g. fun, reliable, hard-working. Yoon *et al.* (2006) hypothesized those consumers’ judgments about adjectives used to describe people and objects would be processing in different regions of the brain. In their experiment, fMRI showed that the left inferior prefrontal cortex was active during judgments about brands and the medial prefrontal cortex was active during judgments about people. While consumers may attribute human characteristics to brands and products, these attributions are not made in the same way as they are for people. This poses many questions for the marketing practice of developing brand personalities (Eastman, 2006).

### Media selection

Researchers have long been interested in brain activity differences attached to various media. Media planning tools currently available strain to cope with formidable industry forces such as audience fragmentation, the dynamic evolution of media forms, and rapidly escalating costs. The possibility of correlating specific brain functions with various media forms is understandably exciting to planners. “The neuromarker’s exploration of the emotional and cultural connections consumers have with brands and media and specific types of media opens a brand new world of research” (Walton, 2004). This could even extend to the way that consumers scan and read text, ads, and images on web pages (Reynolds, 2006)

One approach to media selection is based on Hansen’s (1981) application of the theory of hemispheric lateralization. Researchers assumed that nonverbal, holistic, and pictorial images were stored and processed on the right side of the brain. This would suggest lower order, passive, possibly subconscious and emotional processing of information in the right hemisphere of the brain. The appropriate medium for advertising messages of the “right side” type would be television messages of short duration, repeated frequently since detailed evaluation of message content was not present.

The left side was more appropriate for higher order cognitive processing such as rational (in the economic sense) decision making. “Left side” advertisements should be print where more factual information could be provided to media audiences.

Despite the broad acceptance of lateralization – as indicated by wide spread inclusion in consumer behavior textbooks – there appears to be little factual support for specialized functionality or modularity of the brain. Neurological scans suggest that complex interaction between various areas of the brain is more likely. Gazzaniga (1988) wrote:

Human brain architecture is organized in terms of functional modules capable of working both cooperatively and independently. These modules can carry out their functions in parallel and outside of conscious experience.

The modules can effect internal and external behaviors and do this at regular intervals.

So the brain is like a large company – branch offices specialize in different functions but also communicate to one another and communicate more feverishly when an important decision is being made. Attention in neuroeconomics [likewise neuromarketing] is therefore focused not just on specific regions but also on finding circuits or collaborative systems of specialized regions which create choice and judgment (Camerer *et al.*, 2004, p. 561).

In effect, reliance on the theory of hemispheric lateralization to make media choices now seems a limited if not poor decision making tool. For example, one firm [who wishes to be unnamed] shifted from a print campaign to an audio-visual TV campaign because of superior brain scans provided by the latter (Macklem, 2005).

Renvoise and Morin (2005) do not recommend specific media but they do strongly advocate that marketing stimuli should be more visual and less verbal. They argue that brain research shows that areas of the brain controlling vision are much older than those used for language. As such, any talk about a product’s benefit or solution should be accompanied by a strong visual metaphor; “it’s very hard to convince people using words when their organ of decision is primarily visual”.

### The (un)holy grail of undetected advertising influence

In the 1950s, the reported use of subliminal advertising sparked a controversy between those who were trying to circumvent the conscious defense mechanisms of the consumer and those who were trying to protect the consumer from such influences. Vance Packard’s *The Hidden Persuaders* became a supplementary text for anti-advertising crusaders like Wilson Brian Keys. While the subject still shows up occasionally in the consumer behavior/psychology texts, the alleged insidious effects of subliminal advertising were largely dismissed by Witte *et al.* (1995) who could find no substantiated evidence that presentation of subliminal stimuli resulted in significant, measurable changes in purchase behavior. However, skeptics still claim that advertisers place promotional embeds in various audio and visual mediums in hopes of stimulating sales.

Neurological studies could easily resolve the fundamental question underlying this decades old controversy: Does the brain recognize and process subliminal stimuli at levels that might trigger purchasing behavior? Mucha (2005a) reports that Neureco “will evaluate the subliminal power of colors, logos, or product features”. Such research efforts would determine the magnitude and location of subliminal effects should they exist. However, such findings still beg the question of direct purchase influence. Evidence of subliminal effects without evidence of purchase influence pretty much leaves the question at the status quo.

Before leaving this topic, it is appropriate to report that neurological research findings suggest that advertising which receives little attention may in fact be quite influential in forming purchasing intentions. Macklem (2005) reported on a Neurosense agency experiment that found the brain was actually sorting and sifting and retaining information when the brain was otherwise occupied. “Experiments that let you see what the brain is picking up without the person being aware of it are extremely informative. This would be very useful to predict which of the many package designs or advertising boards people will recall.” While this is not subliminal persuasion per se, it does suggest that the brain is capable of processing without deliberateness.

### Risk assessment, immediate gratification and future benefits

Marketers have long accepted microeconomic theories of consumption based on the logic of utility and economic rationality. Based on works such as Bernoulli’s essay (*Exposition of a New Theory on the Measurement of Risk* in 1738) or Morgenstern and von Neumann’s *Theory of Games and Economic Behavior* in 1944 (now in a 60th Anniversary edition), economists pronounced; and marketers accepted, the thesis that consumer understood their own preferences, made consistent choices over time and tried to maximize their own well being (Huang, 2005). This thesis was not capable of explaining the consumer’s allure for gambling, charging too much on credit cards, buying “junk food” or not insuring against losses. Marketers accepted that consumers made “irrational” choices by incorporating more internal and exogenous variables into the basic economic model which made the illogical choices seem more “rational” even if not in the purely economic sense.

A number of economists have been exploring which regions of the brain are active when choosing between long

or short-term rewards (*Economist*, 2005; Frick, 2005). Neurological scanning suggests that decision making about economic gain or loss may be more emotional than once thought. Consumers faced with a choice of whether to consume something now or delay gratification, “can be as impulsive as chimps” (Coy, 2005). A phenomenon called “time inconsistency” suggests that the brain operates in two radically different ways. One part, the “reward in the future” part that operates out of the prefrontal cortex is fairly rational (from an economic perspective). The other part, the “immediate gratification” part operates out of the more primitive limbic region and behaves in an emotional, selfish and largely irrational (from an economic perspective) way.

While this is happening under the umbrella of neuroeconomics, neuromarketers concur that evaluations of long term economic gain do indeed occur in the frontal cortex; the rational thinking part of the brain. It is also believed that short-term rewards are governed by the limbic system; the reptilian section of the lower brain where emotions are processed. The tenor of emotional feelings exerts a powerful influence on how we process any factual information that follows. Thus, the marketer who uses an attention gaining device that features short term pleasure/arousal (via release of the pleasure chemical dopamine) should not try to deliver a brand message or product claim during the emotionally aroused phase. Timing is critical; rational messages or claims should wait until right afterwards when the emotion-charged brain is primed to receive new information (duPlessis, 2005, Mucha, 2005a). See the list below for a hypothetical product advertising scenario illustrating the neural impact of timing on an emotional/rational ordered advertisement.

### Delivering the right sensory elements at just the right time

- 1 *Establish the mood.* Set to a pulsating rock music soundtrack, a Ruggedero (fictional model) SUV zips down a winding California road. The natural beauty sparks increased EEG activity in the left frontal region of the brain, suggesting subconscious emotional attraction.
- 2 *Build the tension.* Jump to a scene on the road ahead. Three baby seals waddle onto the highway. Our SUV swerves to avoid the accident, and the pups safely reach the other side. The dramatic tension triggers massive frontal lobe activity; more blood flows to the brain, the heart rate slows, and alertness increases to assess threats and opportunities.
- 3 *Deliver the message.* Just three second later, frontal EEG activity becomes more evenly balanced. As the SUV drives into the sunset, the mind becomes more relaxed and more focused. With the viewer primed to receive new information, the commercial delivers the branding message: “Think safety. Think Ruggedero” (Mucha, 2005a).

As a practical matter, being able to know when and where the consumer computes the magnitude and probability of gains and losses would be a great advantage for marketers offering either short term or long term reward oriented products. However, it is difficult to resolve the question of what region, or more likely what modular integrated circuitry, is

responsible for how the brain reacts to the subjective calculated value of a good or service. Value is related to; but not interchangeable with, the notion of reward and pleasure. Until this difference is resolved, any recommendations on economic rationality based on neuromarketing finding are highly speculative.

### The role of satisfaction

Marketers have used the mantra of “customer satisfaction” for at least the last four decades; assuming the Marketing Concept had accurately captured a prime consumer motivator. Unfortunately, satisfaction is a short lived phenomenon. Surveys indicate that even satisfied customers leave the firm on a regular basis. The explanation to this conundrum may lie inside the brain. The striatum in the brain quickly gets used to new stimuli and tends to react only to the unexpected (Coy, 2005). This provides a neural-based explanation why marketing experts now exhort us to “delight” our consumers instead of simply satisfying them.

The Gallup Poll News Service used fMRI machines in a somewhat different fashion than the norm. Instead of presenting marketing stimuli directly, they asked customers of their retailer client a series of CE (Consumer Engagement) questions. Brain activity associated with each of the questions plus control questions was measured. Robison (2006) presented this record of their findings:

The higher the level of engagement, the more activity occurred in three specific areas of the brain: the orbital frontal cortex, which is where emotion and cognition are integrated; the temporal pole, which is one area for accessing memory; and the fusiform gyrus, which is implicated in facial recognition. The initial hypothesis was that the more engaged customers are, the more actively they pull out memories—and that their thinking process involves faces. The hypothesis was that they were probably recollecting an experience they had had at the retailer, and at the same time, they were more active in integrating emotional and cognitive information. When we looked more closely at those who scored high on questions related to their “Passion” for the retailer, two additional areas of the brain lit up. The first was the amygdala, which is the area associated with emotional processing. The second area was the anterior cingulate gyrus, which is implicated in binary decisions—for example, decision about what is good or bad. So those customers who had intensely strong feelings of attachment to the retailer also showed enhanced activity in the amygdala, which is the emotional storehouse, as well as the area involved in good/bad decision making. The implication is that their brains were firing off on a lot of emotional content.

When these two positions are viewed in tandem, it suggests that generating customer satisfaction is not nearly as sufficient as once thought. Customer satisfaction may be the lower end of what marketers must achieve with their target market. To elevate customers to that point where they deliver value back to the firm, marketers must find the crucial emotional connections (e.g. trust, fairness, respect) that create customer engagement and passion – emotions that can be discovered and tracked as neural activity.

## Doubters abound

James (2004) is among those who are skeptical that neuromarketing is other “than another useful source of information, there is nothing to suggest it will render other types of data redundant”. He states that people behave differently when they are obviously test subjects; that there are no hard and fast rules about the relationship between brain activity and behavior (thus); lifestyle variables have far more influence on behavior than brain arousal; and it is highly unlikely that neuromarketing will solve all of our marketing problems.

A review of Glimcher's book in *Consumer Policy Review* (2003) suggests that neuromarketing does not have the capability to “infect other areas of study” such as peer influence that are likely to influence consumer behavior. For that reason, the reviewer believes that neural marketing has a limited role. Similar comments come from Reid (2005). He says all sorts of colorful theories of how the brain interprets sensory stimuli are just that—theories. Loewenstein (quoted in Macklem, 2005) says interpreting brain scans in response to marketing efforts “is not that far removed from reading tea leaves;” the technology is vastly exaggerated and overestimated by people who do not know the limitations.

Advertising professor John Jones (quoted in Henricks, 2006) says neuromarketing “destroys the supposed differentiation between rational and emotional advertising...that's the key thing, there's nothing more to it than that”.

Pure neuroscientists also disdain the commercialization of their discipline. One of the most concise and comprehensive critiques comes from Medina (2004). He believes that the technology is still imprecise; that current neuroscientific understanding is insufficient to answer the complex questions of consumer response and behavior; and that knowing the structure of the brain does not necessarily illustrate how the brain makes decisions.

Add to this list scientists' concerns about the highly processed nature of the images and the inability to extrapolate findings from a small sample to a genetically and culturally diverse population in an almost infinite variety of situations (*Nature Neuroscience*, 2004). For example, Harris (2006) reported that humor caused a different response in the USA, Canada, and the UK.

Greenfield (quoted in Reynolds, 2006) suggests that the brain has no fixed area for consciousness and instead talks about consciousness residing in “a neuronal assembly where the components can belong to a number of assemblies and where they can do other things”. At this time, neuromarketing findings are still under a cloud of suspicion and are usually validated by more conventional (and therefore subjective/inferential) market research techniques. Neurological results can also be compared to physiological results such as galvanic skin response (GSR) and sweating which measure arousal.

## Critics abound

Gary Ruskin, as executive director of the consumer advocacy lobby group Commercial Alert, thinks that marketers already have sufficient influence in the marketplace without the added advantage of neuromarketing. He is quoted in *Economist*

(2004) as saying “marketing is deeply implicated in much serious pathology” (e.g. childhood obesity)... “Neuromarketing is a tool to amplify these trends.” He wrote to the US Senate, “What would happen if corporate marketers and political consultants could literally peer inside our brains and chart the neural activity that leads to our selections in the supermarkets and the voting booth. What if they then could trigger this neural activity by various means so as to modify our behavior to serve their own ends?” (quoted in Harris, 2006). Commercial Alert (2004) would like to outright ban neuromarketing from taking place suggesting that neuromarketing presents other problems such as increased incidence of marketing related diseases and more effective promotion of degraded values.

Lace (2005) laments “we are all glass consumers. Organizations know so much about us, they can almost see through us.” Will neuromarketing become like Superman's X-ray vision, able to penetrate any object, or simply present another tool; useful only when skillfully combined with other analytical techniques?

## Conclusions and recommendations

At this point, neuromarketing is mostly a set of intriguing but far from conclusive experiments linking internal brain activity with external behaviors. For this field of study to become legitimized (loosely following Rangel, 2004), it would be necessary to construct a behavioral model that would predict what types of consumption related problems that brain structures under study need to solve. Second, there would need to be experimental methods which measure the contribution of each brain structure to the overall decision. Once this task is concluded, the model could be operationalized by determining which stimuli (marketing inputs) provide the appropriate brain structure with the material it needs to accomplish its assigned task.

Such a model appears to be far in the future at this point although some preliminary conceptualization of neuroscience and the broader field of marketing science are explored by Lee *et al.* (2007).

More to the present, what can or what should we do with the knowledge gained so far? It is strategically risky to ignore a promising new science, even worse to accept it without question. The following recommendations are offered in no particular order of importance:

First, Grimes (2006) makes a very good argument that it is difficult to create classification schemes for marketing stimuli that are specific, mutually exclusive and exhaustive. A stimulus such as a word can be processed for visual (**STOP**) value, simple linguistic value (stop); generate varying degree of interest (*STOP*); be of high or low involvement (*STOP*); have emotional or connotative meanings (**STOP!**), and so forth depending on the person. Each stimulus would likely produce a different result depending on which neural networks were activated. In other words, marketers and researchers would have great difficulty translating narrowly defined scientific findings into broadly applicable tools and frameworks.

Future work in the area of neuromarketing, to be fruitful and to lay the groundwork for the model outlined above, should attempt to find “universal” stimulus classification systems that are generalizable to a broad population or at least

a viable target market. Otherwise, the interactive nature of brain function will likely result in widely differing responses and eventual behavior *vis-a-vis* any particular stimulus and audience. The opposing position, customizing each stimulus package for each individual consumer to ensure predictability of brain response, is highly impractical.

Second, the inflammatory rhetoric from marketing critics is not helpful and in some respects, it is counterproductive. Firms that are using neuromarketing, even in an experimental fashion, should be very forthcoming with their experiments and results. Demonstrating that neuromarketing is not incompatible with consumer interests, e.g. might reduce unnecessary promotional/product development spending, etc.; would be a beginning. Also, effectively demonstrating that consumers might learn more about themselves as it relates to decision making would be helpful. In effect, they, as consumers, can apply the controls needed to curb unhealthy consumer behaviors such as overspending, impulse shopping, and unhealthy eating habits (i.e. some of the current complaints). As a corollary, neuro-based models will better inform policymakers and lead to more intelligent policies and legislation.

Third, marketing researchers should use neuroimaging to confirm, reconfigure, or improve our conventional theories of consumer behavior. Basic assumptions about the role of trust, risk taking, personality traits, consumer satisfaction, brand loyalty, and dozens of other “standards” of the marketing literature can be corroborated in a very physical way with brain imaging techniques. Such validation efforts might not be conclusive, but it is likely that at least some strengths and shortcomings will be discovered.

With each discovery comes the opportunity for correction and improvements in marketing management decisions. With confirmation comes more confidence that our current understanding of consumer behavior is a useful basis for creating exchange relationships.

Four, future neural research efforts are likely to result in more, not less, complexity and ambiguity. As the mind is probed more deeply, simplistic—or at least causal – explanations of arousal and market behavior are likely to become even rarer. Neurological science envisions therapies for brain trauma, genetic defects or perhaps treatment for mental disease.

If marketing wishes to benefit from the advances of neuroscience, we should shift part of the neural science focus to applied research in marketing. This likely means funding, legitimization of the effort by bodies such as the American Marketing Association (AMA), Association for Consumer Research (ACR), or the Marketing Science Institute (MSI); and a willingness of the marketing community to give this effort time to produce useful results.

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### Executive summary and implications for managers and executives

*This summary has been provided to allow managers and executives a rapid appreciation of the content of this article. Those with a particular interest in the topic covered may then read the article in toto to take advantage of the more comprehensive description of the research undertaken and its results to get the full benefit of the material present.*

Neuromarketing's emergence is already causing a stir in the business environment. Academic study and research data may be scarce but potentially gaining insight into the consumer decision making process using "clinical information about brain functions and mechanisms" is whetting the appetite of many.

#### What is neuromarketing?

The process involves wiring subjects to various electronic devices and asking them to perform experimental tasks and control tasks. These devices generate instant, colorful images of a working brain and the researcher is able to compare differences in the images produced during the respective tasks. It then becomes apparent which parts of the brain have responded to the stimuli used.

As it stands, marketers are forced to rely heavily on assumption when explaining consumer behavior. But if science can establish links between specific brain parts and the urge to buy, much of the guesswork and uncertainty might become a thing of the past. It may then simply become a question of providing appropriate stimuli in order to trigger the desired response.

Industry leaders currently cannot be certain that research participants have provided accurate or truthful information. It has similarly been pointed out that even the most reliable subject can never be certain of the subconscious or emotional factors that might have influenced a particular decision. Prior exposure to marketing invariably sees to that. Neuromarketing, however, has the potential to detect any subconscious predispositions inaccessible to conventional advertising methods. Experts believe that using these "brain clues" could enable greater precision when targeting consumers, leading to higher rates of marketing success.

Controlled studies are shrouded in secrecy although early indications suggest interactions in the brain are more complex than previously assumed. It appears that conscious reasoning and internal preference are detached, while emotional influence is more profound. The latter is especially interesting, given that various disciplines and theories have traditionally perceived human behavior as essentially a product of reason albeit containing an emotional aspect. With neuromarketing, both rational and emotional responses to stimuli can be observed.

#### What can neuromarketing measure?

While a predictive behavioral model is still some way off, the use of brain scanning has significant implications for marketing related activities.

#### Advertising effectiveness

By wiring subjects up while they observe promotional videos or images, researchers can gain insight into subconscious

thoughts. Depending on which area of the brain responds to the stimuli may help determine whether the advertisement has succeeded in eliciting the intended response (such as excitement, passion or humor, for instance) or not. The marketer gains some feedback on ad effectiveness but any impact on purchase behavior remains an unknown at this stage. Research has also indicated that triggering a response in certain areas of the brain might be linked to better recall of specific ads. And while recall does not guarantee liking or subsequent purchase, it is acknowledged as being one determinant of purchase intention.

Studies of reactions to images, tag lines and music used in TV advertisements has also proved interesting and allowed the company involved to ascertain the ad elements that are “neurologically engaging”. Research has similarly investigated neurological response to sense stimuli or even store layout. One conclusion is that responses to the sense of smell have considerable influence on memories and feelings.

#### *Product appeal*

The premise here is that brain scanning has a better chance of eliciting unbiased internal responses to product designs. In usual settings, normative expectations and social influences invariably hold sway. One example of this occurred when male subjects were shown pictures of different cars and asked to evaluate their attractiveness. Sports cars were not surprisingly ranked highest. The main significance, however, was the fact that the area of the brain linked to self-reward and pleasure reacted most. Researchers concluded that the males perceived sports cars as extremely desirable and thus on a par with food or sex. And while there was no evidence that purchase would result, the author suggests that such action is more likely with products regarded as pleasure giving.

#### *Celebrity endorsement*

Research has enabled some awareness of why celebrity endorsement of products is effective. Exposure to auditory and visual stimuli connected with a celebrity generates hormonal secretion in the brain that leads to positive emotional response and trust in the message delivered. Fugate puts forward the idea that our reactions to positive word-of-mouth recommendations from close friends can be similarly explained. The supposition of links between secretion levels and the degree of influence and trust could have implications when it comes to choosing an endorser for products or product messages of a dubious nature.

#### *Logo/brand selection*

A reproduction of the Coke-Pepsi taste challenge provides the perfect illustration of significant results produced by neural research. Brands were not identified during the initial tasting phase and most subjects preferred Pepsi. However, the majority were attracted to Coke when it was clearly marked

on the bottle. Since this did not occur when Pepsi was accordingly labeled, assumptions were made that the result was due to higher levels of brand recognition and emotional attachment. The author believes these outcomes show that developing image and brand is arguably as important as developing the product.

#### *Media selection*

A long held tenet is that different media is processed on different sides of the brain. Researchers claim that areas of the brain that control vision are considerably older than those used for language, and marketing stimuli should therefore be more visual. But brain scanning raises doubts about the existence of such lateralization. Instead, there is now greater inclination to believe that major decisions are the result of complex interaction between these different brain areas. Neuromarketers are thus extremely interested in identifying “circuits or collaborative systems of specialized regions” that influence choice and opinion.

In addition, neuromarketing may possess the capacity to provide a better understanding of risk assessment and why seemingly rational consumers can remain prone to making irrational decisions. Research suggests that rational and irrational decisions respectively relate to long or short term benefit. Choice is triggered by activity in different areas of the brain connected with reason (long term gain) or emotional (short term gain). From a marketing perspective, timing and delivery is considered vital when the advertising message contains both emotional and rational elements.

Other potential uses include determining whether subliminal stimuli are potent enough to influence purchase behavior and a greater understanding of customer satisfaction. In the latter case, Fugate argues that brain scanning can measure whether marketers have succeeded in forming the emotional bonds with the consumer that are considered precursors of loyalty and commitment.

#### **Problems and future direction**

While many are enthusiastic about the potential of neuromarketing, others remain skeptical. A range of concerns have also been raised and some consumer groups worry about the ethics of permitting companies an opportunity to exert even more influence over what we choose. There is likewise awareness of practical issues, not least the doubts about whether findings can be generalized in the presence of “a genetically and culturally diverse population in an almost infinite variety of situations”. The author recognizes such challenges and suggests steps that might bring the development of a workable model closer.

*(A précis of the article “Neuromarketing: a layman's look at neuroscience and its potential application to marketing practice”. Supplied by Marketing Consultants for Emerald.)*

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