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A Historical and Practical Analysis for Neuromarketing in Business Practices Today

by

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**An Honors Thesis in partial fulfillment of the requirements for the degree Bachelor of
Science in Business Administration in Marketing and Management.**

**Sam M. Walton College of Business
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Introduction

What thoughts come to your mind when you think of the term neuromarketing? In a digital age where personal privacy seems to be diminishing and data exploitation appears to be rising, many people are skeptical about businesses' attempts to combine neurology, psychology, and business. This skepticism is unfortunately, legitimate. Our history reveals plenty of occasions where businesses have exploited their customers through unethical means and traded valuable relationships and resources for profits. However, despite the flaws business can introduce, business is arguably still the most powerful tool for creating value in a community. Through business, customers have had access to profound products, some being as significant as electrical power while some as trivial as being able to choose a different brand of bread. When business is conducted as a symbiotic relationship between both the customer and producer, Business can add value to communities and create significant change for generations. One of the most important investments many businesses have made in the 21st century is an investment towards consumer research. By analyzing their specific customers' behavior, businesses have been able to create, improve, and target products that add the most value to their particular target market, therefore increasing the satisfaction of the customers and decreasing costs. With the introduction of the internet and social media, it has become crucial for businesses to understand the people they are marketing their products or services.

Traditional marketing research techniques such as surveys, group discussions, and website analytics have played a significant role in businesses understanding their consumers and will continue to do so. However, business leaders are beginning to explore new opportunities through neuromarketing, which is a set of research techniques that allow businesses to better understand their consumers' unconscious decision-making processes. Through ethical practices of neuromarketing research, businesses can begin to understand their consumers' unconscious decisions, which can significantly impact how a business brands, advertises, and produces its products. On a small scale, this marketing research can allow customers to have a higher amount of satisfaction during the purchase process, and on a large scale, it can prevent global supply chain crises, such as what we experienced during the Covid-19 pandemic from occurring again. In its simplest form, neuromarketing has the potential to give the customers what they want, when they want it, and how they want it while also cutting costs and increasing revenue for the respective business. To fully understand the relevance of neuromarketing today, it is important to understand the history of marketing within business practices and how the simplest form of marketing in the early 1900s developed into the specific field of neuromarketing we know today.

History of Marketing

Marketing today is a necessary component for any successful business. Without marketing, products would lack improvement, customers would lack loyalty, and the average

company would slowly evolve into stagnation. With the rise of faster technology and communication, marketing is a necessary component of any business that wants to contend with its industry competitors. However, while forming a marketing department and team is essential today, marketing hasn't always been a central focus for many businesses and wasn't even discussed academically until the 1900s (Wilkie and Moore, 2003). Around this time, scholars began recognizing that demand was more than purchasing power, but it also reflected a consumer's desire to purchase, and through experimenting with advertisements, they discovered they could mold and influence a person's desire by more factors than supply (Bartels, 1976). Over the past 120 years, scholars and marketers have developed extensive thought within the marketing domain that has rippled worldwide and has affected everyone from household consumers to government leaders. Due to the vast impact of marketing thought throughout history, marketers have gained insight into how marketing's broader relationships with society can help introduce new areas of study. In the following pages, I will discuss the historical events within academia, business, and United States culture that have led to the emerging field of neuromarketing.

Pre-Marketing (*Before 1900*) & Era I: The Founding of the Field (*1900-1920*)

As the rapid progress of marketing is discussed, it is essential to detach formal marketing teaching within academia from the use of marketing concepts. Marketing concepts have been used for thousands of years within businesses because people had to understand the concepts of competition, price, and government influences for their business to be successful; however, these businesses did not include a marketing department or any formal training in marketing thought. What we would consider marketing today was originally interwoven with economics during the mid-1800s and was mainly used to increase revenue and reduce costs (Wilkie and Moore, 2003). For example, as the Industrial Revolution introduced several momentous inventions such as electricity, aluminum, the steam engine, automobiles, telephones, phonographs, and rechargeable batteries, these inventions were primarily used as economic tools to increase profits and lower cost rather than tools to better understand target markets and consumer behavior (Wilkie and Moore, 2003). The Industrial Revolution led to an extraordinary emphasis on production like never before, even to the point of cruel and unethical business practices. However, by the 1900s, there was a significant shift from production to distribution (Wilkie and Moore, 2003). This shift led to what Wilkie and Moore (2003) calls "The Founding of the Field." During the Industrial Revolution, businesses were arguably producing more products faster than ever before, which led to a need for a distribution system. As these processes were discussed, formal marketing courses in academia were introduced, such as "The Marketing of Products" from the University of Pennsylvania and "Distributive and Regulative Industries" at the University of Michigan (Wilkie and Moore, 2003). During this period, discussions about marketing did not address its relations with the government or even society, but they mostly involved questions about middlemen, advertising prices, and possible controls for distribution (Wilkie and Moore, 2003).

Era II: Formalizing the Field (1920-1950)

In these thirty years, prosperity and calamities hit in significant magnitudes, which impacted how marketing shifted the organization of entire businesses. Wilkie and Moore (2003) describes it as, “In only 30 short years, the United States moved through boom and prosperity in the 1920s, to the Great Depression of the 1930s, to the cataclysmic World War II, and to the postwar period of the 1940s. In many respects, this was a remarkable time in U.S. history.” During the Roaring 20s, technological advances and consumers’ product choices increased drastically. Electricity was now in 53% of homes, and the nation's wealth nearly doubled (History.com Editors, 2010). The introduction of the supermarket also led to a marketing need for better advertisement and product packaging; however, it also led to a consumer movement that became frustrated with prices, product quality, and misinformation. This led to a shift of power from suppliers to consumers because of the increase in wealth and the variety of product choices. Similarly, discussions of marketing in academia boomed and resulted in the development of organizations such as the American Marketing Society and the American Marketing Organization (Wilkie and Moore, 2003). The American Marketing Journal was also established and gave businesses open access to scholarly literature about marketing strategy. By the early 1950s, companies began considering how they could improve their products by understanding their customers and their market.

Era III: Shifting the Field (1950-1980)

Post World War II, the US economy was booming and marketing became more prevalent in academia and business. The thriving mass market was largely driven by consumers’ pent-up demand from the war, and marketers anticipated new distribution possibilities as new highways were introduced and Americans shifted to suburban living (Wilkie and Moore, 2003). The introduction of the television also paved the way for a new form of advertisement and media which allowed product sales not to be limited to local areas but could be advertised throughout the country. Era III marks the birth of consumer behavior and marketing research as the introduction of computers made analyzing and distributing large scale surveys possible. This period also introduced marketing concepts widely used today, such as segmentation strategy, marketing mix, brand imaging, marketing management, consumer purchasing, attitudes, behavior sciences, and sociodemographic research (Wilkie and Moore, 2003).

The practice of consumer research initially lacked full acceptance in academia because many scholars believed marketing practices should be applied in ways that improved marketing management, not trying to better understand the human body (Wilkie and Moore, 2003). Most marketing scholars agreed with this view, which caused consumer behavior to grow slower during the first half of this period. However, in 1970, the Association for Consumer Research was formed and multiplied, resulting in 1000 members in 20 countries within ten years (Wilkie and Moore, 2003). As a result, Consumer research gained greater authority and became a

significant part of marketing. This concept even was addressed nationally by President John F. Kennedy in 1962 by introducing “The Consumer Bill of Rights”. The Consumer Bill of Rights is a U.S. set of regulations that grants consumers the right to safety, the right to be informed, the right to choose, the right to be heard, the right to education, and the right to redress in relation to producer’s products and services. These regulations helped introduce discussions regarding ethical practices in business.

Regarding marketing education, there was a substantial increase in graduate degrees awarded in business between 1950 and 1980, allowing students to be taught a marketing curriculum they would apply in their businesses. This was the first time in US History that marketing was widely taught as a separate business entity, and it is from this original infrastructure common marketing tactics such as inbound marketing and neuromarketing have flourished. Figure 1 displays the significant increase in Business college degrees between 1950 and 1980.

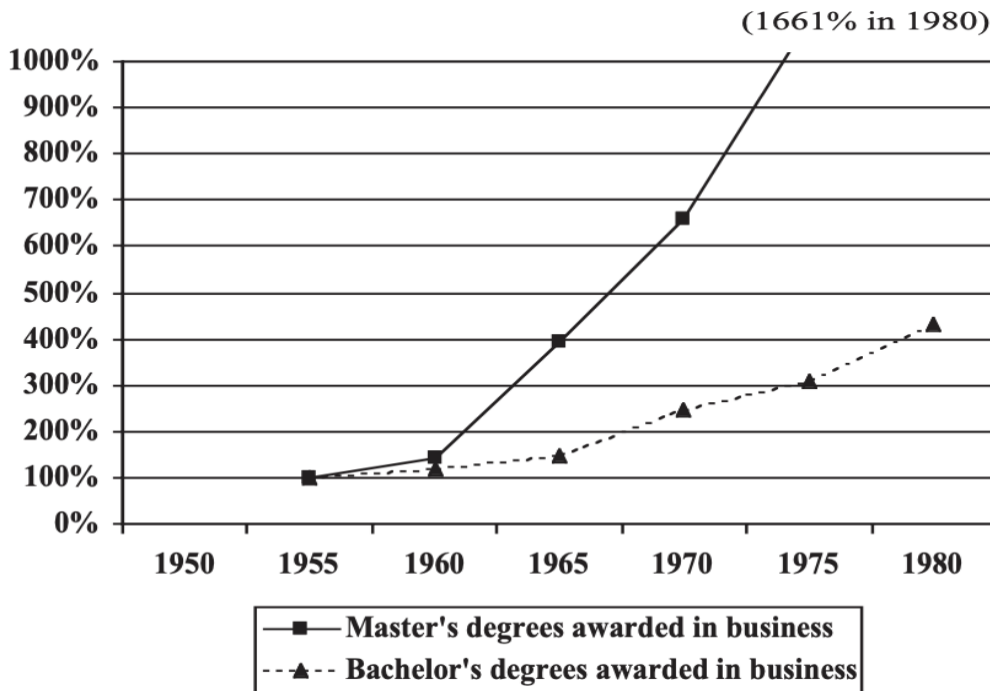


Figure 1: Academic Growth during Era III
(U.S. Department of Education, 2001)

The second half of the period proved to be incredibly exciting and innovative. Events such as the Civil Rights Movement, the Vietnam War, and the assassinations of national leaders provided opportunities for businesses to examine options and paved new routes to improve equity and the operations of society (Wilkie and Moore, 2003). As a result of these events, a new

form of marketing called social marketing emerged. Wilkie and Moore (2003) describes social marketing as “an area that would focus on the work of not-for-profit groups and government agencies concerned with effective intervention into social problem areas, such as the marketing of health, education, or alleviation of poverty.” Much of the creativity marketers display today was inspired by social marketing practices during US History.

Era IV: Enriching the Field (1980-2020)

As Communistic economies fell and the internet was becoming popular, marketing practices were significantly disrupted and forced to develop rapidly during Era IV. The internet made it possible for marketing journals and theories to expand far beyond US borders, which resulted in collaboration between marketers from all over the world. Between 1980 and today, marketing has been expanding dramatically, especially in academia, and most nations have sought to apply marketing concepts for successful enterprises (Wilkie and Moore, 2003). This led to a growing demand for marketing professors as students in business degrees continued to multiply as programs developed internationally. The influx of marketing students led to greater diversity in thought and ethnicity as marketers from different countries could work together and teach from different perspectives. A significant movement of this period is that academia as a whole drifted from the study of the entirety of marketing and began specializing in subset areas such as Marketing ethics, consumer policy, and consumer economics (Wilkie and Moore, 2003). Wilkie and Moore (2003) cite that “In the five short years from 1980 to 1984, the number of research-based marketing journal outlets more than doubled” causing an extensive shift in the pace and quantity of marketing-related information. Often this magnitude of marketing material can make it difficult for marketers to discern the appropriate information for their specialized research.

Era V: Disrupting the Field (2020-Present)

With the help of technology and international interest in marketing research, marketing today is at its peak in terms of information and application. By 2020, marketers began to analyze the immense amount of digital data and develop successful marketing strategies. However, after COVID-19 began spreading in March of 2020, many companies struggled financially, and some were unable to regain equilibrium which resulted in many business closures. During the first few months of the lockdowns, businesses became significantly more curious about how their consumers behaved in times of uncertainty. Much of this curiosity stemmed from the fact that there seemed to be a priority shift during the lockdowns that resulted in people exchanging items such as frozen pizzas for toilet paper and raw chicken for hand sanitizer. Some of these consumer buying decisions were bizarre to business leaders. This shift in consumer buying habits shattered the current demand for products in stores and caused a supply chain disruption that has taken years to stabilize.

In 2020, there was also a near-instantaneous shift from Brick-and-Mortar shopping to eCommerce shopping due to social distancing. This put a lot of pressure on businesses to make sure their products and services were accessible digitally so consumers would still have the option to engage in their business while also protecting themselves and others. The significance of the shift toward digital business wasn't that it was unexpected but that it happened much faster than expected. Companies were instantly faced with either making their products or services available online or sacrificing their revenue and potentially risking closure. In the midst of these changes, marketers had to figure out how to present their services and products to consumers quickly. "Kotler and Keller (2012) stated that a good understanding of customers' lives is crucial to ensuring that the most appropriate products and services are being marketed to the right people in the most effective way possible. During these lockdown phases with no mobility and only digital media to connect, the authors' in-depth discussion with marketing professionals of different sectors has led to an understanding that the suddenness and universality of lockdown has changed the behavioural dynamics of consumers and has redefined the social spheres and individual orientation" (Mehta et al 2020).

Today, marketers are discerning which buying decisions were temporary changes during the pandemic and which will result in a permanent shift. However, even more so, businesses are trying to understand why they were made in the first place. All businesses should want to better understand their consumer's decision-making tactics, improve the quality of the businesses' products and supply chain, and bring more products that the consumer would enjoy. During this Fifth Era, marketers seem to be at peak curiosity about consumer behavior and are eager to learn from the misinterpretations made about consumers during the pandemic. This curiosity mixed with more advanced technology will likely result in innovative consumer behavior research in the near future.

What Can Fill the Consumer Research Gap?

However, as of now, there is still much confusion about how consumers behave. With digital analytics, exceptional technology, and remote communication, businesses have adapted incredibly well and have developed effective marketing strategies that have successfully generated results. While there haven't been significant innovative shifts in consumer behavior in the past few years, companies have done an incredible job of recognizing what factors consumers consider when facing a purchasing decision. From the consumer's perspective, one of their greatest needs is to be able to trust the business they buy products or services from. Trust is becoming a more significant buying factor for consumers and often is displayed in conversations regarding ethical and sustainable practices. Consumer's views towards a product brand seem to be becoming more relational and less transactional than in the past. However, a consumer's desire for trust still does not overrule their desire for quality products and services.

Characteristics such as price, quantity, and quality are still significant factors for the consumer, yet they want to experience a type of partnership with the business. Wilkie and Moore

(2003) say, “The general goal is that such a marketplace be both “fair” and “efficient” for marketers, competitors, and consumers alike.” This type of relationship is not only what consumers want from a business but what they now expect from one.

As businesses begin to research how to establish trust and brand loyalty with their consumers, many are turning to neuromarketing for answers. While others may be skeptical of neuromarketing, the practice of understanding the unconscious decisions of consumers could be incredibly impactful for business today. Not only does neuromarketing have the potential to help companies realize what establishes trust and emotional arousal within their target market, but it can be an incredible tool for businesses to utilize when developing products. Neuromarketing has the potential to generate a value cycle that can increase a company’s understanding of the consumer and increase revenues while also increasing the quality of their products, improving customer experiences, and increasing brand loyalty.

Neuromarketing: What is it and how does it fit in?

The study of the brain has been a fascination in human civilization since before the 4th century BCE. Ancient philosophers such as Aristotle, Plato, and Anaximenes considered the brain “the seat, in which the highest, principal power of the soul is located” (Crivellato, Enrico, and Ribatti, 2007). One Greek Philosopher, Hippocrates of Kos, even says, “[The Brain] has the most power in man. If it is in sound conditions, it is our interpreter of the things ... The eyes and ears and tongue and hands and feet do whatsoever the brain determines; for there is an element of intelligence in the whole body ... but it is the brain that is the messenger to the understanding” (Crivellato, Enrico, and Ribatti, 2007). In recent times, the study of the brain has largely been a medical or psychological area of study. With the rapid increase of technology just over the past 30 years, the study of the brain seems to be expanding beyond those two fields. With the swift development in marketing in general and the recent study of consumer behavior, businesses worldwide are looking to understand their consumers better through the study of the brain: also known as neuromarketing.

For the past few decades, marketing has solely relied on traditional research techniques such as experiments, surveys, and group discussions to identify the consumers’ needs, wants, and desires (Bočková et al. 2021). The practice of neuromarketing has no intention of replacing these research techniques but simply expanding them. While traditional methods primarily study the conscious decisions of consumers, Neuromarketing techniques would attempt to explore the unconscious and biological processes the consumer encounters when facing a purchasing decision. This would result in a more holistic form of consumer research and a more comprehensive marketing strategy. A brief definition of neuromarketing would be “a discipline that applies neuroscientific methods to analyze and to understand human behavior in relation to markets and market exchanges” (Bočková et al. 2021). In theory, neuromarketing practices will unlock what some consider “hidden information” that will create many possibilities for all business sectors.

While the concept of studying the subconsciousness of the mind has been around for centuries, its academic discourse and application are relatively new. According to Morin (2018), “The term neuromarketing cannot be attributed to a particular individual as it started appearing somewhat organically around 2002. At the time, a few U.S. companies like Brighthouse and SalesBrain became the first to offer neuromarketing research and consulting services advocating the use of technology and knowledge coming from the field of cognitive neuroscience.” Now, over seventy-eight articles on neuromarketing have been published in ABS-ranked marketing journals, and prestigious institutions, such as Emory, MIT, and Stanford, have even performed several neuromarketing research experiments (Butler 2008; Lim 2018). There are also a growing amount of companies and organizations such as McDonald's, banks, movie studios, and political campaigns that are preparing for this branch of marketing to become widely practiced (Butler, 2008). For various reasons we will delve into later on, many businesses are cautious when exploring neuromarketing because of possible validity and efficacy concerns (Butler, 2008). Nevertheless, marketers are carefully watching this development and are looking forward to the potential of this exciting new field.

Expanding Beyond Traditional Research Methods

While there is a significant benefit of traditional research methods, one of the main disadvantages is that there is no certainty that the responses will accurately represent the answers to the questions— especially in the digital age. With the introduction of online surveys, there has been a significant increase in survey fraud, which causes the sample size to represent the general public inaccurately. Another disadvantage of marketing research methods today is the inability of respondents to accurately describe the emotional response a product or service gave them. Harvard Business School professor Gerald Zaltman found that 95% of our purchase decision-making is subconscious — and primarily based on our emotions (Zaltman 2003). This statistic shows that even if the respondent is entirely genuine in their answers, an entire section of their decision-making process is subconscious and unrecoverable. In addition to this, emotions are generally complicated for people to understand for themselves, nevertheless explain it to a surveyor. Neuromarketing techniques will conceivably help refine our understanding of unique characteristics, such as unconscious attention, trust, and emotional responses. As we discuss possible neuromarketing techniques, it is essential to consider that much of the researchers’ goals are to identify how the subconscious neural and visual processes change in the presence of certain stimuli and how they can use this information to create more effective marketing strategies.

Neuromarketing Techniques

Currently, there are over a dozen types of methods for tracking specific brain and neural activity. As we discuss neuromarketing techniques, it is important to preface that neuromarketing

doesn't solely include brain scanning. Neuromarketing techniques attempt to discover the source of unconscious decisions, which can be conducted through a combination of biometric and neurometric techniques. These methods are categorized into three major categories: techniques that record neural activity inside the brain, techniques that record neural activity outside the brain, and techniques that manipulate neural activity. Figure 2 displays a breakdown of current neuromarketing techniques (Lim, 2018).

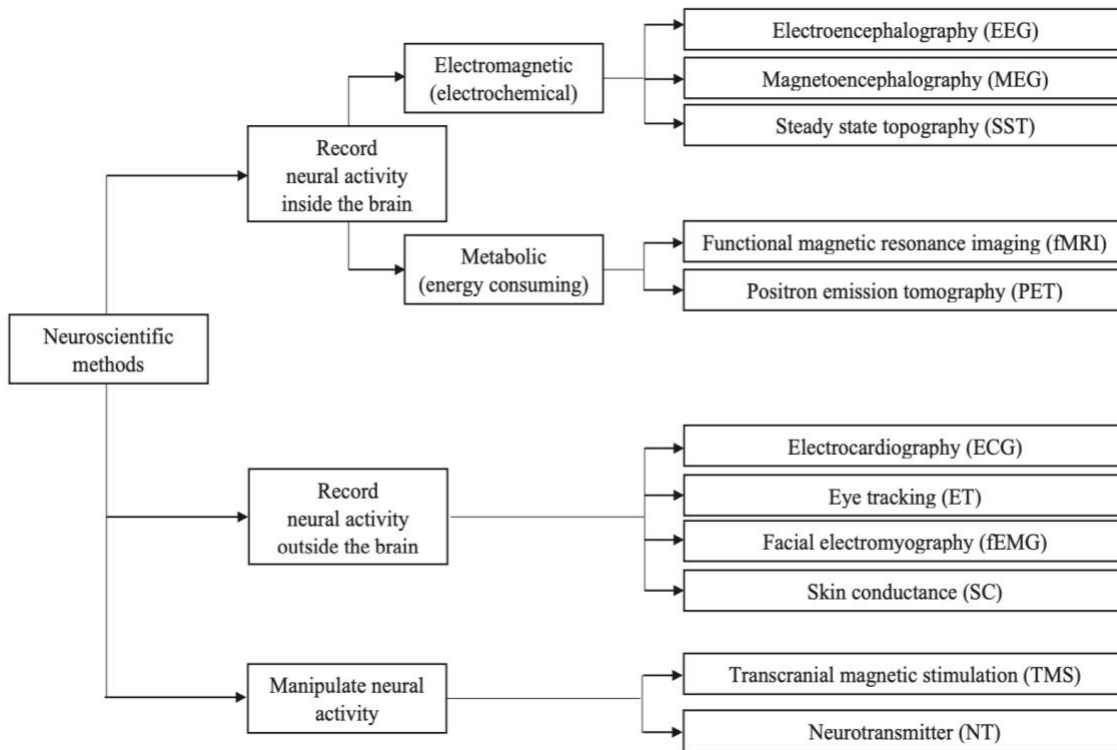


Figure 2: Breakdown of Neuroscientific Methods
(Lim, 2018)

All of these have been used in some form or fashion in neuromarketing experiments; however, according to (Alsharif, Salleh, Baharun, 2021), Electroencephalography (EEG) and Functional Magnetic Resonance Imaging (fMRI) are the most popular among scholars, and most common brain imaging tools, followed by Eye Tracking (ET) which is a biometric and physiological tool (Alsharif, Salleh, Baharun, 2021). For now, tools that manipulate neural activity such as Transcranial Magnetic Stimulation (TMS) and Neurotransmitter (NT) are largely excluded from many neuromarketing research discussions because they are an invasive tool that requires particular environmental conditions to be conducted properly. Techniques such as EEG are often more reliable, less expensive, and viewed as more ethical than TMS and NT. While this paper may mention tools that manipulate neural activity, much of the discussion will be about EEG, fMRI, and ET neuromarketing techniques.

Functional Magnetic Resonance Imaging (fMRI)

Functional Magnetic Resonance Imaging became popular in the medical world in 1980 as a tool for brain diagnosis research purposes. The introduction of fMRI was revolutionary for many, and after the first fMRI study was published in 1991, the number of research articles published grew exponentially. Logothetis (2008) says, “This average obscures the actual rate of publications, as in 1992 there were four publications in total, increasing to about eight per day by 2007.” fMRI is a non-invasive technique of neuromarketing that measures the changes in blood levels from one part of the brain to another. An fMRI is conducted similar to how MRIs are normally conducted. They involve the subject lying on a bed with their head surrounded by a large scanner that causes the atom particles to align with the magnetic field (Lim, 2018). During this time, The fMRI scanner tracks the blood oxygenated and deoxygenated levels, which correlate to neural activity (Lim, 2018). This technique provides a three-dimensional vision of the brain activity and allows neuroscientists to see the neural blood level changes in real-time.



Figure 3: fMRI Machine
(Lemos, 2020)

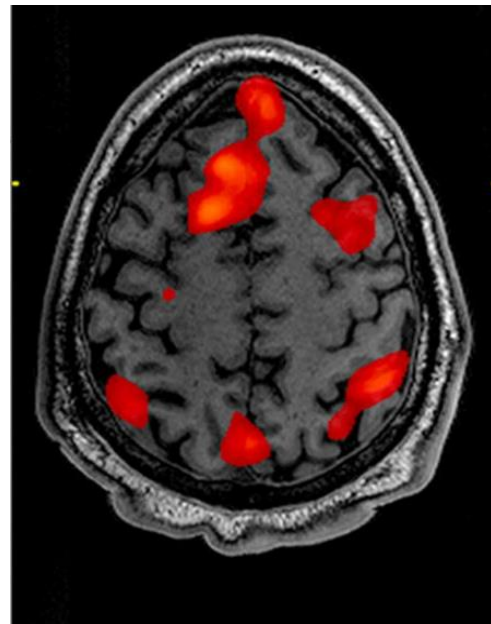


Figure 4: fMRI Scan
(Pedersen, 2021)

Some of the significant advantages of fMRI are its high spatial resolution, its possibility of insight into emotional processes, and its substantial reputation among neuroscientists and researchers. fMRI's ability to see what parts of the brain increase in blood flow in the presence of certain stimuli is promising because this could indicate certain unconscious emotions and responses. For example, if a subject is watching an advertisement or responding to a brand, an fMRI could track whether or not the subject had an unconscious emotional response towards the stimulus if there was an increase in blood flow in the frontal cortex. While many researchers are hopeful of this tool, the results can be challenging to interpret. Neurologists have come a long way in understanding the function of individual parts of the brain, however it is still uncertain what emotions were triggered when there is an increase in blood flow. Deciphering whether the brain activity was a result of a positive emotion like empathy or negative sentiment of disgust proves incredibly important for creating a marketing strategy or determining the unconscious processes present.

fMRI machines can record the deep structure of the brain due to its excellent spatial resolution, and it does so without having to sacrifice temporal activity. Temporal activity is how quickly the machine is syncing with the actual brain activity. The temporal levels of fMRI's estimates 1-6 seconds before the scanner can start recording, which is the slowest of the other two methods (Alsharif, Salleh, Baharun, 2021). According to Alsharif, Salleh, and Baharun (2021), fMRI is one of the best tools to measure the neural responses of consumers and be used to test new products, ads, brands, design of practices, prices, and predicting consumers' purchase decisions.

Electroencephalography (EEG)

Before fMRI became widely used in the 1900s, EEG was the leading technology used in marketing research practices. EEG was created in 1929 by a German scientist named Hans Berger to record electrical currents in certain parts of the brain. Tudor (2005) says, "The discovery of electroencephalography was a milestone for the advancement of neuroscience and of neurologic and neurosurgical everyday practice, especially for patients with seizures." Unfortunately, Berger never received the recognition or credit he deserved due to the emerging Nazi ideology and was forced to retire, leading to a strained professional and personal end; yet his work lives on (Tudor, 2005). The EEG technique is a non-invasive practice involving placing electrodes on the subject's scalp to measure voltage changes towards marketing stimuli in milliseconds (Alsharif, Salleh, Baharun, 2021). These changes in electric frequencies can indicate changes in brain activity in certain areas. EEG has the highest temporal activity of the three techniques, allowing researchers to track changes accurately and quickly.

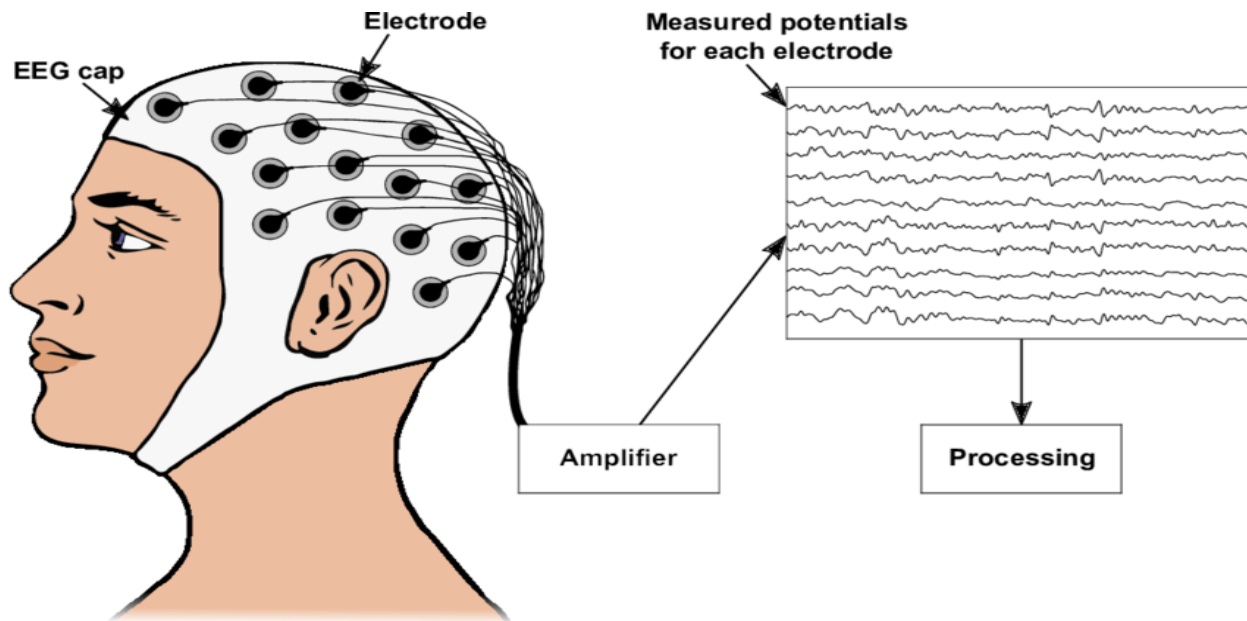


Figure 5: EEG Testing
(Nagel, 2019)

There are several significant benefits of EEG compared to other methods. EEG has the highest temporal activity, allowing the electrodes to detect even minute changes in brain activity. The high temporal activity, also known as temporal resolution, can help researchers accurately predict where and when the brain synapses are firing. This can lead to a better understanding of emotional processes and precisely where the stimulus affects brain voltage changes. However, compared to fMRI, EEG cannot conduct reliable research for parts of the brain in smaller subcortex areas such as the amygdala (Lim, 2018). This is because EEG has a much lower spatial resolution than fMRI, which prevents researchers from studying the responses of deeper parts of the brain. Due to EEG's higher temporal resolution, researchers can analyze more accurate emotional responses to stimuli, but similarly to an fMRI, the meaning of these responses is still difficult to interpret. For practical purposes, EEG is efficient because it is inexpensive and portable so it can be conducted in real-life marketing environments. According to Alsharif, Salleh, and Baharun (2021), EEG is one of the best tools to measure cognitive/emotional processes, engagement, and excitement and would be best used for testing advertisements, products, and websites.

Eye Tracking (ET)

Eye Tracking is another form of neuromarketing that has become widely used in marketing research practices. Like fMRI and EEG, ET has become a field of interest for many researchers. Figure 6 shows that the interest in Eye Tracking between 1994 and 2018 has grown exponentially and is currently one of the most popular neuromarketing tools.

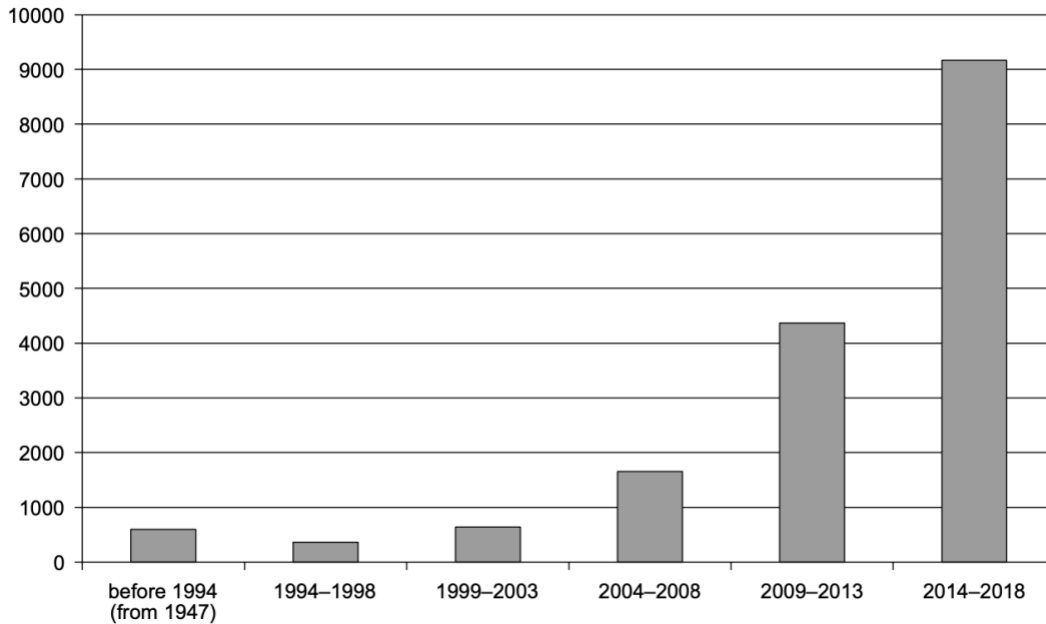


Figure 6: Number of searches for the phrase eye tracking or eye tracker or eye movement measurements in the EBSCO database
(Białowas, Sylwester, Szyszka, 2019)

Eye Tracking is the process of recording eye movements by studying a person’s fixations and saccades. Through studying these two types of changes, researchers can begin to understand the relationship between the brain and visual systems (Białowas, Sylwester, Szyszka, 2019). Fixations are pauses in the eye’s movement where the retina stabilizes at a specific point (Białowas, Sylwester, Szyszka, 2019). Studying fixations can be significant because it allows researchers to identify where a person stops to look upon stimuli. ET also tracks saccades which are the periods between fixations where the eye is moving rapidly (Białowas, Sylwester, Szyszka, 2019). According to Białowas, Sylwester, and Szyszka (2019), “The fixations are from 150 microseconds to 600 microseconds long and constitute 90% of the looking time as they include the smallest eye movements, such as tremor, drift or microsaccades. Saccades last from 10 microseconds to 100 microseconds and are seen as a manifestation of the desire for voluntary changes of attention.” Studying these two types of movements can give neuromarketers insight on how to better design and market their products to prevent voluntary changes of attention. In other words, ET is best at studying a participant’s path of attention.



Figure 7: EEG Testing
(TobiiPro Glasses 3)

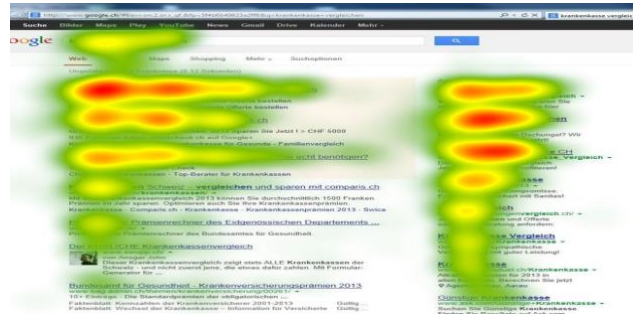


Figure 8: EEG Testing
(Zimmermann, 2015)

Several types of eye trackers are available, and while most have similar purposes, some vary in data acquisition speed. If it is more necessary for a researcher to track data quickly, some trackers can record movements to the millisecond, but a lower sampling rate is usually acceptable if the researcher is more interested in recording where participants looked (Carter, Benjamin, and Luke, 2020). One method of ET involves wearing a chin rest which increases the accuracy of the measurements, but the benefit of the chin rest isn't always significant enough to require one. Many researchers conduct ET experiments through wearable technology, such as the glasses in Figure 7. These glasses can record what the participant is looking at and create a pattern of infrared lights on the eye. In response to this, the cameras take high-resolution images of the user's eyes and patterns, and after processing it through an image algorithm, the eye position and gaze points are calculated. These results often are displayed through heat maps such as **Figure 8** or saccades pathway maps (Tobiipro.com, 2015).

Like EEG, ET is relatively cost-efficient and portable, allowing this type of experiment to be conducted in real-life marketing environments. ET is best used when testing ads, videos, products, positions in stores, design, and websites. A disadvantage of ET compared to EEG and fMRI is that Eye tracking is an indirect form of neuromarketing, making it more difficult to decipher where the unconscious motivation stems from. Therefore, many neuromarketers recommend pairing ET with other neuromarketing techniques such as EEG or fMRI. Through studying eye movements and brain activity simultaneously, it is much easier to analyze ET results and form an accurate conclusion. Białowas, Sylwester, and Szyszka (2019) summarize this idea by saying, “Combining eye-tracking with other methods – especially with neuroscience techniques – shows the vast possibilities of their use in marketing and consumer research. Tracking eye movement is essentially an indicator of the focus of attention. However, the combination of this technique with other methods of measurement enables to obtain more detailed information on the consumer’s affective states, beliefs, decision-making processes, preferences, or motivations”.

How Neuromarketing Brings Value to Advertising and Branding

As stated earlier, one of the main goals of neuromarketing is to establish language and understanding for consumers' emotional and behavioral processes. Today, many companies are already implementing marketing strategies that involve persuading customers with rewards and benefits by appealing to their emotions, yet they do not have sufficient data to strategize these tactics. One question many marketers are currently asking is how they can increase a customer's emotional involvement in their business. Fugate (2008) says, "Neural research shows that the brain's response to short-term riches occurs largely in the limbic system, a region that governs emotion. Future rewards are considered in the prefrontal cortex which is often associated the reason and calculation. All things being equal, the reward of immediate economic gratification generated by the limbic region will prevail over the rationality of deferring rewards generated by the prefrontal cortex." This is especially prevalent to healthcare and insurance providers who seem to offer lower instant gratification than businesses such as restaurants and movie theatres (Fugate, 2008). Through techniques such as EEG or fMRI, Neuromarketers could test different types of emotional appeals and see which ones stimulate the highest amount of emotional arousal. These types of experiments could serve as an excellent tool for companies who want to understand and alter their marketing strategies to boost emotional involvement for branding purposes.

In addition to boosting emotional arousal, neuromarketers could also test different advertisements to prevent unwanted emotions. Fugate (2008) records, "When customers think they are being treated unfairly, a small area called the anterior insula becomes active. The brain's response is similar to that of smelling a skunk. Such a powerful, negative, and primitive reaction easily overwhelms the deliberation of the more logical prefrontal cortex region. Under these conditions, the perceptions of exchange fairness by a service consumer probably take on even a larger role than first imagined. If unfairness is perceived, it is very difficult to re-establish the relationship as the brain has neural wiring from its early formative period that protects it from known dangers – just as it continues to repeat "safe" behaviors. It would be possible to set up experiments depicting various acts of service delivery "unfairness." Neuromarketing techniques such as EEG would allow researchers to accurately detect where these emotions stem from in the brain. Another fascinating area of study could be studying customers' emotional responses during the pre-purchase and post-purchase stages. From the customer's perspective, these stages are usually crucial for decision-making and trust and often provide significant ambiguity to marketers. According to the Edelman Trust Barometer Special Report (2019), 81% of customers factor in trust as a critical variable when making purchase decisions. While most businesses are beginning to focus on branding and building trust, neuromarketing research also hopes to improve branding strategies and analysis.

Written in the *Journal of Services Marketing*, Fugate (2008) provides insight into how neuromarketing can help quantify trust. "When trust is high, a hormone called oxytocin fills different areas of the brain. Oxytocin is part of an emotional response and thus pleasurable.

Reducing the “concentration” – so to speak – of trust in a service transaction would seem to reduce the corresponding amount of pleasure. In other words, the implementation of “hard” technology to standardize service production and reduce costs might be detrimental to customers’ feelings of emotional satisfaction. While many service marketers might have intuitively suspected this in the past, brain imaging provides a neurological explanation. As a result, service marketers could theoretically experiment with different levels of trust to see which generates satisfying levels of oxytocin given services production parameters. It would also allow the services marketer to determine how quickly these levels are internalized; meaning the level of trust might need to be increased to maintain that sense of pleasure.” In response to this research, businesses will likely create more effective advertisements that increase trust while simultaneously decreasing skepticism.

How Neuromarketing Brings Value to Media and Products

Eye Tracking seems to have opened up many possibilities for optimizing websites, media posts, and advertisements. In a study from Bočková et al. (2021), they tested three mobile applications for online shopping to determine which option would lead to the most engagement and interest from their consumers. Their findings showed that the participants were far more interested in the photos of the products than the short descriptions of the products, and the participants became disinterested when there was a wide variety of product options. These experiments can give marketers meaningful insight into their specific target market and allow them to make the necessary changes. Heatmaps are also a powerful tool when conducting ET experiments because marketers can determine where their customers are most likely to fixate their eyes on and create quality content that their specific customers want to see. This will allow website designers and social media managers more insight into building websites and social media campaigns that align with their target market. Neuromarketers can apply similar tactics to product development methods. In a research study by Bočková et al. (2021), subjects were tested using fMRI while listening to songs by unknown artists. Based on activated parts of the brain, assumptions were made about whether the participants thought the song was a success or failure. These experiments can also be applied to products that could offer marketers significant insight into whether potential customers would view their products as successes or failures.

The Uncertainty and Ethical Concerns of Neuromarketing

Similar to any growing field of study, there is some hesitancy among scholars and marketers about whether or not neuromarketing will become a significant sector of marketing. A considerable concern among researcher is the vast ambiguity of the meaning of the results of these three neuromarketing techniques. While it is entirely possible to record and study the brain activity using an fMRI or the voltage charge from an EEG, the activity's meaning is not completely certain. For example, activity in the prefrontal cortex usually signals an emotional

response, but it doesn't always signal a positive emotional response. If a marketer is trying to build an entire marketing plan out of this data alone, mistaking a negative emotion for a positive one could be detrimental to the business. On the other hand, Eye Tracking is superior to the alternatives in terms of portability, cost, and accuracy; however, it doesn't directly give insight into the emotional responses without being coupled with an fMRI or EEG. Eye-tracking alone can still provide excellent understanding to marketers for building websites and studying consumer behaviors, but it cannot reach its full potential without giving better insight into emotional behaviors. However, among all of these concerns, ethical discomfort is a primary focus as consumers, researchers, and businesses envision potential ethical dilemmas they will face in the future regarding neuromarketing.

With any type of research, there will likely be discussion around how to best protect and exhibit transparency for the participants and others. Conducting ethical practices is a regular affair researchers must continually be attentive to, however with neuromarketing, the urgency for protecting the participants is enhanced because there is potential for neuromarketing research to intrude on privacy and free will more than other types of marketing research. As I've mentioned before, the goal of neuromarketing is to study the unconsciousness of the mind, and if the participant is unaware of the emotional responses and brain activity researchers are looking for, there is the potential for a researcher to intrude on the psychological privacy of the individual. In an unethical and irresponsible situation, this could result in researchers receiving an enormous amount of information about the participant without the participant ever realizing what information they gave away. In today's digital world, privacy is a tremendous concern for the regular person, and through envisioning possible unethical paths, neuromarketing has the potential of intruding and exploiting the everyday consumer.

Subliminal Marketing or Neuromarketing?

It is vital to mention that a significant amount of hesitancy towards neuromarketing comes from the harmful effects and recollection of the subliminal marketing age. Around the 1960s, subliminal marketing became a popular form of advertisement marketing that exploited consumers' subconscious emotions to attract them to their products. The goal of subliminal marketing was to use images, words, or sounds to trigger a subconscious response, whether positive or negative. These triggers usually flashed quickly and were used to subconsciously persuade people to buy their products. These experiments were especially harmful to vulnerable groups such as children and those with mental disorders and eventually were made illegal in many different countries, including the United States.

While neuromarketing and subliminal marketing often get confused with one another, Pinar (2019) explains it best when he says, "The main mission of subliminal messages is to leave some positive or negative marks in the minds of consumers and to make them remember these when necessary. However, neuromarketing does not aim to send such messages or direct consumers towards a particular course of action. On the contrary, it works for explaining how the

brain functions of consumers are affected by external factors. In other words, its purpose is not to switch on the purchasing motive in the customers' brain and put them into action, but to help understand which stimulants make them take the purchasing decision via special techniques. Therefore, neuromarketing is a barometer which helps businesses understand and see the preferences of consumers, and measures the level of their needs, desires, and demands.”

While this description of neuromarketing is the current reality of researchers' and businesses', motives could gradually switch from enhancing consumers' product experience to coercing them into buying their products to increase profit. Many scholars and researchers agree that neuromarketing has the potential to become a significant part of businesses in a way that operates as a symbiotic relationship between business and consumers; However, the only way of accomplishing that goal is to emphatically strive to administer ethical policies and committees that engage in learning and demonstrate a commitment to protecting the humanity and dignity of the average consumer.

Protecting Privacy, Transparency, and Vulnerability

The role and responsibility of all researchers must be to protect the participants. When it comes to neuromarketing, these protections take form in issues such as vulnerable groups, informed consent, and privacy (Lim, 2018).

Informed Consent

Informed consent for participants is crucial for neuromarketing because neuromarketing is a relatively new field of study that involves practices the participants might be hesitant or unaware of. In describing the importance of the willingness of the participant, Ulman et al. (2015) says, “As a matter of fact, voluntariness is an indispensable part of any research on any participant. Therefore researchers should be cautious of undue influence of such incentives, which may cross over into indirect coercion.” In order to avoid any type of coercion, researchers must emphatically disclose the vision, means, and goal of each step of the experiment. In addition to the experimental processes, researchers also must disclose any possible physical harm the techniques will have on the participants. This requires participants to disclose relevant medical histories and conduct mutual communication about the safety of these experiments.

Privacy

Unfortunately, unethical practices from large corporations such as Facebook have led consumers to view neurological studies in a poor light. In 2014, Facebook partnered with several academic researchers to conduct a study on 700,000 users' mood states without their consent (Stanton et al. 2017). This case is an obvious invasion of privacy and consent, and unfortunately, events such as these have greatly harmed the reputation of consumer behavior studies and have resulted in even more hesitancy. Cases like Facebook are excellent examples of why researchers

must respond in the early stages of neuromarketing with stricter ethical rules and procedures that protect the participants for the participant's sake.

Another privacy concern people have raised is a concern that neuromarketing will help businesses find a “buy button” in their consumers' brains. This privacy concern truly breaks down into a more profound concern towards companies violating a consumer’s free will. While there should be discussion around this concern, this argument likely stems from a confusion between subliminal and neuromarketing intentions and is inconsistent with the reality of the goals of neuromarketing.

To begin, neuromarketing’s primary interest must be to improve to experience and the products for the consumer. If this is no longer the case, it is no longer neuromarketing but subliminal marketing, and it becomes a tool for manipulation and exploitation rather than a tool to improve the value of the corresponding industry. Secondly, in the early stages of neuromarketing today, it is near impossible for a business to predict the subconscious response of an individual accurately, nevertheless the responses of an entire target market. As mentioned before, neuroscientists still don’t entirely understand the subconscious and emotional meaning behind brain activity, and it will likely take many years before researchers can accurately understand brain activity of this magnitude. However, while this argument is not applicable now, neuromarketing will continue to progress as technology does, and this concern will bear more validity. This is why protections regarding consumers’ privacy and free will must be discussed and established before anyone can be exploited.

Vulnerability

As neuromarketing is fairly intertwined with psychological and medical practices, there is a greater possibility for researchers to discriminate against vulnerable groups, specifically children and those with addictions. While these aren’t the only two vulnerable groups to protect, these two have unfortunately been highly exploited by businesses in the past. Whether it’s creating products that purposely facilitate addiction or subliminal marketing that has neurologically harmed children, vulnerable groups have often fallen victim to unethical practices and these practices are just as possible with neuromarketing. For example, in trying to develop a product such as cigarettes, fMRIs potentially could test which products engage the rewards and reinforcement centers the most to sell more addictive products (Stanton et al. 2017). While this experiment could increase the number of products they sell, this is a failure in protecting vulnerable people such as nicotine addicts and could end up harming them even more. In trying to conduct ethical neuromarketing research, marketers must be intentional about learning from past mistakes and using neuromarketing research in a way where it is beneficial for the consumer, not just the producer. Stanton et al. (2017) says, “When marketing techniques, including product development, increase purchases of harmful products, the marketing itself can be harmful.” This raises the questions, “To what extent does a product have to be harmful to be restricted from using this type of marketing?” and “At what point is intervention necessary?”

(Stanton et al. 2017). These questions led to the necessity for oversight in making ethical decisions about neuromarketing.

Conducting Neuromarketing Ethically

As I've mentioned repeatedly, neuromarketing's goal is to better understand and address the consumers' needs (Stanton et al. 2017). Practically, this goal manifests in producing more desirable products, creating more enticing promotions for marketing material, and enhancing customers' experiences (Stanton et al. 2017). When discussing ethical policies and processes for neuromarketing, all rules must align in how this type of research can benefit consumers, not exploit them. Ulman et al. (2015) describe the current situation best when they say, "There seems at least three main routes for the future prospects: (1) place a total ban or a partial restriction on neurotechnology for commercial use (as the Parliament of France has done), (2) allow total freedom of use due to the lack of any regulatory standard (which is the current situation in many countries), (3) develop a regulatory framework (which would provide guidelines for ethical attitude and behavior in research practice). Whatever the choice, the neuromarketing applications should be controlled scientifically, ethically and legally against any misuse or harm to human beings by giving prominence to human dignity and health as a leading value." For businesses and consumers to reap the benefits of neuromarketing, companies and leaders in the field must strive to develop a regulatory framework that protects both consumers and companies and maximizes the amount of value for both parties. These frameworks often associate themselves in the form of company-regulations, third-party regulations, or governmental regulations.

A significant advantage of self-regulation by a company or research team is that they can control the amount of progress and innovation they want to accomplish. Self-regulation has a considerable advantage in speed because, in all honesty, many regulations slow progress. Self-regulation can allow companies to conduct research the way they desire to, and while consumers hope they are making decisions for what's best for the consumer, there is no guarantee they will. Nevertheless, self-regulation is the most efficient way to innovate in neuromarketing but is often held to no accountability.

Third-party regulations are often used in business for ethical decisions because it involves an unbiased, mutually third party that helps keep a company on track. This type of regulation is beneficial because it doesn't require the involvement of law enforcement, but it can help consumers keep the businesses accountable for their practices. If consumers view the business's research and application practices as unethical, the group often can compel a company to adhere to its written ethical codes. However, depending on the third party and their agreements, regulations by an agency or third party can be misleading to a consumer and can result in the perception of ethical practices and give a false sense of security (Turri et al 2017).

Governmental regulations are often the most loathed form of regulation, but sometimes they are necessary. Regulations and laws should be established in practices that involve human dignity and rights, even if it often results in slower research and innovation. These governmental

regulations often bring clarity and standards for the entire marketing field about how to conduct experiments and apply the information from them ethically.

It is likely, and in my opinion, wise, that the U.S. Government and businesses establish a regulatory framework that involves a combination of all three types. Without putting all their eggs in one basket per se, companies will still be able to conduct research at a desirable speed without being tempted to exploit consumers, whether intentionally or unintentionally. As of now, many marketing and neuromarketing companies aren't subject to oversight by a Review Board, but at some point, these regulations must be established in some form or fashion (Stanton et al. 2017). Businesses must consider the implications of this type of research now and begin establishing an ethical framework that benefits the consumers, or they will be forced to do so later by the Government and will likely taint the image of neuromarketing in the process.

Conclusion

Neuromarketing is a daunting field of study. With possible ethical concerns and exploitations of promising information, many are appropriately uneasy about the future of neuromarketing. Yet, with any possibility for malevolent behavior, there is an equal amount of possibility for ethical behavior. If conducted appropriately with ethical measures in place, neuromarketing has the potential to completely change and improve the relationship between the producer and consumer throughout all business sectors. Lim (2018) says it best when he says, "Until recently, marketing academics and practitioners have had to rely on what they were told or observed (e.g., self-reports, behavioral measures), not what was, to quote the old saw, going on inside some- one's head (i.e., brain and neural activity). The advent of neuroscientific methods holds the promise of helping the marketing community transcend this final barrier by distinguishing the processes that may appear identical or broadly similar, using insights to the brain and neural activity to predict people's unobservable and observable actions, such as what they think, feel, say, and do. As such, neuroscience offers marketing academics and practitioners an exciting new window into the underlying mental processes and activities experienced by their target markets when exposed to specific types of marketing stimuli, and thus it holds great potential for advancing marketing theory and practice." For some, the combination of neurology, psychology, and business still does not sound like a promising proposal, yet for others, in is an area of opportunity. Regardless, I can say confidently that there will be many businesses that pursue neuromarketing in the near future and if done correctly, these businesses could usher in a new holistic approach to marketing that benefits all parties involved.

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