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Horizons of Neuromarketing in Consumer Behavior

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Abstract

In the current study, the data of last researches in the field of neuroscience and memory evolution have been presented, keeping in view the fundamental developments of neuromarketing learning and cognitive behavior. Understanding the essential mechanisms behind customer shopping behaviors and the approach that marketing affects such actions are the essential concerns that need more research. The progression is primarily compelled by the belief that the utilization of neuroscientific approaches will add supplementary evidence to existing concepts and theories. Providentially, marketing investigation can significantly benefit from methodological progress in the field of neurosciences. The contributions of this study to the literature are to investigate the multiple and conflicting criteria of neuromarketing technology evaluation. Significant avenues of the research are what usually meant by neuromarketing, which is the concept that can be employed to understand brain neural functions and physiological measurements to advance the forecast of future marketing success and further what is gained by the non-physiological measurements.

Keywords: neuroscience; neuromarketing; customer; physiological; cognitive behavior

Introduction

The neuromarketing term was introduced by Alesmids in 2005, to explain the study on the use of neuroscience techniques in the marketing industry (Bastiaansen et al. 2018). The current period of investigation into the neuroscience of the consumer has defined the function of contravention lapse in identifying the intricate neural progressions to make causal human decision-making and policymaking, with the affluence of these studies available in neuroscience periodicals and convincing the representation of the purpose of the brain. The study of customer neuroscience, has created anticipation in the field of advertising (Venkatraman, Clithero, Fitzsimons, & Huettel, 2012). However, for the success of the consumer neuroscience in the next decade, the contemporary weight of basic knowledge research must be inclusive in the promotion and control of the promotion.

Neuro-imaging methods and tools can help validate, promote, or disseminate residual marketing concepts by providing insights into the groundbreaking system. At these stages, critical physical actions are a crucial enabler for improving the behavior of sympathetic clients. In other arguments, neuroimaging can help interactive researchers contain the "black box of customer interest in the aquarium" (Plassmann & Weber, 2015). The conventional model for the interpretation of willpower is the asset model, which suggests that the effort of willpower depends on the type of reserve in the brain. Since this is consumed by self-restraint, a few can be obtained for subsequent shifts in self-control (Baumeister, Vohs, & Tice, 2007). Neuroscience is related to various investigative issues, decision making and its complementary neuroscience, user-behavioral, is on wider consumer queries (Karmarkar & Plassmann, 2017) and (Hakim et al., 2019).

Neuroscience can offer information about underlying developments that are challenging to introduce by other approaches. Imagine that you are absorbing the reactions of decision-makers of moral importance that can be a cause of self-deception and bias-ness of societal attractiveness (Venkatraman et al., 2012). In such blindness, neuropsychological instruments can be a respectable counterpart to more obsolete tacit procedures such as response times. Neuroimaging can establish separations among emotional developments. Neuro-imaging and new neuroscientific approaches can be leveraged to well appreciate separate alterations and thereby illuminate the foundations of heterogeneity in customer behavior (Venkatraman et al., 2012). However, the previous research has indicated fNIRS as a neuroscience procedure in various scientific research articles (Kim et al., 2016; Werchan et al., 2016; Krampe et al., 2018).

Including neural events into decision-making, simulations can expand forecasts of publicizing appropriate conduct. This idea was first experienced by (Senior, Lee, & Butler, 2010), who demonstrates that the pre-decisional beginning in applicable brain counties foreseen succeeding selections. An energetic next step for customer neuroscience is the addition and combination of prior work smearing a multi-method for founding expressive multi-level brain performance associations (W Kable, 2011). Since then, it spread in the field of psychiatric and neuropathology (Bastiaansen et al. 2018).

Indeed, marketing borrows theories, ideas, and approaches broadly from the communal disciplines such as thinking, anthropology, sociology, and etymology, from the natural disciplines such as neuroscience, biology, finance, and arithmetic. This means that researchers involved in neuromarketing are examining the human brain and nervous system to understand better the impact of marketing by measuring users' direct and indirect neurological processes (Daugherty and Hoffman, 2017). An open question to study in marketing is whether these payment sensitivity characteristics also show specific differences in how customers respond to the surveillance property created by marketing (Plassmann & Weber, 2015).

Literature Review

Consumer Neuroscience and Challenges

Almost all neuroscientists pursue to understand how brain plans in experimental activities or mental hypotheses. It is not surprising that economists and behavioral investigators argue that the goal of the sympathetic mind, although stimulating for neuro-scientists, is not essential for notify activities (Harrison, 2008). To highlight the confrontation, it is practical to first understand different types of interactions that can be left between mind and activities. Community diversity is primarily based on the perceived effects of neuroscience learning, especially on individuals using fMRI, to the association between stimulation in the mind mapping and performance or knowledge, and brands. There are no agreements on the underlying relationship. The following form of communication is the principle of the ability to step up the occurrence of comportment follow-up to promote the start-up of the equivalent mind section. Thus, if incitement is temporarily increased in a given mental area, the willingness to review consistent compatibility must be amplified (W Kable, 2011). Another notable example is the application of sensor, memory, attention, and language processing systems in terms of established principles. The term is described as “saliency," especially the saliency of being remarkable. “According to neuro-serious research, advertisers can use our brain to be outstanding (Hafed, & Yoshida, 2017; Hakim et al., 2019).

Multidisciplinary advances can combine behavioral processes and biometric measures such as skin conduction, eye tracking, and fMRI to elevate the assets of each technique. Ideally, these

lines should be multidisciplinary and functional to emerge from the exercises using a technique that recommends building expansion and the following study strategy using a variety of techniques (e.g., customary social experimentations). Investigators should consider the consumer neuroscience, not as a method that might replace traditional dimensions of behavior but as a balance that can restore the process of acquiring and understanding social events. Converse inclusion involves an investigation that associates neuroscience with activities that are confined to consumer neuroscience research, but its difficulties inexperience can be discourse by using an ambitious system approach to deceptive instructions and by staining analytical-numerical tools to further decode results. We are eager that meta-analytic approaches are still at their beginning; they will remain to increase the capability of consumer neuroscientists to mark expressive and quantifiable conversation calculations. Recently, several types of automated methods were used for marketing purposes. Some of these methods consider the neural mechanisms behind the advanced research building on marketing procession and neuromarketing. Various types are measured by biochemical reaction including eye-tracking (Santos, 2015), facial expression (Lewinski, 2014), galvanic skin response (Ohira, 2015), functional magnetic resonance imaging (fMRI) (Bruce, 2014) and electroencephalography (EEG) (Telpaz, 2015) have been used for tracking customer attention in the neuromarketing studies (Nik, 2019).

In marketing literature, repetition does not always need to contain the repetition of impartial investigations. Alternatively, results can be replicated through survey data through several similar fMRI studies in diverse perspectives (i.e., "theoretical" duplications). Such theoretical duplications can be done in diametrically different ways. Thus, one can create apparent social predictions on the root of verifiable neural stimuli than in learning behavioral persistence in the laboratory or ground (Plassmann & Weber, 2015). More importantly, many researchers have asked for more programmatic research and integration in neuromarketing so that they can be studied as an integrated field of marketing science, especially in major marketing modules (Chamberlain, & Brandes, 2018).

Cognitive Neuroscience

The apprehensive procedures of neuroscience make this effort in a certain way to calculate brain movement, are such as electro-encephalography (EEG), magneto-encephalography (MEG), positron emanation tomography (PET) and by utmost common in this arena, functional magnetic resonance imaging (f MRI). We may discuss methods such as inherited research, skin reaction behavior and the like to be within the field of neural marketing (Senior et al., 2010). Neuroimaging techniques can directly measure human brain activity (Ulman et al., 2015). The essential tools used in Neuroscience are electrophysiology, eye-tracking and active magnetic goncho imaging (FMRR) (Stasi et al., 2018). Mind electromagnetic activity is used to evaluate ads (Daugherty et al., 2018).

The distinctive study strategy used in neural marketing can be described by supporting accidents or perhaps supporting incentives. This strategy is primarily a reflection of what scientists essentially view as the initial prohibited proposal. That is, the focus is on some elegant experimental incentives (hopefully), their intellectual movements are restricted, and along with some interactive response (e.g., a choice). Additional, some other functional aspects can be restrained, and the variables developed in a reversion recognized investigation construction. Such methods are central in intellectual neuroscience in common, and in neuromarketing. The method has been the initial mainstay of all intellectual neuroscience. In specific, it has been perceived that reactions to the same provocation are vastly adjustable through manifold judgments, uniform in so rudimentary a location as the dimension of reaction times (Braeutigam, Lee, & Senior, 2017). Such deviations might be due to the endogenous motion that is existent at all periods within the social brain. The first and perhaps most important object to be reminded

here is that fMRI does not conflict with public confidence - the amount of brain movement itself. Moderately, fMRI (as engaged in neuro-marketing) events is identified as the BOLD (blood oxygenation level helpless) reaction (while other differences are conceivable). In the soul, this trusts in the knowledge that the brain movement in a given area has inflated the results in a bloodstream amplified into a strong group. On the contrary, it must be prominent that this reaction is not essentially the movement of the mind itself, but the focus on the alternative. Inquiries are rarely investigated by neuroscientists themselves, who are embodied in an effort according to the statement that psychological knowledge can certainly be reduced in the end to physical actions (Bagozzi & Lee, 2017; Imran et al., 2018; Kazmi et al., 2018), this view will be reflected to be shared by many in neuromarketing. This is particularly evident in the overall rationalization of neuroscience as an individual able to detect invisible or otherwise perfect data (Rampl, Opitz, Welpe, & Kenning, 2016). Undeveloped brain movement also develops quite unexpectedly and can be illustrated by an accurate model of consistency. The various diagonal circuits of the brain are visible outside the individuals necessary to sustain life (Bagozzi & Lee, 2017). Significantly, it appears that the brain's inactive movement essentially involves roughly the same quantity of force as still complicated task-related movement (Raichle & Mintun, 2006), which means that the focus on the task of the movement is essentially an inactive reorganization of the continuity. This undeveloped movement absorbs such a huge amount of digestion in the body that involves doing some critical functions in an individual's existence. In addition, the proposal to improve the cognitive abilities of individuals active in confidence continued in the field of the invention of science. Although it still restricts consideration of the nervous system of perception (Bostrom & Sandberg, 2009), the occasion is now ripe for the belief that both potential "perceptual cons" and both are obsessed with direct communion with the mind. A creative entrepreneur suggested that such a research curriculum is compulsory for humans to remain up with proceed in instrument intelligence. Technologies have already in progress to exceed human intellect in several domains (Hawking, Max, Stuart, & Frank, 2014; Russell, Dewey, & Tegmark, 2015; Kazmi et al., 2016). Although proceed in profound neural networks provide instrument vision structures with several competencies that are at least on equivalence with human visualization (He, Zhang, Ren, & Sun, 2016). Thus, practical boundaries aside and presume that prospect researchers will expand secure methods to understand from, and embed to, millions of neurons in the human mind. It also emphasizes a few areas where future devices might improve cognition, the first domain to believe is working remembrance. Individual cognition is restricted by the quantity of information we can preserve while performing a task (Cowan, 2010; Luck & Vogel, 1997). The system, which can connect nerve cells to a terminal memory in a central computer, accumulates, allowing the consumer to abstract the intermediate arithmetic results by reading the mind and accepting it later with a mental writing procedure when necessary. Moreover, the external memory could improve individual cognition in other areas as well, by consent completely new problem-solving approach that takes benefit of the prolonged memory. It is even imaginable that complex calculations might be offloaded to an exterior processor giving consumer-direct entrée to the concluding answer. Thus, the improvement of long-term remembrance would help us with our usually poor memory of past proceedings. The relations between perception, such as among faces and names or among surroundings and procedures, could also be sustaining externally. More important, models (e.g., consciousness, memory, long-term potentiation) and philosophies (e.g., Bayesian free-energy principle, Schultz theory, Hebbian theory, theory of Spatial memory) from neurosciences can

be supplemented with marketing theories to support and enrich neuromarketing interpretations, remembered brand value (For instance, memory of brand connecting, how linking of a brand is encoded, consolidated, and recovered (Lim, 2018).

In research of consumer behavior, to study consumer preferences, study, and learning objectives include ways such as interviews, questionnaires, video testing, and observations, about consumers in the behavior of modern marketing and consumer ideas, unconscious consumer behavior is assessed using neural imaging tools (Hsu, 2018). It is also (Dehaene and Changeux, 2011; Koch, Massimini, Boly, & Tononi, 2016) argue that the chance of distribution of cognizant knowledge among intelligence and mainframe should robustly depend on the type of connectivity. While the certainty that awareness is coupled to the organic substrate of the mind is frequent, the margin circumstances for awareness to appear indoor or exterior a mind are not known (Dehaene, Lau, & Kouider, 2017; Alam Kazmi, 2015). Significant approaching has been acquired from research in patients with divide intellect, where wounding strand relations among the two hemispheres root mindful practice to be split (Gazzaniga, 2000), at least ephemerally. Functional magnetic resonance imaging reflects the cognition responses to marketing stimuli through brain blood circulation (Couwenberg et al., 2017). Some neuro ethics approaches are used to analyze the concepts of Neuroscience such as brain contact, consciousness, personal responsibility, and study of the potential effects of Neuroscience on topics like freedom among others (Salles et al., 2018; Shahriari et al., 2019).

Discussion

There is no question that traditional neuroscience techniques are a practical tool for learning the promotion experience.

The consumer decision happens when the dynamical state of the brain alters compared with the neutral state. A crucial way of the marketing strategy for intriguing the consumers is the advertisement; however, choosing the most effective design is a significant challenge for marketers. The customer firm that is supposed to perform measurements related to neuromarketing researches may prefer less complicated devices because of the limited capability of the personnel who use the technology. Technologies are needed to find essential aspects of buyers' preferences and the better targeted advertisement strategy. Furthermore, automated technologies can be used for predicting consumer choices, provide that the technology is well-matched to positioning purposes (Lindebaum, 2016; Senior et al., 2010). Moreover, little marketing learning has been engaged in relevant executive writing on this subject, nor with the initial neuroscience effort. The new discussions should address how neuroscience can help in estimating the marketing incident, the principles of spending such a scheme, and the presumption that can be strained. Greater consideration to miscellaneous modalities of neuroimaging, such as MEG, TMS, as well as a significantly superior focus on the inconvenience associated with all techniques and psycho analysis.

Although, more examination and planning on the application of equally for our promotion assumption and justification were needed. If the endogenous mind movement is someway concerned in our reaction to stimulus, it appears that accessible neuro-marketing study is only capable to offer us element of the explanation for how we formulate preference or react to promotion stimuli. Largely, it is not feasible to recognize this effect by using the appropriate investigation method. What is needed is the pre-stimulation goal, where the movement of the mind is accurate before the experiment is focused on the untested stimuli. (Braeutigam et al., 2017) providing an opening to this grassy land of the profession, as well as the complicated account involved in the inner movement of the inner mind held in a positive way.

Conclusion and Future Directions

There is significant reason for concerning the prospect of consumer neuroscience. With the development of new technologies and the emergence of neuroscience, we will undoubtedly see significant evolvement in the neuromarketing that adds value to customers and brands.

Identifying the most suitable neuromarketing technology relies on several distinctive factors. Technology selection becomes the central component of process and product innovation strategies. Brands require technology selection choices and presenting new technologies to launch their brands to keep up with the sustainable market; therefore, brands will be able to improve their managerial goals. Technology, innovation, and organizational performance are vital for the success for any brand (Norman, Polyn, Detre, & Haxby, 2006; Tusche, Bode, & Haynes, 2010).

Moreover, even when brands achieve successful forecasts, they are still far from deconstructing marketing communication into various components and understanding why some succeed, and others do not. It is vital to learn more about it, both in order to construct guidelines or strategies that could help sellers build their campaigns and to assist scholars in their pursuit to understand the underlying philosophies that affect the subject choices and valuations. Eventually, the growing influential field of neuroscience gave rise to promising subfields of consumer neuroscience and neuroeconomics, which can be considered its natural extension into marketing philosophy and managerial implications (Clithero, Smith, Carter, & Huettel, 2011; Chua et al., 2011; Shahriari et al., 2019).

References

Alam Kazmi, S. H. (2015). Developments in promotion strategies: Review on psychological streams of consumers. *International Journal of Marketing Studies*, 7(3), 129–138. https://doi.org/10.5539/ijms.v7n3p129

Bagozzi, R. P., & Lee, N. (2017). Philosophical Foundations of Neuroscience in Organizational Research: Functional and Nonfunctional Approaches. *Organizational Research Methods*, 1094428117697042. https://doi.org/10.1177/1094428117697042

Baumeister, R. F., Vohs, K. D., & Tice, D. M. (2007). The Strength Model of Self-Control. *Current Directions in Psychological Science*, *16*(6), 351–355. https://doi.org/10.1111/j.1467-8721.2007.00534.x

Bostrom, N., & Sandberg, A. (2009). Cognitive Enhancement: Methods, Ethics, Regulatory Challenges. *Science and Engineering Ethics*, *15*(3), 311–341. https://doi.org/10.1007/s11948-009-9142-5

Braeutigam, S., Lee, N., & Senior, C. (2017). A Role for Endogenous Brain States in Organizational Research: Moving Toward a Dynamic View of Cognitive Processes. *Organizational Research Methods*, 1094428117692104. https://doi.org/10.1177/1094428117692104

Bruce, A.S., et al. (2014). Branding and a child's brain: an fMRI study of neural responses to logos. Soc Cogn Affect Neur, 9(1), 118-122.

Bastiaansen M, Straatman S, Driessen E, Mitas O, Stekelenburg J, Wang L. (2018). My destination in your brain: a novel neuromarketing approach for evaluating the effectiveness of destination marketing. *J Destin Mark Manag*, 7, 76–88

Chua, H. F., Ho, S. S., Jasinska, A. J., Polk, T. A., Welsh, R. C., Liberzon, I., & Strecher, V. J. (2011). Self-related neural response to tailored smoking-cessation messages predicts quitting. *Nature Neuroscience*, *14*(4), 426–427. https://doi.org/10.1038/nn.2761

Clithero, J. A., Smith, D. V., Carter, R. M., & Huettel, S. A. (2011). Within- and cross-participant classifiers reveal different neural coding of information. *NeuroImage*, *56*(2), 699–708. https://doi.org/10.1016/j.neuroimage.2010.03.057

Cowan, N. (2010). The Magical Mystery Four: How Is Working Memory Capacity Limited, and Why? *Current Directions in Psychological Science*, *19*(1), 51–57. https://doi.org/10.1177/0963721409359277

Couwenberg, L.E., M.A.S. Boksem, R.C. Dietvorst, L. Worm, W. Verbeke, and A. Smidts. (2017). Neural responses to functional and experiential ad appeals: Explaining ad effectiveness. *International Journal of Research in Marketing* 34(2), 355–366.

Dehaene, S., & Changeux, J.-P. (2011). Experimental and Theoretical Approaches to Conscious Processing. *Neuron*, *70*(2), 200–227. https://doi.org/10.1016/j.neuron.2011.03.018

Dehaene, S., Lau, H., & Kouider, S. (2017). What is consciousness, and could machines have it? *Science*, *358*(6362), 486–492. https://doi.org/10.1126/science.aan8871

Dos Santos, R.d.O.J., et al. (2015). Eye tracking in neuromarketing: a research agenda for marketing studies. *International Journal of Psychological Study*, 7(1), 32.

Daugherty, T. and Hoffman, E. (2017). Neuromarketing: understanding the application of neuroscientific methods within marketing research. In Thomas, A.R., Pop, N.A., Iorga, A.M. and Ducu, C. (Eds), *Ethics and Neuromarketing: Implications for Market Research and Business Practice*, Springer, New York, NY, 5-30.

Daugherty, T., E. Hoffman, K. Kennedy, and M. Nolan. (2018). Measuring consumer neural activation to differentiate cognitive processing of advertising: Revisiting Krugman. *European Journal of Marketing*, 52, 182–198.

Gazzaniga, M. S. (2000). Cerebral specialization and interhemispheric communication. Does the corpus callosum enable the human condition? *Brain*, *123*(7), 1293–1326. https://doi.org/10.1093/brain/123.7.1293

Harrison, G. W. (2008). NEUROECONOMICS: A CRITICAL RECONSIDERATION. *Economics Philosophy*, *24*(3), 303–344. https://doi.org/10.1017/S0266267108002009

Hawking, S., Max, T., Stuart, R., & Frank, W. (2014). Transcending complacency on super intelligent machines. *The Huffington Post*, *9*.

He, K., Zhang, X., Ren, S., & Sun, J. (2016). Deep Residual Learning for Image Recognition (pp. 770–778). Presented at the Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition. Retrieved from https://www.cv-foundation.org/openaccess/content_cvpr_2016/html/He_Deep_Residual_Learning_CVPR_2016_paper.html

Hakim, A., & Levy, D. J. (2019). A gateway to consumers' minds: Achievements, caveats, and prospects of electroencephalography-based prediction in neuromarketing. *Wiley Interdisciplinary Reviews: Cognitive Science*, *10*(2), 1485.

Hsu,Y.T. (2018). Cognitive systems research for neuromarketing assessment on evaluating consumer learning theory with fMRI: Comparing how two word-of-mouth strategies affect the human brain differently after a product harm crisis. *Cognitive Systems Research* 49, 49–64.

Imran, Z. S., Jalees, T., Jiang, Y., & Alam, K. S. H. (2018). Testing and incorporating additional determinants of ethics in counterfeiting luxury research according to the theory of planned behavior. *Psihologija*, 51(2), 163-196.

Ohira, H. and N. Hirao. (2015). Analysis of skin conductance response during evaluation of preferences for cosmetic products. Frontiers in Psychology, 6, 103. https://doi.org/10.3389/fpsyg.2015.00103

Kazmi, S. H. A., Zeng, H., & Abid, M. M. (2016). Effects of Hedonism and Utilitarianism in Advertising in E-Business Equity. In *2016 8th International Conference on Intelligent Human-Machine Systems and Cybernetics (IHMSC)*. Vol. 2, 582–585. IEEE. https://doi.org/10.1109/IHMSC.2016.232

Kazmi, S. H. A., Wahab, A., Zaman, S. I., & Kou, Y. (2018). Rise of Digital Media to Triumph Brand Loyalty. In *2018 10th International Conference on Intelligent Human-Machine Systems and Cybernetics (IHMSC)*. Vol. 1, 297–300. IEEE. https://doi.org/10.1109/IHMSC.2018.00075

Koch, C., Massimini, M., Boly, M., & Tononi, G. (2016). Neural correlates of consciousness: progress and problems. *Nature Reviews Neuroscience*, *17*(5), 307–321. https://doi.org/10.1038/nrn.2016.22

Krampe C, Gier NR and Kenning P. (2018). The Application of Mobile fNIRS in Marketing Research—Detecting the "First-Choice-Brand" Effect. *Front. Hum. Neurosci*, 12:433. doi: 10.3389/fnhum.2018.00433

Kim, J.-Y., Kim, K.-I., Han, C.-H., Lim, J.-H., and Im, C.-H. (2016). Estimating consumers' subjective preference using functional near infrared spectroscopy: a feasibility study. J. *Near Infrared Spectrosc*, 24, 433–441. doi: 10.1255/ jnirs.1242

Karmarkar, U. R., & Plassmann, H. (2017). Consumer neuroscience: Past, present and future. Organizational Research Methods. https://doi.org/10.1177/ 1094428117730598

Lindebaum, D. (2016). Critical Essay: Building new management theories on sound data? The case of neuroscience. *Human Relations*, *69*(3), 537–550. https://doi.org/10.1177/0018726715599831

Luck, S. J., & Vogel, E. K. (1997). The capacity of visual working memory for features and conjunctions. *Nature*, *390*(6657), 279–281. https://doi.org/10.1038/36846

Lewinski, P., M.L. Fransen, and E.S. Tan. (2014). Predicting advertising effectiveness by facial expressions in response to amusing persuasive stimuli. *Journal of Neuroscience Psychology Economics*, 7(1), 1.

Lim, W. M. (2018). Demystifying neuromarketing. *Journal of Business Research*, *91*, 205-220.

Lee, N., Chamberlain, L., & Brandes, L. (2018). Welcome to the jungle! The neuromarketing literature through the eyes of a newcomer. *European Journal of Marketing*, 52(1/2), 4–38.

Norman, K. A., Polyn, S. M., Detre, G. J., & Haxby, J. V. (2006). Beyond mind reading: multi-voxel pattern analysis of fMRI data. *Trends in Cognitive Sciences*, *10*(9), 424–430. https://doi.org/10.1016/j.tics.2006.07.005

Plassmann, H., & Weber, B. (2015). Individual Differences in Marketing Placebo Effects: Evidence from Brain Imaging and Behavioral Experiments. *Journal of Marketing Research*, *52*(4), 493–510. https://doi.org/10.1509/jmr.13.0613

P.G. Nik, S. Farashi and M.-S. Safari. (2019). The application of EEG power for the prediction and interpretation of consumer decision-making: *A neuromarketing study, Physiology & Behavior*, https://doi.org/10.1016/j.physbeh.2019.04.025

Raichle, M. E., & Mintun, M. A. (2006). Brain Work and Brain Imaging. *Annual Review of Neuroscience*, *29*(1), 449–476. https://doi.org/10.1146/annurev.neuro.29.051605.112819

Rampl, L. V., Opitz, C., Welpe, I. M., & Kenning, P. (2016). The role of emotions in decision-making on employer brands: insights from functional magnetic resonance imaging (fMRI). *Marketing Letters*, *27*(2), 361–374. https://doi.org/10.1007/s11002-014-9335-9

Russell, S., Dewey, D., & Tegmark, M. (2015). Research Priorities for Robust and Beneficial Artificial Intelligence. *AI Magazine*, *36*(4), 105–114. https://doi.org/10.1609/aimag.v36i4.2577

Senior, C., Lee, N., & Butler, M. (2010). PERSPECTIVE—Organizational Cognitive Neuroscience. *Organization Science*, *22*(3), 804–815. https://doi.org/10.1287/orsc.1100.0532

Stasi, A., G. Songa, M. Mauri, A. Ciceri, F. Diotallevi, G. Nardone, and V. Russo. (2018). Neuromarketing empirical approaches and food choice: A systematic review. *Food Research International,* 108, 650–664.

Salles, A., K. Evers, and M. Farisco. (2018). Neuroethics and philosophy in responsible research and innovation: the case of the human brain project. *Neuroethics*. https://doi.org/10.1007/s12152-018-9372-9

Shahriari, M., Feiz, D., Zarei, A., & Kashi, E. (2019). The Meta-Analysis of Neuro-Marketing Studies: Past, Present and Future. *Neuroethics*, 1-13.

Tusche, A., Bode, S., & Haynes, J.-D. (2010). Neural Responses to Unattended Products Predict Later Consumer Choices. *Journal of Neuroscience*, *30*(23), 8024–8031. https://doi.org/10.1523/JNEUROSCI.0064-10.2010

Telpaz, A., R. Webb, and D.J. Levy. (2015). Using EEG to predict consumers' future choices. *J Marketing Res*, 52(4), 511-529.

Ulman, Y.I., T. Cakar, and G. Yildiz. (2015). Ethical issues in neuromarketing: BI consume, therefore I am. *Science and Engineering Ethics* 21, 1271–1284.

Venkatraman, V., Clithero, J. A., Fitzsimons, G. J., & Huettel, S. A. (2012). New scanner data for brand marketers: How neuroscience can help better understand differences in brand preferences. *Journal of Consumer Psychology*, *22*(1), 143–153. https://doi.org/10.1016/j.jcps.2011.11.008

Veale, R., Hafed, Z. M., & Yoshida, M. (2017). How is visual salience computed in the brain? Insights from behaviour, neurobiology and modelling. *Philosophical Transactions of the Royal Society, B: Biological Sciences*, 372(1714), 20160113. https://doi.org/10.1098/rstb.2016.0113

W Kable, J. (2011). The Cognitive Neuroscience Toolkit for the Neuroeconomist: A Functional Overview. *Journal of Neuroscience, Psychology, and Economics*, *4*, 63–84. https://doi.org/10.1037/a0023555

Werchan, D. M., Collins, A. G., Frank, M. J., and Amso, D. (2016). Role of prefrontal cortex in learning and generalizing hierarchical rules in 8-monthold infants. *J. Neurosci*. 36, 10314–10322. doi: 10.1523/JNEUROSCI.1351- 16.2016