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**NEURO SCIENCE: CURRENT UNDERSTANDING AND
IMPLICATION OF NEURO SCIENCE IN NEURO MARKETING**

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Abstract

Neuro Science has made add on advantages in the field of Neuro Science in the form of Neuro Marketing. The Meaningful ways and the interaction of Neuro Science and Marketing Science has helped in generating the sense of understanding the behaviour of consumer. This blend of neuro science and marketing science led to the introduction of a new field of study which is nomenclature as NEURO MARKETING or CUNSUMER NEURO SCIENCE. Consumer Neuro Science is a new field of marketing which uses Functional Resonance Imaging through Medical Technologies to study brain responses to marketing stimuli. FMRI is used to measure changes in the activity of a particular part of the brain and to study and learn why the consumer has taken the decision on the particular issue and subject and what part of brain is involved to make the decision they do and which part is responsible to do so.

Keywords: Neuro marketing–Consumer neuro science-Neuro branding-Future of marketing

1. Introduction

Research Scholars and scholars who normally practice the marketing and research on consumer behaviour have been trying to unfold the cover of mysteries behind the bioscience and arts of successfully marketing the services and product to the actual consumers. They also make every effort to realize their consumers' behaviours so as to offer them a charming experience in the utilization process. Though there is decades of make inquiries in exploring

various facets of consumer behaviour, we are still very far off from understanding how a consumer behaves in the way she behaves.

The brand managers endlessly try to understand their consumers 'needs and desires to create a unique magnificent experience but the innovative products introduced in the market, a good number of the times, fail to create a centre of attention the consumers 'watch, let alone attention. One of the reasons for the breakdown of the marketers 'understanding of their consumer's behaviour is the fact that there is divergence between the attitude and actual buying behaviour of the consumer. Conventional market research methods try to evaluate the attitude of the consumers towards the brands which may not convert to the actual behaviour at point of purchase.

More than 90% of the information is processed subconsciously in the brain of human (Zuraw- icki2014).This unintentional processing of information in consumer's brain plays a great role in consumer decision making .Conventional market research methods, used to understand the consumer behaviour, fail to tap into the unintentional processes happening in the brain of the Consumers. This leads to inequality between the market research findings and the actual behaviour displayed by the consumers at the point of buying. Marketers and research scholars, therefore, need to re-examine their market research tools to better understand consumer behaviour .In the following parts, we briefly introduce the readers to the budding field of neuro marketing and consumer neuro science. The readers can then expect to learn more about the applications of neuro science in marketing and the way it is expected to open out in future.

2. Emergence of neuro marketing and consumer neuroscience

In the modern times, there has been a immense search to gain deeper understanding of human cognition and behaviour. This has led to the appearance of synergy between the biological and social sciences. These joint research efforts of the biological and social scientists have helped in nurturing major advances along various fronts of social, behavioural, biological and executive

Sciences. Neuro economics and verdict neurosciences have provided valuable theoretical insights. About human decision making that account for both personality choices and the neural mechanism

Underlying those choices (ShivandYoon2012).Consumer neuro science is an rising interdisciplinary field that combines science ,psychology ,neuro ,and economics to study how the brain is physiologically affected by promotion and marketing strategies(Leeetal2017). Over the past decade, the field of consumer neuroscience has made meaningful progress in generating insights related to marketing and consumer behaviour (Plassmannetal2015).Though Consumer neuro science and neuro marketing are frequently used interchangeably in the marketing literature, the past refers to academic research at the intersection of neuroscience, psychology and marketing while the latter generally refers to practitioner or popular interest in neuro physiological tools—such as eye tracking ,skin conductance ,electroencephalography(EEG), event related potential (ERP) and functional magnetic resonance imaging(FMRI),which are used for conducting commercial market research (Plassmannetal2011). Consumer neuroscience is therefore a more rigorous version of neuro marketing, findings of which are embedded in theory.

Neuro marketing and consumer neuroscience research expose reality better than established Methods of research based on questionnaires and interviews (Falketal2017).It is also found to provide information about consumer preferences that are not for sale through conventional Methods (ArielyandBerns2018).The neural procedures are better predictors of population Level data than self report measures. The ability of these neuro science approaches to predict choices in real world contexts has tremendous implications for marketers (Plassmannetal2019).Marketers can apply these tools to gain imminent into the consumers' intention towards their products and services and it can help them test their branding and marketing strategies before actually implementing them in the target market.

Marketing professional can choose best strategies for promoting their product such as celebrity backing or association with social or environmental Cause (cause related marketing). This would help that particular brand save costs which might have otherwise been wasted on an inefficient campaign or failed celebrity endorsements. Neuroscience can add importance to the current consumer research in many ways Shivand Yoon(2012) mention few orbits where neuroscience is expected to provide tangible benefits, these are: providing opportunities and guidelines to facilitate theoretical development; Facilitating new empirical tests of standard theoretical claims; explanations for observed Heterogeneity within and across consumer groups; and novel mechanisms for considering the Physiological perspective and the role of various biological factors ,including hormones and genes, on consumer preferences and decisions(ShivandYoon2012).Neuroscience can shape future theory and models in consumer decision making and suggest ways in which these models can be used for research and decision making.

3. Tools and applications of neuro marketing and consumer neuro science

Consumer neuro science has helped consumer research scholars generate innovative insights in to a range of facets of branding such as brand awareness (LittandShiv2012; Milosavljevic et al2012), brand evaluation (Eschetal2012; Estesetal2012; SaadandStenstrom2012),

Brand relationships (AggarwalandLarrick2012; Reimannetal2012), brand preferences (Venka tramanetal2012; BernsandMoore2012; Yilmazetal2014), pricing (Plassmannetal2007), product packaging (Reimannetal2015; Stolletal2018), brand naming (Hillenbrand et al 2013), green consumption (Leeetal2014), store illumination (Berciketal2015), Advertising (TreleavenHassardetal2010; Vecchiato2014), and new product development (ArielyandBerns2018)

Consumer neuro scientists have a wide range of tools at their disposal for the methodological Examination of their research problems.

These tools work by recording metabolic activities Happening inside the consumers' brain or recording electrical/magnetic properties of the neurons Principle of recording the metabolic activities include functional magnetic resonance imaging(FM RI) and positron emission tomography (PET), Electrical activities recording tools consist of Electro encephalography(EEG)/ event related potential (ERP),magneto encephalography(MEG), steady state topography(SST),and transcranial magnetic stimulation(TMS) Tools for Measuring other physiological activities include eye tracking ,galvanic skin response, facial coding, and facial electromyography. Detailed discussion on application of these tools in marketing is discussed elsewhere (egAgarwalandXavier2015)

4. Future of neuro marketing and consumer neuroscience

Human brain is a stylish network of one hundred billion neurons and we currently lack a deep understanding of how brain operates and how a brain's obscure operation produces the highly specialized human behaviour (Donoghue2018) and human decision making patterns. This Lack of knowledge of human brain, to some extent, currently restricts us to study the consumer Behaviour at minute's level. The current non invasive neuro imaging techniques (EEG,MEG, FMRI,etc) cannot capture the brain's activity to being neuron all evel ;hence for anuanced Understanding of the composite cognitive processes happening in the consumer's brain , highly Advanced methods of investigation are required .We are currently in the midst of a neuro technology revolution that is making it possible to measure and inspire thousands and potentially millions of neurons concurrently (Shenoy2015). Fortunately, the last few years have seen few great projects aimed to address the knowledge gap in our understanding of the functioning of the brain. Some of these projects such as the European Union's Human Brain Project and the BRAIN (Brain Research through Advancing Innovative Neuro technologies) initiative, promises breakthrough advancements in fundamental neuroscience which would help consumer neuro scientist to fill current methodological gaps in consumer neuro science research.

Though these research initiatives, as of now, are not directly focused on addressing neuro marketing or consumer neuroscience research questions, the knowledge of human brain anatomy and enhanced understanding of the cognitive abilities which will be available to the scientists from other research areas including the consumer neuro scientists would help them to generate deeper insights into the consumer behaviour, which are currently not possible to be addressed through the available technologies for example, the role played by each of the consumer's senses in creating their Product preferences and purchase. We do have some insights into the role of senses, but it is mostly at the aggregate level, a combination of all of the senses and that too is at nascent stages.

Consumer researchers certainly need more insights into how our senses help us in creating decisions for product choice for example, what is the best scent to be sprayed in the retail store targeted at senior consumers? or how the consumers' brain process the taste of food being served in an airplane flying at a height of 30, 000ft? Which forms apart of consumer experience with the respective air line and in turn leads to the consumers' satisfaction / dissatisfaction towards the airline brand. Advancement in our knowledge of processing of sensory inputs by the brain will certainly help the consumer neuroscientist to create products and service which would meet the consumers' conscious and unconscious demands.

Neuro marketing and consumer neuroscience are expected to play an increasing role in addressing their search questions of marketing science and consumer behaviour. Consumer neuroscience apart from creating new theories would also be instrumental in revisiting the earlier established theories of marketing while neuro marketing will be beneficial in enhancing the efficiency of marketing professionals. The current consumer neuroscience studies, particularly those using FMRI, are focused on reverse inference, ie reasoning backward from specific brain activations to particular mental functions (Poldrack2006) or the correlation relationship between brain activations and specific consumer

behaviour or experience—and makes no assumptions about the underlying causal relationship (Plassmannetal2015) for example, if the ventro medial prefrontal cortex (vmPFC) and the dorsolateral prefrontal cortex (dlPFC) are activated when participants are reporting their willingness to pay (WTP) for products, then the researchers can argue that there is an association between those brain regions and WTP calculations (Plassmannetal2007) or if researchers found activations in the brain region ,the pallidum ,which is associated with positive emotions and pleasure ,for strong brands and activations of the insula ,which is associated with negative emotions ,for weak and unfamiliar brands then the researchers argue that there is association between these brain regions and consumers' preference for respective brands (Eschetal2012). However, recent evidence indicates that the vastinter connected network of the human brain is responsible for our advanced cognitive capabilities rather than a simple expansion of specialized regions of the brain such as the pre frontal cortex (Hawrylyczetal2015). The consumer neuro scientist themselves agree that advancement in neuroscience technology would help the consumer research as Eschetal (2012) quotes, “Once technology allows for more detailed investigations of brain processes, it will be easier to advance and test more specific hypotheses and to map brain scanning results to specific results in experimental studies” (Eschetal (2012) pp, 82)

Network neuro science, a branch of neuroscience that works with brain networks, has made advancements which addresses the issue of reverse inference ‘in neuro scientific experiments. This branch of neuroscience studies the networks functioning in the brain, which are now believed to be responsible for cognitive processes in human beings rather than a specific brain location such as prefrontal cortexorpallidum.

With the recent advances in technology, it would soon be possible to obtain a wiring diagram,or“connectome”of the brain at single neuron resolution (Zador2015), The neuro scientific community is slowly realizing that virtually all aspects of integrative brain functions depend on the action of networks ,created by connections among neurons and brain regions(Sporns2015).These

connections are now considered vitally important for information processing and computations happening inside the human brain and are so responsible for all consumption related activities pursued by the human beings as a consumer including their product preference, product choice, and decision making. We expect connectomics to play an inevitable role in the future developments of neuro marketing and consumer neuroscience which will unveil the biology that lies behind the mental and physical processes required to execute complex tasks and, ultimately, to reveal the neural basis of our cognitive behaviour.

The consumer neuro science researchers currently study the consumer decision making process in phases and therefore, as of now, there is no unified model of the mind which shows how sub-processes such as attention, memory and reward/aversion processing are integrated and function concurrently for decision making and problem solving (Blocketal2015). There is a need to build an integrated model which helps us understand the consumer decision making in a holistic manner. It is expected that the future researches in this area will throw light upon the integrated model of information processing in the consumer's brain

5. Conclusion

The last decade has laid a solid foundation for neuro marketing and consumer neuro science to emerge as scientific discipline of study and research. There are several interdisciplinary groups, across the globe, which pursue this scientific field and are constantly working on more challenging marketing problems.

The field is also steadily gaining acceptance among mainstream marketing academia. We see more and more consumer neuro science articles appearing in internationally acclaimed marketing and consumer research journals. Many reputed marketing and consumer research journal have either announced special issues of consumer neuro science or have already come up with such issues, e.g.

one of the most esteemed marketing journals, Journal of Marketing Research (JMR) has just come up with a special issue on neuro science and marketing, edited by Colin Camerer and Carolyn Yoon (Camerer and Yoon 2015). This makes us to believe that consumer neuro science has already started contributing to the mainstream marketing literature in substantial manner. We expect to observe increase in such issues with other marketing journals as well as more articles with the applications of consumer neuroscience in the regular issues of the journals.

Consumer neuro science would, in due course, integrate itself with the current mainstream market research methods such as quantitative research and qualitative research. Thus the marketing discipline would be able to develop new theories, which would be based on multi method evidences rather than just survey results or interview results or neuro scientific results. Overall, this would lead to create greater understanding of markets, consumers, their consumption behaviour and consumer decision making. Moreover, these marketing and consumer behaviour models would also have the potential to be scalable to real world outcomes that provide an opportunity to generate deeper understanding about consumers and to inform marketing decisions with practical and economically significant consequences (Plassmann et al 2015).

Like all other scientific disciplines, it is not that consumer neuroscience does not have critics, it has been criticized for its methodological shortcomings such as 'reverse inference', providing correlation evidences rather than causal evidences and for generalize ability and reliability issues of neuro science research (Plassmann et al 2015). Critics of any scientific discipline help that particular discipline to evolve and build robust pillars for future researcher to develop upon that base. Fortunately, consumer neuro science has been able to address all concerns of the critics, to a great extent, and promises to further emerge as a more rigorous scientific discipline of its own. With more fundamental research happening in neuro science, consumer neuro sciences shall, in future, be more

interdisciplinary in nature to look beyond the current methods of EEG and FMRI

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