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THE HUMAN BRAIN AND MEDIA: THE EMERGING PARADIGM OF INTERACTION

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ABSTRACT

The intangible nature of the ideological markers that "constructs" and "propagates" social media usage, the nascent nature of the academic research on neuroscience and the behavioural patterns that influence social media behaviour provides both a challenge and an opportunity to explore human behaviour on social media. The present study attempts to provide a paradigm on social media usage, interaction and impact, unearthing the hibernating "subtexts" of socio-cultural and psychosomatic nature, which are slowly gaining acceptance in academic circles as major stakeholders impacting human behaviour in the virtual world.

The "neurobehavioral" roots of the ideological and affective components that govern social media usage make them susceptible to the various hegemonic practices ingrained in the capitalistic base structure which controls and manipulates social media platforms. For instance, the human dopamine system, the development of the frontal cortex, and the presence or absence of certain genes – all of these which have a profound impact on social media behaviour across age groups and cultures are susceptible to varying degrees of psycho-social manipulation. The nature of "experiential selection" which holds that our life experience literally shapes the connectivity and function of the human brain attains a greater significance in the context of social media usage. Rather than a quantitative analysis, the study hypothesizes social media usage's cultural and neurobiological roots and its reciprocal impact on the former.

Keywords: Neurobehavioral, Social Media Behaviour, Ideology

1. INTRODUCTION

The adaptive nature of human behaviour which has helped us evolve distinctive sociocultural behavioural traits facilitating survival, cooperation and collective evolution is now facing an existential threat in today's millennial global world which is characterised by an ever-increasing and exaggerated cross-linking of virtual world and the 'real' world. The present predicament is in many ways a double-blow to the psycho-somatic core that governs human behaviour as the edifice of culture which lends socio-behavioural adaptability to humans with all the divergent interpretations it carries has already been seriously threatened by the relentless march of globalisation.

The advent of social media is in many ways an offshoot of the process of globalisation, reflected in its multi-faceted, predatory, capitalistic tendencies and the subtle yet omnipresent hegemonic power dynamics which is integral to it. Hence, in many ways, social media can be studied and interpreted as a paradigmatic transplanting of the power equations that constitute globalisation from the social sphere to the digital sphere. From this perspective, the covert operation of hegemonic power and the means employed to propagate the loci of power in the digital sphere of social media requires special attention as the quest for social media hegemony is inextricably intertwined with the manipulation of human behaviour.

The mediating factor of cultural institutions, which acted as tools of propagation of hegemony, as propounded by Gramsci, in the pre-globalized era, has found a systematic reorganization in the digital era whereby the embedded nature of social media interactions covertly takes over the role of hegemonic propagation while overtly acting as the mediating agent for transmutating human social behaviour into 'social-media behaviour' (Neudert, 2016). As a broker for user data and as a space for advertising, each social media platform faces the need to expand its social capital resulting in an increased employment of hegemonic sub-systems to enhance its customer base through manipulating user behaviour. The usage of dubious technologies like neuromarketing brings into the fore, questions of ethics and legality and the lacunae existing in the domain of media literacy. The present study aims to explore the neuroscientific roots of social media behaviour and proposes this exploration as an essential tool to aid and facilitate resistance to hegemonic forces from the paradigm of media literacy. The emerging field of neuroscience provides a fresh impetus in bridging the methodological gaps in the analysis of human behaviour (which has always lacked an organic integrated perspective due to compartmentalization of perspectives provided by various fields like Cognitive Psychology, Behaviourism, Evolutionary Behaviour etc). Though the dichotomy between the body and the mind is bridged to a great extent from a theoretical perspective with the help of advancements in various fields of science, we are still a long way behind in the analysis and utilization of empirical data to bring about systemic changes on a tangible level, in the realm of human behaviour. This systemic ambiguity in our approach to human behaviour is a reflection of the lacunae in employment of an integrated vision encompassing diverse perspectives under a single umbrella. The emerging field of neuroscience holds the potential for providing an integrated perspective of human behaviour, synthesizing seemingly unrelated fields of science backed by empirical data and tools to validate the findings. The present study postulates that the empirical paradigm provided by neuroscience in the analysis of human behaviour is replicable in varying degrees for the understanding of social media behaviour, thereby providing a new dimension of neuro-literacy to media literacy which can aid in enhancing resistance to hegemonic practices systemically ingrained in social media propagation. The above postulation gains added signification under the context of massive investments made by social media hegemons in neuroscience research and the growing trend of neuromarketing employed extensively in digital media.

Though restricted fundamentally to the understanding of fundamental and emergent properties of neurons and neural circuits, the multidisciplinary nature of the methodology employed by neuroscience involving psysiology, mathematical modelling, developmental biology, and psychology helps in providing a holistic vision which involves diverse components – a much needed paradigm for understanding human behaviour. A neuroscientist can specialize in a wide range of fields from neuroanatomy to neuropsychology. Research in this field can improve our understanding of both the brain and the body, how they work and the behavioural patterns emerging from them. Reintegrating the methodological premise set by neuroscience for exploring human behaviour into the premise of social media behaviour is at once a challenge and an opportunity to be embraced so as to push the frontiers of human psychology in general and 'media literacy' in particular. From this perspective even a cursory glance at the tools used by neuroscience opens a window to the enormous progress made in understanding the realm of human behaviour. The potential this holds in the arena of social media behaviour is clearly evident, as the empirical analysis of human experience in its multifaceted dimensions is indispensable for attaining scientific validation, which, in many ways define the ethos of what constitutes human progress. For instance, current neuroimaging techniques have improved our insight into how the brain is structured as well as the functional features implicit in the underlying anatomical correlates. Among these the CT scan is used fundamentally as a tool to diagnose a range of conditions including abnormalities, atrophy, aneurysm, infection and injuries. Magnetic Resonance Imaging (MRI) uses strong magnetic fields, radio waves and a computer to create detailed images of the brain. Since these tools are not restricted for diagnostic purposes alone, the MRI holds a special significance in the process of brain mapping – the process of determining the anatomic correlates of specific functions like speech, sensation, emotion etc. In tune with the rapid advancement in the field of neuroscience, the fMRI, which is a more advanced tool, processes images of metabolic activity within these anatomic features. To use a simplistic paradigm – when an area of the brain is in use, the corresponding blood flow to that region spikes and functional MRI (fMRI) captures this activity as images. The images processed by the fMRI due to its greater resolution and precision have received a huge reception in modern neuroscience research focusing on critical brain functions related to cognitive and affective features of human behaviour. Another key diagnostic tool which has gained currency in the research arena is the EEG, (electroencephalogram). An EEG can detect changes in brain activity which aids in diagnosing brain disorders. However the cost efficiency and simplicity of the hardware used have helped EEG attain a wide currency in brain research. The extent of EEG usage as a common research tool is validated by the fact that many EEG techniques used generally in research are not standardised sufficiently for clinical use. In addition to the above, there is the GSR sensor

(which measures the Galvanic Skin response or the electrodermal activity, i.e., the changes in sweat gland activity) which measures the emotional arousal of an individual in response to a particular stimulus. The fact that the scope of neuroscience is not circumscribed even by a fascinating set of research tools given above is underlined by ambitious projects like the 'Human Brain Project' (HBP), which aims to integrate Neuroinformatics, Brain Simulation, High Performance Analytics and Computing, Medical Informatics, Neuromorphic Computing and Neurobiotics into a single infrastructure. However the fundamental factor that lends significance to the above given tools of neuroscience in the arena of social media behaviour is the flexibility offered by the tools themselves to understand user behaviour and the potential replication of these findings as an instrument to perpetuate hegemonic capitalistic self interests. For instance, experiments have shown that neural activity in the amygdala (the region of the brain associated with primal emotions) differed when subjects were exposed to people from a different race. "Numerous experiments confirm that the brain differentially processes images within milliseconds based on minimal cues about race or gender" (Sapolsky, 2017, p. 389). Two factors that play a key role in determining how the brain processes the images were the frequency of such exposure and the intensity of such exposure (Sapolsky, 2017). The extent to which both the above given variables can be manipulated in social media platforms, producing a cumulative effect overtime is just a pointer to the immense potential for the replication of neuroscientific experiments and the possible hazardous usage of empirical data by hegemonic forces for perpetuation of ideology. This again raises questions on the lacunae in media literacy with a specific focus on neuro-literacy in the context of ever widening knowledge gap between social media hegemons (armed with endless reserves of capital and technical expertise) and the average user.

A brief overview of neuro-anatomy relating to two significant aspects of human behaviour namely the affective component and the cognitive component will be helpful in integrating the interdisciplinary perspective of the present study into the context of social media behaviour. The 'triune brain' model which postulated three layers for the human brain namely the reptilian, the limbic and the neocortex – controlling the functional features associated with automatized vital functions (heart rate, breathing, body temperature), emotion and cognition respectively, is used under the present study to provide a neurological basis for cognition and emotion. The second layer, namely the limbic system has a central role in regulating emotions while the outermost layer, namely the neocortex plays an important role in cognition. The above given perspective, as Maclean himself emphasized is for the sake of study and the three layers of the brain are anatomically interconnected in a highly complex way (Sapolsky, 2017, p. 22). The limbic system is structurally and functionally integrated with the automated functions controlled by layer one and vice versa. The same holds true for the neocortex and limbic system. The extent of interconnection between the neocortex and limbic system exhibits such a complexity, that certain anatomical features of the cortex are actually considered to be part of the limbic system. In short, in the language of neuroanatomy, thought and emotion are interchangeable and interdependent signifiers with a shared neural network mutually interacting to influence human behaviour (Sapolsky, 2017, p. 28).

The indirect regulation of automated functions by the limbic system (layer two) has a profound effect on human behaviour. This is due to the feedback from the automatic and the hormonal states influencing the brain, which in turn affects behaviour (Sapolsky, 2017). The typical unconscious nature of this influence on human behaviour can have far reaching ramifications in social behaviour in general and social media behaviour in particular. Thus, the arousal of the limbic system by a particular stimulus holds the potential to elicit a corresponding automated behavioural change. The "feeble joke" quoted by Robert Sapolsky, that the limbic system mediates the four F's- fear, fight, flight and sex (2017, p. 26) turns out to be more of a cultural signifier pointing to one of the most powerful leveraging tools exploited by social media for perpetuating its hegemonic agenda.

A significant impact of amygdala in human behaviour can be observed in the context of processing sensory inputs. Usually sensory inputs are processed and cognized after an enormous level of neural activity in the cerebral cortex (layer 3).

However some sensory information entering the brain takes a short-cut, bypassing the cortex and going directly to the amygdala. Thus the amygdala can be informed about something scary before the cortex has a cue. Moreover, thanks to the extreme excitability of this pathway, the amygdala can respond to stimuli that are too fleeting or faint for the cortex to note...Crucially, while sensory information reaches the amygdala rapidly by this shortcut, it isn't terribly accurate (since, after all accuracy is what the cortex supplies)...this produces tragic circumstances where, say, the amygdala decides it is seeing the handgun before the visual cortex can report that it is actually a cell phone. (Sapolsky, 2017)

This enormous human vulnerability in the processing of sensory stimulus, has far reaching ramifications in conceptualizing the premises of social behaviour and literacy.

In addition to this the process of amygdala arousal has two major implications. "Both sex and aggression activate the sympathetic nervous system, which in turn can influence behaviour – people feel differently about things if, say, their heart is racing versus beating slowly". The pattern of arousal and the autonomic feedback influences the intensity of the experience (Sapolsky, 2017, p. 44).

Emotional arousal and the implicit conditioning of the human behaviour, fundamentally orchestrated through the amygdala, is a potential neurobehavioural hotspot which needs to be empirically explored with interdisciplinary studies involving neuroscience and the social sciences. However, as explored earlier, the affective underpinning of brain anatomy is systemically conjoined with the cognitive component, which is primarily centered in the frontal cortex (layer three). The frontal cortex regulates important cognitive tasks associated with working memory, executive function, gratification, postponement, long term planning, regulation of emotion and reigning in impulsivity.

Further substantiating the falseness implicit in the dichotomy between cognition and emotion, the prefrontal cortex has two sub parts namely, dlPFC and vmPFC, corresponding to logical decision making and emotional decision making. The ability of a human being to forego an immediate reward for a bigger one, rests on the functionality of dlPFC. A malfunctional dlPFC or damage to it can result in hyper-aggression and hyper sexuality. Damage to vmPFC can result in the lack of empathetic quotient in the decision making process (Sapolsky, 2017, p. 57) leading to frictions in social interaction. However, the vmPFC with its connection to the amygdala can be the root of extreme emotional stress, if not mediated by other parts of PFC. The rationalization and strategic thinking employed by prefrontal cortex can help in calming down the amygdala and bringing about affective stability (Sapolsky, 2017, p. 59).

The above given paradigm provides an anatomical basis of how thought can be used to control emotion and this is particularly important in dealing with specific case scenarios of social media behaviour involving fake news, ideologic propaganda and social media addiction. The neuroscientific validation for such reappraisal strategies provide an extra impetus to techniques like CBT (Cognitive Behavioural Therapy) which is used for the treatment of disorders involving lack of emotional regulation (Sapolsky, 2017, p. 61). This has the potential to bring about a systemic reorganization of the main structural premise of media literacy involving both prevention as well as intervention. CBT can provide tools to reappraise circumstances that evoke anxiety in victims of cyber bullying and thus help in recovery. Similarly, imparting CBT to the perpetrators as an essential part of the legal procedure can help prevent recurrence of improper social media behaviour. Perhaps, the most significant step that could be taken in this direction, will be to impart the reappraisal strategies as part of the academic curriculum along with the neuroscientific underpinnings of the process so as to aid the individuals themselves to organically integrate the necessary adjustments as per requirements in tune with overall scenario of social media etiquette. The preventive nature of the above given strategy can help arrest the cumulative effect of transgressive acts happening in social media in a mass scale and can be used as a tool for empowerment in social media literacy.

The present study, proposes an interdisciplinary approach so as to address the ever widening gap between empirical progress in neurobehavioural research and actual application in regulating social media behaviour. Media literacy, as an empowering tool can, help bridge this gap. A broad concensus among media literacy experts identifies media literacy as the ability to access, analyze and evaluate information across all forms of communication. The key faculties of critical thinking and communal sense making is foregrounded in the process of imparting media literacy (Bulger & Davison, 2018, p. 3). The evolving nature of digital media, especially the social media, problematizes the arena of media literacy and calls for greater flexibility and fluidity in conceptualizing it. This is well emphasized by leading media literacy theorists like Renee Hobbs (Bulger & Davison, 2018, p. 4). The shift in perspective is oriented towards a process of empowerment rather than protective measures against misleading content. This is clearly a breakaway from the conventional notion of parental protection and vigilance against content that are deemed inappropriate. The stark truth is that a majority of the parents themselves lack 'media literacy' in the broad paradigm indicated by the term (page 6). This has brought forth "positive outcomes related to a flexible response for both teachers and students following current events as a method of linking critical thinking and behaviour change for youth and as a foundation for accurately digesting partisan content" (Bulger & Davison, 2018)

The empirical paradigm provided in the present study, elucidating the neuroanatomical underpinning of critical decision making and behavioural change (under CBT) can thus act both as a direct intervention reinforcing the prospective direction that could be taken forth by media literacy and as a meta-knowledge providing new empirical data and interdisciplinary findings validated by neuroscience. The White Paper on social media literacy issued by EMSOC identifies the potential drawbacks of project based media literacy empowerment as that of finance related over-reliance

on such projects and the lack of structural long term approach (Donoso & Verdoodt, p. 15). However short term interdisciplinary approaches, incorporating divergent methodologies and findings as in neuroscience can provide a quantum leap for social media literacy to evolve and keep in pace with the swiftness of technological progress. From this perspective, certain experiments in neuroscience pertaining to specific anatomical components related to human social behaviour are given below so as elucidate the relevance of employing interdisciplinary methodologies and insights to empower the arena of social media literacy.

Anger

"Show human subjects pictures that provoke anger, and the amygdala activates (as shown with neuroimaging). Similarly, sticking an electrode in someone's amygdala and stimulating it (as is done before certain types of neurosurgery) produces rage" (Sapolsky, 2017, p. 31).

Social Behaviour

"The amygdala is particularly sensitive to unsettling circumstances that are social. A high ranking male rhesus monkey is in a sexual consortship with a female; in one condition the female is placed in another room, where the male can see her. In the second, she is in the other room along with a rival of the male - the extent of amygdala activation correlated with the extent of anxiety displayed" (Sapolsky, 2017, p. 35) and is much higher in the second case scenario.

Identity

"The amygdala is linked to social uncertainty in other ways. In one neuroimaging study, a subject would participate against a group of other players; outcomes were rigged so that the subject would wind up in the middle of the rankings" (Sapolsky, 2017, p. 35). Experiments then manipulated the game outcomes so that subject's ranking either remained stable or fluctuated wildly. Stable rankings activated parts of the frontal cortex. Instability in rankings lead to significant activation of the amygdala. "Being unsure of your place is unsettling" (Sapolsky, 2017, p. 35)

Decision making

The amygdala also plays a logical role in social and emotional decision making. In the Ultimatum Game, an economic game involving two players, the first makes an offer as to how to divide a pot of money, which the other players either accept or reject. If the latter, neither gets anything. Research shows that rejecting an offer is an emotional decision, triggered by anger at a lousy offer and the desire to punish. The more the amygdala activation in the second player after an offer, the more likely the rejection" (Sapolsky, 2017, p. 38). "...these findings suggest that the amygdala injects implicit distrust and vigilance into social decision making. In other words, the default state is trust, and what the amygdala does is to learn vigilance and distrust" (Jaques et al., 2019).

2. SEXUAL MOTIVATION

"Unexpectedly, the amygdala and one of its hypothalamic targets also play a role in male sexual motivation...One neuroimaging study sheds some light. 'Young heterosexual men' looked at pictures of attractive women (versus, as a control, of attractive men). Passively observing the pictures activated the normal reward circuitry of the brain. In contrast working to see the pictures – by repeatedly pressing a button – also activated the amygdala..." (Sapolsky, 2017, p. 39). The implications of the above given experiments on the realm of social media behaviour can easily find coherence with regular users. The sexual motivation in dating apps like Tinder, the innate urge among users to enhance their 'ranking' in social media apps by increasing the number of likes, the number of friends and being part of multiple groups; the highly emotional nature of scathing comments and posts done in social media; the inflammatory images and content used for propaganda in social media – all of these have clear cut neuro-anatomical correlates as shown in experiments given above. The empirical knowledge provided by neuroscientific tools, if imparted as an integral part of social media literacy, can empower users to be enhanced by social media usage rather than being a victim of the above. This again takes us back to the importance of prefrontal cortex in the realm of social media behaviour. To quote Robert Sapolsky – "We utilize the frontal cortex to do the harder thing in social contexts – we praise the hosts for the inedible dinner; refrain from hitting the infuriating co-worker, don't make sexual advances to someone despite our fantasies, don't belch loudly during the eulogy" (2017, p. 51). The replication of this functionality, and the behavioural tools to replicate this can help reduce or even prevent abuse and misuse rampant in social media usage.

To explicate further, no semiotic analysis in any social media platform can ever be complete without taking into account the neurological underpinning of the signifier under consideration – whether it be an image or a comment or the use of an 'emoji'.

Title	Publisher	Date Posted to Facebook	Reactions/Comments/Shares
Heart wrenching video shows Starving Polar Bear on Iceless Land	National Geographic	8 December 2017	210,000/6,900/129,000
Monster storm to blast East Coast before polar vortex uncorks tremendous cold late this week	Washington Post	2 January 2018	11,000/1,883/10,000
Syria Signs Paris Agreement Leaving America As The Only Nation On Earth To Reject It	IFLScience.com	7 November 2017	90,000/7,700/38,000

Note. Adapted from "Post-truth: Hegemony on Social Media and Implications for Sustainability Communication" by C. Jaques, M. Islar, and G. Lord, 2019, Sustainability, 11(7), p. 5. Copyright 2019 by C. Jaques, M. Islar , and G. Lord. Adapted with permission.

Thus an image or a video of a polar bear starving in the iceless land can garner greater 'reaction' (as likes, shares and comments) rather than a news article predicting an imminent adverse impact of climate change. The implications are multi dimensional – the automacity of amygdala arousal due to the highly 'affective' nature of the image, the lack of scientific knowledge about climate change, preventing the prefrontal cortex to take charge, might have contributed to a higher engagement in social media for the emotionally provocative content as opposed to the intellectually stimulating content. Though lacking in empirical validation, this can be suggestive of the general neurobehavioral 'trend' in social media behaviour where the affective component usually gains precedence over the cognitive component (vmPFC as opposed to diPFC).

The recent trends in the utilization of neuroscience for commercial purposes provides a deeper insight to the impact of sensory cues on the human brain and how the data provided by various tools like fMRI, EEG, eye tracking etc can be used to predict customer behaviour and thereby increase profit. Many of these findings are used in various aspects of marketing like in effective packaging, advertising efficiency, prototype testing, pricing and even website layout (Harrell, 2019). Testing the neurological impact of a particular product with respect to its packaging or pricing or any other associated variable on a small section of consumers can help in predicting its success on a larger consumer size. The reliability of the data provided by neuroscience tools can help in overcoming biased and skewed responses elicited by traditional techniques like questionnaires or verbalized feedback. Though costly, the reliability of the data provided has persuaded many major companies to adopt the path of neuromarketing. A vastly unregulated field, with an aura of secrecy to avoid public scrutiny, neuromarketing tools are slowly gaining greater currency in the modern-day market, raising questions of ethics, privacy and susceptibility. Given the implicit neurological susceptibility to subliminal cues, neuromarketing, in its worst imagined scenario signifies a dystopian world of 'Orwellian' dimensions, where customer manipulation on a neurological level becomes the norm rather than a niche business attempt

The emerging trends in neurocinematics (an interdisciplinary approach combining neuroscience and film studies) provides details of how specific visual and auditory cues, orchestrated in a synchronised way could create specific neurological responses in a large section of the audience. Hitchcock's famous assertion that for him, "creation is based

on exact science of audience reactions" (Hasson et al., 2008, p. 16), is thus backed by experiments in neurocinematics. The fact that watching a portion of T. V episode directed by Hitchcock created an ISC (Inter Subject Correlation of brain activity) of sixty five percent in the audience, serves as a validation for the universality of art, at least under certain conditions. The fact that this "objective correlative" (namely the ISC) could be exploited across a wide terrain of human endeavours – from commercial films to advertising and social media usage brings the focus back to the primary concerns of the present study. Advertising being the intersection of art and commerce, and social media being the ideal platform for fast paced propagation, the amalgamation of both – represented by social media advertising, if aided by the precision of neuroscience can be an irresistible tool of hegemony, unheralded in human history.

Social capital, characterized by the quantum of users in the digital media is the new keyword in the realm of digital capitalism due to its monetizing potential, the compounding effect in capital accumulation which facilitates data collection and targeted advertising. The shroud of secrecy surrounding the experiments run by tech giants like Facebook, Google and Amazon is an indicator of the synchronization of neuroscience and digital media and the predictable path a hegemon will undertake. The manipulation of nearly 700,000 users' mood states, without consent, by Facebook in 2012 can only be considered as the tip of the ice-berg, given the rapid strides in digital technology made in the following years (Harrell, 2019). The increased hiring of neuroscientists, the excessive investments in neuromarketing, setting up of neurolabs, the lack of transparency and accountability (coupled by near zero regulation especially in under-developed countries) are all indicators of the strategy of accelerating the monopolization of the digital sphere through covert and overt means. The marginalisation of narratives regarding media literacy can be a perfect breeding ground for such trends in hegemonic monopolization of the digital landscape.

This raises serious questions about advocating media literacy as a primary mode of resistance against hegemonic power structures. Though a powerful tool in empowering individuals as well as the society to assimilate universally accepted norms of media usage, media literacy as an academic discipline still lacks the economic framework to combat the over-arching narrative of hegemonic dominance by social media giants. This is partly due to the huge influx of capital in media hegemons, in comparison to the academic discipline dealing with them.

Articulating a strategy to counter the all pervading strength of hegemonic forces, needs a counter balancing force with considerable leveraging strength. Various efforts have been made in this direction by consumer advocate organizations like the Centre for Digital Democracy which has criticized the potentially invasive technology used by media giants. Likewise, certain ethical guidelines have been established by industry associations like Neuromarketing Science and Business Association to address issues pertaining to privacy in neuroscience research. They chiefly include transparency about research methodology, results and maintenance of confidentiality. The effect of neuromarketing on the consumers are also an area of focus for the organizations. Jeff Chesler, the executive director of the Centre for Digital Democracy, expresses his concern over the ability of neuromarketing technology to bypass the rational defence mechanisms of an individual (Neuromarketing, n.d). However concrete steps to resist unethical practices can be taken only if aided by a legal framework with governmental support. The intersection of legal rules and discoveries in neuroscience attains special significance from the above given perspective. This is characterized by the emergence of the interdisciplinary field of neurolaw, which attempts to integrate the findings of neuroscience research with the framework of the legal system.

The term 'neurolaw' was coined by J. Sherrod Taylor in 1991 in a journal analyzing the role of psychologists and lawyers in the criminal justice system (Neurolaw, n.d). Though findings of neuroscience and psychiatry have led to significant judgements in the realm of criminal justice, heated debates around the credibility for neuroimaging techniques and the inablility to bring out a direct correspondence between neuroanatomy and human behaviour has prevented the widespread adoption of neuroscience tools within the legal framework. However, given the rapid strides in the field of neuroscience, especially with the advent of tools like fMRI, and given the potential hazards of the adoption of the tools as discussed earlier, there is an urgent need to dissociate the narratives and debates concerning the use of neurolaw from the framework of criminal law to a broader paradigm incorporating policy making and corporate practices. The power structures ingrained in hegemonic practices can be countered in an effective way only if there is substantial support from a counter balancing power structure and given the all pervasive nature of a social media hegemon, only the State empowered by a strong legal framework can act as the driving force for macrocosmic hegemonic resistance.

Dissociating the over emphasis of neurolaw from the realm of criminal law and placing the perspectives of neurolaw under a wider ambit is the need of the hour. This involves the incorporating of insights from neurolaw in curtailing

unethical practices in social media, postulating policies and providing guidelines for social media advertising and bringing about transparency in research practices. This milieu of hegemonic resistance backed by strong legal enforcement can act as the perfect ambience for imparting social media literacy on the microcosmic level of the individual. Legal enforcement preventing misdirected social media practices can help in articulation of well-defined academic policies integrating media literacy. This process is essential for making media literacy a norm, rather than an appendage in the fringes of academic pursuits. Such a normalisation is backed by neuroscientific experiments as well as by social psychology. "The influential 'social identity theory' posits that our concept of who we are is heavily shaped by the social context – by the groups we do or don't identify with" (Sapolsky, 2017, p. 459). Studies have confirmed that when we imitate someone's action, the dopamine system (involved with the release of the feel-good hormone dopamine) in our brain gets activated. However, the disagreement with other members of the group activates the amygdala and this results in the person taking corrective measures to modify behaviour. "Studies suggest that the greater the activation of the amygdala, the greater the probability of the individual taking corrective measures to conform" (Sapolsky, 2017, p. 466). The neurobiological underpinnings of conformity can be used positively by structuring an environment where media literacy, as part of academic literacy, is the norm whereby conformity can aid in the easy dissemination of knowledge in a structured way to resist hegemonic practices.

This is particularly important in specific target groups like adolescents which contribute to the largest share of social media users (Anderson & Jiang, 2018). The neurological underpinnings of an adolescent brain call for a synergetic approach involving legal guidelines as well as imparting media literacy. In adolescence, the limbic, autonomic, and endocrine systems have already achieved high levels of functional coherence while the frontal cortex is still in a period of transition (Sapolsky, 2017, p. 155). The fact that the frontal cortex attains full maturity only by the mid-twenties explains many of the common traits associated with adolescence including higher levels of sensation seeking, susceptibility to peer pressure, risk-taking and violence (Sapolsky, 2017, p. 156-170).

The delayed frontal cortical maturation in adolescence is a result of the process of neural Darwinism, whereby there is a marked increase in the number of neurons in the brain, followed by the process of competitive pruning (genes are activated that cause them to shrivel and die) during the transition to full adulthood. "Thus the delayed frontal cortical maturation during adolescence is about a more efficient brain" (Sapolsky, 2017, p. 156-57). The fact that during adolescence, the frontal cortex, which is responsible for rational and balanced decision making, is in a transitional phase has a profound impact on social media usage and behaviour. Robert Sapolsky provides a lucid explanation about one aspect of adolescent social media usage "...a 2013 study showed that teens" have an "average of more than four hundred Facebook friends far more than adults do. Moreover, teen sociality is particularly about affect, and responsiveness to emotional signalling...and teens don't rack up four hundred Facebook friends for data for their sociology doctorates. Instead there is the frantic need to belong" (Sapolsky, 2017, p. 164). The vulnerability of the adolescent population to multiple components of social media usage, including targeted advertising, neuro-marketing, propaganda dissemination, to name a few is all too apparent. This raises serious questions regarding the lack of structured intervention strategies involving media literacy and neurolaw. Presently, the fact that the minimal age of opening a social media account is around thirteen years of age, points to an asymmetry between the neurological immaturity of the adolescent brain and the legal guidelines to protect it. Majority of the countries have brought forth legal amendments restricting the punishment given to adolescents. However, the same does not hold true for the regulation of social media behaviour in adolescence. The discrepancy pertaining to the accountability in social media behaviour and lack of legal guidelines formulated with age group specificity foregrounds the importance of media literacy in the present context. This again raises questions about the homogenised induction of social media across cultures without taking into account the neurological, genetic, or cultural specificities. For instance, the high incidence of 7R variant gene is associated with the personality traits of impulsivity and novelty seeking. The gene occurs in about twenty three percent of Europeans and European Americans in contrast to just one percent in East Asians. Any analysis of social media behaviour can never be complete without taking into account such 'compounding factors' like the one mentioned above. This is an indicator of the need to evolve a comprehensive cross methodological paradigm - an interdisciplinary perspective under the fulcrum of media literacy.

Neuroscience, Genetics, Neurolaw, Cognitive Psychology and other perspectives from the social sciences and natural sciences need to be integrated to evolve a comprehensive action plan under the premise of media literacy to counter the covert and overt hegemonic practices operating within the context of social media. The present study underlines the

importance of analyzing and utilizing interdisciplinary research involving empirical data so as to arrive at tools to regulate media behaviour, from the paradigm of media literacy.

The study proves that cross methodological application of neuro anatomical findings can enhance our vision regarding human behaviour and more precise experiments focused on social media behaviour can help in arriving at a scientific paradigm for regulating the same within the context of legality, culture and ethics.

The call is to adopt an accelerated approach to adopt such methodologies and keep pace with the rapidity of hegemonic growth. The perspectives from neuroscience can deepen the insights in this direction and the present study calls for a more focused approach for using neuroscientific research tools with increased specificity in the realm of social media behaviour under the watchful ambit of initiatives under media literacy.

CONFLICT OF INTERESTS

None.

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