SOCIOLOGICAL ASPECT OF NEUROSCIENC

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Abstract

Social species generate organisations that transcend the individual. These emergent structures and the “neurological, hormonal, cellular, and genetic systems” that support them co-evolved because the resulting social behaviours assisted these species in surviving, reproducing, and caring for young long enough for them to reproduce. “Social neuroscience” aims to elucidate the “neurological, hormonal, cellular, and genetic factors” underpinning social behaviour in order to comprehend the interrelationships and impacts between social and biological levels of organisation. Diverse people and organisations perceive neuroscience as a potent tool for generating new knowledge about ourselves and our communities. This paper explores the possible transitions in competence and identities that neuroscientific research may promote. It describes the context and impacts of neuroscience in numerous social areas, such as education and mental health, as well as the intellectual and professional endeavours it has inspired within (such as neuroethics). The study listens to the cultural logics by which the brain is occasionally made prominent in society, while also highlighting some of the dimensions of the terrain in which the brain's social existence is enacted. There is discussion of instances of social resistance and agnosticism, which may make sociological study on neuroscience in society that, presupposes the universal significance of neuroscientific knowledge challenging (as either an object of celebration or critique). This study concluded with some observations on the production and attribution of socio-technical innovation and its ramifications by secondary sources.

Keywords: Social, Genetic, Brain, neuroscience

Introduction

Human social behaviour is complex, and many behaviours have ambiguous causes. While it is possible to eat when one is actually hungry, eating at particular times of day or when participating in social activities is more often done out of habit. “Identification of the genes, gene transcripts, proteins, cells, cell assemblies, brain areas, and neural networks that are significant to a particular behaviour is advanced by the empirical separation of the underlying psychological component processes”. A wide range of social behaviours have conceptual structures and processes that are defined by theoretical models in social psychology, and behavioural paradigms enable the separation of theorised structures and processes for empirical investigation.Given the complexity of the genes and the brain, theories of the mind and behaviour are likely to be helpful in guiding empirical research and discovery in order to identify the function of these systems.

Research Methodology

In order to evaluate the sociological component of neuroscience and the social environment in which the human brain now exists, the current study is based on secondary data. Secondary data were gathered from a variety of research publications, and careful consideration was given to the data analysis process in order to get to a specific study result. The research is descriptive in nature, and it is founded on earlier studies that were disseminated in reputable journals.

Objectives

1. To understand the sociological aspect of neuroscience.
2. To study the impacts between social and biological levels of human being.
3. To study key features of the current social life of the brain.

Result and Discussion

Similar to trying to describe the social sciences, characterising neuroscience runs the danger of condensing a varied range of discourses and practises into a "manageable" framework that may obscure as much as it illuminates and portrays as homogeneous that which is in fact very heterogeneous. However, we might put up a broad definition: “neuroscience is the study of the nervous system, which includes the brain”. It is both an amalgamation of academic traditions (such as “molecular biology, biochemistry, medical physics, and others”) and a field unto itself (“much like gender studies, or STS”). The structure and function of neurological matter are of great interest to neuroscientists. For example, what are the distinct parts of the brain and what purpose do they serve in both simple and complex physiological and cognitive processes? In the past, so-called "lesion studies" had a significant impact on neurological research; currently, genetic and cellular techniques are used with computational viewpoints. This tradition sometimes occasionally falls under the umbrella of "the neurosciences." Modern neuroscience often uses molecular methods, neurosurgery, and pharmacological disruption of brain circuitry.

A wide range of topics, including “addiction, emotion, learning, memory, sensation, sleep, and, of course, psychopathology”, have been the attention of researchers. Thus, it is clear that both the goals and the scope of neuroscience are quite broad. These goals are shown by the following excerpt from the first page of the introduction chapter of a well-known undergraduate neuroscience textbook:

It is in our nature to wonder how we see and hear, why certain things feel pleasant while others hurt, how we move, learn, remember, and forget, as well as the origins of wrath and insanity. Basic neuroscience studies are beginning to shed light on these riddles. (Bear 2007)

Three important arguments are made in this little excerpt. In contrast to earlier endeavours linked with the quest of brain knowledge, such as craniometry, which were especially motivated by attempts to experimentally confirm distinctions between Europeans and other hominids, neuroscience often treats the human as its topic (Carson, 1999). Second, despite this, modernist 'Western' beliefs about the uniqueness of human nature inspire the idea of humanity that guides most neuroscientific study. Finally, it is believed that somatic structures and processes form human essence.

Neuroscientists are much more interested in sociality than only the neurological in recent years. For instance, the field of "social neuroscience" studies how the brain affects social interaction and cognition (Young, 2012). This topic serves as an example of the jurisdictional challenge that some believe neuroscience to provide to the conventional social sciences (including the humanities), as well as the manner in which it reconfigures the boundaries between traditionally held divisions between "biology" and "society."

However, sociologists have also carried out similar work connecting the study of social life with the research of brain science (“Franks, 2010; TenHouten, 1997; for analysis, see Von Scheve, 2011”). Such study requires us to face, or at least consider, a situation in which the "basic object of social scientific analysis—the social—is no longer clearly defined," as Webster stated for genomics (Webster, 2005: 234). The soma continues to be emphasised in the social sciences' long-standing efforts to do so (Dingwall et al., 2003), and “research at the interface between sociology and neuroscience” challenges simple descriptions of these fields as being, a priori, "opposed" to one another. It also serves as a reminder of the degree to which neuroscientists themselves may include rather intricate ontological imaginaries into their experimental praxis that “rapprochements between brain and social science are considered feasible and viable” (Pickersgill, 2009). In fact, people engaged in "critical neuroscience" labour consciously to advance "reflexive scientific practise" in the field of neuroscientific research by incorporating ideas from the “social sciences and humanities” (Choudhury et al., 2009).

Therefore, not all neuroscientists are naively deterministic and harbour the delusion that everything of human experience can be boiled down to the flow of cerebral blood and the synthesis of neurotransmitters. However, when considering and making assumptions about personhood, a study concentration on neuroscience and the neurological does often lead to the attribution of an ontogenic advantage to the brain. The ideology of brainhood, which Fernando Vidal defines as "the quality or condition of being a brain," has, in fact, "impelled neuroscientific investigation much more than it resulted from it," despite the common understanding that such investigations help to encourage new understandings of selves as brain (Vidal, 2009). According to Vidal, concepts concerning brainhood first began to emerge in the middle of the eighteenth century. This realization—that assertions about the transformative nature of neuroscience may be flawed in and of themselves—serves as the organising principle for the study that follows and is provided below.

Therefore, social neuroscience stands to benefit much from current “social psychology research”. This is not the argument made in this special issue; rather, the issue is whether social psychology can learn anything from social neuroscience. In some ways, a "no" response to this question would not undermine social neuroscience. Social neuroscience strives to define the “neurological, hormonal, cellular, and genetic mechanisms” underlying social behaviour in order to comprehend the reciprocal links and effects between the social and biological levels of organisation. Success in the field is therefore assessed in terms of the identification of the “biological mechanisms underlying social interactions and behaviour” as opposed to specific contributions to social psychology, which is an objective Frith and Wolpert (Frith & Wolpert, 2004) described as “one of the major problems for the neurosciences to address in the 21st century”.

“The foundation of social neuroscience is the idea that there are rational connections between biological, psychological, and social processes. The “Greek physician Erasistratos” used his observations of peripheral physiological reactions, such as the appearance of an erratic pulse and pallor in a young man when his stepmother visited, to identify the root of the person's illness—lovesickness—as early as the third century B.C.E.” (Mesulam& Perry, 1972). This historical example suggests that social neuroscience data and theory can support empirical research and theoretical advancements in social psychology as the fields of social psychology and social neuroscience converge, that is, as the mapping between measures and constructs across these levels of organisation is defined.“As demonstrated by the existing social psychological literature on emotional contagion (Hatfield, Cacioppo, & Rapson, 1994), empathy (Yamada &Decety, 2009), embodied cognition (Cacioppo, Priester, &Berntson, 1993; Niedenthal, 2007), health and well-being (Cacioppo & Patrick, 2008), and self-regulation (Cacioppo & Patrick, 2008), new theoretical insights and testable hypotheses in social psychology may also (Berntson& Cacioppo, 2008; Cacioppo, Berntson, Norris, & Gollan, in press)”.

The core “neurological, hormonal, cellular, and genetic factors” that shape emerging structures and are crucial for appropriate mental and physical growth and functioning, rather than being late tangential additions, characterise social species. Individual members of sociable animals, for instance, perform poorly while leading lonely lifestyles. Social isolation shortens the lifetime of social animals, including Homo sapiens and Drosophila (Ruan& Wu, 2008). (House, Landis, & Umberson, 1988).

Humans suffer badly from both mental and physical health when they are socially isolated or feel they are socially isolated because they are born into the longest period of absolute reliance of any species and rely on conspecifics to live and flourish throughout their lifetime (Cacioppo & Patrick, 2008). Initially, it was hypothesised that social isolation leads to worse health behaviours in isolated people as the reason explaining the link between "social isolation and mortality in humans" (House et al., 1988). The data in humans indicates that "social isolation, and especially perceived isolation, negatively impacts health through its effects on the brain, hypothalamic-pituitary-adrenocortical axis, vascular functions, blood pressure, gene transcription, inflammatory functions, immunity, and sleep". The facts in humans do not significantly support this theory, and it is unable to account for the negative impacts of social isolation in nonhuman social creatures(see review by Cacioppo &Hawkley, 2009).

Homo sapiens emerged during about the final 1% of the 7 million years that hominids inhabited the globe, and just the past 5 to 10% of that time is defined by the advancements and civilization we now take for granted. Although there is some debate about the characteristics of Homo sapiens that have contributed to our success as a species, the size of the human brain and the number of genes both fall short of providing a complete explanation. Biologists estimated ten years ago that the biological mechanisms underlying social behaviour in humans required 100,000 genes, yet humans only had roughly a fifth of that number of genes (see review by Cacioppo et al., 2007). Although working memory and executive function are regarded to be especially dependent on the prefrontal cortex, the proportion of prefrontal to total grey matter in humans and nonhuman primates is the same. Despite having more cortical neurons than other animals, humans only have a little advantage over whales and elephants in this regard. Humans may have more specialised abilities as a consequence of the brain's larger total information-processing capacity, increased synaptic density and processing power, increased cell packing density, enhanced connection, and faster neuronal conduction velocities. Humans also have hands with fingers and thumbs, theory of mind, and language, among other specific abilities. These characteristics promote intricately planned group endeavours. In other words, our great collective achievements as a species reflect our collective capacity rather than our individual power. Our brains have evolved to link to other minds. As a result, social neuroscience has the ability to provide light on social cognition, emotion, and behaviour. This is shown, for example, by the expanding literature on oxytocin and trust as well as brain, genes, and culture (Chiao &Blizinsky, 2010).

Similar to cognitive neuroscience, social neuroscience focuses on how we think about and behave toward other people in order to better understand how we think and act. We might conceive of social neuroscience more explicitly as an interdisciplinary discipline that employs a variety of neuroscience tests to comprehend how other people affect our ideas, emotions, and actions. As a result, social neuroscience examines the same issues that social psychology addresses, but from a multidimensional angle that also takes into account research on the brain and body. In comparison to the more established disciplines of social psychology and neuroscience, Figure 1 illustrates the extent of social neuroscience. The term "neural and physiological information" first appeared in 1992 (Cacioppo &Berntson), but despite its youth, the field has expanded quickly as a result of technological advancements that have made brain and body measurements more affordable and effective than ever before, as well as the realisation that this information is essential to understanding how we interact with others.

Social neuroscience employs a variety of techniques to look at how social and neurological processes interact. These techniques are associated with a variety of neurobiological techniques, such as "functional magnetic resonance imaging (fMRI)", "magnetoencephalography (MEG)", "positron emission tomography (PET)", "facial electromyography (EMG)", "transcranial magnetic stimulation (TMS)", "electroencephalography (EEG)", "event-related potentials (ERPs)", electrocardiograms, and electromyography, and draw from behavioural techniques developed in “social psychology, cognitive psychology, and neuropsychology”. Virtual reality (VR) technologies and hormone tests have been added to these procedures in recent years. Investigating the potential function of certain brain regions, circuits, or processes requires the use of animal models (e.g., “the reward system and drug addiction”). Additionally, quantitative meta-analyses are crucial to get beyond the limitations of individual research, and neurodevelopmental studies may advance our knowledge of the relationships between the brain and behaviour. fMRI and EEG are the two most often utilised techniques in social neuroscience. fMRI have a great spatial resolution and are highly cost-effective. However, because of their poor temporal precision, they are ideal for identifying the neural circuits in the brain that underlie social experimentation. Because oxygenated blood pools to the areas of the brain that are engaged and in need of extra oxygen, fMRI reads oxygenated blood levels with limited temporal resolution (timing). As a result, the blood takes some time to reach the area of the brain that is activating, making it harder to determine the precise timing of activation during social tests. EEG works best when a researcher is attempting to map a specific region of the brain that corresponds to a social construct that is being investigated. “High temporal resolution” but limited spatial resolution are both provided by EEGs. Researchers are trying to narrow down locations and sections of the brain but they also produce a lot of "noise" since the time of the activation is highly precise but it is difficult to identify specific spots on the brain. The most current brain mapping study has used TMS, which is the best method for pinpointing the precise region. With the help of this device, researchers may experiment with how different areas of the brain function during social situations. However, due to its high cost, this gadget is seldom ever utilised.

A drawback of social neuroscience is that the study must be interpreted via correlations, which might result in a diminished content validity. The majority of these technologies, with the exception of TMS, can only reveal correlations between brain mapping and social events. For instance, it is hard to establish causality during an experiment when a participant is doing a task to test a social theory and a section of the brain is engaged since anything else in the room or the person's thoughts may have caused that reaction. In these tests, it is quite challenging to separate these factors. Self-reports are crucial because of this. Additionally, this will lessen the likelihood of VooDoo linkages (“correlations that are too high and over 0.8 which look like a correlation exists between two factors but actually is just an error in design and statistical measures”). Using hormone testing that can determine causation is another method to prevent this scam. For instance, we can evaluate people's differences in social behaviour when we give them oxytocin and placebos. Because it is the body's natural parasympathetic reaction to the outer environment, using SCRs will also assist in differentiating between unconscious and conscious ideas. Social neuroscientists will be able to learn more about the connections in the brain that enable our daily social interactions with the aid of all of these tools and exams.

Primarily psychological techniques include observational techniques like preference staring in newborn studies, performance-based measurements that track reaction speed and/or accuracy, like the Implicit Association Test, and self-report techniques like questionnaires and interviews.

The many types of neurobiological techniques include those that assess more extrinsic body responses, electrophysiological techniques, hemodynamic measurements, and lesion techniques. GSR (sometimes referred to as “skin conductance response”, or SCR), face EMG, and the startle reflex in the eye are examples of bodily response techniques. EEG, ERPs, and single-cell recordings are examples of electrophysiological techniques. PET and fMRI are examples of hemodynamic measurements, which gauge changes in blood flow rather than neuronal activity directly. Lesion procedures have historically been used to examine brains that have suffered damage due to ailments including strokes, severe traumas, tumours, infections, or neurodegenerative diseases. TMS could possibly fall under this heading because of its capacity to produce a certain kind of transient "virtual lesion." More precisely, TMS techniques simulate a brain injury by activating a particular region of the brain and isolating it from the rest of the brain. This is especially useful for brain mapping, a crucial method used in social neuroscience to identify the regions of the brain that are active during certain activities.

After dinner at the “Society for Neuroscience” meeting, “John Cacioppo and Jean Decety” arranged a series of meetings with "social neuroscientists, psychologists, neuroscientists, psychiatrists, and neurologists" in "Argentina, Australia, Chile, China, Colombia, Hong Kong, Israel, Japan, the Netherlands, New Zealand, Singapore, South Korea, Taiwan, and the United States" to discuss the challenges and opportunities in the interdisciplinary field of social neuroscience(Chicago, November 2009). The study of the “neurological, hormonal, cellular, and genetic factors” underpinning the emergent structures that characterise social creatures was widely referred to as social neuroscience. Thus, experts who employed a broad range of techniques in studies of animals as well as people, as well as sick as well as healthy volunteers, were present at these sessions. The idea that a “Society for Social Neuroscience” should be founded to allow scientists from many fields and viewpoints to interact, exchange ideas, and learn from one another's research also became widely accepted. Following these discussions, “on January 20, 2010, in Auckland, New Zealand”, the worldwide, multidisciplinary Society for social neuroscience was established. On November 12, 2010, the day before the 2010 Society for Neuroscience conference, the Society's first meeting was held (San Diego, CA).

Conclusion

This essay's goal is to outline some of the main aspects of the social life that the brain currently leads while also examining the factors that influence how, why, and who consider the brain to be significant (at times). In addition, I tried to map out some of the main aspects of the brain's present-day social existence. It is important to recognise the impact that neuroscience has had on society, but it's also likely that the brain itself is best understood as an illustration of what I've previously referred to as something of "mundane relevance." This means that studies of the brain's structure and function are taken for granted since they are synthesised by the vast amount of data that has been collected. At the same time, neuroscientific research is frequently removed from the day-to-day professional and health practise that most people engage in. When viewed in this context, the brain and the discourses and techniques that help to constitute it are seen as examples of sociotechnical innovation. Despite this, it is important to keep in mind the ways in which the so-called "inventiveness" of neuroscience is itself the product of social production. By doing so, cultural studies of neuroscience may be better able to differentiate themselves from biological and entrepreneurial discourses, both of which similarly attribute transformational implications to neurologic knowledge.

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