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The Brain is within the Self and Not Our Entire Self

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Abstract

This article explores the true nature of the "self" by excusing the human fear of death and historical attempts to uncover immortality. The human desire for immortality motivates us to study the nature of the self in order to keep it as much as possible. However, the factors that influence self and self-awareness are very complex, and some of them vary each time. Therefore, self-perception changes over time, and recreating it without considering these factors through newly proposed approaches, such as mind uploading or copying the mind into a new brain, may be a challenging endeavor. It seems that despite the complexity and importance of neural networks, the brain cannot fully explain self-awareness. Self-awareness is an emergent property of the brain that arises from its interaction with a set of variable factors that form each moment.

Key Words: Self-awareness, Mind uploading, Emergence, Microbiome, Inflammation

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Introduction

The fear of death has been a long-standing concern for humans. This fear persists throughout life. For this reason, humans always desire to seek immortality. This desire manifests itself through myths, magic, rituals, and, later, efforts by alchemists to obtain the youth elixir in all national cultures. Modern humans seek to fulfill the same age-old desires using modern approaches based on scientific researches. However, the methods we are currently exploring to conquer death may seem superstitious to future generations.

Regarding the desire of humans for eternity, some philosophical issues arise. In this regard, one of the important questions is knowing the existential nature of humans. What aspect of human existence has the potential to endure indefinitely? Historically, two main schools of

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thought have attempted to answer this question. From a religious perspective, the main component of humans is the immaterial soul. The materialistic view suggests that humans are composed solely of material elements without any supernatural aspect. The conflict between these two schools has not led to any conclusion until now (Ahrensdorf, 2000).

To escape from the boring historical debates, we assume that the human body is its true essence. Given this assumption, it is important to determine which part of the body is considered the essence of the human. Do all parts of the body contribute to the formation of the self, or is the self located in just one organ? This led to a new dualism in modern science and philosophy. Some scholars argue that the brain is the seat of our self and identity, while others believe that other parts of the body or the entire body are also involved in shaping human existence.

Where is the self to keep it from death?

Hilary Putnam proposed a famous thought experiment in which a brain in a vat, filled with nutrients and other compounds necessary for survival, can have self-consciousness if it receives fake sensory signals generated by a computer to simulate external world. In this hypothetical scenario, our perception of the outside world and awareness about ourselves in relationship with the surrounding environment can be considered unreal which the brain produces So, the brain is the essence of our existence, generating the illusion of reality. However, preserving this brain or a copy of its information may extend our deluded self forever. Putnam argued that mind or self-awareness, at least in part, depends on external or environmental signals (Bernecker, 2016).

The human brain is composed of approximately one hundred billion neurons, with each neuron capable of connecting to ten thousand others. Synapses between neurons initiate, regulate, and transmit the action potential. While some synapses facilitate the transfer of the action potential, others inhibit it. New connections are formed dynamically, based on our perceptions and experiences, while some old and unused ones are severed (Askenasy and Lehmann, 2013). In 2005, neuroscientist Olaf Sporns coined the term "connectome" for the first time. Our connectome can contain millions of times more units of information than our genome (Sporns *et al.,* 2005). Many neuroscientists suggest that the connectome holds the key to the fundamental functions of the mind, which is considered the nature of the self, including memory, emotions, and self-awareness (Quian Quiroga, 2020).

From birth through maturity, personality and identity evolve in response to their surroundings and experiences, as well as changes in the connectome. These scientists have revealed that each sensory

impression or feeling creates a new sequence of interconnected neurons through synapses. The activation of the first neuron in this sequence triggers the next. Then, the signal travels to the last neuron. This brain activity leads to the reactivation of emotion or memory. Some neuroscientists overstep the concept and claim that the connectome is synonymous with the "self." The main point of Sebastian Seung's TED Talk in 2010 was "I am my connectome." According to this theory, transferring the connectome to a supercomputer would transfer the mind to the computer and preserve it there indefinitely (Seung, 2012). This intriguing hypothesis has inspired numerous stories and movies in recent years.

Despite current technological limitations, some pioneering scientists decided to examine this theory. They targeted smaller, more realistic goals to show the involvement of the connectome in the formation of the mind. The project began with the implementation of the connectome of a simple worm, Caenorhabditis elegans, which contains 300 neurons and 7000 connections. They expanded their research on mice by using high-resolution imaging to examine the connections of neurons at a two-dimensional level in very thin slices of the brain. When the 2D images of brain slices are stacked up in a computer, a 3D image is obtained that shows all the connections in the analyzed area (Cook *et al.,* 2019).

Nectome is a startup company that freezes the human brain with a new technique to keep the connectome intact till technological advancements are available to implant their whole connections. Today's technology is very rudimentary to analyze and store this amount of information and most importantly, to apply this connectome as a computer program. However, there are no physical or technical limits to accessing this technology in the future (Mandelbaum, 2022). Among the famous people who are candidates for Nectome is Sam Altman. These individuals believe that mind uploading will one day bring them back to life. We should wait until that time to observe the solution to this fundamental question: Is connectome equal to 'I'? If the answer is yes, we can create a computer-generated clone of ourselves or live as an avatar in the metaverse. Will the self transition to the metaverse after physical death? If the answer to this question is "yes," several philosophical questions will arise.

The body plays a role in shaping identity and self-perception

However, some observations have shown that peripheral and environmental signals also influence the mind and, consequently, the sense of self. For instance, in the psychological disorder known as Phantom Limb Syndrome, patients who have lost limbs, such as hands or legs, due to accidents or surgery, may experience sensations from the amputated organs, such as pain or itching. In the rare other psychological illness known as Body Integrity Identity Disorder (BIID),

patients experience a strong desire to have one of their limbs, for example, removed. Individuals with BIID often experience a deep sense of mismatch between their perceived body image and their ideal body image, causing distress and longing for extreme measures to harmonize their physical body with their internal sense of self. These two disorders highlight the influence of body organs on shaping one's sense of self and identity. Both BIID and phantom limb syndrome highlight how our perception of our physical bodies can influence our sense of self and shape our understanding of who we are (Sobchack, 2010). These psychological disorders persuade us to consider the complexities of self-perception in relation to our bodies.

Immune system impact on self-awareness

There is several line of evidence showing peripheral inflammation in the body leads to mental disorders. A blood brain barrier usually is considered as a symbolic firewall between body and the brain. However, there is some path which cause blood-born inflammatory compounds come to the brain. Blood-brain barrier is a selective barrier that regulate transmission of compounds between body and the brain selectively. It has been shown that some inflammatory compound can cross the barrier under certain circumstance. There is some evidence also showing some parts of the brain do not have a tight blood brain barrier including area postrema in the medulla (Litvin *et al.,* 2020), pineal gland (Dyatlova *et al.,* 2022), median eminence and hypothalamus (Rivest *et al.,* 2000).

The gut-brain axis contributes to the formation of one's sense of self

The gut-brain axis is known as bidirectional communication between the gastrointestinal tract and the brain. Several pathways including the immune system, autonomic and enteric nervous system, endocrine system, and gut microbiome provided this reciprocal connection. The human microbiota consists of bacteria, fungi, and viruses that reside in body cavities. The microbes which live in intestine, in particular, is known to impact human health in various ways. Research has demonstrated that the microbiome can influence the brain through processes like fermentation products, immune system modulation, and neurotransmitter activity. As a result, the microbiome can affect cognitive processes, emotions, behavior, decision-making, and cravings. Changes in the beneficial populations of the microbiome or dysbiosis can lead to psychological issues such as anxiety and depression (Appleton). Today, there are efforts focused on discovering new combinations of microbes that can impact mental disorders such as stress and anxiety. These are known as psychobiotics (Oroojzadeh *et al.,* 2022).

Some of these microorganisms affect the neurotransmitters that control mood, feelings, and emotions in the central nervous system. Alteration of neurotransmitters such as serotonin in the brain, even via pharmacological approaches, causes patients to experience changes in self-perception, as Peter D. Kramer wrote in "Listening to Prozac." (Kramer, 1994). When the balance of gut microbes changes, the levels of neurotransmitters in the brain also change, ultimately leading to alterations in mood, cognition, and self-perception. Research has shown that certain types of microbes can contribute to depression, anxiety, and cognitive impairment (Sichko *et al.,* 2021).

Effect of socioeconomic factors on individuals' self-perception

An individual's environment plays a profound role in shaping their sense of self. It is widely acknowledged that our sense of self is shaped by our surroundings and the people we live with. People compare themselves with others according to socioeconomic status. In comparison to rich individuals may feel inadequate and vice versa. However, individuals with their socioeconomic status may experience struggles to keep their conditions which impact on feeling of self.

People compare themselves to others based on their socioeconomic status. Individuals may feel inadequate in comparison to wealthy people, and vice versa. However, individuals with higher socioeconomic status may also struggle to maintain their living conditions, which can impact their sense of self (Wilcox and Laird, 2000).

Individuals with limited access to resources such as jobs, education, and healthcare may experience feelings of inadequacy, which is a significant factor in self-perception. Social factors, such as disparities and discrimination, may lead to psychological stress, anxiety, and low self-esteem. Better access to education is a significant factor in shaping one's identity. Educated individuals have different self-related feelings compared to non-educated individuals (Hofer *et al.,* 2024). Socioeconomic variables have the potential to influence an individual's social identity and their perception of themselves in relation to others. For instance, individuals hailing from marginalized or disadvantaged backgrounds may internalize adverse stereotypes or stigma linked to their socioeconomic standing, resulting in diminished self-esteem and self-value.

Discussion

Numerous pieces of evidence indicate that self-awareness or self-perception is influenced by a variety of factors. These factors include genetics, epigenetics, brain connectivity shaped by perceived experiences, intestinal microorganisms, signals from body organs, environmental and social factors such as living environment and time,

as well as human and potentially other factors that are not yet understood.

The term "emergence" refers to the ultimate property of sets composed of components that cannot be evident in their individual parts. The comprehensive properties of complex systems emerge from the interactions of individual components and can only be understood by studying the system as a whole. The behavior of ant colonies cannot be observed in each distinct ant. Each ant is less intelligent and behaves simply; however, the colony displays more complex properties, such as foraging and defense. This phenomenon is also observed in other social animals such as bees and certain types of birds, as well as in the complex properties of large cities (Johnson, 2001).

Although it has been proposed that self-consciousness arises from a combination of neurons forming neural networks, the emergence of self-awareness may be related to more factors than just neurons, despite these components being heterogeneous (Guevara and Mateos, 2020). In this way, a combination of factors contributes to the emergence of a sense of self at every moment, which cannot be attributed solely to any individual factor. This sense is ultimately understood as self-awareness or awareness of one's existence by the brain, however, it is the interaction, relationships, and organization among the components of these factors that create this sense. Since some of these components are constantly changing, the ultimate perception of the self also changes constantly. A man today is different from his childhood or adolescence, and, of course, he is also different from his old age. Although memory prompts us to imagine that we are continuously existing over time. When we consider our self-awareness as a continuous and inseparable entity, and reduce it to one of its constituent parts, such as the brain, we often assume that we can replicate it by copying and reproducing it in another body or a digital platform. When we consider the self as a set of several components that are sometimes variable, reproducing it with methods such as mind uploading will seem simplistic. Uploading a brain connectome to a supercomputer may create an offline copy of an individual's memory, similar to a personal album that captures their past experiences.

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