

Cognitive Beings: Brain Mechanisms Discussed in Cultural Studies

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Abstract

Cognitive science emerged from an interdisciplinary discussion of information theory, linguistics and psychology among many other disciplines. Since its emergence, it has not only been largely discussed in other disciplines but has also shaped our views and perception of the world. In this paper, I will examine how scholars in cultural studies and philosophers incorporate scientific theories about the brain into their work, and how they bridge scientific knowledge with immediate human experience. Through Katherine Hayle's notion of the cognisphere, this paper examines the impacts of informatization of human body and cognition within a pyramid of digital data flows between machines. This paper also takes the French philosopher, Catherine Malabou's observation of the scientific concept of brain activities – brain plasticity and synaptic connection - as a metaphor to identify what is needed in our social engagement.

Keywords

Cognitive Science, Cybernetics, Cognisphere, Brain Plasticity, Synapse, Posthumanism, Synaptic Self, Enactivism.

Introduction

As a scientific study of cognition concerns computational operating mechanisms in human perception as well as provides a foundation for the development of intelligent machines, cognitive science has been advanced along with digital information technology. The informatics theory in mathematics, studied by Claude Shannon and Donald MacKay among others, influenced the emergence of cognitive science. (Varela, 1991). Cybernetic movement in the late twentieth century largely discussed information theory, the neuronal functioning, and its implication in the relationship between humans and machines (Hayles, 1999). In this way, science, technology, and cultural studies have influenced each other, and especially cognitive science has emerged from the intersection of these interdisciplinary discussions. The information processing in the brain is linked and expanded into the sensory motor system in the body.

Therefore, the discussion of our cognitive activities should be extended into our engagement in the cultural and political domain, where the sensory motor embodies its phenomena.

In this text, I will discuss the role and impact of the evolution of cognitive science on cultural and media studies. Firstly, the early complementary relationship between information theory in engineering and the foundation of cognitive science in cybernetics has continued with changes over time, bringing about the new concepts of dynamic co-evolution with technology addressed by Katherine Hayles, who was largely influenced by Donna Haraway's thinking on cyborgs. Today, the domains of human and machine are hard to distinguish, and their interaction is so active and continuous that technologies we make affect who we are. Hayles recognizes the cognitivity of machine and globally interconnected human/machine cognitive systems. Also, Catherine Malabou discusses our identities in relation to the sociopolitical world based on scientific discovery and research in neurons and brain plasticity. In her work, brain mechanisms are a physiological metaphor for society, and she bridges discoveries of neuroscience to our daily experience to arouse "each individual's responsibility to know what he should do with himself," (Malabou, 2008 p. 10) and identifies what is being plastic – not to be confused with being flexible. Furthermore, Malabou seeks cultural meanings in a smaller scale of the brain, the synapse and its function, which makes the brain malleable. Her exploration on the cultural and political identity on the basis of scientific research of the brain urges us to reconsider our relationship to the central power – not only consciousness and body but also the economic/political power and our free will.

Co-Evolution of Posthumans and Technologies

In her article, "Unfinished Work: From Cyborg to Cognisphere," Hayles acknowledges the new scope of cog-

nitions embodied through both humans and technologies and the influence of the scientific study of cognition on the objective and subjective understanding of the reality. She claims that computation is a “relational process that can run in the brain” (Hayles, 2006, p 163) exemplified in some technological inventions such as intelligent machines, data processing and quantum computers. Considering the parallel mechanism between humans and machines, technologies are not merely cognitive and lively but they also construct collaboratively the interconnected cognitive system with and among people. The world is not split into human and non-human; rather, the organic and technical anymore, but human, animal and machine coevolve together in a complex system Hayle’s refers to as a “cognisphere.”

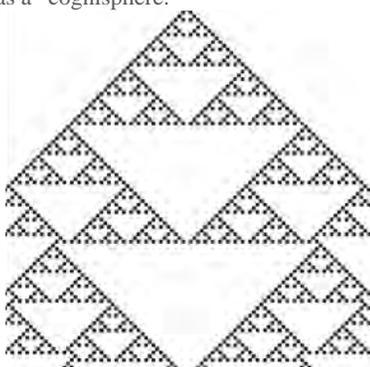


Figure 1. A complex evolutionary pattern generated with Cellular Automata. ©Stanford Encyclopedia of Philosophy

Together with the idea of “cellular automata” that suggests the universe is information (Kelly, 2002), the reduction of a human body into generic data in binary code reifies the concept of computational cognition and information processing in brains. To digitize natural phenomena is, in fact, to objectify the universe, even human experience. Although the stripped-down neuronal model is arguable in that it does not encompass the complexities of embodied experience, it disembodies objects like human bodies and machines as immaterial existences and shifts boundaries between traditionally separated beings. Their “substance is not essence but dynamic relationality” (Hayles, 2008, p.160). This idea supports Hayle’s claim that (post) humans are increasingly embedded in a pyramid of data flows, most of which occur between machines. Hayles writes, “cultural beliefs and practices are part of this co-evolutionary dynamic because they influence what

tools are made and how those tools are used, which in turn affects who we are as biological organisms, which then feeds back into the co-evolutionary spiral” (Hayles, 2008, p.164). We live in the era of the coevolution of tools and technology that we make and in a cognisphere where data flows between different substrates, such as the biological and mechanical, bits and atoms.

The philosophical question of the objective-subjective reality is also jointly reconsidered in cognitive science and cultural studies. Hayles refers to the book by Evan Thompson and Francisco J. Varela, *Why the Mind Isn’t in the Head: The Lived Body in Biology, Cognitive Science, and Human Experience* (2010), which argues that the subject-object split, institutionalized by the birth of modern science, is manifested strongly in cognitive science as explaining how reality is constructed in human minds on both the physical and psychological level. Furthermore, contemporary models of cognition dismantle the notion of a coherent self in response to dynamic external stimuli. Those concurring cognitive models of autopoiesis and enaction suggest that the self and cognition is not anymore a closed system, yet structured with “recurrent sensory-motor patterns,” and the nerves in our organic bodies are connected and flowing into the environment (Hayles, 1999). These scientific models subvert the notion of a unified self and the objectivity of the world’s existence, and take their interaction as a networked pattern rather than a discontinuous relationship. As Hayle’s writes, reality “is constantly enlarging as self-conscious (scientific) observers operate recursively on their representations to generate new representations and realizations” (Hayles, 1999, p.158) and the observer’s mind is “a disunified, heterogeneous, collection of processes” (Hayles, 1999, p.156). The discussion in cognitive science influences the advancement of technologies as well as affects our perception of reality and the self, and addresses our existence as one, which is a posthuman.

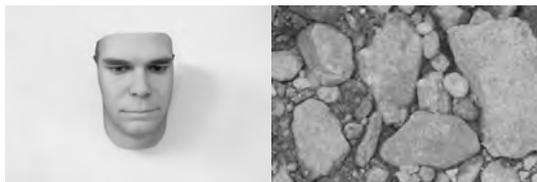


Figure 2. Stranger Visions by Heather Dewey-Hagborg. 3D print sculpture (left) from analyses of a generic material collected in public spaces (right) ©Heather Dewey-Hagborg artist website

Brain Plasticity as a Neuronal Metaphor

For Catherine Malabou, the scientific theory of brain plasticity works as a metaphor for our identities in a sociocultural environment, and the meaning of ‘plasticity’ is situated at two ironic extremes of determination and freedom, which nullifies the determination. By heightening the awareness of the brain mechanism and the scientific fact that the brain is plastic, that is, affected by our history, Malabou urges us in her book *What Should We Do with Our Brain?* (2008), to rethink how we should engage in social ideology, specifically to clarify the often-confused notion of plasticity and flexibility. Departing from the old model that brain and consciousness are separate entities, we should now start to establish discussions in philosophy, science and politics with a consciousness of the brain. The idea of a naturalization effect from *The New Spirit of Capitalism* (2007) by Luc Boltanski and Eve Chiapello strongly supports the idea of considering neuronal functioning and social functioning together. The natural effect means “neuronal functioning and social functioning interdetermine each other and mutually give each other form to the point where it is no longer possible to distinguish them” (Malabou, 2008, p.9). The brain mechanism becomes a neuronal metaphor rather than a neuronal ideology that implicates consciousness (Malabou, 2008).

As mistaking the plasticity as a cognate with ‘flexibility,’ the ideology expects us to accept a certain docility that disregards our own history. Being plastic means that we autonomously construct the brain with a capacity to annihilate existing forms based on our own experience to drive synaptic neurons. To ask the question “What should we do with our brain?” is to enlighten what potentials we have in our brains and what is natural to them (brains) and us (self), so that we explode against the cultural system of flexibility to be plastic.

Observing the scientific phenomenon of brain plasticity, we should be aware of the responsibility to form our

identities in society and acknowledge the close connection between neuronal and political/ideological selves.

Being a True ‘Synaptic Self’

The brain is not a simple organ, but the fundamental organic coherence of our personality. Malabou investigates the concept of the subject and self-discussed in contemporary neuroscience (Ibid), focusing on LeDoux’s notion of synaptic self and Damasia’s proto-self. Damasio explains, the “proto-self” or “primordial” self covers “the ensemble of brain devices which continuously and nonconsciously maintain the body within the narrow range and relative stability required for survival” (Malabou, 2008, p.58).

The fact that a synapse changes its form according to the subject’s personal history brings up political, economic and cultural questions. A personality is formed from the proto-self that is the general neuronal structure to the conscious level of an autobiographical self. Among numerous neurons in the subject’s unconsciousness, only the best, highest performing ones are selected and converted into the conscious image for a harmonious and mature personality, which can be seen as mental or psychological Darwinism. By pointing out that “only the most “useful” synaptic connections would be modulated or reinforced,” (Malabou, 2008, p.65) Malabou observes an ecological relation in neurons.

While looking at the brain as an image of the world, the transition between a proto-self and conscience, how the nonconscious neurons signal to consciousness, is not yet scientifically postulated. Therefore, it has constituted a philosophical or epistemological position (Malabou, 2008), and this discontinuity in scientific knowledge leaves a space for us to explicate consciousness rather than hinder our true liberation. Malabou suggests looking into the new plasticity called “intermediate plasticity” – in addition to developmental plasticity, modulational plasticity, and reparative plasticity – to include richness in our experience (Ibid). The nebulous transition between the neuronal to the psychical is where we can overcome the limitation of scientific knowledge and find answers to improve our “quality of life.”

As Nietzsche said, the sickness and suffering in life is caused from the lack of “resistance” (Malabou, 2008).

Self-fashioning, in which multiple lives and forms are contemporaneous together, means the capacity to resist and annihilate a form, and it is neither smooth nor continuous. Transitioning from the cerebral to the psychical as well as living in an autoconstruction entails a series

of leaps or gaps (which is referred to Malabou as the explosion). Malabou's philosophical perspective within scientific discovery is extended to creating resistance to neuronal ideology and liberates us from being flexible to determination.

Conclusion

A scientific discussion and approach in cognitive science shapes current views about the brain, and the brain and consciousness are the essential identity and personality being enacted and represented in cultural circumstances. Mental representations are coded again with a cultural understanding, and the analyzed symbol and code – both digitally and experientially – become a foundation to evaluate the adequacy of behaviors. The scientific research on cognition and the change of the socio-cultural perspective are inseparable and contribute to each other's development, and we develop self-recognition based on this knowledge.

Varela's enactivism in cognitive science expands, described extensively in his book *The Embodied Mind* (1991), the horizon of cognitive science by including both the meditative attention to experience in daily life and the scientific attention to mind, and helps us to understand the space between the self and the world in a scientific way without losing the richness derived from immediate experience. His alternative direction in cognitive science puts the focus on the "transition" and changes our understanding of objectivity in science. Philosophy and cultural studies were the foundation of the emergence of the cognitive science in the 1950s. Today, this interdisciplinary science that investigates how we recognize, understand and represent the world confirms, refreshes, and embodies our cultural view and understanding.

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Author Biography

Su Hyun Nam is an interdisciplinary media artist and researcher based in Buffalo and Chicago, USA, working at the intersection of art, technology and philosophy to explore her relationship to digital media with an artistic and meditative approach to computation. Her works, including an interactive video installation, 3D game art and media performance, has been exhibited both nationally and internationally at venues from Spain, UAE, Greece to Singapore. Her recent paper was presented at SIGGRAPH ASIA in Japan, and her community-based media art projects were showcased at Hallwalls Contemporary Art Center in Buffalo. She graduated summa cum laude from Konkuk university in Seoul, and received her MFA in Art and Technology Studies from the School of the Art Institute of Chicago. She is currently pursuing her Ph.D. in Media Study and teaching programming and 3D game technology as an adjunct instructor at the State University of New York at Buffalo.