

SUBJECTIVE EXPERIENCE

A SCIENTIFIC APPROACH

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BOOK REVIEW

Michael Graziano, *Rethinking Consciousness: A Scientific Theory of Subjective Experience*, W. W. Norton, 2019.

Phenomenology is the philosophical approach to understand consciousness through a first person subjective experience as conceived by Husserl. Phenomenology was one of the earliest attempts to understand consciousness in a systematic manner and hence can be considered as an early science.¹ Over the years more rigorous and scientific approaches to the philosophy of mind have shifted the attention of the study of consciousness as a subjective experience to an objective entity and has replaced conventional phenomenology with hetero-phenomenology.²

Michael Graziano is an American neuroscientist working at Princeton and has been researching on the brain basis of consciousness for over 25 years. His research on peripersonal space and action map in the motor cortex made him develop the 'Attention Schema Theory' which tries to explain the brain basis of consciousness from an evolutionary perspective. *Rethinking Consciousness: A Scientific Theory of Subjective Experience* is his latest treaty on the attention schema theory that tries to explain how over the course of evolution certain animals surreptitiously developed the ability of attention which in turn transformed into the illusion of consciousness.

THE ILLUSION OF CONSCIOUSNESS

Graziano who is fond of ventriloquism and often appears on stage with this puppet show, is fascinated by how conscious beings like his 3 year old son attributes consciousness to inanimate puppets and in turn about how we as a species asserts consciousness to other social beings like us. With his interest in ventriloquism and his research for over 20 years in the field of neuroscience, Graziano started to consider the problem of consciousness from a different angle — that if the notion of subjective experience arise from the very source that enables us to attribute consciousness to others, just like the way his three year old son attributes consciousness to lifeless puppets.

"As I thought more about ventriloquism, I began to wonder if my own consciousness and these examples of attributing consciousness to others might stem from the same source. Maybe there is one unifying explanation: we automatically build models of minds and project them onto ourselves and other people. Our intuitions about a mysterious conscious presence, our conviction that it is present in me or you or this pet or that object, might depend on those simplified but useful models—sets of information that the brain constructs to understand its world"¹

In his attempt to account for the long standing mystery of consciousness, Graziano, but dismisses the 'hard problem of consciousness' and propense towards an illusionist conception of consciousness "stating that the new approach would explain why people might mistakenly think that there is a hard problem to begin with" (Graziano 3). The stream of consciousness seems so real to us that we cannot for any reason dismiss it. But with his new attention schema theory of consciousness, Graziano argues that everything from the ever changing kaleidoscopic nature of mind to our subjective experience of pain and pleasure what in philosopher's term is called 'qualia' and the palpable entity that distinguishes 'us' from other species, the ability to make conscious decisions, are mere information processing and that the brain produces the illusion of consciously experiencing them to serve certain evolutionary purposes.

EVOLUTION OF CONSCIOUSNESS

Graziano tries to demystify consciousness by calling our attention to smaller and simpler organisms to jog our memory to the fact that what may be seen as a complex system in us arose out of much simpler systems in these lower organisms and they serve the same purpose in these organisms in a basal but efficient manner. Sea sponges are the most primitive multicellular organism yet they share with us at least 25 genes that in humans are responsible for the complex neuronal system. The eye of a crab is a simple but highly complicated system. It is an array of photo detector cells. Each neuron that connects the visual system is also connected to the neighboring neuron and the neurons compete with one another to suppress the signal of the adjacent neuron. The one that wins the race, signals a bright spot. The signal thus enhanced, forms the rudimentary form of subjective experience. This mechanism in the crab's eye, according to Graziano, is the fundamental principle of attention- signals competing with each other determining the cause and consequence.

The gradual evolution in information processing does not mean that consciousness arose with the complexity of the brain crossing a threshold. Graziano like many other neuroscientists argues that

¹ Graziano, Michael. *Rethinking Consciousness: A Scientific Theory of Subjective Experience*. W. W. Norton, 2019.

big-brain smartness is not the only form of intelligence, though a centralized neural system would provide “a coherent response to its environment” and “allow the animal to select the most vivid object in its environment” (Graziano 12). This type of intelligence could have developed independently and in an altogether different manner at least twice, first among the vertebrates and then among the invertebrates. Octopuses, squids and cuttlefish are in this regard true aliens. Octopuses are one of the most studied organisms to understand the evolution of consciousness.² They have an excellent visual system that makes them the best predator. Their extraordinary nervous system is so complex that it needs an internal model of itself to function the way it does. But does this mean that an octopus is conscious? Graziano points out that with our low-bar definition of consciousness it is difficult for us to consider octopuses as conscious even while it is easy to attribute consciousness to lifeless puppets. Even single celled organisms have their complex methods of electrochemical information processing. This should not however lead us to the pitfall of believing that everything in the universe is conscious and hence fall prey to the notion of panpsychism.

The complex process of attention was not a sudden spurt but a result of millions of years of evolution. From dinosaurs to crocodiles to birds this evolutionary foible takes on character. Graziano embellishes the notion of attention by pointing to the central intelligence system in frogs and other amphibians. The tectum which is a hump at the top of the brain is not just found in amphibians but also in fishes, reptiles, mammals and birds and in humans it is the ‘superior colliculus’. It is an effective input/output processor with high precision and the neural system associated with this, efficiently detects signals and amplifies them to be transferred. A frog can precisely determine the spatial location of an insect that buzzes around it with this efficient system.³ This detection/amplification system is the basic system of attention or what in a more precise term can be expressed as ‘overt attention’, the ability to focus and act upon what is in front of. But human consciousness is also determined by something more glistening-covert attention. The ability to attend to what is not in front of us. Our deep thoughts and daydreams are part of covert attention. It is a kind of retrieval, “a cartoonish account that describes an essence

² Philosopher Peter Godfrey-Smith unlike conventional philosophers spends a considerable amount of his time in the deep sea exploring the origin of consciousness. Some of his works like *Other Minds The Octopus, the Sea, and the Deep Origins of Consciousness* (2016), explores the alternative origin of consciousness.

³ Neuroscientist Roger Sperry in the 1960’s showed how rewiring the visual system in frogs could reestablish the internal visual map. Stimulation of tectum in other animals have also shown how they spatially orient themselves as a response to the stimuli.

that has no specific physical substance but has a location vaguely inside you that takes temporary possession of items” (Graziano 42).

The expanded forebrain is the gold mine of information. The cerebral cortex is a key player in making us aware of the world around. Incoming signals are processed through various levels of elimination. They are sometimes augmented and at times diminished. A complex visual information is processed by parts as line segments and blobs of colour and are passed to the upper level of hierarchy that are sensitive to complex images which then processes information about the identity of the object rather than the details. Signals can flow in all possible directions adding to the complexity. These competitive scrimmages are not always unbiased. It is not always the case that the strongest signal wins. The winning signal has in the words of Dennett, gained “fame in the brain”.⁴ While the cerebral cortex is responsible for the processing of information, the primitive ‘tectum’ is vital for attention. The cerebral cortex creates an inner spotlight that allows for conscious experience of even things that are not physically present. As the focus shifts from one information to another, the brain processes necessary information giving us the feeling of being conscious.

Any self-functioning technological system needs an internal model of itself to function. “A self-driving car needs an internal model of the car. It’s not enough for the car’s computer to receive information about the outside world and then send signals to the steering wheel and the pedals. The system needs a set of information about the car itself, including its size and shape, the way it handles on the road, and its constantly changing state—speed, acceleration, position. Without a rich, continuously updated internal model that encompasses a good range of information, the car could still have a controller and it could still send out driving commands, but it would probably crash” (Graziano 22). A similar biological principle called the ‘body-schema’⁵ which is the set of information that the brain has about the constantly changing state of the body is crucial in facilitating the evolutionary existence of complex organisms. Damage to the brain area responsible for body schema would inhibit a person from moving the body in the desired manner. Even a normal human being hanging a heavy grocery bag on his arm would find it difficult to grasp a doorknob, points out Graziano. This internal model requires to know the current state and

⁴ Dennett, Daniel. *Sweet Dreams Philosophical Obstacles to a Science of Consciousness*, Cambridge, MA, MIT Press, 2005.

⁵ Body schema is a concept used in various disciplines from philosophy to sports medicine. The idea was originally defined by Sir Henry Head as “the impressions produced by incoming sensory impulses in such a way that the final sensation of [body] position, or of locality, rises into consciousness charged with a relation to something that has happened before”. (Head, Henry, and W. H. R Rivers. *Studies in Neurology*; Volume 2 . London, Oxford University Press, 1920).

predict the next move. Children are terrible at this task while adults are intuitively modeled with sufficient practice.

SOCIAL CONSCIOUSNESS

As the brain pays attention to the inner activities of itself so is it capable of attributing consciousness to others. To pay attention to others does not mean that the brain pays attention to the internal neural structure of the other's brain. It has a much more efficient schematic model. To have social consciousness means to know what the other's mind would be like. This social intelligence to efficiently compute from the possible scenario is fundamental to the 'theory of mind'.⁶ One of the key ideas of attention schema theory is psychologist J. J. Jibsons notion of 'affordance', where the primary motive of sensory input to the organism is not to understand the world rather to provide itself an existential niche. This explains why we attribute consciousness to others by efficiently deducing from available data. With enough data from the past, people can therefore effectively deduce other's intentions and motives. Like many other researcher's Graziano too considers the brain as an efficient Bayesian machine. An AI system with sufficient data can also predict the possible course of action in a similar manner. Garziano propounds his theory not as a new system but as an addition to the existing system of knowledge about consciousness. He tries to account for the discrepancies in other similar theories like the 'global workspace theory'.⁷

A scientific question about consciousness is its location. Conventionally the cerebral cortex along with the thalamus is considered to be the center of consciousness. Graziano's works suggest that additionally the claustrum, a thin sheet on the either sides of the ears, is also responsible for consciousness. Hence the subjective experience of our consciousness can be said to exist in the cerebral cortex plus something extra. Experiments on binocular rivalry show that consciousness does not arise out of a fixed spot in the brain rather it is an emergent property of the systems that processes information.⁸ The theory might seem quite daunting however the basic essence can be summed up that when perceiving an object the brain does not in fact process it as a whole rather different parts of the brain processes different details about the object and collectively produce

⁶ Theory of mind is the notion attributed to the mind's ability to attribute knowledge, emotions and consciousness to one-self and others. It has been a major topic of philosophical deliberation from the time of Descartes.

⁷ Global workspace theory however is explained through the theater metaphor though Baars, himself argues that this is distinct from the concept of the Cartesian theater. Global workspace theory according to Graziano has only accounted for the 'fame in the brain' and attention schema theory is an attempt to complete the picture.

⁸ An underlying argument for the case of consciousness as an attention schema is the binocular rivalry experiment where the subject when exposed to two distinct images at the same time find it difficult to attend to both the images at once pointing to the nature of signals to gain 'fame in the brain'. Still the theory is a scientific quagmire when accounting for the scientific nature of consciousness.

the illusion of being subjectively aware of the object as a whole. The temporoparietal junction (TPJ) is a key region in comprehending the self–other distinction and in computing possible mind states of other people. The temporoparietal junctions on either hemisphere are responsible for processing of information in terms of the ability of an individual to pay attention involved in language cognition, processing, and comprehension of both written and spoken language. Therefore, Graziano considers the TPJ to be the area of the cortex responsible for the construct of consciousness. However neither is the TPJ conscious of anything nor does it generate conscious experience.

OTHER THEORIES

In a nutshell, attention schema theory is parallel to the body schema theory. The body schema is the brain's highly aware pre-model of the body composition in space, that a phantom limb feels so real. Likewise the illusion of consciousness emanates from the brain's ability to monitor its activities. The theory also draws parallel to the ideas of 'Higher-Order Thought', a meta-cognitive understanding of consciousness.⁹ A common misunderstanding about consciousness is that oftentimes the notion of attention and awareness is considered to be the same. William James in the 1890's wrote "Everyone knows what attention is. It is the taking possession by the mind in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought. Focalisation, concentration, of consciousness are of its essence. It implies withdrawal from some things in order to deal effectively with others".¹⁰ But in a neuroscientific sense, attention means the ability of the system to prime one signal over the other. Neurological conditions like 'blindsight' are cases for (re)actions without consciousness. Attention schema theory considers information as an integrated complex of many input and sub-conscious processes. Nevertheless the theory does not seem compatible with the Integrated Information Theory posited by Julio Tononi and Christof Koch as the theory anchors on the brain basis of consciousness.¹¹

PHILOSOPHICAL BOGS

Graziano tries to address some integral philosophical questions that emanates from the attention schema theory. The hard problem of consciousness as already mentioned has been dismissed by the 'attention schema' and now replaced with the meta-problem of consciousness — why we

⁹ Higher order theories of consciousness considers consciousness as a higher order perception of first order mental states. It fits into the general idea of metacognition or thinking about thinking.

¹⁰ James, William. *Principles of Psychology*. New York, Henry Holt & Co, 1890.

¹¹ Integrated Information Theory computes a 'phi value' of consciousness even for subatomic particles. This theory, however, is not compatible with the attention schema theory as the basis of consciousness according to attention schema theory is a sophisticated system like the brain.

think there really is a hard problem. Even Chalmers recently shifted his attention to the meta-problem of consciousness from the transitory question of the hard problem.¹² The attention schema theory is a scientific explanation of its philosophical equivalent the illusionist theory.¹³ However Graziano does not take the illusionist title as he thinks it would bring in much confusion to ordinary understanding of what feels so real, except to few philosophers who understand the notion in its clearest sense. An intrinsic logical conundrum in claiming consciousness as an illusion is — who’s experiencing the illusion? An easy answer to the question is that the term ‘illusion’ does not necessarily mean that someone seriously is experiencing rather it means that the “brain claims to have consciousness on the basis of imperfect information” (Graziano 100). With this understanding of consciousness as information processing, there are some palpable ethical questions that are to be addressed, like can a specific impairment to the brain cause a person to become a philosophical zombie. The short answer that can be deciphered from our understanding about consciousness is ‘NO’. This is because a person’s conscious experience is so inevitable that the “brain depends too much for its normal functioning on the construct of consciousness” (Graziano 87). Though “the attention schema theory allows for the possibility of zombies, we can never turn a normal person into a walking, talking, philosophical zombie” (Graziano 87) and so a fundamental ethical question of reducing humans into mere unconscious p-zombie is out of the picture.

BEYOND CONSCIOUSNESS

As now there is a physicalist theory of consciousness, the awaited question would be Artificial Consciousness. From at least the time of Alan Turing the question of Artificial Intelligence (AI) has been settled or has revived the scope of never ending deliberations. Graziano hopes that the attention schema theory would be an “engineering answer to the alchemical mystery of consciousness” (Graziano 119). A damper to the study of consciousness was its metaphysical nature which can be settled through a physicalist account as given by attention schema. To anyone interested in constructing ‘Artificial Consciousness’, Graziano offers the practical advice from attention schema that the “brain evolved the construct of consciousness because it provided two substantial advantages: first, to improve internal regulation, and second, to serve for social cognition” (Graziano 120). With this understanding of consciousness Graziano hopes that “artificial

¹² Chalmers, David. “The Meta-problem of Consciousness.” *The Journal of Consciousness Studies*, vol. 25, no. 9-10, 2018, pp. 6-61.

¹³ Tor Nørretranders, Daniel Dennett and other illusionist philosophers consider phenomenal consciousness to be a ‘user-illusion’. See *Illusionism: As a Theory of Consciousness* (2017) edited by philosopher Keith Frankish.

consciousness might now be poised to take off” and thus outlines a map for artificial consciousness” (Graziano 120).

With advancement emerges newer ethical problems. We do not yet have a good cultural model for how consciousness would shape our future. “Science fiction often makes accurate predictions about our future gadgets, but the social impact of those gadgets can be a lot harder to envision” (Graziano 134). As anybody who seriously considers the purpose of life would argue, an eternal life would only degrade its value. Nevertheless our ideas can be eternal. With advancing technology is also the possibility of uploading our minds. But for this we need a comprehensive understanding of the brain. The human brain with its umpteen number of neural networks cannot easily be deciphered, at least with available technology, so as to create an exact simulation of the ‘human mind’. Experiments like the Human Connectome Project are endeavours in this direction.

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