

Discover

# The Hard Problem of Consciousness

Author: Reetika Sud

What about the physical structure of the brain makes it capable of subjective experiences? And, why do we have subjective experiences at all? Questions such as these, now known as the 'hard problem' of consciousness, have intrigued scientists and philosophers for thousands of years. Are we any closer to finding answers to them?



Your consciousness - it is what makes you, you.

We recognize consciousness not only in ourselves but in others as well. Here you are sitting, reading this magazine. You are aware of that. As you look out on the street, you are aware of other people going about their lives. Maybe you see someone checking their phone as they walk, not aware they are about to walk into a pole.

At any and every moment, consciousness is the sum total of your experience - how you feel, and thoughts about how you feel.

Now you feel: the neural basis of subjective feelings

Any feeling, physical or emotional, has its foundations in the workings of the brain. We have known this since the time of Hippocrates (fifth century BCE), who observed that people with brain damage tended to lose the ability to be aware, or what we call 'be conscious'.



Let's look at psychosis - a condition that causes patients to experience the world differently than those around them. This could be in the form of hallucinations (seeing/hearing someone or something that's not there), or delusions (illogical views not based in reality, for instance, a patient may be convinced their family is trying to poison them through medications or food). Hallucinations or delusions can be an account of any number of brain diseases that change the brain, physically and chemically. Thus, changes to the brain affect how we perceive ourselves and the world around us.



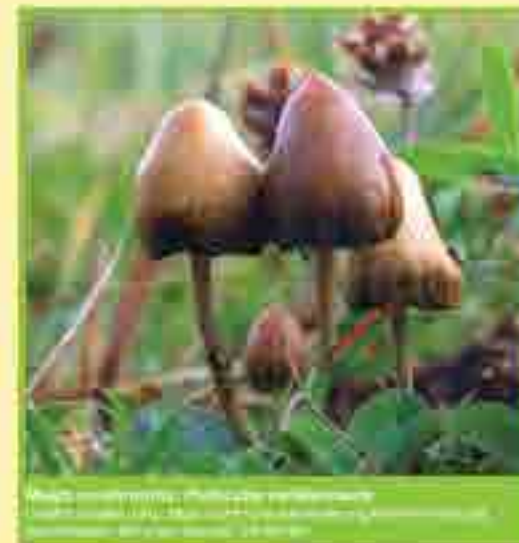
Progress in neuroscience has made it possible for us to learn a lot about how the brain computes incoming information. We also know that the brain is aware of this information. How does the brain accomplish this? And, why does this ability exist? This has been a hard nut to crack and, therefore, is aptly characterized by scientists and philosophers alike as the 'hard problem of consciousness'.

What is the 'hard problem' of consciousness?

In an episode of the TV show 'Friends', one of the characters describes his mental state as "I feel like somebody reached down my throat, pulled out my small intestine and wrapped it around my throat!". It doesn't take much to figure out that this character is despondent or just generally dispirited with his life. There is emotion, and then there is the 'felt quality' of that emotion (including the mental images his words conjure up) - and these can be different for different individuals, even when faced with similar circumstances. Modern neuroscience has made impressive strides in describing the brain circuits that



process physical and emotional feelings - this is the 'easy problem' in comparison, the question of experience, the 'hard problem' - why, and how does brain activity produce subjective experience - is still beyond our grasp. So, how are scientists today attempting to answer this age-old mystery?



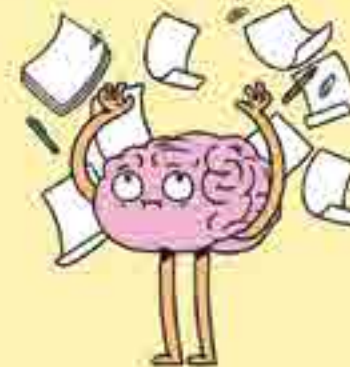
Dr. Robin Carhart-Harris at the Imperial College in London (UK), is probing the existence of the mind using psychedelic drugs. The word 'psychedelic' means 'to make the mind manifest'. This class of drugs is believed to be unrivalled in its ability to elicit mind-altering (mind-expanding, to be more specific) effects. "I study them because they can reveal the very depths of human mind", he says. Certain mushrooms have a psychedelic ingredient called psilocybin in them, earning them the nickname of 'magic mushrooms'. The effect of psilocybin on the brain is no magic though. Brain scans show that its activity patterns are vastly different after psilocybin, indicating

freer communication pathways. "We are beginning to uncover some key principles about how psychedelics alter consciousness - and the profound thing is ... It can tell you something fundamental about the nature of brain function itself and its relationship to the mind," says Carhart-Harris.

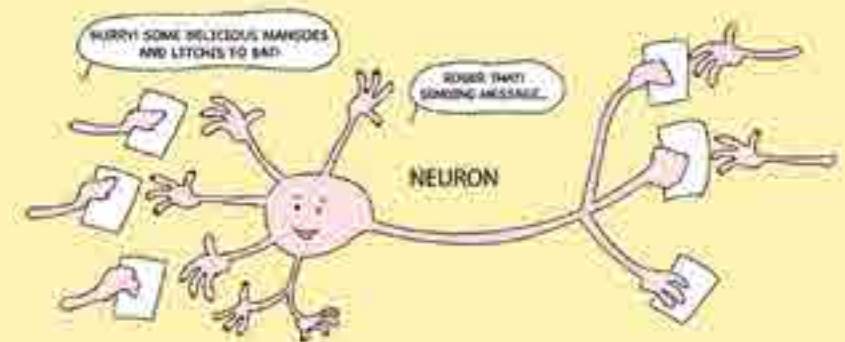
Why does a scientific understanding of consciousness matter to us?

Dr. Michael Graziano, faculty at Princeton University (New Jersey, USA), has proposed what he calls 'attention schema theory' that explains consciousness as an evolved form of attention. For the brain to function, attention is extremely important - what and where should the brain's resources be directed at any given moment? Different groups of neurons give their own answers. Inevitable competition ensues, with the winning group of neurons dictating what you pay attention to, until the next moment, which could have a different winner, and so on and so forth. To be able to control attention, says Graziano, the brain needs an internal model of it, a map of attention if you will.

WHY CAN'T YOU NEURONS AGREE UPON OUR PRIORITIES?



Say you were to walk by a fruit vendor when you're hungry. You spot juicy mangoes and litchis in his shop, and your mouth starts watering - by its very nature, something as simple as this requires integration of information across multiple domains within the brain. Incoming information has to get integrated with information about the self and the environment. Attention is invaluable for predicting behavior - your own as well as of others. "In the attention schema theory, awareness serves this function...to usefully describe the constantly changing state of attention," says Graziano.



According to Graziano, we are not far from a future where knowledge of consciousness will be practically applicable to all human beings. Artificial intelligence is no longer the stuff of movies only. Google and Facebook have been using artificial intelligence software for some time now. As machines get increasingly sophisticated in how they process information, could we, one day, have machines that can 'feel' or are 'conscious'? Consciousness, believes Graziano, is a matter of engineering - an inevitable quality of a complex processing machine. While this still remains to be tested, remarkable progress is being made in developing neuromorphic chips. Modelled on brain circuitry, these computing systems are designed to integrate the ability to process information with that of learning from experience. If internal models do indeed lead to consciousness in the human brain as the attention schema theory predicts, it could one day be possible to build that into man-made machines!



Further readings:

1. Consciousness and the Soul from - Michael Cresswell, Oxford University Press, 2013
2. Definition of psychology: <https://www.oxfordjournals.org/abstract/doi/10.1093/acprof:oso/9780195309001.003.0001>
3. Billy: research on child health and development, Andrew C. Gwynne, LSE, <https://www.lse.ac.uk/child-development/billy>, 2014-2015-2016-2017, accessed May 21
4. New consciousness evidence: What are the signs? LSE, <https://www.lse.ac.uk/child-development/new-consciousness-evidence>, 2016-2017, accessed May 21
5. Thinking in Pictures, MIT Review, LSE, <https://www.mitreview.com/2016/05/21/thinking-in-pictures/>, Accessed May 21



Reetika Sud is the Education Coordinator for IndiaBioscience. A neuroscientist by training, she is passionate about science communication. She can be reached at reeteka@gmail.com

i wonder  
Rediscovering school science

