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Anil Seth: identifying the root of consciousness

The co-director of the Sackler Centre for Consciousness Science hopes to unravel the mystery of where 'we' exist through studying the brain

Alok Jha
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Anil Seth in Brighton, where he has helped set up the Sackler Centre for Consciousness Science. Photograph: Andy Hall for the Observer

Consciousness is the last outpost of pure mystery in our scientific understanding of the brain. We are learning ever more about the brain's physiology and how it controls our bodies, but the idea of where "we" exist, how we develop that sense of self and how it can be explained in terms of the activity of brain cells, all of that is still largely the domain of philosophers rather than scientists.

Anil Seth, co-director of the Sackler Centre for Consciousness Science at the University of Sussex, wants to turn that around. The recently opened institute will include neuroscientists, psychiatrists, roboticists, philosophers and a hypnotist. Using brain-scanners and computer algorithms, they will measure, model and characterise what consciousness might be at a physiological level. Seth and his co-director Hugo Critchley then want to take the findings into the clinic, using these ideas to explain whether altered states of consciousness might explain (and help treat) psychiatric conditions.

Why have scientists been so reluctant to study consciousness until now?

A hundred years ago, consciousness was at the heart of psychology, and it was only excluded following the advent of behaviourism, which focused scientific efforts only on what could be observed objectively — behaviour, not experience. But now we recognise it's OK to take people's descriptions of their conscious experiences as proper scientific data.

The study of consciousness may also have been retarded by people worrying about what the philosopher David Chalmers called the "hard problem". This says, let's say we can understand everything about how the brain works, we know how you generate behaviour and perceptions... but we would still have no idea why there was anything like experience generated by this stuff. In other words, why is there consciousness in the universe at all?

Nowadays, more of us realise that we don't need to answer that "why?" question to make a lot of progress. Consciousness exists, we know when we're conscious and when we're not, and what we're conscious of. We can start to study those differences in the same way physicists have made progress without worrying about why there's a universe in the first place.

What do we know so far?

We know quite a lot about which brain mechanisms are necessary: you can get rid of quite large parts of the brain without seeming to affect consciousness. For example, you can lose large parts of the cerebellum and it doesn't seem to affect your conscious experience. But if you lose small parts of the brain, say parts of the thalamus, you lose consciousness forever.

Is consciousness something you can localise to parts of the brain or is it more likely that the senses network together to create it?

Consciousness, since it's generated by the brain, is not likely to be localisable to one region. It's likely to be a distributed process that's going to largely depend on the thalamocortical system, which is a big chunk of the brain but, by no means, all of it.

Do you need to define consciousness before you go looking for it?

There is this idea that, to study something scientifically, you need to have a really explicit definition of it before you get going. But I don't think that's true. With consciousness, you can define it with various levels of specificity. You can distinguish between conscious level — the scale between being completely asleep or in a coma and being completely aware and awake, say — and conscious content, which would be the actual components of a given experience. So, if you were looking at cup of tea. Things that are relevant to conscious level might not be relevant to conscious content. There's another important distinction between primary consciousness – the raw components of an experience – and what people call higher-order or reflexive consciousness, or even self-consciousness. This is the part of our experience that maps onto our concept of "I". There is an experiencing subject for all these experiences we're having.

How will your work be used by doctors?

There hasn't always been as much communication between psychiatry and neuroscience as one might have expected. That's changing now. One reason is that psychiatrists are increasingly interested in the possibility of finding biomarkers for psychiatric disorders. Right now, psychiatric disorders are classified on the basis of symptoms presented in the clinic. There is, in most cases, no other reliable way of making a psychiatric diagnosis. That difficulty maps to treatments as well, which are often based primarily on alleviating symptoms. By thinking of psychiatric disorders as disturbances of conscious experience, and trying to understand the mechanisms that might generate particular patterns you see, you have a new way to diagnose and treat them.

One example comes from schizophrenia, where one of the symptoms is this misattribution of thoughts and actions, so that the person thinks they are being controlled by something else – by the TV or aliens. One possible explanation for that is, our normal experience of thinking and behaving is unproblematic because we can predict the sensory consequences of our own actions. A thought is just like an action that stays in the brain, so if we can predict what's going to happen when we have a thought or perform an action, then we know that they're not caused by anything else.

But if our predictions are awry, possibly because our internal timing mechanisms are screwed up, we might not be able to predict the consequences of our own actions so the

brain is then forced to find some other cause for these things that are happening.

So it's possible that underlying some of the symptoms seen in schizophrenia, there might be a disorder of making fine time judgments or predictions.

What clinical work will you focus on first?

One phenomenon we're studying is depersonalisation, a fascinating condition where the world or the self loses its subjective reality. There's evidence that those brain areas responsible for integrating external perceptions with internal ones are less active in people with depersonalisation. We want to extend this work into clinical contexts such as the early stages of schizophrenia.

Do you think that consciousness will be reducible by science?

In terms of how the world works, ontologically, consciousness must be. Otherwise, something dualistic is going on, there's something about consciousness that's different from the universe that is not part of the natural world. Consciousness is dependent on the laws of physics, chemistry and biology and we may not know all of those laws yet but we're not going to need anything else.

The right level at which to explain the phenomenon is a different question. I'm less confident that the right level to explain how brains generate consciousness is going to be at the level of this neurotransmitter or this molecule or something like that. It may turn out that the best explanation comes at a higher level.

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