



UNLOCKING
CONSCIOUSNESS



BRIAN MIND FORUM

Appendix 036

Greenfield Criteria to evaluate theories of consciousness

In her book *Tomorrow's People* Susan (Baroness) Greenfield set out "ten criteria as the minimum kit by which the success of competing theories from different levels might be compared and evaluated".

1. *"What is the question that the theory is actually addressing? If it is not the hard problem, or some variant, then the theory is not really getting to the nub of the issue"*
2. *"Can the theory explain how the consciousness of dreaming is both the same as and different from normal consciousness? There is no doubt that the consciousness of dreams is very different from that when we are awake, assuming of course that we are not on drugs and are not psychotic. Yet various markers like EEG patterns and protein- synthesis rates in dreaming are similar to those in wakefulness. So what physical substrate will reflect the difference in the subjective states?"*
3. *"Can the theory explain how non-human animal consciousness is the same, and how it is different from human consciousness? (This is a variant of 2.). Most would concede that most mammals are conscious, though some suggest drawing a line beyond which animals, like a lobster, are mere automata. But in the animal kingdom there is no corresponding clear-cut anatomical or physiological divide. In fact, the nervous system is designed along broadly common principles from the most primitive sea slug right through to primates."*
4. *"How does the theory differentiate self-consciousness, sub-consciousness and unconsciousness from consciousness? (Again, this issue follows from questions 2 & 3.) Though all non-human animals may be conscious, it seems a fair assumption that, like small infants, they do not enjoy the experience we call self-consciousness. And sometimes, in extreme situations of sport, dance, sex or drugs, we too can 'let ourselves go', abandoning self-consciousness whilst still being conscious. Any good*

theory should be able to offer a description of what might be happening in the brain when you 'blow your mind'."

5. *"Does the theory attempt to describe how consciousness relates to the body as the boundary of self? If consciousness is generated in the brain, then a credible theory should be able to account for why we feel our bodies are the boundaries of ourselves. Although this issue might seem obvious, it will be critical in a far more mentally networked society; we will need to evaluate the dangers or absurdities of feeling part of a greater collective that breaches the fire wall of our sense of individuality."*

6. *"Can the theory explain how the same type of electrical signals arriving in different parts of the structurally more-or-less similar cortex translate so distinctly into experiences of sound, hearing and touch? Once more, this point is far less obvious than it might seem. To recap from Chapter 3, the outer layer of the brain, the cortex, has similar neuronal architecture throughout; we know that when certain parts are active they match up with an experience of vision, other parts hearing, and so on. Although the answer might simply be that the difference comes from the different inputs to each zone of cortex, from the retina, cochlea and so on, the tricky riddle remains that those inputs all use the same system of electrical signalling. There is nothing intrinsic to the inputs to the visual or auditory cortex therefore that could match up easily to the difference in experience. If a theory could make progress on this point, it would be a big step forward towards understanding the causal relationship between brain events and subjective states."*

7. *"Can the theory explain how different drugs, such as morphine, LSD and amphetamines, produce different states of consciousness? If we accept that there is no subcomponent of the brain, be it anatomical structure, gene or chemical, that is not only necessary but actually sufficient for consciousness, then we need to understand how varying the availability of different chemicals by taking drugs can give rise to different types of consciousness. The drugs do something to chemical systems in the brain, which in turn change its holistic organisation and way of operating to give rise to a shift in subjective sensation. Any theory that ignores this process, or cannot accommodate it, is not accounting with sufficient accuracy for how the brain generates the different 'feel' of different types of consciousness."*

8. *"Can the theory account for the effect of a placebo, and the psychological effects of certain peripherally acting drugs, such as anti-hypertensive drug propranolol, as well as explaining the change in emotion caused by a cognitive stimulus, such as good or bad news? This question touches on the mechanism by which subjective states, generated by the brain, are triggered by indirect factors such as feedback from the rest of the body or from the outside world. There must be some intermediary change in neuronal networking that in turn influences how the brain will configure to generate the shift in consciousness. But as yet we have no idea how a succession of such events might unfold – nor even, indeed, what they are".*

9. *“In this particular theory, what salient feature of consciousness is being modelled, and what left out? A model involves extracting the salient features of a system and disregarding everything else. We saw that, in the case of silicon models, if no one knew what to leave out in the first place, there would be a risk that the all-important factor for sufficiency, as opposed to mere necessity, would be omitted. If, to be on the safe side, everything were retained, then the model would not be a model.”*

10. *“What is the experiment that would test the theory, and what would constitute a persuasive ‘solution’? This question is almost as hard to answer as the hard problem itself. As yet no one has put forward the type of explanation that they would expect if someone were to claim that they had some concept of how the physical brain gives you the inner world that only you can experience at first hand, and how it might be proved. More intriguing still is to assume that somehow the hard problem had been solved- what would be the consequences? True understanding would give the ability not just to monitor but also to manipulate. We would therefore be able, with deadly accuracy, to transform individual consciousness, hack into it and share it around.”*

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