

Consciousness and complexity

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The most fundamental question that can be asked about consciousness is why it exists at all. Once asked, that question splits into two related questions: What causes consciousness, and what is it for? And it must be conceded at the outset that we don't know the answer to either question. Perhaps that should be the end of it, but of course it isn't, because we know enough to realize that both questions are not only unanswered but harder to answer, even in principle, than they may at first seem to be. At least one philosopher has argued that they are unanswerable by beings like us.¹ I am not certain that he is right, but even if he is not, I don't think he overestimates the difficulty of the problems by much.

As soon as we ask what causes consciousness, we are struck by the fact that as far as we know consciousness is associated only with certain complex systems--the nervous systems of at least some animals--and nothing else. Specifically, it appears to be *brains* that are associated with consciousness. We don't know that all animals are conscious beings (we may well doubt this), and we don't know precisely which animals are conscious and which are not, but there is no doubt at all that some are. But apart from brains, there is no other consciousness at all in the universe. I specify brains as being most intimately associated with consciousness because it is change in the brain that most directly seems to bring about change in consciousness. The right chemical, introduced into the brain by means of the blood, can cause a temporary or permanent cessation of consciousness, or changes in its qualities.

For the sake of compactness of expression, I shall henceforth say that brains "are conscious" rather than the cumbersome "are associated with consciousness." Strictly speaking, it is organisms with brains that are conscious. Whether brains, considered somehow independently from organisms (in vats?) are or could be conscious is a separate question, and not one that I intend to address here. My saying that brains "are conscious" should be understood simply as a *façon de parler*, implying no position on the properties of disembodied brains.

Another striking fact is that brains are arguably the most complex things in the universe.

Even simple brains are incredibly complex in their connectivity. So, when we consider these two striking facts together we arrive at the observation that brains are uniquely complex and uniquely conscious. It is certainly reasonable to suppose that brains are conscious *because* of their complexity. Of course, that is not the only possibility. So, it's worth setting out four possibilities explicitly.

1. Brains are conscious because of their complexity.
2. Brains are complex because they are conscious.
3. The consciousness and complexity of brains are both caused by some further fact about brains.
4. It is a coincidence that brains are uniquely complex and conscious.

Possibility 1 is the most frequently discussed, perhaps because the sciences of complexity have recently begun to teach us that complexity can indeed cause surprising things to happen. I want to take a moment to emphasize that consciousness is a surprising thing.

The surprising thing about consciousness is that nothing else that we know about the physical universe would lead us to expect it to exist at all. Everything that we understand about the workings of the physical universe would be just as understandable if there were no such thing as consciousness. Indeed, if there were no such thing as consciousness, no physical theory would imply that something was missing.

The question is whether the complexity of brains could make their consciousness less surprising. The answer is: There is nothing at all to connect complexity conceptually with consciousness. Even though we *observe* the correlation of consciousness and complex brains, there is no known conceptual connection between the two. Consciousness is the property of having experiences. What is there about complexity that would link it to *that*? Note that this is not the case if we turn to another mental property, intelligence. Prior to the rise of artificial intelligence, it was also true that brains were uniquely the loci of intelligence, and once again, uniquely complex. If we then entertain the hypothesis that brains are intelligent because they are complex, we can see that there is at least some sort of conceptual bridge between the two. Intelligence, for example, is capable of *creating* complexity, and of *understanding* complexity. And yes, AI systems depend on complexity in order to function at all. Indeed, the rise of AI makes it possible for us to say some things about complexity's contribution to intelligence. We know something about the relation between computing power and various sorts of tasks that involve intelligence, and we know something about the relation between complexity and

computing power. So when it comes to intelligence we are on reasonably sure ground in supposing that it depends on complexity. We can afford to be optimistic about being eventually in a position to say *how* complexity can give rise to intelligence.

With consciousness we have no such grounds for optimism. It may be tempting to suppose that consciousness is an "emergent" property of certain complex systems, but emergence is itself an elusive concept. If it means the sort of thing that Searle means when he speaks of "high-level" properties caused by "low-level" properties, then once again we must ask *how* consciousness could possibly emerge from complex low-level interactions in a system. To press again the disanalogy between consciousness and intelligence, we *could* make a case that intelligence is such a high-level emergent property, precisely because we can hope to be able to say how the complex low-level processes contribute to intelligence. Connectionists, for example, are trying very hard to show how complex low-level interactions in neural networks give rise to high-level intelligent processes such as learning and memory. That is, they can show how certain interactions with the "environment" can bring about persistent changes in the network, and those changes influence its subsequent interactions, and so on. Whether connectionism will ultimately be a successful model of intelligence is not the issue. The point is that it makes sense as a model of how a high-level property such as intelligence can be emergent, and how that emergence may be understood.

We might be tempted to say at this point that consciousness is "brutely emergent" from certain kinds of complexity (to be specified later). That is, we might insist that it is emergent with *no* conceptual bridge between the lower- and higher-level properties. After all, if we are cavalier enough about causation, in a Humean spirit, we can simply accept that anything can cause anything, if the correlations are hooked up right, and that's all there is to it. If you have this sort of complex configuration, you get consciousness. Period.

The notion of brute emergence is logically possible but troubling in some respects. Any naturalist must accept that there will be brute facts about the way the world is. Explanations come to an end, and some things are just *given*. But therein lies the problem. The things that are just given in the naturalistic conception of the world to date are the lowest-level physical universals: the speed of light, the gravitational constant, the mass of baryons, etc. These are *not* emergent properties of things. They are the very opposite of emergent. They are as "base" as base properties can be. If there were other examples of brute emergence, this might be less

troubling, but are there? Sometimes chaos theory is invoked to provide examples of emergent phenomena that are unpredictable, given the low-level "base" phenomena. These phenomena include various attractors and metastable configurations of systems, certain weather systems, for example. The difference is that the sorts of examples of seemingly brute emergence provided by chaos theory are not conceptually brute emergents at all. We may not be able to predict certain weather patterns or market patterns *in practice* because the computational power to do so is beyond us, but we can still say what the causal connection between the base phenomena and the emergent phenomena is generally like. In fact, doing so is the very subject matter of chaos theory. True brute emergence occurs when there is *nothing* about the base phenomena that explains the emergent phenomenon, beyond mere correlation. This, I believe, we do not see in science, and to introduce it solely to "explain" consciousness would not be a step forward. It is one thing to say that consciousness must be added to the list of brute facts about nature. It is quite another thing to say that it must be added as the first and *only* emergent brute fact. Such a move is, in my view, unacceptably *ad hoc*.²

The second of the three possibilities I enumerated at the start of this essay is that brains are complex because they are conscious. This is a logical possibility, but it cannot be advanced as an explanation of why consciousness exists. It would instead take consciousness to be a brute fact about brains that explains the kind of complexity found in brains. But it is no easier to conceive of how consciousness in itself could bring about complexity than it was to conceive of how complexity could bring about consciousness, so this option goes nowhere.

The third possibility is that both the complexity and consciousness of brains are caused by some further fact or dynamic. Colin McGinn has speculated that either the brain or space itself have properties that we still do not grasp (and perhaps cannot grasp, given our cognitive endowments), and these properties explain consciousness. He does not argue that they explain the brain's complexity, since he is satisfied that the complexity of brains is adequately explained by evolutionary principles. So on his view it is possible that the unique complexity of brains and their unique consciousness is a coincidence, the fourth possibility.

This brings us to the other question about consciousness mentioned in the opening paragraph: What is it for? This is a question that we *can* answer with respect to the complexity of brains. The complexity of brains is "for" the support of their sophisticated information-processing capabilities: sensation, memory, communication, etc. These capabilities fit well into

the evolutionary theory, since it is plausible that they would be shaped by selection pressures. Consciousness, on the other hand, appears to be a mere accompaniment to (some of) these processes, with no evolutionary traction. A nonsentient creature with certain cognitive abilities would be as "fit" as its sentient counterpart. No one has yet suggested a reason to believe that consciousness is a necessary accompaniment to those cognitive processes, so its presence is unexplained by the evolutionary story that purports to explain them. Quite simply, in evolutionary and functional terms, we do not know what consciousness is for. It's no good to argue that consciousness somehow "optimizes" certain cognitive processes, unless we are in a position to say what it is about consciousness that could accomplish any such thing. For example, the formation of sentences by a native speaker of a language is a largely unconscious process. She simply starts talking and the sentences, or fragments of sentences, come out. A native speaker need not be aware at the beginning of a complex utterance how it will end. Suppose we could make sentence formation an entirely conscious process. Is there any reason to suppose that this would optimize it? It's very hard to see why it would.

Countless theories exist to explain the function of consciousness.³ Regrettably, they all share a common shortcoming. They attempt to link consciousness with something to which it is conceptually unconnected. For example, Nicholas Humphrey argues that consciousness is a product of "self-reflexive" cognitive activity.⁴ But he also concedes that this hypothesis doesn't explain the sheer subjective, experiential character of consciousness, which is after all the heart of what consciousness is.⁵ It's no good to explain consciousness by explaining why it's good to be able to be conscious of X, where X might be internal cognitive processes, social situations, environmental threats, or whatever. This begs the question of why it's better to be *conscious* of X as opposed to simply detecting or monitoring X without consciousness. What benefit does consciousness *add* to the detection of X?

Consciousness exists. It not only exists, it is precious to us. Arguably it is more precious than anything, since to lose consciousness permanently is to lose what matters about being alive. Faced with the choice between death and continued existence as a zombie, there might be reasons to prefer the latter (one's loved ones could continue to be provided for, etc.), but in strictly first-person terms there is nothing to choose between. Both would be the end of all that matters. In light of this it's reasonable to say that there is nothing more important to beings like us than consciousness. Yet we do not know how it is possible for us to be conscious, or what

purpose our consciousness has. This is not a philosophically satisfying conclusion to reach. I do not claim, as Colin McGinn does, that we are "cognitively closed" to the answers. I believe that claim is premature. Amazingly, the problem of consciousness is a relatively new one in the history of philosophy, at least in the West. The Western philosophical tradition has been more preoccupied with understanding other properties of mind, notably its cognitive powers, and consciousness has mostly been left to the side. In the non-Western traditions (with which I claim no more than passing familiarity), there has been more interest in consciousness, but I have the sense that that interest is directed less at *explaining* consciousness than at mapping its subtleties. In this essay, all I have wanted to do is suggest that while it is tempting to suppose that the brain's complexity is the key to consciousness, that key is not likely to fit the lock.

1 Colin McGinn, *The Character of Mind, 2nd edition* (Oxford: Oxford University Press, 1996), p. 44.

2 I argued for this point in more detail in Todd Moody, "Naturalism and the Problem of Consciousness," *The Personalist Forum*, forthcoming.

3 See chapter 11, "The Function of Consciousness," in Susan Blackmore's text, *Consciousness: An Introduction* (Oxford: Oxford University Press, 2004), pp. 152-165.

4 Nicholas Humphrey, "The inner eye of consciousness," in C. Blakemore and S. Greenfield, eds., *Mindwaves* (Oxford: Blackwell Press, 1987), p. 379.

5 Nicholas Humphrey, *The Mind Made Flesh: Frontiers of Psychology and Evolution* (Oxford: Oxford University Press, 2002), p. 75.