CONSCIOUS OBJECTIONS: GOD AND THE CONSCIOUSNESS DEBATES

by Kirsten Birkett

Abstract. Consciousness studies are dogged with religious overtones, and many researchers fight hard against Christian ideas of soul or anything supernatural. This gives many studies on consciousness a particular relevance to religious belief. Many writers assume that, if consciousness can be explained physically, religious belief in a soul—and perhaps religious belief itself—must be false. Theorists of consciousness grapple with questions of materialism and reduction in trying to understand how the physical brain can produce the bizarre sensations that we call *ourselves*. In this essay I discuss the problems in trying to separate religion from science in such a "fuzzy" area as consciousness. I look at the question of what precisely theories of consciousness are trying to explain. I consider theories from David Chalmers, Daniel Dennett, and Roger Penrose as examples of different approaches. Although all of these are materialistically based, I argue that they do not necessarily demonstrate the nonexistence of a soul and also that religious belief does not necessarily require belief in a nonmaterial soul. I conclude with a discussion of why a physical/materialist explanation of consciousness is desired and how religious bias is still a problem in this scientific/philosophical field.

Keywords: David Chalmers; cognitive science; consciousness; Francis Crick; Daniel Dennett; materialism; mind; Stephen Mithen; Roger Penrose; reductionism; soul; zombies.

Francis Crick, Nobel prizewinner for his work on DNA, writes: "'You', your joys and your sorrows, your memories and your ambitions, your sense of personal identity and free will, are in fact no more than the behaviour of a vast assembly of nerve cells and their associated molecules" (Crick 1995, 5). This was Crick's "astonishing hypothesis" from which came the title of

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his famous book. The hypothesis is that the mind—the thinking part, the *I*, the part of me that makes my decisions—is nothing more than brain cells. Among cognitive scientists, this is not so astonishing; materialism has been the dominant philosophy for some time, and the idea of an immaterial or ghostly soul is very much out of fashion. However, Crick is not addressing educated cognitive scientists in his book. He writes for "the general reader"—in particular, it seems, for those who might be affected by religious ideas. The first chapter begins with a quotation from a Roman Catholic catechism, and the constant allusion to religious ideas on the soul continues as the backdrop to the discussion.

Crick compares the move from the religious belief in the soul to a scientific view that the soul is a myth with the dismissal of the belief that the world is flat as a result of "the spectacular advance of modern science" (1995, 4).[1] His book is predicated on the contrast between his "correct" theory of consciousness and the old "incorrect" religious belief in the soul, another example of religious ideas that "so often turn out to be incorrect" (p. 262). His book—which presents interesting research on visual perception, not a theory of consciousness even by his own definition—is written to oppose religion. The final chapter is even titled "Dr Crick's Sunday Morning Service," and in it he carefully explains to those who hold "religious beliefs" with "blind faith" that their ideas are outmoded and wrong, as proved by the evidence he has presented (p. 257).

In an interview just after the publication of the book, Crick was even more blunt. He wrote his book, he said, not for scientists who already know the truth but for people "who, for instance, belong to churches, like the Church of England" (Clark 1994, 96). He also made the point that in the United States "70 percent of the population still believe in the existence of angels"—and so presumably also have wrong ideas about consciousness. These ideas he planned to correct with his solid, scientific thinking.

It is a tone not uncommon among writers on consciousness. Although study of the mind is in principle no different from study of any other human characteristic, it is taken to be particularly relevant for believers, especially Christian believers. The logic is presumably that if no immaterial soul exists, Christianity, which seems to depend crucially upon the existence of a nonmaterial soul, is proved false or at least is in serious need of revision. This, at least, is the tenor of Crick's writing. "If the scientific facts . . . support the Astonishing Hypothesis, then it will be possible to argue that the idea that man has a disembodied soul is as unnecessary as the old idea that there was a Life Force," Crick writes in his conclusion. "This is a head-on contradiction to the religious beliefs of billions of human beings" (1995, 261). A similar trend of argument is found in more or less subtle ways throughout the field.

In this essay I do not present yet another theory of consciousness, although comments toward the end may suggest my preference among those

on offer. Rather, I criticize the antireligious bias in discussion of consciousness and suggest that such a bias, found in a great many authors, is not merely disappointing but unwarranted by the arguments presented. In the first section I aim to demonstrate that such a bias exists. I then examine some particular theories and some ways forward for the debate. Consciousness may be best explained without needing an immaterial soul, however that is defined, but how this affects theology is not immediately obvious, and certainly there is no need for overt attacks on religion as part of the debate.

Of course, the philosophy of materialism is no discovery of modern science and no particular advance. It is as old as ancient Greek philosophy, with the atomism of Leucippus and Democritus in the fifth century B.C.E. Indeed, in the subsequent discussion as Socrates opposes the atomists (as recorded by Plato in the *Phaedo*) and other Greek writings we find many of the concepts that appear in modern debates of the mind—materialism, immortal souls, eternal ideas, and so on. In fact, modern consciousness debates probably are far more relevant for students of ancient Greek philosophy than for Christianity. Nevertheless, the idea that religion, and especially Christianity, is somehow refuted by consciousness theories keeps on appearing.

To cite another example, archaeologist Stephen Mithen presented his ideas about consciousness in the popular science book *The Prehistory of the Mind* (Mithen 1996). Essentially, this book is an attempt to study what archaeological evidence can say about the mind and how it developed.

Mithen opens his book with the honest admission "The human mind is intangible, an abstraction. In spite of more than a century of systematic study by psychologists and philosophers, it eludes definition and adequate description, let alone explanation" (1996, 9). Nonetheless, he finds himself able to state on the next page that "Creationists believe that the mind sprang suddenly into existence fully formed. In their view it is a product of divine creation. They are wrong: the mind has a long evolutionary history and can be explained without recourse to supernatural powers" (p. 10). His goal for the book is, then:

> I will be searching for—and will find—the cognitive foundations of art, religion and science. By exposing these foundations it will become clear how we share common roots with other species—even though the mind of our closest living relative, the chimpanzee, is indeed so fundamentally different from our own. I will thus provide the hard evidence to reject the creationist claim that the mind is a product of supernatural intervention. (p. 16)

By the time he reaches his final chapter, he is confident he has done so: "The human mind is a product of evolution, not supernatural creation. I have laid bare the evidence. I have specified the 'whats', the 'whens' and the 'whys' for the evolution of the mind" (p. 215).

Mithen perhaps overstates what he was able to "specify." His book is an interesting overview of the fossil evidence for human development with creative speculations as to the psychology of the different supposed stages of human evolution. He tells us how, for instance, human ancestor *Australopithecus* thought more than six million years ago, on the basis of some fossilized bone fragments, and even how the "missing link"—the theoretical common ancestor of humans and apes for which there is no fossil evidence whatsoever—thought. Even more surprising than the scientific overstatement is his assumption that any such study could prove that the mind was not created.

Another unapologetic example is Steven Pinker, Johnstone Family Professor in the Department of Psychology at Harvard University—a prestigious position—whose book *How the Mind Works* (1997) contains a fairly standard summary of the arguments for and against different views of intelligence, understanding, and so on. Fairly early in the book, he acknowledges that he has no theory of consciousness as such. He suggests that perhaps it is just too hard a problem for our brains to solve.

Yet, despite this being a book about the mind, an absolute disdain for all things religious pervades it and becomes particularly apparent in the last chapter. Religious belief, he thinks, is simply the result of certain adaptive characteristics of the brain having to do with competition, protection of the social grouping, and so on. He seems to overlook the actual content of most religions, making very general claims about the tendency of the mind to believe certain demonstrably false statements—"How does religion fit into a mind that one might have thought was designed to reject the palpably not true?" (1997, 554)[2]

The logical problem in Pinker's argument is that, as he endeavors to find an adaptive explanation for human traits, he seems to think that he is refuting religious explanations (among others). This is an invalid logical step. Even if his adaptive explanations are correct, and demonstrably so, they do nothing to refute religious explanations; God, or gods, could have used evolutionary techniques as secondary causes of their activities, a view compatible with the vast majority of religious claims.[3] Pinker, however, continues to assert that a physical explanation for such things as emotion and religious impulse proves that we were not created by any divine being.

These arguments are put forward by highly intelligent, high-profile, influential thinkers. The lack of understanding of both religious reasoning and scientific thinking is very disappointing. None of these authors actually argues from the nonexistence of a soul to the falsity of specific religions. Quite the contrary: having decided that religion, particularly Christian religion, is false, they assume that a soul cannot exist, and they construct their cognitive theories without one.

The first point—the misunderstanding of Christian theology (and usually Christian theology is the target)—needs to be dealt with, even if only

in passing. Does Christianity depend on the existence of an immaterial soul? Not necessarily, although the Bible does not rule it out, either. The language translated by *soul*-related words in English most literally refers to *breath* or *life* and in context refers to the person. My soul is me—who I am, my inner being. No particular theory is presented as to whether my inner being is material or nonmaterial; such a distinction is not made in the Bible.[4]

What is the import of this? Despite the leanings of materialist cognitive scientists, even if a complete theory of consciousness could be constructed, it proves nothing about Christianity or indeed most other major religions, whether the theory be materialist or not.

In any case, there is as yet no such thing as an established theory of consciousness. This is the second point: the overwhelming lack of scientific logic in the argument. What are published as theories, or even explanations, of consciousness are at best speculative guidelines for further thought—useful heuristics for proceeding with the study of consciousness. Moreover, very few of these have as a goal actually *explaining* consciousness. Most try to prove merely that a person's being conscious is not incompatible with that person's being entirely physical. Explaining consciousness, if it is possible at all, is still a long way off.

How far off is it? As examples of the state of play in discussions of consciousness, we look next at three currently prominent writers in consciousness studies: philosopher David Chalmers, philosopher Daniel Dennett, and British physicist Sir Roger Penrose. They have very different ideas as to what might explain consciousness and the correct strategy to find it.

What Are We Trying to Explain?

Consciousness is a wonderfully enigmatic thing. When I as a thinking, active person decide to do something, who is it that does the deciding? One thing science has established about human behavior is that it has many causes. There almost certainly are innate, genetic tendencies toward certain behavioral traits such as violence, musical competence, athleticism, short temper, relationship, humor, and love; at least some of these things seem to run in families. There also are learned behavior rules, rational deductions about effects of behavior, ambition for certain goals, and so on. If I am the totality of this conglomeration of causal factors, how can I step back to decide which factor is going to win? If I am the sum of my mental processes, I am a mixture of causal factors, one of which will win. When that happens, it means I have decided. But if this is all a determined process in which the winner is simply whichever causal factor is strongest, where is the place of free will? Where is the place of consciousness? If it is like a computer that assigns printing projects an order in a queue depending on their priority, which is programmed from the beginning, how can

"I" have any "oomph," any power in making sure one particular causal factor wins? How can "I" give priority to processes?

Many mindlike properties are involved here. Free will, intelligence, thinking, and feelings are difficult concepts that sometimes come labelled as *consciousness* in discussion. Dennett touches on all of these topics in various ways. As he puts it, it is a mystery that living physical bodies in the physical world could produce ideas, deliberation, sensations, experiences of pain, and so on. This is one of the last mysteries of science. Not only is it something that is not known; it is something we don't even really know how to study.

So what is it? Chalmers describes consciousness as being indefinable but perhaps something like "the subjective quality of experience" (1996, 4). A mental state is conscious if it has a qualitative *feel*. (The technical term for the mental feeling of something is *qualia*, a word that keeps popping up in discussions of consciousness.) There is nothing strange about the fact that systems in the brain can process information, react to stimuli, and even have learning, memory, and language—immensely complicated, but not mysterious. But where does conscious experience come from, and why do we have it? A pain system that warns our brain to move a hand away from fire because it is burning is a useful system. Why does it actually have to *hurt*, though? Why can't it just make the hand move?

Two main things need explaining: the very existence of consciousness and the specific character of conscious experience. Why do individual experiences have their particular nature? Why does the retinal information from certain light waves make me feel as if I am seeing something red? Why not make me feel as if I am hearing a trumpet?

For a long time, the thinking, reasoning, experiencing part of humans was explained as an immaterial soul. Descartes famously asserted this in the seventeenth century, reasoning that our bodies for the most part run like automatic machines, without thought (breathing, heart beating, and so on), but our thinking self is something extra and different. It is a nonmaterial substance, the soul or mind, which is the essential difference between a human and an animal (for, in Descartes' view, animals did not have it).

Today's strong materialism largely rejects the idea of an immaterial soul. However, when it comes to actually explaining how we think and experience, the notion of some extra "mind stuff," as Dennett puts it, is still compelling. For instance, Dennett asks, what is the difference between imagining a purple cow and imagining a yellow one? Even if a scientist could tell which neuron vibrated differently, what is the purple that you imagine? Purple is not a neuron. Where did the imagined cow come into existence? It wasn't in the medium of brain stuff—neurons and so on, so it must be in the medium of mind stuff.

Various things that we do seem not to fit with the idea of brain matter. A separate soul or mind would seem to account for such things as what the purple cow is made of, what the thinking *I* is, what appreciates wine, hates racism, or loves someone, and what acts with moral responsibility (Dennett 1991, 33). Most modern theorists, however, have rejected the idea of dualism. Materialism rules. There are valid reasons for this. The biggest problem with the idea of an immaterial soul is the question of how mind interacts with body. How can physical stuff possibly transmit to mind stuff? If it manages to "push" something physical, must it not be physical itself? Most of all, however, the immaterial soul or mind is rejected because it seems to be contra-scientific, something entirely other than this world, unable to be understood or studied. This is Dennett's reason for rejecting it. To him, resorting to an immaterial soul is tantamount to giving up; dualism is antiscientific and must be avoided "at all costs" (1991, 37).

Dualism is not so simple a concept, however, and not so easily dismissed. Even if substance dualism—that there is a separate soul or mind that exists but is not physical—is dismissed, the idea that the mind is somehow different from the brain and that consciousness needs to be explained by something more than the firing pattern of neurons is still alive and well. It is not necessarily a ghostly, supernatural force, but, as several authors have pointed out, strict, reductionist materialism has a very difficult job making sense of consciousness.

Chalmers: Can Consciousness Be Reduced to Brain Cells?

Chalmers, a young philosopher already well known for his work in cognitive science at Indiana University and Washington University, has been developing for some time ideas about how a mind works. With no particular acknowledged religious affiliation, Chalmers is of the opinion that consciousness is not reducible to the physical. Most of science depends on reductive explanations in theory even if not in actuality. It is assumed that biology can be reduced to explanations in terms of chemistry and that chemical reactions can in turn be explained by the physics of atoms and so on; everything can, in principle, be reduced to an explanation in terms of some more basic structure. However, according to Chalmers, "No explanation given wholly in physical terms can ever account for the emergence of conscious experience" (1996, 93). He is a materialist—there is no suggestion in his work that he posits a nonmaterial soul—but argues that some properties of the brain are distinct from ordinary physical properties. Consciousness, he says, is not logically entailed by brain structure. Even if we could explain the entire activity of the brain, every neuron and every connection, we still would not understand consciousness. It is explained by something different, something more than just brain structure.

Chalmers puts forward five arguments for this. The first involves the logical possibility of zombies. It is conceptually coherent, Chalmers says, that there may exist a zombie world physically identical to ours but in which the people lack consciousness. My zombie twin will process the same information, react the same way, be able to introspect and report on psychological states, and pay attention to things, but there will be no phenomenal feel to these things. She will not have an inner conscious experience as I do; she will just carry out these things automatically. If this is the case, having a physical brain does not necessarily entail being conscious. Consciousness is something extra.

The second argument raises the question: Why is it that when I see red, it looks *red* to me and not something else? One can imagine a physically identical world in which conscious experiences are inverted. My inverted twin might have a blue experience when I have a red experience, even though we receive the same frequency of light waves. After all, nothing in physiology dictates that one sort of processing should be accompanied by red experience rather than blue.

The third argument concerns how we know about consciousness. My knowledge of consciousness comes from my own case, not from any external observation. From low-level facts we can in principle derive all sorts of high-level facts but not consciousness. If it were not for our own consciousness, we could disregard others' reports of consciousness. Even when we know everything physical about other creatures, we do not know for certain that they are conscious. This is a problem that is not found in other areas. We can know for certain that another creature has life, for instance, by studying it objectively. So consciousness cannot be logically implied from biology.

The fourth argument is popular in philosophical literature and introduces the now fairly famous Mary. Imagine that we are living in an age of a completed neuroscience, where we know everything about the physical processes of our brain. Mary is a neuroscientist in the neurophysiology of color vision and knows every physical fact about perceiving color. But she has been brought up in a black-and-white room and has never seen colors, so she does not know what it is like to see red. There is a conscious experience that she is lacking that is entirely separate from the knowledge of brain function. Can she be said to know what red is?

The fifth argument deals with possible objectors. Any opponent to the above arguments, Chalmers says, needs to show at least in principle how the existence of consciousness may be entailed by physical facts. But that is impossible, for it needs some kind of analysis of the notion of consciousness as a criterion that physical facts had to meet, and there is no such analysis. What makes a conscious state conscious is that it has a certain feel, and this is not a functional thing.

Therefore, Chalmers concludes, consciousness does not logically supervene on the physical; just having the physical brain does not entail that a being is conscious. Therefore, no reductive explanation of consciousness can succeed. Any account of the physical processes purported to underlie consciousness will have the further question of why these processes are accompanied by a conscious experience. If we cannot predict consciousness from a cognitive model, even if we build this model and somehow determine that consciousness is there we still have not explained consciousness. It still is something that just happened despite our knowledge of the physical processes.

Chalmers claims that materialism is therefore false. There are features of the world over and above the physical features. However, he insists that he is a naturalist rather than a supernaturalist. For him, the laws of consciousness are a part of our natural universe and not something "spooky" or "spiritual"; just not material. He does without materialism and retains naturalism by saying that consciousness is supervenient upon fundamental properties that are different from what are known at the moment. Just as electromagnetism required a new set of fundamental laws, so does consciousness. These do not interfere with physical laws. They are supervenience laws, explaining how experience arises from physical processes. So materialism is false, but the dualism he advocates is not a supernatural one. It is natural, just different from the physical although it arises from the physical.

So, in Chalmers's view, consciousness cannot be explained reductively, but there still can be a theory of consciousness: a nonreductive one. That is, we need to give up trying to explain the existence of consciousness wholly in terms of something more basic and instead admit it as fundamental, giving an account of how it relates to everything else in the world. Such a theory will be similar in kind to the theories of matter, motion, or space and time. Its essence would be a set of psychophysical laws governing the relationship between consciousness and physical systems.

This theory would not explain the existence of consciousness in the sense of telling us why consciousness exists, but it would explain specific instances of consciousness in terms of the underlying physical structure and the psychophysical laws. How do we discover these laws? The big problem, as Chalmers sees it, is lack of data. Because consciousness is not directly observable in experiments, we cannot simply run experiments measuring the experiences that are associated with various physical processes, thereby confirming or disconfirming various psychophysical hypotheses. This makes it difficult, but not impossible, to get a grip on the theory. We have the rich data of our own case. We also have several plausible constraints, among them that fundamental laws are homogeneous in space and time and that conscious experience depends only on the internal physical state of an organism.

One of the first steps would be to try to find the neural correlates of consciousness—that is, what happens in the brain at the same time as a conscious experience. Some people have put forward suggestions: for instance, that certain 40-hertz oscillations in the cortex are the neural correlates of experience. Through experimenting with which neurons fire, and how, when a person reports a conscious experience, some first tentative steps can be made, in Chalmers's view, toward a theory of consciousness.

This is an honest conclusion. For all of his analysis, Chalmers realizes that we are nowhere near a working theory of consciousness; what he has explored are initial ideas that may in time prove fruitful. The opinion of this well-known commentator on consciousness, who may be a key figure in the debate for many years to come, is that after all this time we have barely started.

DENNETT: CONSCIOUSNESS EXPLAINED

One of the main opponents of views like Chalmers's is Dennett, a strict materialist and atheist who believes that once we have a map of all brain cells and what they do, we have an explanation of consciousness. He admits that this is counterintuitive, but because, he believes, dualism is a dead end, we must look for a materialistic theory and put up with counterintuitive ideas.

In many ways, Dennett's arguments are the exact reverse of Chalmers's. Chalmers bases part of his argument on the fact that zombies could in principle exist; Dennett dismisses zombies as in principle impossible. To Chalmers it is possible and therefore needs to be considered; to Dennett it is not and so is dismissed. This seems to parallel Dennett's overall strategy. Dennett considers dualism to be a dead end, a giving up on the problem and not trying hard enough to find the real answer. Chalmers considers those who dismiss dualism as not trying hard enough and so puts effort into exploring the concept of dualism further.

Dennett's theory is based on what he calls the multiple-drafts model. He states that all varieties of perception, thought, or mental activity are accomplished in the brain by parallel, multitrack processes of interpretation of sensory inputs. Information is under constant "editorial" revision; for example, something heard may be reinterpreted on the basis of the accompanying visual input.

Dennett spends a large part of his book *Consciousness Explained* (1991) exploring how consciousness might have developed. For instance, he says, for survival, one develops either armor or means of avoiding danger. The latter needs a nervous system to make decisions about what to do to avoid danger. The key to control is the ability to track or even anticipate the important features of the environment and know what to do about them (such as ducking to avoid injury). So a fight-or-flight response develops, which is "hard-wired" in.

Information other than the immediate can be useful as well, so a new behavioral strategy of acquiring information begins to evolve. In the environment, some things stay the same (gravity, need for food), so brain systems for dealing with these are hard-wired in. Other things change but are predictable (seasons, day and night), so their systems also are hard-wired. Some things are chaotic, so the brain needs some flexible facility that can learn, or develop itself. Those with the ability to learn survival traits have more offspring and pass that ability on.

With language, or even proto-language, hominids can both ask for and give information. Asking questions of oneself is the beginning of reflection. The answer impulse can be stimulated by its own question impulse, which provokes rewiring of the brain. A genetic predisposition to this kind of flexibility becomes an advantage and is passed on.

Once reflective thinking becomes a habit, new ideas develop. Those that are more fruitful than others survive and spread. Cultural evolution means that people can acquire survival knowledge already honed by their predecessors who are not their genetic ancestors. The spreading of ideas takes over from the inheritance of flexible brain wiring as the main mind-developing mechanism in humans. It works so well that physical evolution is no longer needed.

This speculative story about the development of consciousness leads Dennett to his proposed model of how consciousness works. Human consciousness is, in his view, a huge complex of ideas in brains, best understood as the operation of a virtual machine implemented in the brain. It is a software program. It is a virtual serial machine implemented on parallel hardware. The feeling of consciousness is merely a good mental habit, for things like self-reminding and self-exhortation are part of the program's running well. The difference between the mind and a computer program is that the mind can be the object of its own perceptual systems.

As Dennett puts it,

> In our brains there is a cobbled-together collection of specialist brain circuits, which, thanks to a family of habits inculcated partly by culture and partly by individual self-exploration, conspire together to produce a more or less orderly, more or less effective, more or less well-designed virtual machine . . . by yoking these independently evolved specialist organs together in common cause, and thereby giving their union vastly enhanced powers, this virtual machine . . . performs a sort of internal political miracle: It creates a virtual captain of the crew, without elevating any one of them to long-term dictatorial power. Who's in charge? First one coalition and then another, shifting in ways that are not chaotic thanks to good meta-habits that tend to entrain coherent, purposeful sequences. (Dennett 1991, 228)

In other words, consciousness is nothing but the collection of ideas running around in our brain. There is nothing in any sense different, or beyond, the physical brain. Our experience is an illusion created by this coalition of thoughts. For Dennett, this explains everything that needs

explaining. There is no problem of qualia; Dennett rejects this as so much argument about nothing. There is nothing more to explain.

Is Dennett right? Whether one agrees with his approach or Chalmers's largely comes down to things such as whether one is persuaded of the logical possibility of zombies or whether one believes that qualia exist. Often it seems that Chalmers and Dennett are simply talking past each other. Dennett dismisses as not worthy of discussion the very things that Chalmers thinks are central issues. Could there be an exact physical representation of me but without my conscious experience? Is conscious experience something more than brain processing? If I think so, I may find Chalmers's line of reasoning tempting. If not, I may go with Dennett. Either way, the specific theory that explains consciousness could end up being very different from what either of them suggests. What we are dealing with here is not actually a theory of consciousness but rather ideas that could form the philosophical basis for a future theory. As we have seen, there is no agreement among leaders in the field. What consciousness is is still a mystery.

Penrose: Quantum Physics Is the Key

Penrose, Professor of Mathematics at the University of Oxford, who has worked with Steven Hawking on relativistic theories of gravity and made a huge number of contributions to mathematics and mathematical physics, stands alone with an entirely different approach to consciousness. He does not claim any particular religion in his writings, but he is a Platonist—he believes that there is a realm of absolute, eternal ideas that have specific instances in our world. He also is a highly accomplished physicist and approaches consciousness in terms of physics.

Penrose bases his work on a variant of Kurt Gödel's theorem in mathematics. Gödel proved early last century that within certain closed logical systems there are statements that can be true but cannot be proved true by the axioms of the system alone. From this, Penrose argues, we can conclude that there are certain mathematical problems that a computer cannot be programmed to answer. A computer cannot discover mathematical theorems in the way that human mathematicians do. Therefore, Penrose says, thinking is noncomputational. The human mind cannot just be a computer, for it can do things that it is logically impossible for a computer to do.

Then what kind of thing is it? Penrose insists that the problems of quantum mechanics and the problems of understanding consciousness are related. The bizarre and counterintuitive properties of quantum physics can be used to solve the bizarre and counterintuitive problem of consciousness. Therefore, when we understand quantum physics we will be in a position to understand consciousness.

The essential problem of quantum physics is that it is contradictory in some ways to Einstein's theory of relativity. Yet both theories have im-

mense amounts of experimental evidence that show them to be accurate. Solving this problem is one of the "big questions" of physics—the solution would be something like the "theory of everything" that Hawking predicts will be ours one day. Penrose has his own ideas about how the dilemma will be solved, with which Hawking disagrees, but it is on the basis of these ideas that Penrose presents his unique approach to a theory of consciousness (Penrose 1989; 1994; 1997).

Penrose's view is that something physical in the brain evokes awareness, but it is not something that can be simulated computationally. There is something in the physical action of the brain that is beyond computation. This thing beyond computation is also beyond present-day physics, so some new discovery is needed. Penrose thinks that thing is the same thing that solves the problem of quantum physics.

Is it plausible that there is something beyond computation in our understanding? Penrose gives some examples from chess, where the answer is immediately obvious to a human, but computer programs cannot see it. Also, there are certain mathematical ideas which a human can see are true, even though there is no way (so far) of proving them true. We do not understand numbers, for instance, by rules. We just understand them. Mathematical insight or ability is therefore not computational; therefore no understanding is computational.

This perhaps does not do justice to Penrose's argument, which requires working through mathematical ideas that are beyond the scope of this article. The essential strength of his argument is that there are certain intuitive, creative aspects of thought that to the best of our knowledge computers will never be able to equal. There is something about the human brain that is more than just computation—things such as judgment, common sense, insight, aesthetics, compassion, and morality. Perhaps, Penrose hypothesizes, they live in the Platonic world, and perhaps our awareness enables us to contact that world.

Penrose moves to more practical matters as he discusses the neural structure of brains. His theory depends on certain physical structures within neurons, called microtubules, which are so small that they are on the scale of quantum events. A single microtubule could behave like a computer. This is where Penrose's ideas about quantum mechanics come in. Microtubules may be able to isolate things inside them from the outside random activity so that what happens inside the tube is a closed system.

This is the link between consciousness and biophysical processes. As theoretically unpredictable quantum events are able to occur within the microtubules, their results can be what we regard as consciousness. This could also account for unpredictable mind events such as creativity and free will. The freedom from physical constraints that seems to be a characteristic of consciousness may be explained by quantum events within microtubules, which give a genuinely nondetermined aspect to thinking.

It must be said that all of this is based on a prediction about how quantum physics will eventually be resolved and is entirely speculative when it comes to what may or may not happen within microtubules (which is very difficult to test). Penrose realizes this but still considers his theory the most promising of all ideas about consciousness. Others disagree, pointing out flaws in his reasoning quite apart from the possibility of a new theory of quantum physics.

Basically, in saying that our brains cannot be computers because of Gödel's theorem, Penrose is bringing together very different domains of thought. Applying Gödel's theorem, an abstract formulation of pure mathematics, to the brain is not at all straightforward. It depends upon Penrose's Platonic guarantee that mathematics is always appropriate to model real-world systems. Others do not place so much faith in this guarantee.

Penrose continues to stand alone with his ideas, which certainly are novel and creative. They also are physically untestable and rely upon a revolution in the major problem of physics that has so far eluded physicists. We are still left searching for a theory of consciousness. Indeed, it is arguable that, even if Penrose is entirely correct, he still has not touched on what Chalmers sees as the essence of consciousness—the subjective "feel" of experience.

I have discussed here three prominent authors. This by no means exhausts the range of views available. There seem to be as many theories of consciousness as there are writers on the matter, and that is a great many. Almost weekly, it seems, a new book appears in which some academic psychologist, neuroscientist, philosopher, or mathematician publishes new speculations on the matter. It is a field receptive of a huge range of ideas, from the careful to the bizarre, and it shows no sign of slowing down.[5]

Why Do We Need a Physical Explanation?

As theoreticians from several fields attempt to explain consciousness, some question the terms of the quest itself. One is Mary Midgley, retired Senior Lecturer in Philosophy at the University of Newcastle on Tyne and author of many books on philosophy and meaning. In an intriguing essay (1998) Midgley asks why people are looking for the sorts of answers they are. After all, many things, not just consciousness, are hard to explain in a physical/chemical world. Three examples are money, government, and football. These can be understood only in terms framed to express the subjective point of view. Physical analysis of the material objects—a coin, a government building, or an inflated leather ball—may be irrelevant.

In consciousness studies, many people look for its explanation in its cause—a physical condition that produces it—and look for this antecedent in evolution or neurology. They are mystified to see why anybody should look anywhere else. However, this kind of explanation works only

when we already know the thing well and are explaining how it came to be. The projects of explaining money, or marriage, or grammar—or consciousness—are not like that, for in these we want to know more about the things themselves. Life and consciousness are even more awkward, because they are at the boundary of a category; they mark the frontier of a whole logical type, a jump from straightforward, scientific problems to the problem of trying to relate our own individual experience sensibly to that of others and the official views of our society. This is a central concern of serious literature and philosophy. It is part of what the pioneers of science deliberately withdrew from in the seventeenth century.

Philosopher of science Nancy Cartwright, Professor of Philosophy at the London School of Economics and Political Science, agrees. Why, she asks, does Penrose think the answers are in physics rather than, say, biology? She thinks the answer comes down to the fact that we like to assume that the mind is not mysterious, that it can be explained in scientific terms; and, as science is now understood, that means it can be explained in physics terms. Without the kind of unity that physics gives we are left with some kind of mysterious dualism. It is a basic physics bias that is found throughout science and philosophy of science. It is a love of reductionistic explanation.

This, Cartwright asserts, is a false love. Why? There apparently are a very, very large number of different properties at work in the world. Some are studied by one scientific discipline, some by another, some are in the intersection of different sciences, and most are not studied by any science at all. What legitimates the view that behind the appearances they are all really the same? I think two things: one is an excessive confidence in the systematicity of their interactions, and the other is an excessive estimation of what physics has accomplished (Cartwright 1997, 164).

This kind of physics bias is widespread, as any observer of science can testify. It follows a pattern in which physics is regarded as fundamental, the underlying basis of all other sciences to which all other sciences will eventually be reduced. Psychology can be explained by biology, which can be explained by chemistry, which can be explained by physics, which ultimately will give us the Theory of Everything. Cartwright is of the opinion that this view flies in the face of empirical evidence. In practice, different sciences are *not* reduced like this, and it would not help our understanding if they were. Biologists do not want to know about quarks, which have nothing to do with understanding how different cellular systems interact.

Cartwright proposes a kind of pluralistic view in which all of the sciences stand side by side on a roughly equal footing. There is no gradation of hard science and soft science, of "fundamental" research that is more basic than other research; there are just a great many sciences that investigate different aspects of the universe. Cartwright does not mean that sciences are just constructed and not true; her pluralism does not imply

antirealism. She believes that the laws of physics are true; they are just not entirely sovereign.

Yet materialism rules, and Midgley is aware of the role of religious bias in its reign. "The current credulity about materialism is understandable because—quite apart from the attractions of the traditional warfare against God—the way in which the dispute has lately been thought of makes it seem unavoidable" (Midgley 1998, 255). Those who think of mind as some strange substance realize there's no room for it in current cognitive theories, so it has to go—as Dennett has dismissed it. Others, however, seem to hope to find a place for it on the borders of physical science. Chalmers suggests new fundamental laws of consciousness. This, Midgley thinks, is plain physics envy. There is no space for consciousness in fundamental physics any more than there is in neuroscience. Physical laws are very carefully shaped to fit together. They cannot accommodate an honorary member of a different kind. It's like trying to put a real queen or knight on the chessboard—they are entirely different categories. In any case, if consciousness can have this fundamental status, what about substance, necessity, truth, knowledge, reason, feeling, good, evil? What about life?

The physical level is not the ground floor of all thought, not a set to which all really important concepts have to belong, Midgley insists. This way of thinking that materialist science has imposed upon the world is misleading and untenable. The two aspects of life, physical and mental, are not two kinds of stuff but two points of view, inside and outside. They are both about the same thing. The only thing that has to exist in order to accommodate both is the whole person. Scientific objectivity is not always a virtue or always useful for explanation, and it may not be for consciousness. In trying to understand a play or a novel, for instance, withdrawing sympathy may make explanation impossible. This is true to some extent for all social phenomena. Physics, along with mathematics and light, is at one end of the spectrum. It specifically shuts out personal experience, which makes it different and remote from ordinary thought. This specialization is entirely justified by its success in its own work. But the idea of using it as a place from which to explain consciousness at the other end of the spectrum is senseless. A shotgun marriage between these two radically different things, ignoring all that is in between, will not work.

Consciousness, Midgley concludes, is best explained in its own, subjective terms. It does not need to be explained in terms of fundamental laws, whether from existing physics or otherwise. There is no sacred specialness about such an explanation.

Midgley's view, of course, does not suit those still committed to reductionistic explanation. It is very tempting in our mechanistic world to assume that something has not *really* been explained until it can be seen as a consequence of basic, known physical laws. But that may not be possible,

says Chalmers, and it is not even desirable, says Midgley. Rather than thinking of the world as puzzles that need to be reduced to fundamental laws, why not think of explanation in terms of a series of maps? Different maps in an atlas may portray different aspects of the world—geological, political, biological—but they are all perfectly good explanations for what they are trying to explain. Indeed, if one tries to reduce a political map to a geological one, one not only fails to explain but also loses all the information one was interested in to start with.

We still await the beginnings of scientific consensus on how consciousness is to be explained. There are not, yet, arguments between competing experimental models with testable outcomes. What we have is fascinating speculation, some more plausible than others depending on one's philosophical preference. There is no coherent theory, no substantial agreement between theorists, and no experimental program. There is not even agreement as to what *kind* of explanation should be sought.

It is too early to conclude that consciousness studies prove Christianity, or any other religion, false. Materialist authors, as determined believers, can have a tendency to forget their scientific principles when arguing about religion. Debates about consciousness would do well to be freed from religious bias, either for or against religion.

NOTES

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1. Ancient Greeks were in fact aware that the world is round; the shadow that Earth casts on the moon during lunar eclipses is sufficient to come to this view. Aristotelian physics, endorsed by the Catholic Church of the high middle ages, also entailed a spherical Earth.
2. For a detailed review of Pinker's book, and author's response, see *http://bostonreview.net*.
3. For an explanation of these ideas, see Birkett 1998.
4. See, for instance, the article on "Soul" in Brown 1971.
5. As suggested, the literature on consciousness is immense; the bibliographies of any of the books already cited here go for pages and yield libraries of further reading. An easily accessible way to start is with collections of essays, such as Rose 1998, or an introductory work such as Blackmore 2005.

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