**Bundles of Potentials**

**David Papineau**

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Michael Lockwood

*Mind, Brain and the Quantum: The compound "I"*

352pp. Oxford: Blackwell. £25. 0631 16183

Danah Zohar with I. N. Marshall

*The Quantum Self: A revolutionary view of human nature and consciousness rooted in the new physics*

245pp. Bloomsbury. £14.95. 07475 0271 4

Two of the thorniest problems in contemporary philosophy are consciousness and the interpretation of quantum mechanics. At first sight it might seem unlikely that they should have much to do with each other. But Michael Lockwood thinks otherwise, and has written a lively book offering interlinked solutions to both problems.

Most people think of consciousness as an essentially private phenomenon. To know what pain is, for example, it seems plausible that you need to have experienced pain you-self. In Thomas Nagel's phrase, you will then "know what it is like" to feel pain, where this seems to involve knowledge of some peculiarly subjective fact, knowledge which would be unavailable to a being who had only learned about pain at second hand, by observing the symptoms of pain in others.

However, this intuitive idea of consciousness as essentially private comes under attack from two sides, namely, from the Wittgensteinians and from the physicalists, unlikely bedfellows who for once are happy to sink their differences and gang up on the subjectivists. The physicalists focus on the fact that mind interacts with matter. They point out that, despite its apparent subjectivity, consciousness certainly has physical effects, as when a conscious pain causes me to remove my hand from a fire. Yet physics also tells us that physical effects, like my arm moving, have physical causes, like neurones firing off in my brain. Putting these two thoughts together, it seems hard to avoid the conclusion that the conscious pain must be identical with the neuronal activity.

The Wittgensteinians' doubts about subjectivity stem from their mentor's celebrated "private language argument". The subjective view of consciousness gains much of its strength from the apparent transparency of consciousness to itself: it seems that if you are in pain, you will automatically know you are in pain, in a way that wouldn't be possible if pains were not private. But Wittgenstein argued against the possibility of such an infallible discourse of privacy, on the grounds, roughly, that if it is impossible to be mistaken, then there cannot be anything substantial to know about. Of course few Wittgensteinians, and certainly not Wittgenstein himself, go along with the physicalist identification of consciousness with neuronal activity in the brain. Instead, they prefer to account for consciousness in terms of its links to behaviour. But their private language argument adds weight to all philosophical positions which reject the intuitive picture of consciousness as private.

In the case of quantum mechanics it is not intuition, but established scientific theory, that seems threatened with incoherence. The best-publicized features of quantum mechanics are its indeterminism and its curious non-causal correlations at a distance. These are not so much problems, however, as simply surprising facts. The real problem with quantum mechanics is its use of the notion of measurement. In quantum mechanics, any system of physical particles is characterized, not by the familiar properties of mass, position and velocity, but rather by a bundle of potentialities, by a "wave function" which specifies the probability of the system displaying various observable results if certain measurements are made. Schrödinger's equation then specifies how this bundle of potentialities will evolve smoothly over time. Except that this smooth Schrödinger evolution is only part of the story. For when a measurement is made, the wave function is standardly assumed suddenly to "collapse", with the system therewith becoming a quite different bundle of potentials, depending on which result was actually displayed in the measurement.

This story flirts with inconsistency. Measuring instruments are themselves systems of physical particles. So composite physical systems involving measuring instruments ought themselves to evolve smoothly in accord with Schrödinger's equation. But this contradicts the thesis that the wave function "collapses" when a measurement is made. The only way to preserve consistency is to specify that the smooth Schrödinger equation does not apply to certain systems of particles, namely, those systems which comprise measuring instruments. The trouble with this, however, is that there is nothing in quantum mechanics itself to

explain why some systems qualify as measuring instruments and others don't. All we can say is that measuring instruments are just those large physical systems that seem to make the wave function collapse. But it surely beggars belief to suppose that the world contains two quite different kinds of physical system, obeying quite different laws, but which can only be distinguished retrospectively in this ad hoc way.

Anybody who wants to know more about either consciousness or quantum mechanics will not do better than start with *Mind, Brain and the Quantum*. Lockwood is an exception-

ally gifted expositor. Without assuming any previous knowledge, he guides his reader through many of the intricacies of the contemporary philosophical debate along the way to-wards his own solutions. Much of the first half of the book is taken up with the baroque geography of contemporary physicalism about mind. Lockwood explains and distinguishes weak and strong reductionism, functionalism, eliminativism and so on. But he rejects all of these in favour of a traditional subjectivist view of the mind, arguing that even the most sophisticated versions of physicalism must inevitably leave out what it is like to have conscious experiences. Lockwood is aware that this insistence on traditional subjectivism then leaves him with the problem of how mind and body interact. His answer is that mind and body are identical, not because the mental is the physical in disguise, but rather because the physical is the mental in disguise. Physicalists explain the apparent duality of mind and body by saying that conscious introspection gives us a misleading form of access to physical events in the brain. Lockwood reverses this and argues that the scientific investigation of the brain gives us a misleading form of access to events whose real nature is revealed in introspection.

In the second half of the book Lockwood turns to quantum mechanics. His solution to the measurement problem is to deny that the wave function ever really "collapses". When a human observer interacts with a physical system characterized by a bundle of potential observable results, then, according to Lockwood, none of these potentials collapses into an actual observational result. Rather, the observer enters a composite state which comprises all the potential observational results. Lockwood then introduces his crucial hypothesis: even if there is no objective collapse, consciousness registers each of the possible observational results separately. From any given conscious perspective, it will seem as if just one result occurred, thus creating the impression that the wave function has collapsed. But this is an illusion, in that separate conscious awarenesses of all the other possible results will simultaneously be present in the same observer. Lockwood argues that there are possible experiments which would demonstrate the simultaneous presence of all these different perspectives, but that the complexity of human brains and other measuring instruments makes these experiments quite impracticable.

I suspect most readers will find Lockwood's account of consciousness plausible, but his solution to the problem of quantum measurement absurd. My own reactions are the other way round. I find his account of consciousness unacceptable, but think that his view of quantum mechanics may well be right. The reason Lockwood's line on consciousness will strike a chord with many readers is that it is not far removed from the phenomenalism which has been philosophical orthodoxy throughout much of the modern English-speaking philosophical tradition. When he insists that the intrinsic features of reality are transparently revealed in conscious awareness, he is in effect defending a version of the view that the world is made of sense-data. It is not clear to me, however, that Lockwood has fully grasped the consequences of this reversion to tradition. For example, at one point he mentions, with apparent approval, the currently widely accepted doctrine of physical supervenience, according to which all mental differences between people depend on physical differences. However, given Lockwood's view that the fundamental constituents of reality are sense-data, he ought surely to permit mental differences without physical differences, and insist instead that all physical differences between people must depend on differences in sense-data. I would find such awkward consequences more palatable if Lockwood had stronger reasons for upholding sense-data as the fundamental reality. But his argument that the physicalist alternative necessarily leaves out consciousness leans too heavily on unexamined pre-Wittgensteinian assumptions.

Lockwood's view of quantum mechanics is related to the "many-worlds" interpretation developed by the physicist Hugh Everett. However, he is careful to distinguish his own view from the vulgar versions of this theory in which consciousness "splits" the universe whenever a mind interacts with a physical system. Lockwood agrees it would be absurd for consciousness to play any such active role, and explains that on his view it is consciousness that splits, not the universe. Our consciousness of time provides a useful analogy: at any one time we are conscious of that time, and not of others; but this doesn't mean that consciousness actively splits the universe into different worlds corresponding to different times.

There is no denying that Lockwood still leaves us with a weird world, containing numerous parallel selves who are prevented from interacting with each other only by empirical complexities. Nevertheless, given his careful handling, his theory seems to me to cope with the phenomena at least as neatly as any other current interpretation. It is worth noting, however, that although his view requires certain assumptions about consciousness, it doesn't require the specific subjectivist theory of consciousness he develops in the first half of the book. Indeed, there seems no reason why physicalists about consciousness shouldn't be able to follow Lockwood's line on quantum mechanics. Such physicalists will then have to explain why it is philosophically unpuzzling that consciousness should split itself among the different quantum possibilities. This is, however, a problem for all parties. As with the analogous problem about the splitting of consciousness among times, part of the issue here is exactly what would count as a solution, but there is no immediate reason for thinking it will be harder for physicalists to find solutions than non-physicalists.

*The Quantum Self*, by Danah Zohar, is also about quantum mechanics and consciousness, and is also well written. Apart from that it could not be more different from Lockwood's book. Where he invites his readers to work hard, and rewards them with an understanding of some of the most exciting issues in contemporary thought, Zohar immerses her readers in a bowl of lukewarm muesli. Her discussion of quantum mechanics functions solely as a stepping-stone to the essential oneness of mind and body and self and others and past and future, not to mention the essential ugliness of concrete buildings and plastic toys. It is possible that a lot of people will enjoy reading her hook; I only hope they don't mistake it for philosophical thought.