Why Science Can't Explain Consciousness

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Abstract
Physicalism is attractive to analytic philosophers because they take it to be the metaphysical picture that fits best with modern science. I argue that this common view concerning the relationship between science and metaphysics is based in a misconception of the history of mathematical physics, and the essential limitations of that enterprise. Mathematical physics was born when Galileo took put sensory qualities on one side, so that the remainder of the natural world might be captured in mathematics. Given that sensory qualities exist, if only in conscious experience, physics is necessarily giving us only a partial understanding of the natural world.

The technical details of arguments rarely convince a philosopher to change her view. It is the broad allegiances, the 'big picture' in the background, that shape one's basic loyalties. In the 20th and 21st centuries, physicalism has been dominant in Analytic philosophy. I doubt that this is because of the more technical arguments in its favour, such as the causal exclusion argument. It is rather the powerful background narrative that the direction of history is pointing towards physicalism that has resulted in philosophers being irresistibly drawn to the view.

The narrative runs as follows. Before the scientific revolution, the project of finding out what reality is like – call it 'metaphysics' – was going nowhere. Philosophers guessed what the world was like. Some lucky guesses happened to approximate to the truth, such as Democritus' belief in atoms. Others were wildly off, such as Thales' belief that everything is made of water. But there was no method for deciding between these various hypotheses, and hence no consensus about which were true and which false.

Then Galileo came along and had the novel idea of using experiments and observation to choose between these alternatives. Since then, for the past five hundred years or so, we've been using the experimental method to steadily build up a rich body of information concerning the natural world, about which there is considerable consensus. That information has allowed us to manipulate the world in all such of extraordinary ways, building lasers and microwave ovens and space rockets.

When the facts are presented in this way, the lesson of history seems clear. The experimental method, i.e. using third person observations to decide between competing hypotheses, is the only way to do metaphysics, i.e. the only way to find out about the world. Metaphysical speculation in the absence of observation is guess work. Call the view of those who draw this lesson 'naturalism'.

Naturalism doesn't immediately lead one to physicalism. It does so only in conjunction with the view that the metaphysical commitments of special sciences, such as chemistry and biology, are nothing over and above the metaphysical commitments of physics. Jack Smart puts this view nicely when he says that 'biology is to physics as radio-engineering is to

electro-magnetism' and that consequently 'everything should be explicable in physical terms' (Smart 1959: 142). Call this view 'physics-centrism'. Naturalism combines with physics-centrism to yield physicalism: the view that physics yields the complete metaphysical truth. Of course nobody thinks that *current* physics gives us a complete account of the world; for one thing our best physical theory of the very big is inconsistent with our best physical theory of the very small. But physicalists have faith that these difficulties will be ironed out and the physicists of the future will one day present us with a complete theory of everything.

This narrative has been vividly pressed upon the philosophical community by the ingenious analogies of Daniel Dennett (2001) and Paul and Patricia Churchland. The enemies of physicalism are seen to be enemies of progress, setting us against the onwards march of science, dragging us back to the 13th century. They are to be grouped together with creationists, climate change sceptics and believers in magic.

Even when not passionately defended in the style of Dennett and the Churchlands, the assumptions behind the narrative are to one degree or another implicitly assumed, quietly regulating the direction of travel. Moreover, I suspect something like this narrative is widely held by the non-academic public. In general the secular public turn to scientists, principally physicists, to tell us what the world is like. They turn to philosophers, if at all, to find consolation and meaning in the world science has resigned us to.

I think this narrative gets history of science wrong, and gives a false, or at least incomplete, explanation of the success of science. There is of course some truth in the idea that Galileo advanced the experimental method (although he was certainly not the first person to think of using experiments and observation to find out about the world!). But Galileo's more crucial contribution the scientific method was his declaration that natural philosophers should use mathematical

> Philosophy [i.e. physics] is written in this grand book — I mean the universe — which stands continually open to our gaze, but it cannot be understood unless one first learns to comprehend the language and interpret the characters in which it is written. It is written in the language of mathematics, and its characters are triangles, circles, and other geometrical figures, without which it is humanly impossible to understand a single word of it; without these, one is wandering around in a dark labyrinth. (Drake 1957: 237-8)

Why had philosophers not thought before to frame metaphysical theories of the physical world in the language of mathematics? After all, ancient philosophers such as Plato and Pytharogus took mathematics to be crucial for a proper understanding of reality. Why had no one thought to give an entirely mathematical description of the natural world? The reason is that the supposition that material objects instantiate *sensory qualities*, such as colours, shapes and odours, is incompatible with their having an entirely mathematical nature. And hence it was necessary to strip physical objects of their sensory qualities in order to make it intelligible to suppose that the physical world could be completely captured in mathematics. Here is Galileo describing his conception of matter:

> Now I say that whenever I conceive any material or corporeal substance, I immediately feel the need to think of it as bounded, and as having this or that shape; as being large or small in relation to other things, and in some specific place at any given time; as being in motion or

at rest; as touching or not touching some other body; and as being one in number, or few, or many. From these conditions I cannot separate such a substance by any stretch of my imagination. But that it must be *white or red, bitter or sweet, noisy or silent, and of sweet or foul odour*, my mind does not feel compelled to bring in as necessary accompaniments. Without the senses as our guides, reason or imagination unaided would probably never arrive at qualities like these. Hence I think that tastes, odours and colours, and so on are no more than mere names as far as the object in which we place them is concerned, and that they reside only in the consciousness. Hence, if the living creature were removed, all these qualities would be wiped away and annihilated. (Drake 1957: 274-7).

It is clear that Galileo believed in sensory qualities, but took them to reside 'only in the consciousness' rather than in matter. In taking the qualities of consciousness not to be instantiated by material bodies, Galileo seems to be taking the qualities of consciousness to reside in an immaterial substance. This rough sketch of nature was a short time later turned into a rigorous metaphysical view by Descartes. For Descartes, colours and smells and odours result from the interaction of immaterial minds with physical bodies. Like beauty, sensory qualities are in the eye of the beholder. Physical objects out there in the world are not coloured and smelly and tasty and hot; rather their entire nature is given by the fact that they *fill space* in a certain way.

As the result of this radical new Galilean/Cartesian metaphysics, we have, perhaps for the first time in history, a picture of the material world such that its nature can be completely captured in mathematics. Sensory qualities – the taste of the lemon, the smell of the flowers – cannot be entirely captured in mathematical language. So long as philosophers took such qualities to reside in the physical world, the scientific revolution was impossible. But once the physical world had been divested of qualitative nature, the remaining quantitative nature, concerning the way in which objects fill space, could be entirely captured in geometry. By putting sensory qualities in the conscious mind, and putting the conscious mind outside of the physical world, Galileo and Descartes provided the metaphysical underpinnings of the scientific revolution.

This is the start of mathematical physics, and it has been a great success. A short time later we have Newton's laws of motion and gravity, and ever since we have been progressively building up an extraordinary cannon of knowledge concerning the causal workings of the material world. It is difficult not to be blown away by the progress of natural science in the last five hundred years.

However, for all its virtues, physics has never been in the business of giving a complete description of reality. It aims to give a mathematical description of the fundamental causal workings of natural world. The formal nature of such a description entails that it necessarily abstracts not only from the reality of consciousness, but from any other real, categorical nature that material entities might happen to have. Just as a mathematical model in economics abstracts away from the concrete features of real world consumers, e.g. the nature of their labour and the specific things they buy and sell, so physics abstracts from the concrete features of fundamental particles and the composite entities they compose.

Think of what physics tells us about an electron. Physics tell us that an electron has negative charge. What does physics have to tell us about negative charge? Answer: things with negative charge repel other things with negative charge and attract other things with

positive charge. Physics tells us that an electron has $109/10^{-31}$ kilograms of mass. What does physics have to tell us about mass? Answer: things with mass attract other things with mass, and resist acceleration (Or if general relativity is true, things with mass curve spacetime, and unless acted on by a contrary force follow the straightest path through curved spacetime). Physics tells us only what an electron *does*; it tells us nothing about what it *is* in itself. But beings aren't mere doings. There must be some real categorical nature to an electron, some way the electron is in and of itself. But of this real categorical nature physics is silent.

Consider the following analogy. Imagine you own a chess set, but the pieces are covered in thick cloth, such that you can't see or feel what they're made of. Knowing the rules of chess, you know what each piece is able to do: a rook can move in straight lines, a bishop diagonally. But you don't know what kind of stuff is constituting each of these things; you don't know *what it is* that is moving in these set ways. This perhaps makes vivid the knowledge physics gives of fundamental particles. Physics tells us nothing of what things are; it only tells us how things behave.

Of course, there are philosophers who would dispute my claim that 'beings aren't mere doings'. Some philosophers are sensitive to how 'metaphysically thin' the information physics provides us with is, but reason in the following way: if physics reveals nothing other than dispositions, then dispositions are all there are. On such a view, the nature of an electron is completely specified by saying what it is disposed to do. Some philosophers even go so far as to claim that corporeal reality is pure mathematical structure. But whether or not such thin 'pure power' or 'pure structure' worlds are intelligible, we know that our world is not like that. We are immediately acquainted with the qualities of consciousness – how pain feels, how coffee tastes – and it is implausible to suppose that the nature of such qualities can be captured with mathematical and causal concepts. It was only when Galileo put such qualities out of the way that mathematical physics could begin.

Physics is wonderful. It is not surprising that men and women passionate about truth should be inclined to hope that it might provide us with the complete truth concerning the concrete world. There seems to be something here that *works*, something that's *proved itself*, something we can *put our ontological faith in.* How awful it would it would be to have to go back to those speculative days before the scientific revolution! But sadly the success of physics was bought at a cost. Physics, for all its virtues, gives us a radically incomplete picture of the world. It provides a description of the world that necessarily abstracts from the one aspect of concrete reality we know for certain to exist: the qualities of consciousness that are immediately and indubitably known to each of us.

Dennett, D. 1991. Consciousness Explained, Little Brown.

Galileo Galilei, *The Assayer*, as translated by Stillman Drake (1957), *Discoveries and Opinions of Galileo,* pp. 237-8

Smart, J. J. C. 1959. 'Sensations and brain processes', *Philosophical Review* 68.