The scientific method in philosophy: Assessing the physicalist hypothesis

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The place of physics in the edifice of science

Modern planetarium software (e.g. on your tablet computer) allows to virtually travel to a celestial body in outer space, circle a bit around it and then return back to Earth. As one travels around in space one meets big, very big chunks of matter subject to enormous physical forces. Back on Earth one may continue the travel by zooming in on incredibly small objects using eventually a scanning electron microscope. Whatever one sees on the way is matter subject to certain forces – all of that physical in character. One would not be able to see these things, safe by a miracle, unless they were physical; because seeing things is itself at bottom a physical process. It is, of course, an enormously complicated process. So complicated that it would be folly to try to describe it in basic physical terms. But we are confident that it can be done, that it must be doable in principle, if we had enough information storage and computing time and power – and enough interest in accomplishing the task. So, whatever objects we encounter in this world, they are objects in principle in the domain of physics. And whatever properties these objects may have, they are properties equivalent to a set of values for fundamentally physical variables. This special role of physics in modern natural science is, we take it, a deeply entrenched working hypothesis of all science. Of course, the special sciences, as well as the humanities, employ carefully attuned “macro-packages” so as to obtain explanations of the phenomena that charac-
terize their specific domains. But these explanations must be capable of fitting into the general physical picture of the world. Explanations in biology, e.g., that would require a violation of the principle of the conservation of energy do not stand a sporting chance of being accepted in the community. Likewise, contemporary historians do not accept explanations by telepathy. They rather prefer leaving events unexplained than to resort to explanations that go beyond what is physically possible. Is this just a fashion or prejudice that will pass away one day? We do not think so. The picture, according to which the general science of physical items plays a special, fundamental role in the edifice of all sciences, including the humanities, has a name in philosophy: *physicalism* – sometimes also called *naturalism* or *materialism*. It is the prevailing metaphysical doctrine of our time.

What do we mean by saying that physicalism is the prevailing or preferred metaphysical theory in contemporary philosophy? Certainly not that most philosophers subscribe to it. In fact, most philosophers have probably no view on the matter. That may at first seem puzzling but, in fact, it is not. Philosophy is, like any academic discipline, a huge and diverse area. Compare, e.g., mathematics. Set theory is, institutionally speaking, a very small subdiscipline of mathematics. Most mathematicians do not care whether there is a version of set theory that consistently allows to derive all of mathematics. But those who do care, will tend to come to a conclusion. Likewise, a philosopher spending his professional life in social philosophy or in ethics may never care to ask himself whether the world is at bottom a physical world. But those who choose to take a serious interest in the question will by default favour attempts at giving a physicalist answer. It is in this sense that physicalism is the preferred metaphysical doctrine of our time.

Before trying to explain why it is so difficult to unsettle the physicalist picture, some cautionary remarks are in order. The paper is not directed at specialists in the philosophy of mind, perhaps not even primarily at philosophers – though we do defend, by way of a case study, a particular thesis about the nature of contemporary philosophy (and thus engage in what is now sometimes called “metaphilosophy”). In particular, the paper is not designed to convince the reader of the truth of physicalism. Rather, we should like to let the reader have a glimpse at how modern philosophy works. (There are many and quite dramatic misconceptions about this, a fact which partially explains many or our students drop out of the course after the first few semesters.) The questions philosophers raise may seem strange to outsiders. But the ways of trying to come up with answers should not. Philosophers are in the business of producing
theories so as to accommodate evidence. Eventually they face a decision problem just as anyone in science: They need to pick out the best theory, i.e. the one that is most likely to be true. Since this problem is common to all cognitive enterprises, it should not come as a surprise that the ways of solving it are familiar from other fields of inquiry.

In a moment, we shall explain what the central tenet of physicalism is. But we better start by pointing out what physicalism decidedly does not imply. First, physicalism does not imply that explanations in the other special sciences or in the humanities are in some sense second-rate. It does not matter, for example, how Catilina’s belief that he will never legally be elected consul was physically realized. Catilina’s frustration by itself is a first-rate explanans in Sallustius’ account of how the conspiracy against the Roman senate came about. The neurophysiological grounding of Catilina’s frustration would be just as irrelevant for the purpose of an historical explanation as the number of threads in his tunica.

Second, there is also no claim to the effect that every statement about Catilina and his conspiracy must in principle be translatable to elementary physical language. “Catilina alleges that he is the victim of false accusations” does not mean the same as ... and now follows some long sentence in elementary physical terms. If the two sentences meant the same, then it would be a semanticist’s business to discover the neurophysiological groundings of Catilina’s beliefs. That is, of course, absurd. Neither is physicalism as such committed to the existence of so-called bridge laws that span the gulf between the theoretical terms of physics and those of the other sciences, including e.g. history. There may be no such laws. This has to do with the fact that mental states, for instance, may be physically realized in many different ways so that there would be no simple correspondence between, say, feelings of frustration, and a certain type of brain-states. Physicalism as such only claims that each mental episode is grounded in a physical episode. Physicalism as such does not claim that mental episode types (like being frustrated) correspond in any non-trivial sense to types of neurophysiological states or the like. They may so correspond; but if they don’t, then this is not the end of physicalism.

Third, it is at least an open question whether physicalism is committed to atheism or whether it is compatible with some form of theism or even with e.g. an uncompromising catholic theology. The catholic doctrine, for example, requires that we take things on faith that we cannot fully comprehend. There is no reason why physicalists should deny themselves such acts of
To be sure, the simultaneous acceptance of physicalism and certain religious doctrines is likely to cause some cognitive stress. But tolerating such stress may even be a defining feature of certain types of faith.

Now that we have mentioned a few theses that are not entailed by physicalism, let us try to explain what physicalism does claim. We shall use a fitting analogy due to the late David Lewis. As you browse through the photos taken with your smart phone you see images of your daughter, your cat or the beach where you passed your last holidays. As you know, each of these images is composed of pixels that take values in a range of certain parameters. So these images are fundamentally nothing but pixel configurations. Here is another way of putting this fact: There is no way that the image on the screen can change without a change in the underlying pixel configuration. And here is the thesis of physicalism:

There is no way that anything in the world can change without some physical change in the world.

It follows that if we duplicate our world in all physical respects, then we duplicate it in all respects. Thus, imagine an exact physical twin of our world. In the twin world all physical parameters are fixed as in our world, and the twin world is governed by the same physical laws as our world. Then, so physicalism claims, the twin world is indistinguishable from our world in all respects. It cannot be, for example, that President Putin has no mental life (is a “zombie”) in the twin world, given that he does have a mental life in our world; or that sunbursts are expressions of pain in the twin world while they are not in our world; or that the molecule-for-molecule twins of Angela Merkel and Dilma Rousseff are capable of consultations by telepathy, supposing that they have no such ability in our world. There are a number of questions of (important) detail in the thesis of physicalism and professional philosophers spend a lot of brain power on trying to come up with sensible answers. We shall not enter into these problems here. Instead, we trust that the reader has worked up sufficient interest in the doctrine of physicalism: in its importance and its potentially controversial character. Philosophers frequently suppose that colleagues from the lab-sciences take physicalism to be close to a truism, while those from the

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1 The number is 2, and the questions concern, first, the meaning of “can”, and, second, the meaning of “physical” in the formulation of the the physicalist thesis.
humanities tend to be more hesitant to embrace physicalism. In our experience, this is a myth. Many natural scientists are just as much tempted to adumbrate their findings with an air of “philosophical mystery” as many scientists from the humanities are over-confident that their results ultimately fit into a “sober” picture of the world. It is one of the tasks of professional philosophers to critically examine such tendencies. Before putting physicalism to the test, let us now look at an important argument to the conclusion that physicalism should enjoy the status of truth by default in metaphysics.

**Why is physicalism so plausible?**

To fully appreciate what physicalism claims, one needs to look briefly at the alternatives. The alternatives are united in claiming that our world is such that “things” (in the widest sense) may change without there being a physical change. For example, there might suddenly appear pure spirits, i.e. entities that have no physical realization; or mental properties may disappear, thus, in the extreme, turning people into zombies, i.e. creatures that are physically exactly like us but lack mental states. The alternatives to physicalism are various kinds of dualisms (or pluralisms), recognizing entities or qualities that in principle float freely on the physical make-up of our world. Descartes was a defender of dualism. His motif for holding the view was mainly theological: He believed that without a separation between body and soul, there could be no way in which the latter could survive after the body’s death. Though his motif was theological, his arguments were not. It is this fact that makes Descartes the founding figure of modern philosophy – a simplified picture taught to students because it is good enough as a rough anchoring point.

Physicalism is a monist doctrine, denying in particular any kind of dualism. What makes it prevail in contemporary philosophy? The explanation of this fact is not much different from that of similar facts in science. For example: Why is evolutionary theory the prevailing doctrine in biology rather than some form of creationism? Or: Why does a multi-faceted explanation of the origins of the First World War find more acceptance among historians today than the Versailles
Treaty version of the story? We compare the competing theories and rate them according to their respective capabilities to integrate and explain the data in a coherent and economical way. That, surely, is not an easy task. But at the end of the day the community of scientists – critical professionals, not dogmatists! – tends to converge on a ranking. Some may call that ranking a “prejudice”. But this is a rather unimpressive reaction and cuts no ice whatsoever. If you fall behind in a ranking, you better work rather than complain. (This is, of course, a maxim, not a rule free of exceptions.) The best dualist philosophers do accept that challenge and present impressive work. But, as it happens, up to now physicalism seems to be able to defend its lead.

Physicalism rests on an eminently plausible premise and avoids problems that dualism has difficulties to resolve. That makes physicalism the preferred theory. The eminently plausible premise is this: All physical events (in so far as they have causes at all) have complete physical causes. (If one wanted to take into account indeterminate quantum events, a different formulation would be required: All physical events have their probabilities completely determined on the basis of the probabilities of prior physical events. In the interest of simplicity, but without loss of generality, we shall ignore quantum events in what follows.) This is the principle of the causal closure of the physical world. Evidently, the principle is independent of physicalism. It says something about the realm of the physical only and remains silent about the existence of entities outside that realm. So, contrary to what is sometimes claimed, any support that the causal closure principle may give to physicalism is not question-begging. In fact, the causal closure principle is such a deeply engrained principle in all natural sciences that some dualists too would like to remain consistent with it.

But the causal closure principle creates what is probably the gravest problem for dualism. Suppose that dualism were true. Then there would be non-physical events (events involving either non-physical items (“spirits”) or non-physical properties attaching to physical items). Suppose, for example, that someone’s feeling pain is such a non-physical event, i.e. an event that, in principle, can come and go without there being any physical change in the subject that feels the pain. Take such a pain-event. If you feel pain, then you will reach for the aspirin and get a glass of water. So pain-events can be causes of physical events. But, by the causal closure principle, the physical event of reaching for a glass of water has also a complete physical cause. So the event of reaching for a glass of water is causally overdetermined: There is a (complete) physical cause and there is a distinct (partial) mental cause.
Now, causal overdetermination may happen (though some philosophers deny this – a position which we shall ignore for the sake of the argument). Think of a rabbit whose death is caused by two bullets hitting it with exact simultaneity. Although such cases stretch the imagination they are by no means impossible (or so we may suppose). But if dualism is right, then we have causal overdetermination each time a mental event has physical effects, that is: each time you eat because you feel hungry, each time you laugh because you find something funny, each time you scratch because you feel an itch, and so on. Overdetermination would not be an unlikely coincidence but be a ubiquitous, massively occurring phenomenon. That does not sound good, to put it mildly. And a theory which is committed to consequences that do not sound good, is, by default, no good. So we better conclude either that there are no non-physical events, or that non-physical events (like feeling hungry) can have no physical effects, thus evading overdetermination and preserving the causal closure of the physical world. The first option, denying the existence of non-physical events, is the physicalist one; mental events have a physical nature in virtue of which they are causally potent. The second is the currently favoured version of dualism. It is called epiphenomenalism, denying that, in a most straightforward sense, that one eats because one feels hungry, since feeling hungry can have no physical causal effects.

That should be enough for one to sense that dualism is committed to steering a dangerous course between Skylla and Charybdis. Skylla denies causal closure; Charybdis populates the world with events that can turn no causal wheel. Physicalism has no such navigation problems. It is the simpler theory and therefore reigns by default\(^4\).

Being the default theory is certainly nice. But default theories are, by definition, defeasible. Physicalism would be defeated if it were inconsistent or could not save the phenomena. No-one as yet has claimed that physicalism is inconsistent. But can it explain all that needs to be explained?

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\(^4\) There are other problems for dualism. For example, there is no apparent “mechanism”, no identifiable “interface” in mental-to-physical or physical-to-mental causation. This troubled philosophers in Descartes’ times. (Descartes believed that the hypothalamus was the organ that mediated between body and soul.) It is seen as less of a problem nowadays, since analyses of causation, after Hume, tend to be “thin”, merely reflecting the truth of certain counterfactuals. But with thicker notions of causation, such as Salmon’s marking theory, the old problem persists.
Putting physicalism to the test

Philosophers experiment too. They have a way of exactly setting variables, holding them constant during the experiment and recording observations. Theories are then called upon to interpret the observations. Philosophers call such experiments thought experiments. Here is one that puts physicalism severely to the test. It threatens to waive physicalism’s status as a default theory, if not to outrightly defeat it. The thought experiment is due to the Australian philosopher Frank Jackson and is known as the knowledge argument.

Imagine a brilliant scientist, Mary, who knows everything about the physics of colour perception. So here is the first variable we are asked to hold constant: Mary’s complete knowledge of physics. If there is some fact of physics about colours and how humans perceive them, then Mary knows it. As it happens, Mary has always been locked up in a black and white room. So she has never seen coloured objects under ordinary light conditions. Clearly, this is compatible with having complete physical knowledge.

Physics can exhaustively be taught by means of black-and-white textbooks. The second variable to be held constant is this: The black-and-white room leaves no margin for colour experience as we know it. Now suppose that one day the door of her black-and-white room is unlocked and she steps out into the world of colours. One of the first things she sees is a ripe tomato. So far the experimental set-up. Now we make an observation. We observe that Mary is likely to say something like the following to herself: “Ah, so this is what it is like to see the colour of a ripe tomato. I didn’t know that!” (Let us call this the “ripe-tomato-response”. ) If Mary didn’t know that – viz. that this is what it feels like to see red –, then, so it must appear, there is a fact that Mary did not know prior to her release. By hypothesis, Mary knows, prior to her release, all physical facts. So the fact she learns only after her release cannot be a physical fact. So there are non-physical facts and, hence, physicalism is false.

There must be an unkind word in the lab sciences for something that has all the rings and bells of a proper experiment but does not produce any results that someone right in his mind should bet even small sums on. In philosophy there is a word for thought experiments of that kind: They are called “intuition pumps”. Jackson’s knowledge argument has been thus called by the American philosopher Daniel Dennett. He offers the following “counter-pump”. If Mary, after her release, were presented with a blue banana, she would “surely” exclaim: “What
a strange banana! Aren’t they supposed to be yellow?” Now, the point of the counter-pump is not that one should find Dennett’s strange-banana-response more likely than Jackson’s ripe-tomato-response. Instead one should simply ask: What reasons do we have for supposing that the strange-banana-response is ruled out by the experimental set up? If there are none, then, by parity of reason, there is presumably nothing that forces something like the ripe-tomato-response in the knowledge argument. So the thought experiment issues in no dependable observation that could embarrass the physicalist.

Dennett’s response to the knowledge argument is bold and brave. But few philosophers believe that the knowledge argument can be dismissed as a mere intuition-pump. Although the thought experiment falls short of “proving” anything, it certainly succeeds in putting the physicalist position under considerable stress. The reason why Dennett’s physicalistic response to the knowledge argument is quite unconvincing for many of us is that Dennett rejects the most powerful element of the argument, which is the second premise that Mary makes epistemic progress when she leaves the room. She learns something new. Dennett’s response rejects the novelty in Mary’s knowledge. But most of us believe that Mary, once released, does learn something new, that she does make some kind of epistemic progress. But how could “learning something new” not mean “coming to know a new fact”? And if it does mean that, then, by the assumption, the new fact cannot be physical, whence the physicality’s thesis cannot be maintained.

It is clear, how the physicalist can proceed at this point. He must deny that “learning something new” always means “coming to know a new fact”; he must explain in which sense Mary learns something new without thereby learning a fact hitherto unknown to her. We shall briefly sketch two ways in which this blueprint may be filled in.

• Ability hypothesis. Here is a way in which you can learn something new, without learning new facts about the world. You can learn how to ride a bicycle. You can learn how to quickly identify açaí by taste rather than by chemical analysis. Similarly you can learn how to quickly identify red by sight rather than by analysing the wavelength of reflected light. The ability hypothesis is fundamentally an error-theory. In an error-theory applied to an experiment, we explain away the observation by showing that the observation is the result of consistently malfunctioning measuring instruments. Likewise, the ability hypothesis explains why the observation made (Mary learns something new) is not what it seems to be (Mary learns a new fact) by poin-
telling out that we confuse knowledge-how with knowledge-that. There is new knowledge how to do something (detect colours); there is no new knowledge that something is the case.

- **Phenomenal concepts strategy.** Here is another way of learning something new, without learning new facts. Given that Dilma Rousseff actually is the Brazilian president, there is no way that facts about Dilma are not also facts about the actual president. So whatever is a fact about Dilma will be a fact about the president. Yet, for someone who does not know that Dilma is the president, but knows, say, that Dilma has been spied upon, it will be news that the president has been spied upon – though the fact that the president has been spied upon is not a fact distinct from the fact that Dilma has been spied upon. Distinct pieces of information (in one sense of the term “information”) may refer to the very same fact. We may learn facts under a new description – and be surprised – without thereby learning new facts.

Let us now transfer this to the case of Mary. The physicalist claims that the physical facts determine all the facts. So once Mary knows all the physical facts, she knows all the facts to be known. That is perfectly compatible with the possibility that Mary be surprised by being presented in a new and surprising way with a fact already known. For, surely, Mary may know all facts of physics without knowing them *in every possible way of presenting them*. There is indeed something special about the concept of what a certain experience feels like. Arguably such concepts can only be acquired by proper experience.

By hypothesis, Mary is prevented from having any such experience in her black-and-white room. When she is released, however, she suddenly gains access to the concept of what a red-experience feels like; thus her surprise. But the surprise is not directed at learning a new fact but at the new guise in which a fact, already known, suddenly presents itself to her. This strategy offers an alternative physicalist explanation to Mary’s epistemic progress. What Mary learns when she leaves the room is a new concept referring to a fact she already knew before her release. Mary’s epistemic progress is explained in terms of the acquisition of a new concept whose extension she already knew. She could not have possessed this concept while confined in the B&W room because she had not undergone the relevant experience of seeing red. The strategy sees Mary’s epistemic progress in conceptual terms: she learns a new concept and *not* a new fact. So physicalism is safe. Like the ability hypothesis, this view is attractive because it disarms the knowledge argument without renouncing the intuition that Mary learns something
new that could not be deduced from her previous physical knowledge.

The phenomenal concepts strategy suggests a *hidden-variable interpretation* of the thought experiment. The variable hidden is the way in which information may be presented. By making this variable explicit we obtain an interpretation of the thought experiment which is compatible with physicalism.

These are, in a nutshell, the two or three most prominent physicalist responses to Jackson’s knowledge argument. There are responses to these responses which give rise to refinements, clarifications and variations. But what has been said so far should make it sufficiently clear that the physicalist has ways of resisting the pressure exerted by the thought experiment in ways that are not *ad hoc*: They resort to generally shared insights and independently plausible principles. The availability of such responses restores physicalism to its status as the default metaphysical theory. Still, in all fairness it must be said that the debate about physicalist and dualist theories is still open. This reflects the fact that the participants in the debate weigh the parameters of theory choice differently. Again, a situation not unfamiliar from similar debates in science.

**Why Philosophy?**

We hope that the reader has noticed some important respects in which philosophy is not much different from biology, physics or history. Philosophers knit theories and evaluate them in just the same way in which theories are evaluated in other areas of knowledge. Such evaluation is not easy, though. It requires professional training. Again, in the respect the situation in philosophy is not much different from that in, says, the sciences. Let us, by way of some concluding remarks, expand on that important theme.

Everyone has seen animals move and plants grow. Everyone has asked himself how they do it. Most of us have received partial answers to these questions and have rested content with them. But some have turned professional biologists. Biologists spend all of their professional life on these and related questions and try to answer all of them in some coherent fashion, i.e. so that everything fits together. This is hard work and requires professional dedication.

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5 Rehearsing a theme from David Stove’s delightful essay (1985).
Turning to philosophy, most people will have thought about at least some of the questions addressed in this paper at some time or other. The difference between non-philosophers and philosophers is that the latter spend all of their professional life on thinking about these questions. Moreover, philosophers try to bring them all together so as to come up with an integrated, coherent theory. Again, this is hard work and requires professional dedication.

Professionalisation is what has happened to all of science. Learning curves have become much steeper and it is difficult to explain the significance of cutting edge research to laymen. Long ago is the time when educated people entertained themselves with discovering new species through the microscope and discussed the works of Darwin and his adversaries. On the one hand, that is regrettable. On the other hand, biology would be in a sorry state, if its progress still depended on the enthusiasm of amateur naturalists. Physics would be a far cry from what it actually is, if it were the pastime of garage experimenters. History has become a sophisticated science since the times of Sallustius or Mommsen, though their books still give pleasure to read. The same goes for philosophy. Though amateurs can still derive much pleasure from taking an interest in philosophy, the discipline has progressed to a level where it is not likely that amateurs find quickly their way to the state of the art, not to mention to contribute something worthwhile themselves.

We mention this because this state of affairs is sometimes held against contemporary philosophy, as if philosophy were under an onus to permanently remain at an amateur level. No one would protest that a botanical institute shows little interest in the plant collection of a returning tourist. No one would think it fair to expect of mathematicians that they check the proofs of hobby number theorists. No one would dream of censoring contemporary historians for not presenting and dramatizing events as Sallustius did. Strangely, however, many believe that one could walk into a philosophical institute and expect a conversation as in Plato’s academy. This is, of course, not so. Philosophers should therefore be forgiven for not reacting with enthusiasm – or for not reacting at all – when, say, a neurophysiologist claims to have solved the problem of consciousness (whatever that may be). To be sure, there is nothing in principle that impedes a neurophysiologist from coming up with a cutting edge solution to a problem in philosophy. There is nothing in principle that impedes a philosopher finding a serious new approach to a central problem in neurophysiology. But let’s be reasonable: It just isn’t very likely.
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References


RESUMO

A filosofia contemporânea é predominantemente guiada pela hipótese de que o nosso mundo é fundamentalmente físico: Uma vez que todas as variáveis físicas são determinadas, as leis físicas fundamentais determinam a distribuição de todas as propriedades (ou determinam suas probabilidades). Propriedades de níveis superior são “macros”, eventualmente compostas por propriedades físicas básicas. Esta é a hipótese característica de uma perspetiva variavelmente chamada de naturalismo, fisicalismo ou materialismo. Esta hipótese é amplamente aceita no cenário atual da filosofia contemporânea, pois é favorecida suficientemente por uma abordagem plausível frente ao problema da escolha de uma teoria. Tal abordagem é basicamente a mesma em cada campo investigativo, seja ele da física, da biologia, da psicologia ou da filosofia. Os termos centrais aqui são: simplicidade, poder explanatório e adequação empírica. A escolha de uma teoria é afinal um problema de decisão. Nós ilustraremos este ponto mobilizando um debate central na filosofia da mente. No decorrer do presente trabalho pretendemos expor e argumentar a favor de certas teses meta-filosóficas que podem por si só estar sujeitas a um debate filosófico.

Palavras-chaves: Método filosófico, fisicalismo, naturalismo, materialismo, filosofia da mente.

ABSTRACT

Much of contemporary philosophy is guided by the hypothesis that our world is fundamentally a physical world: Given that all fundamental physical variable are determined, the fundamental physical laws determine the distribution of all properties whatsoever (or determine their probabilities). Higher-level properties are “macros”, eventually composed of basic physical properties. This is the characteristic hypothesis of a view variably called naturalism, physicalism or materialism. The view is widely accepted because it is sufficiently favoured by sound approach towards the problem of theory choice. This approach is basically the same in every field of inquiry, be it physics, biology, psychology or philosophy. The key words are: simplicity, explanatory power, empirical adequacy. At bottom theory choice is a decision problem. We shall illustrate this by way of a key debate in the philosophy of mind. In the course of doing so we put forward and argue in the conclusion for some metaphilosophical theses which may themselves be subject to philosophical debate.

Key words: Philosophical Method, Physicalism, Materialism, Naturalism, Philosophy of Mind.